



ANS Annual Meeting

2019

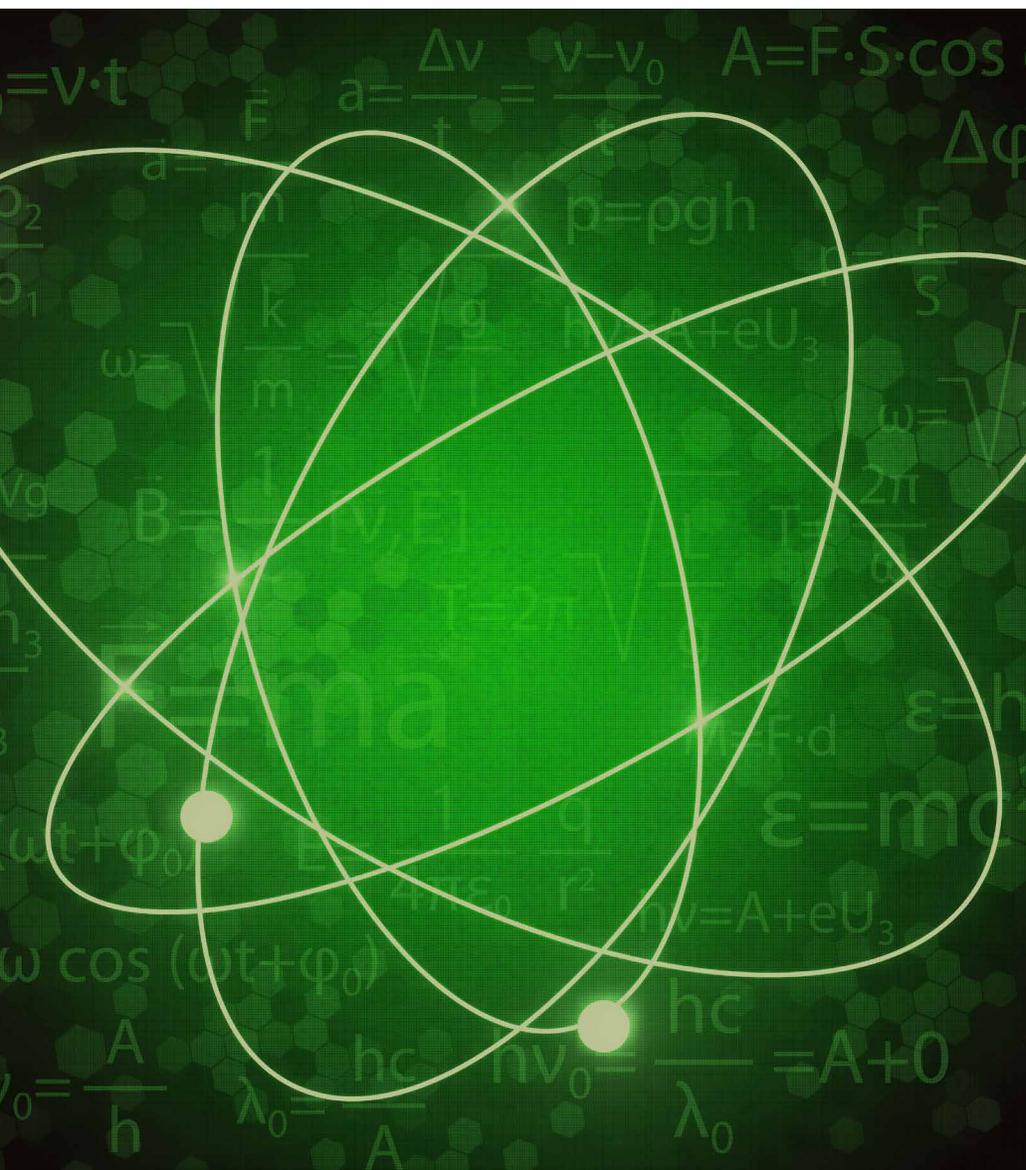
Official Program

THE VALUE OF NUCLEAR

June 9-13, 2019

Minneapolis, MN, USA

Hyatt Regency Minneapolis





ANS

Annual 2019

THE VALUE OF NUCLEAR

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Meeting Officials

THE VALUE OF NUCLEAR

2019 Annual Meeting



GENERAL CHAIR
Timothy O'Connor
Xcel Energy



ASSISTANT GENERAL COCHAIR
Patrick Burke
Xcel Energy



ASSISTANT GENERAL COCHAIR
Sheri Hallberg
Xcel Energy



ASSISTANT GENERAL COCHAIR
Peter Gardner
Xcel Energy



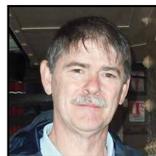
ASSISTANT GENERAL COCHAIR
Pamela Gorman
Xcel Energy



ASSISTANT GENERAL COCHAIR
Michelle Kelly
Xcel Energy, WIN Sponsor



TECHNICAL PROGRAM CHAIR
Sue Aggarwal
NMNTI



ASSISTANT TECHNICAL PROGRAM CHAIR
James J. Byrne
Byrne & Associates



MEDIA CHAIR
Randy Fordice
Xcel Energy



STUDENT PROGRAM COCHAIR
Amanda Bachmann
University of Tennessee, Knoxville



STUDENT PROGRAM COCHAIR
Marilyn Delgado
Texas A&M University College Station



TECHNICAL TOUR CHAIR
Jon Kapitz
Xcel Energy

Daily Schedule

Sunday, June 9

7:00 am-7:00 pm 6:00-8:00 pm	Registration ANS President's Opening Reception	Nicollet Promenade Northstar Ballroom
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Monday, June 10

7:00 am-5:00 pm 7:30-8:00 am 8:00-11:15 am	Registration Continental Breakfast Opening Plenary Sponsored by 	Nicollet Promenade Nicollet Promenade Nicollet Ballroom
11:15 am-1:00 pm 1:00-3:35 pm	Lunch on Own ANS Technical Sessions <ul style="list-style-type: none"> • The WIPP-20th Anniversary–Panel • Isotopes and Radiation: General • Experimental Thermal Hydraulics—I • Current Issues in Computational Methods–Roundtable • Highlights of RPSD-2018—I • Rejuvenate Nuclear Technology Infrastructure and Facilities–Panel • Teaching the Value of Nuclear—Nuclear Science in the Pre-College Space–Panel • Nuclear Science User Facilities—I • Thermal Energy Storage Systems • Overview of the Versatile Test Reactor—I–Panel 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway B Greenway I Greenway Promenade
3:35-3:50 pm 3:50-6:00 pm	Coffee Break ANS Technical Sessions <ul style="list-style-type: none"> • Advances in Off-Gas Management of Fuel Cycle Operations • [Grand Challenge] Sodium Reactor Database to Support Knowledge Management–Panel • Computational Thermal Hydraulics—I • Pitch your PhD–Panel • Highlights of RPSD-2018—II • Nuclear Nonproliferation Policy Division: General • Training, Human Performance and Workforce Development • Fusion Energy Applications • Data, Analysis and Operations in Nuclear Criticality Safety—I • Overview of the Versatile Test Reactor—II 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway B Greenway I
7:00-9:00 pm	OPD Honors & Awards Dinner	Brit's Pub

Daily Schedule

Tuesday, June 11

7:00 am-5:00 pm	Registration	Nicollet Promenade
7:30-8:00 am	Continental Breakfast	Nicollet Promenade
8:00-10:00 am	ANS President's Special Session	Nicollet Ballroom
10:00-10:15 am	Coffee Break	Greenway Promenade
10:15 am-12:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> • University Research in Fuel Cycle and Waste Management—I • Advancement of On-Line Monitoring Systems for Operations in Nuclear Fuel Recycling Applications • Thermal Hydraulics of Accident-Tolerant Fuels • Computational Methods: General • General Topics in Decommissioning • Credible Accident Sequences in NCS—Panel • ANS Nuclear Grand Challenges • Fuel and Materials for Molten Salt Reactors • Reactor Analysis Methods—I 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway I
12:00 pm-1:30 pm	Lunch on Own	
1:30-3:40 pm	ANS Technical Sessions <ul style="list-style-type: none"> • University Research in Fuel Cycle and Waste Management—II • Challenges Associated with Material Transport into and Waste Removal from Hot Cell R&D Facilities Worldwide—Panel • Scaling Methodologies for SET and IET—Panel • Transport Methods • Water Technologies and Nuclear Power Update—Panel • Real World Applications of Sensitivity/Uncertainty • Focus on Communications: Meanwhile in Canada—How Communications Helped the Nuclear Industry to Expand—I—Panel • Nuclear Science User Facilities—II • Radiation Protection and Shielding: General • Overview of the Versatile Test Reactor—III 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway B Greenway I
1:30-3:40 pm	New -Supply Chain Special Session: The Next Generation Of Supply Chain Innovation—A New Business Road Map For The Supply Chain, Domestic And International Part 1	Nicollet Ballroom
3:55-5:30 pm	New -Supply Chain Special Session: The Next Generation Of Supply Chain Innovation—A New Business Road Map For The Supply Chain, Domestic And International Workshop	Nicollet Ballroom
3:40-3:55 pm	Coffee Break	Greenway Promenade
3:55-6:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Recycle and Reuse of Used Nuclear Fuel Resources • Multiphase CFD and Large Eddy/Direct Numerical Simulations • Creating a Successful Career—Panel • Reactor Physics: General—I • Focus on Communications: Working with Students (K and up)—II—Panel • Accident Tolerant Fuels—I • Molten Salt Reactors—I • Advanced Modeling and Simulation Efforts for Light Water Reactors 	Greenway A Greenway D Greenway E Greenway F Greenway H Greenway J Greenway I Greenway I

Daily Schedule

Wednesday, June 12

7:00 am-5:00 pm	Registration	Nicollet Promenade
7:30-8:00 am	Continental Breakfast	Nicollet Promenade
8:00-10:00 am	General Chair's Special Session	Nicollet Ballroom
10:00-10:15 am	Coffee Break	Greenway Promenade
10:15 am-12:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> • The Importance of Future Fuel Cycle Options in Addressing Growing Worldwide Energy Demand—Panel • Safety Aspects of Accident Tolerant Fuel Critical Heat Flux—Panel • Experimental Thermal Hydraulics—II • Innovations in Nuclear Education—Panel • Reactor Physics: General—II • Operational Reviews: How Facilities Meet ANSI/ANS-8.1 Section 4.1.6—Panel • Highlights of the 2019 NPIC-HMIT Conference: Instrumentation and Controls—I—Panel • Accident Tolerant Fuels—II • Results of the April 2019 “Fastest Path to Zero” Summit and Unconference—Panel 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway B
12:00 pm-1:30 pm	Lunch on Own	
1:30-3:40 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Prospects for a Commercial High-Assay Low Enriched Uranium Supply to Support Advanced Reactors and Advanced LWR Fuel Applications—Panel • Irradiation Experiments—I • Experiments on Two-Phase Flow and Heat Transfer Fundamentals • Severe Accident Thermal Hydraulics—I • License Transfers for Decommissioning—Panel • Nuclear Installations Safety: General—I • Highlights of the 2019 NPIC-HMIT Conference: Human Factors Engineering—II—Panel • General Topics in Human Factors Engineering • Fuel and Materials for Fast Reactors • Advanced/Gen-IV Reactors—I • Reactor Physics Design, Validation and Operational Experience— I 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway H Greenway J Greenway B Greenway I
3:40-3:55 pm	Coffee Break	Greenway Promenade
3:55-6:05 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Molten Salt Chemistry and Corrosion • Irradiation Experiments—II • General Thermal Hydraulics • Severe Accident Thermal Hydraulics—II • Molten Salt Reactors—II • Data, Analysis and Operations in Nuclear Criticality Safety—II • Highlights of 2019 ANS Probabilistic Safety Assessment and Analysis (PSA 2019)—Panel • Computational Tools for Radiation Protection and Shielding—I • Computational Tools for Radiation Protection and Shielding—II • Advanced/Gen-IV Reactors—II • Operations and Power: General • Reactor Analysis Methods—II 	Greenway A Greenway C Greenway D Greenway E Greenway F Greenway G Greenway H Greenway J Greenway J Greenway B Greenway B Greenway I
5:45-7:00 pm	ANS Annual Business Meeting	Lakeshore C

Daily Schedule

Thursday, June 13

7:00 am-10:00 am	Registration	Nicollet Promenade
7:30-8:00 am	Continental Breakfast	Greenway Promenade
8:00-10:10 am	ANS Technical Sessions <ul style="list-style-type: none"> • Fuel Cycle and Waste Management: General—I • Irradiation Experiments—III • Computational Thermal Hydraulics—II • Advanced Nuclear NOW! Showcasing Technology Near Deployment—Panel • Decommissioning Experience in the Midwest—Panel • Sharing of Good Industry Practices and/or Lessons Learned in Nuclear Criticality Safety—Panel • Cutting Edge Techniques in Education, Training and Distance Education • Post Irradiation Examination and Advanced Measurement Techniques • Nuclear Installations Safety: General—II • Reactor Physics Design, Validation and Operational Experience—II 	Greenway A Greenway C Greenway D Greenway E Greenway F
8:30 am-3:30 pm	Technical Tour: Monticello Nuclear Generating Plant	
8:30 am-3:30 pm	Technical Tour: Prairie Island Nuclear Generating Station	
10:10-10:25 am	Coffee Break	Greenway Promenade
10:25 am-12:35 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Fuel Cycle and Waste Management: General—II • Irradiation Experiments—IV • Computational Thermal Hydraulics—III • From Nuclear Advocacy to Policy, From Local to Global—Panel • Data, Analysis and Operations in Nuclear Criticality Safety—III • General Topics in Instrumentation and Control • Advanced Manufacturing and Material Science: General • Reactor Physics: General— III • Current Topics in Risk Analysis 	Greenway A Greenway C Greenway D Greenway E Greenway G Greenway H Greenway J Greenway B Greenway I



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General Information

MEETING INFORMATION

The American Nuclear Society is excited to invite you to join us in the north star state, Minneapolis, MN from June 9-13 for the 2019 ANS Annual Meeting, which will be held at the Hyatt Regency Minneapolis.

In addition to an impressive list of government and industry leaders, we are also planning several outstanding hot-topic technical sessions and popular plenary speakers which will attract professionals from across the nation and internationally.

REGISTRATION

Location: Nicollet Promenade

Name badges must be worn during all technical sessions and events. Some events require a ticket, and may entail an additional cost.

REGISTRATION HOURS

Sunday, June 9	7:00 am – 7:00 pm
Monday, June 10	7:00 am – 5:00 pm
Tuesday, June 11	7:00 am – 5:00 pm
Wednesday, June 12	7:00 am – 5:00 pm
Thursday, June 13	7:00 am – 10:00 am

NOTICE TO SPEAKERS

All speakers and session chairs must check in at the ANS Registration Desk.

ANS BUSINESS OFFICE

Location: Minnehaha

Sunday-Wednesday: 8:00 am-5:00 pm

ANS MEDIA CENTER

Location: Skyway A

Monday-Tuesday: 7:45 am-4:00 pm

Wednesday: 7:45 am-12:00 pm

ANS STUDENT OFFICE

Location: Skyway B

Sunday-Wednesday: 8:00 am-5:00 pm

Thursday: 8:00 am-1:00 pm

ATTENDEE MEAL FUNCTIONS

Continental Breakfast & Breaks

Continental Breakfast will be provided to all registered meeting attendees in the Nicollet Promenade Monday-Wednesday and in the Greenway Promenade on Thursday.

Morning and afternoon beverages and snacks will be provided to all registered meeting attendees in the Greenway Promenade Monday-Thursday.

ANS President's Opening Reception

Heavy hors d'oeuvre and beverage tickets will be provided to all registered meeting attendees. This reception is a ticketed event. (2) Drink tickets are included with a full meeting registration. Additional tickets are available for purchase at the following cost: \$125 (Adult)/\$50 (under 21).

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GREEN MEETING INITIATIVE

In an effort to be more environmentally conscious, **this program will not be printed.** The best way for attendees to navigate the Annual Meeting is to download the Attendee Hub app to your phone or tablet by [clicking here](#), then type in ANS Annual Meeting. **NOTE:** The app will not be live until May 22nd.

General Information

OTHER THINGS TO ATTEND

Teacher's Workshop

Saturday: 9:30 am-4:00 pm - Lakeshore A

Learn how ANS members conduct teacher workshops by observing one in progress. You will learn methods and hands-on activities you can incorporate into your own Local Section programs. Advance Registration is required. Please contact Janice Lindegard, ANS Education and Community Outreach Specialist at 708-579-8290 for further details. This workshop is supported by the ANS Center for Nuclear Science and Technology Information.

Information Session on Nuclear Engineering PE Exam Module Program

Sunday: 10:00 am-12:00 pm - Lakeshore B

This session, which will introduce ANS's new nuclear PE exam module program, is for individuals who have passed the Fundamentals of Engineering (FE) Exam (formerly the EIT exam) and who are preparing for the Principles and Practice of Engineering Exam (PE exam) in Nuclear Engineering. One of the developers of the module program will host the session. The module program consists of more than 50 brief online modules spanning the exam's four specification areas (nuclear power systems, nuclear fuel cycle, interaction of radiation with matter, and nuclear criticality/kinetics/neutronics). Examples of the modules will be presented during the session, along with an overview of the program. Questions from the audience will be answered. Exam takers will be instructed how to purchase some or all of the modules (when available) to use as a self-paced refresher course to help pass the nuclear PE exam in October.

First-Time Attendee Orientation

Sunday 1:00-2:00 pm - Regency

The ANS Membership Committee will offer an orientation session for first-time ANS meeting attendees. Learn what goes on at national meetings, how the national organization works, and how to get involved at the national and local levels. Whether you are a member or not, student or professional, if this is your first ANS national meeting, the Membership Committee invites you to attend this session.

Student Program Q&A Meeting

Sunday: 4:00-5:00 pm - Regency

All students participating in the Student Program are encouraged to attend this brief informative meeting. Learn the basic operation of the Program and get your questions answered.

Attention Runners: ANS Fun Run

Tuesday, 6:00 am - Hotel Lobby

There will be a noncompetitive run starting at 6:00 am from the lobby entrance of the hotel. We hope you can join us. Bring shoes and a big smile!

Nuclear Trivia Night & Networking Social

Tuesday: Nuclear Trivia Night 6:00-8:00 pm - Regency

Networking Social 8:00-10:00 pm - Prairie Kitchen and Bar

Do you consider yourself knowledgeable about nuclear? How much do you really know about energy generated by fission and the history of our society? For example, which country opened the first civilian nuclear power plant? What was the name of the first nuclear powered submarine? What were the first three professional divisions in ANS? Join us to test yourself and have fun!

The Diversity and Inclusion in ANS Committee invites you to Nuclear Trivia Night emceed by 2019-20 ANS President Elect Marilyn Kray and 2020-21 ANS President Elect Mary Lou Dunzik-Gougar! The event will take place from 6:00 - 8:00 pm on Tuesday, June 11, in the Regency room at the Hyatt Regency Minneapolis. Come compete with industry peers and test your general knowledge about nuclear science, technology, and engineering. Snacks and non-alcoholic refreshments will be served. A prize will be awarded to the winning team. Following the trivia competition, the Diversity and Inclusion in ANS Committee is hosting a social networking event from 8:00 - 10:00 pm at Prairie Kitchen and Bar on the first floor of the Hyatt. Drink tickets will be distributed for the networking social.

8 Trivia teams will be assigned upon arrival; please arrive on time for assignments as it will be difficult to join mid-game.

General Information

ABOUT ANS

Mission

ANS provides its members with opportunities for professional development. It also serves the nuclear community by creating a forum for sharing information and advancements in technology, and by engaging the public and policymakers through communication outreach.

Statement on Diversity

The American Nuclear Society (ANS) is committed, in principle and in practice, to creating a diverse and welcoming environment for everyone interested in nuclear science and technology. Diversity means creating an environment – both in ANS and in the profession – in which all members are valued equitably for their skills and abilities and respected equally for their unique perspectives and experiences. Diverse backgrounds foster unique contributions and capabilities, and so creation of an inclusive Society ultimately leads to a more creative, effective, and technically respected Society.

ANS believes that everyone deserves opportunities for learning, networking, leadership, training, recognition, volunteering in Society activities, and all the other benefits that involvement in the Society brings, regardless of age, color, creed, disability, ethnicity, gender identity and expression, marital status, military service status, national origin, parental status, physical appearance, race, religion, sex, or sexual orientation. The selection of a member to serve in ANS's volunteer leadership structure shall be based solely on the member's ability, interest, and commitment to serve. In particular, ANS encourages members at each level of the Society and in each Professional Division and Technical Group to make special efforts to recruit underrepresented minorities and women to ensure that they are adequately represented in the Society.

Respectful Behavior Policy (Abbreviated)

The open exchange of ideas, freedom of thought and expression, and productive scientific debate are central to the mission of the American Nuclear Society (ANS). These require an open and diverse environment that is built on dignity and mutual respect for all participants and ANS staff members, and is free of bias and intimidation.

ANS is dedicated to providing a safe, welcoming, and productive experience for everyone participating in Society events and other Society activities regardless of age, color, creed, disability, ethnicity, gender identity and expression, marital status, military service status, national origin, parental status, physical appearance, race, religion, sex, or sexual orientation. Creation of a safe and welcoming environment is a shared responsibility held by all participants. Therefore, ANS will not tolerate harassment of or by participants (including ANS volunteer leaders and staff members) in any form. Disciplinary action for participants found to have violated this principle may include reprimand, expulsion from an event or activity with or without a refund, temporary or permanent exclusion from all ANS events and activities, suspension or expulsion from volunteer leadership positions or groups, and/or suspension or expulsion from Society membership, as appropriate.

If you or someone else experiences harassment, regardless of how you otherwise choose to initially handle the situation, you are encouraged to report the situation to ANS. It is possible that the behavior you experienced is part of a larger pattern of repeated harassment. Please alert ANS to behavior you feel to be harassment regardless of the offender's identity or standing in the Society.

The designated contact for reports at the 2019 Annual Meeting is Executive Director Bob Fine. He can be reached at the hotel.

The complete Respectful Behavior Policy can be found at www.ans.org/about/rbp. If you have questions about the policy, please contact ANS Executive Director Bob Fine at 708-579-8200 or rfine@ans.org.

Consent to Use Photographs and Videos: All attendance of registered participants, attendees, exhibitors, sponsors and guests ("you") at American Nuclear Society ("ANS") meetings, courses, conventions, conferences, or related activities ("Events") constitutes an agreement between you and ANS regarding the use and distribution of your image, including but not limited to your name, voice and likeness ("Image"). By attending the ANS Events, you acknowledge and agree that photographs, videotaping, live feed video and audio, and/or audio recordings may be taken of you and you grant ANS the right to use, in perpetuity, your Image in any electronic or print distribution, or by other means hereinafter created, both now and in the future, for media, art, entertainment, promotional, marketing, advertising, trade, internal use, educational purposes or any other lawful purpose.

General Information

ANS CODE OF ETHICS

Preamble

Recognizing the profound importance of nuclear science and technology in affecting the quality of life throughout the world, members of the American Nuclear Society (ANS) are committed to the highest ethical and professional conduct.

Fundamental Principle

ANS members as professionals are dedicated to improving the understanding of nuclear science and technology, appropriate applications, and potential consequences of their use.

To that end, ANS members uphold and advance the integrity and honor of their professions by using their knowledge and skill for the enhancement of human welfare and the environment; being honest and impartial; serving with fidelity the public, their employers, and their clients; and striving to continuously improve the competence and prestige of their various professions.

ANS members shall subscribe to the following practices of professional conduct:

Principles of Professional Conduct

1. We hold paramount the safety, health, and welfare of the public and fellow workers, work to protect the environment, and strive to comply with the principles of sustainable development in the performance of our professional duties.
2. We will formally advise our employers, clients, or any appropriate authority and, if warranted, consider further disclosure, if and when we perceive that pursuit of our professional duties might have adverse consequences for the present or future public and fellow worker health and safety or the environment.
3. We act in accordance with all applicable laws and these Practices, lend support to others who strive to do likewise, and report violations to appropriate authorities.
4. We perform only those services that we are qualified by training or experience to perform, and provide full disclosure of our qualifications.
5. We present all data and claims, with their bases, truthfully, and are honest and truthful in all aspects of our professional activities. We issue public statements and make presentations on professional matters in an objective and truthful manner.
6. We continue our professional development and maintain an ethical commitment throughout our careers, encourage similar actions by our colleagues, and provide opportunities for the professional and ethical training of those persons under our supervision.
7. We act in a professional and ethical manner towards each employer or client and act as faithful agents or trustees, disclosing nothing of a proprietary nature concerning the business affairs or technical processes of any present or former client or employer without specific consent, unless necessary to abide by other provisions of this Code or applicable laws.
8. We disclose to affected parties, known or potential conflicts of interest or other circumstances, which might influence, or appear to influence, our judgment or impair the fairness or quality of our performance.
9. We treat all persons fairly.
10. We build our professional reputation on the merit of our services, do not compete unfairly with others, and avoid injuring others, their property, reputation, or employment.
11. We reject bribery and coercion in all their forms.
12. We accept responsibility for our actions; are open to and acknowledge criticism of our work; offer honest criticism of the work of others; properly credit the contributions of others; and do not accept credit for work not our own.

Plenary, Special Sessions and Events

SUNDAY, JUNE 9

ANS President's Opening Reception

Location: Northstar Ballroom **Time:** 6:00-8:00 pm

All attendees are invited to enjoy an evening of networking. This event is included in your full meeting registration. Additional tickets are available for purchase at the following cost: \$125 (Adult)/\$50 (under 21).

MONDAY, JUNE 10

Keynote Speaker: Preserving Principles Amid Change

Speaker: Annie Caputo (*NRC Commissioner*)

Opening Plenary: A Carbon-Free Energy Future

Session Organizer and Chair: Timothy O'Connor (*Xcel Energy*)

Location: Nicollet Ballroom **Time:** 8:00-11:15 am **Sponsored by:**



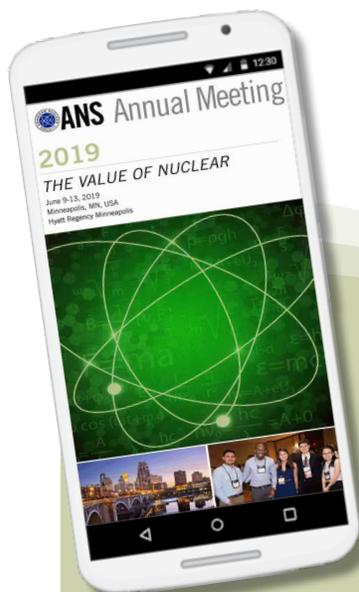
As the United States moves towards the vision of a carbon-free energy future we will explore what needs to happen between now and then in order to successfully achieve. At the same time, the future of current nuclear power plants is challenged to stay in the long-term energy portfolio. With a distinguished panel featuring key leaders in the energy field, this session addresses those challenges, answering questions such as: What will it take to reach a carbon-free energy future? What is the role of existing and new nuclear power? What research needs to take place as we look to a carbon-free future?

Speakers: Chris Clark (*President, Xcel Energy – Minnesota*)
Michael Noble (*Executive Director, Fresh Energy*)
David Howell (*President, Westinghouse North America*)
Suzanne Jaworowski (*Senior Advisor, Policy & Communications, Department of Energy*)

OPD Honors & Awards Dinner

Location: Brit's Pub **Time:** 7:00 pm

Join the Operations and Power Division in celebrating the accomplishments of their colleagues and a successful year as a division. This event is not included in your registration fee. The ticket price is \$85. Tickets may be purchased online or at the Registration Desk, space is limited.



Free ANS Meetings App

ANS will no longer print the Annual Meeting Program. Scan the code to the right or type in Attendee Hub to your app store, download the app, then type in ANS Annual Meeting and login to the ANS Meetings App to experience all of the app features!

NOTE: All session evaluations will be done in the app only.

If you still have the email invitation sent to you by ANS Meetings:

1. Open the invitation in your inbox. Tap Verify Account.
2. Tap **Open App**. to complete the verification via the new mobile app.

To retrieve your verification code:

1. From the event homescreen, tap the three white lines icon on the top left.
2. Tap Log in for more features and enter your name and tap Next.
3. Tap Resend Code to have a verification code sent to your email address.

If you already have Attendee Hub on your phone:

1. From the event homescreen, tap the three white lines icon on the top left.
2. Choose Switch Event, then type ANS Annual on the search screen to find this years meeting.



Or go to event.crowdcompass.com/ans-annual2019 for the online event guide.

Plenary, Special Sessions and Events

TUESDAY, JUNE 11

ANS President's Special Session: Popping the Nuclear Bubble—A Facilitated Conversation with Minnesota's Utility Community

Session Organizer: John E. Kelly (*ANS President*)

Chair: Harsh S. Desai (*NEI*)

Location: Nicollet Ballroom **Time:** 8:00-10:00 am

This Presidential Special Session, presented by ANS YMG, in partnership with the Gateway for Accelerated Innovation in Nuclear (GAIN) is proud to offer a chance to get out of the Nuclear Bubble. Following up on GAIN's groundbreaking research on customer engagement in the domestic utility market, this session will feature representatives from Minnesota's electric utility sector. Audience members will hear how our Host State's utility providers are planning to address their next 15 years of energy generation needs – and have a chance to discuss what role nuclear and advanced nuclear technologies may play. Discussion will be facilitated by Harsh S. Desai, YMG Vice Chair, and Tay Stevenson, who led the engagement team at Envoy Public Labs for GAIN. The session will also feature remarks from the GAIN Director and live social media engagement.

Moderator: Tay Stevenson (*Partner, Envoy Public Labs*)

Panelists: Julie Pierce (*Vice President of Strategy and Planning, Minnesota Power (Allte)*)

Steve Morse (*Executive Director, Minnesota Environmental Partnership*)

Pam Gorman (*Xcel Energy*)

New-Supply Chain Special Session: The Next Generation Of Supply Chain Innovation—A New Business Road Map for the Supply Chain, Domestic and International

Session Chair: Greg Gibson (*UNI Executive Director and former President and CEO of Unistar Nuclear Energy*)

Location: Nicollet Ballroom **Part 1:** 1:30-3:40 pm; **Workshop:** 3:55-5:30 pm

This joint ANS-United Nuclear Industry Alliance (UNI) session will discuss the need for U.S. suppliers to be more competitive, and outright successful, as the nuclear industry transitions into the next decade of new nuclear projects.

A modern business road map must be integrated into the “Next-Generation U.S. Supply Chain Process” for it to be successful. This is imperative domestically with Utilities/Operators and emerging reactor technologies, and internationally as they compete to provide goods and services to global nuclear projects.

Engaged industry executives will share their perspectives on what is needed to improve collaboration and integration between Suppliers and Utilities/Operators.

Special focus will be dedicated to attendee and panelist interaction with a workshop to identify issues needing attention along with developing corresponding actions for a 2019-2020 Supply Chain Strategic and Tactical Working Plan.

Moderator: Don Eggett (*UNI Director of Supply Chain and President, Eggett Consulting LLC*)

Panelists: Donald Hoffman (*UNI Chairman of the Board and President and CEO of EXCEL Services Corporation*)

Graham Cable (*Vice President, Marketing and Commercial Integration, Westinghouse*)

Don Dracon (*Vice President, Business Development AECOM*)

Art Wharton (*Vice President Market Development, Studsvik*)



Plenary, Special Sessions and Events

WEDNESDAY, JUNE 12

General Chair's Special Session: Moving Nuclear Energy to Greater Competitiveness

Session Organizer and Chair: Timothy O'Connor (*Chief Nuclear Officer, Xcel Energy*)

Location: Nicollet Ballroom **Time:** 8:00-10:00 am

The continued operation of nuclear power plants in the United States is being challenged by economics and other issues such as finding a solution to used fuel and where to store it. Industry experts are working hard to gain efficiencies and make nuclear competitive against all sources of energy. In addition, two companies have filed a license application with the Nuclear Regulatory Commission to store used fuel at a consolidated interim facility. Find out what's happening in the industry today and what to expect over the next decade.

Moderator: Timothy O'Connor (*Chief Nuclear Officer, Xcel Energy*)

Speakers: Blake Lindsay (*McKinsey*)

Pierre Oneid (*Senior VP and Chief Nuclear Officer, Holtec International*)

Jeff Isakson (*Interim Storage Partners LLC*)

Bruce Hallbert (*Director of the LWRS, INL*)

Bryan Hanson (*President and Chief Nuclear Officer, Exelon Nuclear*)

Focus on Communications Workshop

Location: Regency Room **Time:** 4:00-6:00 pm

Politics and policy have an outside effect on energy, particularly nuclear energy. They determine liabilities, subsidies, incentives, regulatory requirements, and enforcement. As a result, they determine winners and losers. So, how do we affect politics and policy? Through compelling communications. Join ANS Washington Representative Craig Piercy and Potomac Communications Group's Mimi Limbach for a discussion on the political and policy landscape in the Federal and state governments and the communications strategies that can help nuclear energy become a winner. In addition, the Canadian Nuclear Laboratory's (CNL) Corey McDaniel will brief us on CNL's research and SMR program. Beer, wine and snacks will be provided by the Canadian Nuclear Laboratory.

ANS Annual Business Meeting

Location: Lakeshore C **Time:** 5:45-7:00 pm

ANS encourages all members to attend the Annual Business Meeting. During the Business Meeting, members will receive reports from the President and other Society leaders, and ask questions and make comments on Society issues.

THURSDAY, JUNE 13

Technical Tour: Monticello Nuclear Generating Plant

Time: 8:30 am-3:30 pm

Registration for the tour is closed. Board the bus at 8:15 am at the front entrance of the hotel lobby.

Technical Tour: Prairie Island Nuclear Generating Station

Time: 8:30 am-3:30 pm

Registration for the tour is closed. Board the bus at 8:15 am at the front entrance of the hotel lobby.



#ANSMeeting

Technical Sessions by Division

(Asterisks indicate special sessions)

SPECIAL SESSIONS

*Opening Plenary: A Carbon-Free Energy Future, Mon. am (8:00-11:15 am)

*ANS President's Special Session: Popping the Nuclear Bubble—A Facilitated Conversation with Minnesota's Utility Community, Tues. am (8:00-10:00 am)

*General Chair's Special Session, Wed. am (8:00-10:00 am)

AEROSPACE NUCLEAR SCIENCE AND TECHNOLOGY (ANSTD)

(Current Topics in Risk Analysis), Thurs. Am

(Reactor Physics: General—II), Wed. am

DECOMMISSIONING AND ENVIRONMENTAL SCIENCES (DESD)

(Rejuvenate Nuclear Technology Infrastructure and Facilities—Panel), Mon. pm

General Topics in Decommissioning, Tues. am

Water Technologies and Nuclear Power Update—Panel, Tues. pm

License Transfers for Decommissioning—Panel, Wed. pm

Decommissioning Experience in the Midwest—Panel, Thurs. am

EDUCATION, TRAINING, AND WORKFORCE DEVELOPMENT (ETWDD)

Teaching the Value of Nuclear—Nuclear Science and Facilities—Panel, Mon. pm

(Pitch Your PhD—Panel), Mon. pm

Training, Human Performance, and Workforce Development, Mon. pm

(University Research in Fuel Cycle and Waste Management—I), Tues. am

(University Research in Fuel Cycle and Waste Management—II), Tues. pm

ANS Nuclear Grand Challenges, Tues. am

Focus on Communications: Meanwhile in Canada—How Communications Helped the Nuclear Industry to Expand—I—Panel, Tues. pm

Focus on Communications: Working with Students (K and Up)—II—Panel, Tues. pm

(Innovations in Nuclear Education—Panel), Wed. am

Cutting Edge Techniques in Education, Training and Distance Education, Thurs. am

(From Nuclear Advocacy to Policy, From Local to Global—Panel), Thurs. am

FUEL CYCLE AND WASTE MANAGEMENT (FCWMD)

The WIPP-20th Anniversary—Panel, Mon. pm

Advances in Off-Gas Management of Fuel Cycle Operations, Mon. pm

University Research in Fuel Cycle and Waste Management—I, Tues. am

University Research in Fuel Cycle and Waste Management—II, Tues. pm

Advancement of On-Line Monitoring Systems for Operations in Nuclear Fuel Recycling Applications, Tues. am

Challenges Associated with Material Transport into and Waste Removal from Hot Cell R&D Facilities Worldwide—Panel, Tues. pm

Recycle and Reuse of Used Nuclear Fuel Resources, Tues. pm

FUEL CYCLE AND WASTE MANAGEMENT (FCWMD) CONTINUED

The Importance of Future Fuel Cycle Options in Addressing Growing Worldwide Energy Demand—Panel, Wed. am

Prospects for a Commercial High-Assay Low Enriched Uranium Supply to Support Advanced Reactors and Advanced LWR Fuel Applications—Panel, Wed. pm

Molten Salt Chemistry and Corrosion, Wed. pm

Fuel Cycle and Waste Management: General—I, Thurs. am

Fuel Cycle and Waste Management: General—II, Thurs. am

FUSION ENERGY (FED)

(Current Issues in Computational Methods—Roundtable), Mon. pm

Fusion Energy Applications, Mon. pm

HUMAN FACTORS, INSTRUMENTATION, AND CONTROLS (HFICD)

Highlights of the 2019 NPIC-HMIT Conference: Instrumentation and Controls—I—Panel, Wed. am

Highlights of the 2019 NPIC-HMIT Conference: Human Factors Engineering—II, Wed. pm

General Topics in Human Factors Engineering, Wed. pm

General Topics in Instrumentation and Control, Thurs. am

ISOTOPES AND RADIATION (IRD)

Isotopes and Radiation: General, Mon. pm

Irradiation Experiments—I, Wed. pm

Irradiation Experiments—II, Wed. pm

Irradiation Experiments—III, Thurs. am

Irradiation Experiments—IV, Thurs. am

MATERIALS SCIENCE AND TECHNOLOGY (MSTD)

Nuclear Science User Facilities—I, Mon. pm

Nuclear Science User Facilities—II, Tues. pm

Fuel and Materials for Molten Salt Reactors, Tues. am

Accident Tolerant Fuels—I, Tues. pm

Accident Tolerant Fuels—II, Wed. am

Fuel and Materials for Fast Reactors, Wed. pm

Post Irradiation Examination and Advanced Measurement Techniques, Thurs. am

Advanced Manufacturing and Material Science: General, Thurs. am

MATHEMATICS AND COMPUTATION (MCD)

Current Issues in Computational Methods—Roundtable, Mon. pm

(Overview of the Versatile Test Reactor—I—Panel), Mon. pm

Computational Methods: General, Tues. am

Transport Methods, Tues. pm

Technical Sessions by Division

NUCLEAR CRITICALITY SAFETY (NCSD)

Rejuvenate Nuclear Technology Infrastructure and Facilities—Panel, Mon. pm
Credible Accident Sequences in NCS—Panel, Tues am
Real World Applications of Sensitivity/Uncertainty, Tues. pm
Operational Reviews: How Facilities Meet ANSI/ANS-8.1 Section 4.1.6—Panel, Wed. am
Data, Analysis and Operations in Nuclear Criticality Safety—I, Mon. pm
Data, Analysis and Operations in Nuclear Criticality Safety—II, Wed. pm
Data, Analysis and Operations in Nuclear Criticality Safety—III, Thurs. am
Sharing of Good Industry Practices and/or Lessons Learned in Nuclear Criticality Safety—Panel, Thurs. am

NUCLEAR INSTALLATIONS SAFETY (NISD)

[Grand Challenge] Sodium Reactor Database to Support Knowledge Management—Panel, Mon. pm
Safety Aspects of Accident Tolerant Fuel Critical Heat Flux—Panel, Wed. am
Nuclear Installations Safety: General—I, Wed. pm
Nuclear Installations Safety: General—II, Thurs. am
Highlights of 2019 ANS Probabilistic Safety Assessment and Analysis (PSA 2019)—Panel, Wed. pm
Current Topics in Risk Analysis, Thurs am

NUCLEAR NONPROLIFERATION POLICY (NNPD)

Nuclear Nonproliferation Policy Division: General, Mon. pm
(Prospects for a High-Assay Low Enriched Uranium Supply to Support Advanced Reactors and Advanced LWR Fuel Applications—Panel)

OPERATIONS AND POWER (OPD)

Thermal Energy Storage Systems, Mon. pm
Results of the April 2019 “Fastest Path to Zero” Summit and Unconference—Panel, Wed. am
Advanced/Gen-IV Reactors—I, Wed. pm
Advanced Gen-IV Reactors—II, Wed. pm
Operations and Power Division: General, Wed. pm

RADIATION PROTECTION AND SHIELDING (RPSD)

Highlights of RPSD-2018—I, Mon. pm
Highlights of RPSD-2018—II, Mon. pm
Radiation Protection and Shielding: General, Tues. pm
Computational Tools for Radiation Protection and Shielding—I, Wed. pm
Computational Tools for Radiation Protection and Shielding—II, Wed. pm

REACTOR PHYSICS (RPD)

(Current Issues in Computational Methods—Roundtable), Mon. pm
Overview of the Versatile Test Reactor—I—Panel, Mon. pm
Overview of the Versatile Test Reactor—II, Mon. pm
Overview of the Versatile Test Reactor—III, Tues. pm
Reactor Analysis Methods—I, Tues. am
Reactor Analysis Methods—II, Wed. pm
Reactor Physics: General—I, Tues. pm

Reactor Physics: General—II, Wed. am

REACTOR PHYSICS (RPD) CONTINUED

Reactor Physics: General—III, Thurs am
Molten Salt Reactors—I, Tues. pm
Molten Salt Reactors—II, Wed. pm
Advanced Modeling and Simulation Efforts for Light Water Reactors, Tues. pm
Reactor Physics Design, Validation and Operational Experience—I, Wed. pm
Reactor Physics Design, Validation and Operational Experience—II, Thurs. am
(Advanced Nuclear NOW! Showcasing Technology Near Deployment—Panel), Thurs. am

THERMAL HYDRAULICS (THD)

Experimental Thermal Hydraulics—I, Mon. pm
Experimental Thermal Hydraulics—II, Wed. am
(Current Issues in Computational Methods—Roundtable), Mon. pm
(Overview of the Versatile Test Reactor—I—Panel), Mon. pm
(Overview of the Versatile Test Reactor—II—Panel), Mon. pm
Computational Thermal Hydraulics—I, Mon. pm
Computational Thermal Hydraulics—II, Thurs. am
Computational Thermal Hydraulics—III, Thurs. am
Thermal Hydraulics of Accident-Tolerant Fuels, Tues. am
(Reactor Analysis Methods—I), Tues. am
Scaling Methodologies for SET and IET—Panel, Tues. pm
Multiphase CFD and Large Eddy/Direct Numerical Simulations, Tues. pm
(Molten Salt Reactors—I), Tues. pm
Experiments on Two-Phase Flow and Heat Transfer Fundamentals, Wed. pm
Severe Accident Thermal Hydraulics—I, Wed. pm
Severe Accident Thermal Hydraulics—II, Wed. pm
General Thermal Hydraulics, Wed. pm

YOUNG MEMBERS GROUP (YMG)

(Overview of the Versatile Test Reactor—I—Panel), Mon. pm
(Overview of the Versatile Test Reactor—II—Panel), Mon. pm
Pitch Your PhD—Panel, Mon. pm
(Focus on Communications—I—Panel), Tues. pm
(Focus on Communications—II—Panel), Tues. pm
Creating a Successful Career—Panel, Tues. pm
Innovations in Nuclear Education—Panel, Wed. am
Advanced Nuclear NOW! Showcasing Technology Near Deployment—Panel, Thurs. am
From Nuclear Advocacy to Policy, From Local to Global—Panel, Thurs. am

Technical Sessions: Monday June 10

MONDAY, JUNE 10 TECHNICAL SESSIONS – 1:00 PM

The WIPP 20th Anniversary–Panel

Sponsored by FCWMD

Session Organizer and Chair: Jean-Francois Lucchini (LANL)

Location: Greenway A Time: 1:00-3:35 pm

The Waste Isolation Pilot Plant (WIPP) has been disposing of defense-generated legacy transuranic (TRU) waste since March 1999. In 20 years, more than 90,000 cubic meters contact-handled and 350 cubic meters of remote-handled TRU waste have been stored 2,150 feet below ground, cleaning up 22 generator sites nationwide. Presentations in this panel session will celebrate the 20th anniversary of WIPP, the nation's first and only operating deep geologic repository for radioactive wastes.

Panelists:

Todd Shrader (DOE)

George Basabilvazo (DOE)

Robert Kehrman (Spectra Tech Inc.)

Jean-Francois Lucchini (LANL)

Isotopes and Radiation: General

Sponsored by IRD

Session Organizer: Igor Jovanovic (Univ. Michigan)

Chair: Brenden Heidrich (INL)

Location: Greenway C Time: 1:00-3:10 pm

- 1:05 pm:** Niowave's Domestic Radioisotope Production from Uranium and Radium, Amanda K. Grimm, Chase H. Boulware, Terry L. Grimm, William A. Peters, Mike A. Zamara (Niowave)
- 1:30 pm:** Efficiency Optimization of a Positron Moderator Foil, Raed Alsulami, Mubarak Albarqi (Missouri S&T & King Abdulaziz City), S. Q. Jaradat (Higher Colleges Technol.), Joseph Graham, Shoaib Usman (Missouri S&T)
- 1:55 pm:** Neutron Depth Profiling Measurement for Borophosphosilicate Glass (BPSG), Mubarak Albarqi, Raed Alsulami (Missouri S&T & King Abdulaziz City), Joseph Graham (Missouri S&T)
- 2:20 pm:** Application of Pb Isotopes in Uranium-Cobalt Mineralisation, Manny Mathuthu (North-West Univ.)
- 2:45pm:** Data-Driven Methodology for Predicting Isotope Production at Material Testing Reactors, Jorge Navarro (ORNL), Josh Peterson-Droogh, Brian Gross (INL), Richard Howard (ORNL), Wilson Cowherd (Univ. Missouri), Carla Dwight (INL)

Experimental Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Xiaodong Sun (Univ. Michigan)

Co-chairs: Brian G. Woods (Oregon State Univ), Caleb S. Brooks (Univ of Illinois)

Location: Greenway D Time: 1:00-2:45 pm

- 1:05 pm:** Turbulent Flow Measurements of the Under-Expanded Free Jet and Jet Impinging on a Flat Surface, B. Maher, T. D. Nguyen, C. F. Matozinhos, G. C. Q. Tomaz, Y. A. Hassan (Texas A&M)
- 1:30 pm:** Temperature Measurements in Sub-Cooled Boiling Using Laser Induced Fluorescence Technique (LIF), Bandar Alkudhiri, Yassin A. Hassan (Texas A&M)
- 1:55 pm:** Temperature Measurement of Direct Contact Condensation of Steam Using Backlight Aided LIF, Joseph Seo, Sero Yang, Yassin A. Hassan (Texas A&M)
- 2:20 pm:** Facility for Simulating Transient Boiling Behavior Under PWR Conditions, C. Jensen, C. Folsom, N. Woolstenhulme, N. Smith, K. Condie (INL), K. Terrill, R. Christensen (Univ. Idaho)

MONDAY, JUNE 10

TECHNICAL SESSIONS – 1:00 PM

Current Issues in Computational Methods–Roundtable

Sponsored by MCD; **Cosponsored by** THD, RPD, FED

Session Organizer and Chair: David P. Griesheimer (*NNL*)

Location: Greenway E **Time:** 1:00-3:35 pm

“Exascale Computing Project”

In 2016 the U.S. Department of Energy established the Exascale Computing Project (ECP), a 7 year, ~\$2 billion effort intended to deliver a capable exascale computing system (10^{18} floating point operations per second) in the early 2020s. This initiative represents a major investment in high-performance computing in the U.S., which directly benefits a wide variety of scientific disciplines that utilize large-scale modeling and simulation. ECP emphasizes coordinated development of hardware, software, and computational methods in order to ensure that application programs are ready to take advantage of new computing architectures/systems as soon as they are available. The roundtable will include panelists from the hardware integration, software technology, and application development areas of ECP, who will share their perspectives on the Project and the future of scientific computing at exascale and beyond.

Panelists:

Douglas Kothe (*ORNL*)

Andrew Siegel (*ANL*)

Thomas Evans (*ORNL*)

Rob Neely (*LLNL*)

Judith Hill (*ORNL*)

Highlights of RPSD-2018—I

Sponsored by RPSD

Session Organizer and Chair: Jeffrey A. Favorite (*LANL*)

Location: Greenway F **Time:** 1:00-2:20 pm

- 1:05 pm:** Electron Transport Algorithms in the Integrated TIGER Series (ITS) Codes, Brian C. Franke, Ronald P. Kensek (*Sandia*)
- 1:30 pm:** Monte Carlo Neutronics Analysis of the SNS STS Monolith, Igor Remec, F. X. Gallmeier (*ORNL*)
- 1:55 pm:** Adjoint-Enabled Multidimensional Optimization of Satellite Radiation Shields, Shawn Pautz, Don Bruss, Brian Adams, Brian Franke, Ethan Blansett (*Sandia*)

Rejuvenate Nuclear Technology Infrastructure and Facilities–Panel

Sponsored by NCSD; **Cosponsored by** DESD

Session Organizers and Cochairs: Dustin Miller (*Chase*), Kevin H. Reynolds (*Y-12*)

Location: Greenway G **Time:** 1:00-3:35 pm

There is an urgent need to rejuvenate and build the infrastructure, facilities, and skilled associated scientific staff involved in the research, testing, development, and deployment of advanced nuclear technologies. Maintaining this national testbed is critical to support vibrant commercial nuclear businesses. This panel will include speakers from government and private industry to speak to efforts ongoing in the United States that are attempting to address rejuvenation of infrastructure and facilities in the nuclear industry.

Panelists:

David Kupferer (*CNS*)

William R. Lonergan (*CNS*)

Chris Crefeld (*Westinghouse*)

Marilyn Kray (*Exelon*)

Lou Martinez (*Kairos Power*)

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MONDAY, JUNE 10
TECHNICAL SESSIONS – 1:00 PM

Teaching the Value of Nuclear—Nuclear Science and Facilities—Panel

Sponsored by ETWDD

Chair: Lisa M. Marshall (*NCSU*)

Location: Greenway H **Time:** 1:00-3:35 pm

For coming generations to understand the value of nuclear, they must first understand the science. Reaching students in the pre-college space. This panel will explore developing local outreach activities that use Navigating Nuclear: Energizing our world™ and other tools created by ANS to present nuclear science in accurate and engaging ways.

Panelists:

Mary Lou Dunzik-Gougar (*Idaho State Univ*)

Miriam Kreher (*MIT*)

Janice Lindegard (*ANS*)

Leah Parks (*NRC*)

Nuclear Science User Facilities—I

Sponsored by MSTD

Session Organizer and Chair: J. Rory Kennedy (*INL*)

Location: Greenway J **Time:** 1:00-3:35 pm

- 1:05 pm:** Irradiation Damage Behavior in Novel High-Entropy Carbide Ceramics, Fei Wang, Xueliang Yan (*Univ. Nebraska*), Lin Shao (*Texas A&M*), Michael Nastasi, Bai Cui (*Univ. Nebraska*)
- 1:30 pm:** Radiation Damage in High Entropy Alloys, Calvin Parkin, Michael Moorehead, Mohamed Elbakhshwan, Kumar Sridharan, Adrien Couet (*U. W., Madison*)
- 1:55 pm:** Evaluation of Nb-Rich Clustering in a Zr-1.0%Nb Alloy Following Kr²⁺ or Neutron Irradiation at 310°C, S. B. Adisa (*Univ. Idaho*), J. Hu (*ANL*), M. J. Swenson (*Univ. Idaho*)
- 2:20 pm:** Nb Redistribution in Proton Irradiated Zr1.0Nb, Zefeng Yu, Adrien Couet (*U. W., Madison*)
- 2:45 pm:** TEM Study of Nickel Under In-Situ Helium/Krypton Dual-Beam Irradiation, Wei-Ying Chen, Meimei Li (*ANL*)
- 3:10 pm:** Development of the FaMUS Methodology for Quantify Materials Understanding and its Application to the NSUF Research Portfolio, Simon M. Pimblott and J. Rory Kennedy (*INL*)

Thermal Energy Storage Systems

Sponsored by OPD

Session Organizer and Chair: Piyush Sabharwall (*INL*)

Location: Greenway B **Time:** 1:00-3:10 pm

- 1:05 pm:** Economic and Low-Carbon Incentives for Dispatchable Electricity From Base-load Reactors with Heat Storage, Charles Forsberg (*MIT*)
- 1:30 pm:** Meeting Low-Carbon Industrial Heat Demand with High-Temperature Reactors Using Co-Generation and Heat Storage, Charles Forsberg (*MIT*)
- 1:55 pm:** Potential of Chemical-Absorption Heat Pumps for Thermoamplification in Nuclear Hybrid Energy Systems, Paul D. Armatis (*Oregon State*), Aman Gupta (*Univ. Idaho*), Piyush Sabharwall (*INL*), Vivek Utgikar (*Univ. Idaho*), Brian M. Fronk (*Oregon State*)
- 2:20 pm:** Experimental Investigation and Analysis of Ca(OH)₂/CaO Chemical Heat Pump for Thermal Energy Storage, Aman Gupta (*Univ. Idaho*), Paul D. Armatis (*Oregon State*), Piyush Sabharwall (*INL*), Vivek Utgikar (*Univ. Idaho*), Brian M. Fronk (*Oregon State*)
- 2:45 pm:** The Progress, Process and Value of a Zero Carbon Electric Generation Financial Futures Instrument, John K. Downing (*John Downing Consulting*)

MONDAY, JUNE 10

TECHNICAL SESSIONS – 1:00 PM

Overview of the Versatile Test Reactor—I-Panel

Sponsored by RPD; **Cosponsored by** MCD, THD, YMG

Session Organizer and Chair: Florent Heidet (*ANL*)

Location: Greenway I **Time:** 1:00-3:35 pm

The Versatile Test Reactor program is a recently initiated program as part of the U.S. DOE-NE. It aims at designing and building a fast-spectrum reactor in order to meet the material irradiation needs of national and international stakeholders. It is designed to be versatile and to allow material irradiation under various environment. The panel will provide an overview of the current state of the VTR design efforts and directions.

Panelists:

John Bumgardner (*INL*)

Jordi Roglans-Ribas (*ANL*)

Tom O'Connor (*DOE-NE*)

Sean McDeavitt (*Texas A&M Univ*)

Everett Redmond (*NEI*)

TECHNICAL SESSIONS – 3:50 PM

Advances in Off-Gas Management of Fuel Cycle Operations

Sponsored by FCWMD

Session Organizer and Chair: Robert T. Jubin (*ORNL*)

Location: Greenway A **Time:** 3:50-6:00 pm

3:55 pm: Dynamic Sorption Studies of Organoiodine Species on Silver-Mordenite, Tejaswini Vaidya, Vivek Utgikar, Krishnan Raja (*Univ. Idaho*), Piyush Sabharwall (*INL*)

4:20 pm: Kinetic Study of Ag⁰Z and Ag⁰-Aerogel Aged in Off-Gas Streams from Spent Nuclear Fuel Reprocessing System, Seungrag Choi, Yue Nan (*Syracuse*), Alexander Wiechert, Austin P. Ladshaw, Sotira Yiacomou (*Georgia Tech*), Costas Tsouris (*Georgia Tech & ORNL*), Lawrence L. Tavlarides (*Syracuse*)

4:45 pm: Extended Duration Adsorption of Elemental Iodine by AgZ Under Prototypical Vessel Off-Gas Conditions, R. T. Jubin, J. A. Jordan, S. H. Bruffey (*ORNL*)

5:10 pm: Separation of Xenon from Krypton in UNF Reprocessing Off Gas, Amy K. Welty, Mitchell R. Greenhalgh, Troy G. Garn (*INL*)

5:35 pm: Removal of Krypton from Nuclear Re-Processing Plants Using Metal Organic Frameworks, Praveen K. Thallapally, Michael Sinnwell (*PNNL*)

[Grand Challenge] Sodium Reactor Database to Support Knowledge Management—Panel

Sponsored by NISD

Session Organizer and Chair: Matthew R. Denman (*Kairos Power*)

Location: Greenway C **Time:** 3:50-6:00 pm

This panel directly advances two of ANS's grand challenges: (1) Knowledge Transfer and (2) Advanced Reactor Licensing. Over the past few years, the Department of Energy Office of Nuclear Energy has invested in the development of multiple databases to preserve experimental and operational data related to the safety basis of sodium fast reactors. To ensure transfer of this data to a new generation of engineers and startups, access accounts to these databases are now available to U.S. citizens. This panel will discuss the data collection, cleaning, presentation, and access control issues encountered by these database efforts.

Panelists:

Tanju Sofu (*ANL*)

Carolyn Tomchik (*ANL*)

Aaron Oaks (*ANL*)

David Wootan (*PNNL*)

Zachary Jankovsky (*SNL*)

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MONDAY, JUNE 10
TECHNICAL SESSIONS – 3:50 PM

Computational Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Kurshad Muftuoglu (*GNF*)

Co-chairs: Igor A. Bolotnov (*NCSU*), Dillon R. Shaver (*ANL*)

Location: Greenway D **Time:** 3:50-6:00 pm

- 3:55 pm:** Numerical Investigation of Flow in Rod Bundle Subchannels on Natural Convection: Effect of Twisted Tapes, Salman Alzahrani (*King Abdulaziz City, Missouri Univ. S&T*), Shoaib Usman (*Missouri Univ. S&T*)
- 4:20 pm:** S-RELAP5 and RELAP5/MOD2-B&W Validation for Long Term Core Cooling Following a Large-Break LOCA, C. K. Nithianandan, Andrei Burghilea, Kent Abel, Robert L. Baxter Jr., Gordon Wissinger, John Klingenfus (*Framatome*)
- 4:45 pm:** Preliminary Heater Rod Design for Transient Critical Heat Flux Experiments in TREAT, Richard Hernandez (*Penn State*), Charles P. Folsom, Nicolas E. Woolstenhulme, Colby B. Jensen (*INL*), Nicholas R. Brown (*U. T., Knoxville*)
- 5:10 pm:** Point Kinetics and Reactivity Feedback Modeling in SAM, Guojun Hu, Guanheng Zhang, Rui Hu (*ANL*), Joseph M. Kelly (*NRC*)
- 5:35 pm:** Effect of Off-Nominal Channel Thickness for MITR LEU Conversion, Dakota Allen, Akshay J. Dave, Kaichao Sun, Lin-Wen Hu (*MIT*), Son H. Pham, David Jaluvka, Erik H. Wilson (*ANL*)

Pitch Your Ph.D.–Panel

Sponsored by YMG; Cosponsored by ETWDD

Session Organizer and Chair: Nicolas E. Stauff (*ANL*)

Location: Greenway E **Time:** 3:50-6:00 pm

This session will showcase the latest PhD research done in the field of nuclear engineering. Students in the process of finishing their PhD will have 3 minutes to present their thesis and to captivate an audience of peers who will vote for the best pitches. The winners will receive \$300 (first place), \$200 (second place), and \$100 (third place) awards given out during the conference.

Highlights of RPSD-2018—II

Sponsored by RPSD

Session Organizer and Chair: Jeffrey A. Favorite (*LANL*)

Location: Greenway F **Time:** 3:50-5:35 pm

- 3:55 pm:** Evaluating Importance Maps for TRIPOLI-4® Using Deterministic or On-Line Methods, Davide Mancusi, Michel Nowak (*CEA Saclay*), Éric Dumonteil (*IRSN*), Henri Louvin, Emiliano Masiello, Daniele Sciannandrone (*CEA Saclay*)
- 4:20 pm:** SINBAD Database—Ongoing Activities, Ivan A. Kodeli (*Jožef Stefan Inst*)
- 4:45 pm:** Performance Study of Atomic Tally Methods for GPU-Accelerated Monte Carlo Dose Calculation, Tianyu Liu, Noah Wolfe, Hui Lin, Christopher D. Carothers, X. George Xu (*RPI*)
- 5:10 pm:** Effects of Statistical Uncertainty in Activation Calculations Based on Monte Carlo Radiation Transport, Jason Haverkamp (*NNL*)

MONDAY, JUNE 10
TECHNICAL SESSIONS – 3:50 PM

Nuclear Nonproliferation Policy Division: General

Sponsored by NNPD

Session Organizer: Kelsey Amundson (*U. C., Berkeley*)

Chair: Kathryn (Katie) Mummah (*Univ of Wisconsin*)

Location: Greenway G Time: 3:50-5:10 pm

- 3:55 pm:** Conversion of Miniature Neutron Source Reactors to Low Enriched Uranium Fuel, James A. Morman, Francesc Puig, John G. Stevens (*ANL*)
- 4:20 pm:** Japanese Plutonium Balance Outlook to 2050: A Monte Carlo Approach, Shutaro Takeda (*Kyoto Univ.*)
- 4:45 pm:** Investigation on Iran's Nuclear Weapon Latency Time in Case of Non-Compliance with JCPOA, Kavita Rathore, Sunil S. Chirayath (*Texas A&M*)

Training, Human Performance, and Workforce Development

Sponsored by ETWDD

Session Organizer: Lisa M. Marshall (*NCSU*)

Chair: Andrew E. Thomas (*INL*)

Location: Greenway H Time: 3:50-5:35 pm

- 3:55 pm:** Nuclear Science Training for Secondary School Teachers at Argonne National Laboratory, David Grabaskas, Sunaree Hamilton, Natalie Zender (*ANL*)
- 4:20 pm:** Nuclear Power Technology Training Based on Mixed Reality Technology, Yifen Chen, Jianxiang Zheng, Huai-En Hsieh, Yichun Wu (*Xiamen Univ.*)
- 4:45 pm:** New Toys and Tricks for Old Dogs, Rizwan-uddin (*Univ. Illinois*)
- 5:10 pm:** Training Management and the Workforce: How to Recognize and Arrest Performance that is Indicative of Multiple/Repetitive Degraded Cornerstone Column (Column 4) Plants, Gary R. Cavanaugh (*Marathon Consulting*)

Fusion Energy Applications

Sponsored by FED

Session Organizer: Arnold Lumsdaine (*ORNL*)

Chair: Paul P. Wilson (*Univ of Wisconsin, Madison*)

Location: Greenway J Time: 3:50-4:45 pm

- 3:55 pm:** Numerical Simulation of Observed Plasma Asymmetries in Tokamaks, Salah Ud-Din Khan, Riaz Khan (*Pakistan Atomic Energy Commission*), Song Yuntao (*IPP CAS*), Shahid Hussain (*Pakistan Atomic Energy Commission*)
- 4:20 pm:** Estimation of Eddy Current on Pakistan Metallic Spherical Tokamak, Shahab Ud-Din Khan, Riaz Khan, Zia Ur Rehman, Sehrish Shakir, Shahid Hussain (*Pakistan Atomic Energy Commission*)

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MONDAY, JUNE 10
TECHNICAL SESSIONS – 3:50 PM

Data, Analysis and Operations in Nuclear Criticality Safety—I

Sponsored by NCS

Session Organizer: Theresa Cutler (*LANL*)

Chair: William McKinley Cook (*SNL*)

Location: Greenway B **Time:** 3:50-5:35 pm

- 3:55 pm:** Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation, Jennifer Alwin, Forrest Brown (*LANL*)
- 4:20 pm:** Initial Investigations of the Criticality Safety Validation Basis for HA-LEU Transportation, B. T. Rearden, W. J. Marshall, J. B. Clarity, A. M. Holcomb, F. Bostelmann, J. M. Scaglione (*ORNL*)
- 4:45 pm:** Minimum Accident of Concern for Uranyl Sulfate Solutions, Joseph Christensen (*SHINE Medical Technol.*), R. A. Borelli (*Center Advanced Energy Studies*), Charles S. Henkel, Brian Matthews (*Nucl. Safety & Technol. Services*)
- 5:10 pm:** Performance of Nano-Fluids as Coolants/Moderator in APR1400 –Neutronics Case Study, Fatima I. Alhamadi, Rana Sadek, Amal Abdalla, Ahmed Ababneh, Zafar Said, Bassam A. Khuwaileh (*Univ. Sharjah*)

Overview of the Versatile Test Reactor—II

Sponsored by RPD; **Cosponsored by** MCD, THD, YMG

Session Organizer and Chair: Florent Heidet (*ANL*)

Location: Greenway I **Time:** 3:50-6:25 pm

- 3:55 pm:** Overview of the Versatile Test Reactor Core Design Activities, Florent Heidet (*ANL*), Gilles Youinou (*INL*), Jordi Roglans-Ribas (*ANL*)
- 4:20 pm:** Assessment of High Quality Plutonium-Fueled Core Configurations for the Versatile Test Reactor, Bo Feng, Florent Heidet (*ANL*)
- 4:45 pm:** Assessment of Low Enriched Uranium Fueled Core Configurations for the Versatile Test Reactor, Nicolas E. Stauff, Florent Heidet (*ANL*)
- 5:10 pm:** Preliminary In-Vessel Shielding Analysis for the Versatile Test Reactor, T. Fei (*ANL*), S. Bays (*INL*), F. Heidet (*ANL*)
- 5:35 pm:** Preliminary Control Rod Lifetime Assessment for the Versatile Test Reactor, Zhaopeng Zhong (*ANL*), Abdalla Abou-Jaoude (*INL*), Florent Heidet (*ANL*)
- 6:00 pm:** Preliminary Thermal-Hydraulic Assessment of the Versatile Test Reactor, Florent Heidet (*ANL*)



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TUESDAY, JUNE 11
TECHNICAL SESSIONS – 10:15 AM

University Research in Fuel Cycle and Waste Management—I

Sponsored by FCWMD; **Cosponsored by** ETWDD

Session Organizer and Chair: Jack D. Law (*INL*)

Location: Greenway A **Time:** 10:15 am-12:00 pm

- 10:20 am:** Life-Cycle Assessment of Small-Modular Nuclear Reactors Using Current U.S. Fuel Cycle, Kara Michelle Godsey, Lindsay Shuller-Nickles, Michael Carbajales-Dale (*Clemson*)
- 10:45 am:** Safety Evaluation of a Spent Fuel Dry-Storage Canister with Various Fill Materials, Jeremy W. King, Sunil S. Chirayath, Eric E. Aboud, Victor M. Bautista, Patrick A. Behne, Heukjin Boo, Ryan D. Brownfield, Jim A. Chisholm, Katie M. Cook, Amanda C. Edwin, Hadyn M. Kistle, Patrick J. O’Neal, Ernesto A. Ordenez, Mariah M. Ramirez, Sidney A. Ricketts, Rainbow Y. Suh (*Texas A&M*)
- 11:10 am:** Preliminary Evaluation of Low-Force Solid-State Technologies for Mitigation and Repair of Stress Corrosion Cracking in Stainless Steel Canister, Hwasung Yeom, Nickolas Pocquette, Evan Rocco, Frederick van Steenderen (*U.W., Madison*), Kenneth Ross (*PNNL*), John Kessler (*J Kessler & Associates*), Gary Cannell (*Fluor*), Jay Rozzi (*Creare*), Kumar Sridharan, Frank E. Pfefferkorn (*U.W., Madison*)
- 11:35 am:** Experimental Investigation of Partitioning Ratio of Co Between Ingot and Slag after Melting Process of Radioactive Metal Waste, Byum Kyu Kim, Hwajeong Han, Byung Gi Park (*Soonchunhyang Univ.*), Bongsoo Lee (*Chung-ang Univ.*)

Advancement of On-Line Monitoring Systems for Operations in Nuclear Fuel Recycling Applications

Sponsored by FCWMD

Session Organizer and Chair: Patricia D. Paviet (*PNNL*)

Location: Greenway C **Time:** 10:15 am-12:00 pm

- 10:20 am:** Advances in Online Spectroscopic Monitoring for Application Throughout the Nuclear Fuel Cycle, Samuel A. Bryan (*PNNL*), Gilbert L. Nelson (*College of Idaho*), Amanda Lines (*PNNL*), Job Bello (*Spectra Solutions*)
- 10:45 am:** Square Wave Voltammetry Analysis of Metal Ions in Molten Salt Reactors, Huan Zhang, Suhee Choi, Michael F. Simpson (*Univ. Utah*)
- 11:10 am:** Use of Machine Learning with On-Line Monitoring Systems for Reprocessing, Benjamin B. Cipiti, Nathan T. Shoman (*Sandia*)
- 11:35 am:** Fiber-Optic Laser-Induced Breakdown Spectroscopy in High Temperature/Radiation Environment, Yichen Zhao, Haori Yang (*Oregon State*)

Thermal Hydraulics of Accident-Tolerant Fuels

Sponsored by THD

Session Organizer: Wade R. Marcum (*Oregon State*)

Co-chairs: Jun Wang (*Univ of Wisconsin, Madison*), Hwasung Yeom (*Univ of Wisconsin, Madison*)

Location: Greenway D **Time:** 10:15 am-12:00 pm

- 10:20 am:** Critical Heat Flux Study with Different Substrate Conditions for Accident Tolerant Fuel Cladding Development, HangJin Jo, Emilio Gutierrez, Hwasung Yeom, Kumar Sridharan, Michael Corradini (*U. W., Madison*)
- 10:45 am:** Thermal Hydraulic Performances Analysis of Cr-Coated Zircaloy Clad During Station Blackout Accident, Jun Wang, Hwasung Yeom, Michael Corradini (*U. W., Madison*)
- 11:10 am:** Sensitivity of Critical Heat Flux for ATF FeCrAl Alloy Using RELAP5-3D and RAVEN, Jacob P. Gorton (*U. T., Knoxville, Penn State*), Nicholas R. Brown (*U. T., Knoxville*)
- 11:35 am:** Potential Impact of Increased Critical Heat Flux for FeCrAl Clad Fuels in Hot Zero-Power Rod-Ejection Accidents, Robert F. Kile (*U. T., Knoxville, Penn State*), Nicholas R. Brown (*U. T., Knoxville*)

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TUESDAY, JUNE 11
TECHNICAL SESSIONS – 10:15 AM

Computational Methods: General

Sponsored by MCD

Session Organizer: Steven P. Hamilton (*ORNL*)

Chair: Tara Pandya (*ORNL*)

Location: Greenway E **Time:** 10:15 am-11:35 am

10:20 am: A Reduced-Order Neutron Diffusion Model Separated in Space and Energy via Proper Generalized Decomposition, Kurt A. Dominesey, Wei Ji (*RPI*)

10:45 am: Calculation of Parametric Variance Using Variance Deconvolution, Aaron J. Olson (*Sandia*)

11:10 am: Correlated Synthetic Time Series Generation Using Fourier and ARMA, Paul Talbot, Cristian Rabiti, Andrea Alfonsi, Cameron Krome, M. Ross Kunz, Aaron Epiney, Congjian Wang, Diego Mandelli (*INL*)

Credible Accident Sequences in NCS–Panel

Sponsored by NCSD

Session Organizer: Lon E. Paulson (*GE Hitachi*)

Chair: Thomas P. McLaughlin (*LANL, ret.*)

Location: Greenway G **Time:** 10:15 am-12:00 pm

The purpose of this panel session is to provide practical examples of the determination of “credible” nuclear criticality accident sequences with fissionable materials in operations outside reactors. Panel to include NRC licensees, DOE facilities, or international fissionable material operations perspectives. A revisit of what constitutes a “credible” criticality accident sequence under current regulatory framework can improve facility operations, eliminate unnecessary controls, and permit focused attention on those that remain. Panelists should present and emphasize what constitutes a “credible” abnormal condition leading to a postulated nuclear criticality accident sequence or, alternatively, present what constitutes a “not credible” determination for a postulated criticality accident sequence. Practical applications may include existing fissionable material operations, storage, natural phenomena hazards (NPH), facilities undergoing decommissioning, new facilities under design and construction, CAAS system needs evaluation, or other. Credibility comes down to a shared belief between the analyst, the operator, and perhaps the regulator that there are enough barriers to assure ourselves that the credible [believable] scenarios have been prevented and enough controls and barriers are in place such that we render the sequence “highly unlikely.”

Panelists:

Mandy Bowles Tomaszewski (*LANL*)

David Erickson (*SRNS*)

Jerry Hicks (*DOE, retired*)

Deb Hill (*NNL*)

Brandon O'Donnell (*BWXT*)

Lon Paulson (*GE Hitachi*)

Randy Shackelford (*NFS*)

TUESDAY, JUNE 11
TECHNICAL SESSIONS – 10:15 AM

ANS Nuclear Grand Challenges

Sponsored by ETWDD

Session Organizer: Lisa M. Marshall (NCSU)

Chair: James E. Baciak (Univ of Florida)

Location: Greenway H Time: 10:15-11:35 pm

10:20 am: Addressing Fears of Nuclear Through Free-Choice Learning, Jonathan Gomez (Y-12)

10:45 am: How to Effectively Manage Public Communications and Outreach in Support of Nuclear Energy Related Issues, Scott D. Northard (Due North Energy Consulting)

11:10 am: Examining the Role of Cultural Value on Nuclear Acceptance in China, Dongqin Xia, Yazhou Li, Yanling He, Tingting Zhang, FDS Team (Inst. Nuclear Energy Safety)

Fuels and Materials for Molten Salt Reactors

Sponsored by MSTD

Session Organizer: Kenneth J. Geelhood (PNNL)

Chair: Laura M. Jamison (ANL)

Location: Greenway J Time: 10:15-11:35 am

10:20 am: Technological Aspects of MSR Fuel Cycle, Martin Straka (ÚJV Řež), Jan Uhlíř (Res. Centre Řež), Lórant Szatmáry (ÚJV Řež), Martin Mareček (Res. Centre Řež)

10:45 am: Compatibility Studies of Structural and Moderator Materials with Molten Chloride and Fluoride Salts, Stephen S. Raiman, Richard T. Mayes, J. Matthew Kurley, James R. Keiser, Nidia C. Gallego, Cristian I. Contescu, Dino Sulejmanovic, A. Lou Qualls (ORNL)

11:10 am: First-Principles Investigation on the Effect of Salt Species Adsorption on Cr Surface Segregation in Ni-Cr Alloys, J. K. Startt (Georgia Tech, ORNL), C. S. Deo (Georgia Tech), S. S. Raiman (ORNL)

Reactor Analysis Methods—I

Sponsored by RPD; Cosponsored by THD

Session Organizer: Pavel V. Tsvetkov (Texas A&M)

Chair: Yunlin Xu (Purdue Univ)

Location: Greenway I Time: 10:15 am-12:00 pm

10:20 am: Candidates for Non-Fuel Antineutrino Emissions in the High Flux Isotope Reactor, Andrew J. Conant, Anna Erickson (Georgia Tech)

10:45 am: Mesh and Effect on Thermal Hydraulic Calculations, Alok Jha (Homi Bhabha National Inst.), Anurag Gupta (BARC)

11:10 am: Measurement of Reactor Kinetics Parameters in TREAT During Temperature Limited Transients, Thomas Holschuh, Daniel Wachs (INL)

11:35 am: Burnup Calculation Methodology for a Small-Scale Fuel Irradiation Experiment in the High Flux Isotope Reactor (HFIR), J. R. Burns, C. M. Petrie, D. Chandler (ORNL)



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TUESDAY, JUNE 11
TECHNICAL SESSIONS – 1:30 PM

University Research in Fuel Cycle and Waste Management—II

Sponsored by FCWMD; **Cosponsored by** ETWDD
Session Organizer and Chair: Jack D. Law (*INL*)
Location: Greenway A **Time:** 1:30-2:50 pm

- 1:35 pm:** Bismuthate Behavior with Used Nuclear Fuel Species in Nitric Acid, Jeffrey D. Einkauf, Andrew J. Wilcox, Jonathan D. Burns (*Texas A&M*)
- 2:00 pm:** Comparison of DEHiBA and DHOA for Neptunium Separation, Jarrod M. Gogolski (*CSM*), Peter Zalupski, Dean Peterman (*INL*), Mark P. Jensen (*CSM*)
- 2:25 pm:** Design and Implementation of a Flowsheet Solvent Extraction Simulator, Taha Azzaoui (*Univ. Mass., Lowell*), Kevin L. Lyon (*INL*), Valmor F. de Almeida (*Univ. Mass., Lowell*)

Challenges Associated with Material Transport into and Waste Removal from Hot Cell R&D Facilities Worldwide—Panel

Sponsored by FCWMD
Session Organizer and Chair: Stephen Napier (*NNL*)
Location: Greenway C **Time:** 1:30-3:40 pm

The ANS Winter 2017 panel on Hot Cells for Nuclear R&D highlighted the strategic international importance of hot cell R&D facilities and the challenges associated with aging facilities and ongoing capacity reductions. Development of advanced nuclear energy systems will require significant effort in material and fuel testing, especially in post-irradiation examination (PIE). This panel will identify and quantify the expected growth in demand for PIE against the capacity and capability of international facilities. It will discuss the actions needed to ensure that facilities are available and that problems with transport of materials to and from these facilities are addressed.

Panelists:
Heather Chichester (*INL*)
Des Wright (*NNL*)
Jared Johnson (*ORNL*)
Ali Siddiqui (*CNL*)
Kathryn Metzger (*Westinghouse*)

Scaling Methodologies for SET and IET—Panel

Sponsored by THD
Session Organizer and Chair: Lane Carasik (*USNC - Space*)
Location: Greenway D **Time:** 1:30-3:40 pm

In this panel, the different scaling methodologies for integral effects testing (IET) and separate effects testing (SET) will be presented with past and current examples. The aim of this panel is to provide an overview of the current state of scaling methodologies and what the future may hold for scaling in advanced reactors.

Panelists:
Brian Woods (*Oregon State Univ*)
Chul-Hwa Song (*KAERI*)
Nicolas Zweibaum (*Kairos Power LLC*)

Transport Methods

Sponsored by MCD
Session Organizer: Steven P. Hamilton (*ORNL*)
Chair: David P. Griesheimer (*NNL*)
Location: Greenway E **Time:** 1:30-3:15 pm

- 1:35 pm:** Conditional Point Sampling: A Novel Monte Carlo Method for Radiation Transport in Stochastic Media, Emily H. Vu (*U. C., Berkeley, Sandia*), Aaron J. Olson (*Sandia*)
- 2:00 pm:** Enhancements to the Discrete Generalized Multigroup Method, Richard L. Reed, Jeremy A. Roberts (*Kansas State*)
- 2:25 pm:** Angular Adaptivity with Filtered Pn Methods, S. Dargaville (*Imperial College*), A. G. Buchan (*Queen Mary Univ.*), R. P. Smedley-Stevenson (*Imperial College, AWE*), P. N. Smith (*Imperial College, ANSWERS Software*), C. C. Pain (*Imperial College*)
- 2:50 pm:** Weighted Average Calculation of the Method of Characteristics, Gil Soo Lee, Chae-Yong Yang (*Korea Inst. Nucl. Safety*) Adriaan Buijs (*McMaster Univ.*)

TUESDAY, JUNE 11
TECHNICAL SESSIONS – 1:30 PM

Water Technologies and Nuclear Power Update—Panel

Sponsored by DESD

Session Organizer and Chair: Leah Parks (*NRC*)

Location: Greenway F **Time:** 1:30-3:40 pm

Light water reactors are a “thirsty” technology in that they require large volumes of water to operate. Meanwhile, in many parts of the United States and around the world, fresh water is a scarce resource and the environmental requirements for water have changed in recent years. This panel will discuss some of the current and future approaches to meeting nuclear power plant’s water needs and the regulations surrounding water use. Furthermore, expanding the use of current nuclear reactors for desalination projects will become increasingly important given the growing world population and already existing local shortages of fresh water. This panel will compare current and potential future systems for meeting nuclear power plants water demands as well as exploring the possibilities of expanded use of nuclear reactors to provide heat and electricity to desalination projects.

Panelists:

Ibrahim Khamis (*IAEA*)

Aaron Wilson (*INL*)

Eric Schwarz (*Exelon*)

Youssef Shatilla (*Masdar Inst*)

Real World Applications of Sensitivity/Uncertainty

Sponsored by NCS D

Session Organizer and Chair: Jennifer L. Alwin (*LANL*)

Location: Greenway G **Time:** 1:30-3:15 pm

1:35 pm: Whisper Sensitivity Study of the NMIS ATR Fuel Storage Racks, K. M. Casanova (*INL*)

2:00 pm: Investigating Region-Wise Sensitivities for Nuclear Criticality Safety Validation, Bobbi Merryman (*Univ. New Mexico*), Forrest Brown (*Univ. New Mexico, LANL*), Jennifer Alwin, Christopher M. Perfetti (*LANL*)

2:25 pm: Preliminary TSUNAMI Assessment of the Impact of Accident Tolerant Fuel Concepts on Reactor Physics Validation, W. J. Marshall, J. Yang, U. Mertyurek, M. A. Jessee (*ORNL*)

2:50 pm: A Method for Performing k_{eff} Validation of As-Loaded Criticality Safety Calculations Using UNF-ST&DARDS, Justin B. Clarity, William J. Marshall, Kaushik Banerjee, John M. Scaglione (*ORNL*)

Focus on Communications: Meanwhile in Canada—How Communications Helped the Nuclear Industry to Expand—I—Panel

Sponsored by ETWDD; **Cosponsored by** YMG

Session Organizer and Chair: Mimi H. Limbach (*Potomac Communications*)

Location: Greenway H **Time:** 1:30-3:40 pm

Over the past several years, the nuclear industry in Canada has expanded substantially. The Canadian nuclear lab is thriving. The Bruce plant is expanding. Several advanced technology startups are expanding. This panel will explore the role communications is playing in the Canadian nuclear energy renaissance, and what communicators in other nations can learn from it.

Panelists:

Corey McDaniel (*CNL*)

Erin Polka (*Canadian Nuclear Association*)

Jacque Hoornweg (*Querencia Partners*)

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TUESDAY, JUNE 11
TECHNICAL SESSIONS – 1:30 PM

Nuclear Science User Facilities—II

Sponsored by MSTD

Session Organizer and Chair: J. Rory Kennedy (*INL*)

Location: Greenway J **Time:** 1:30-3:40 pm

- 1:35 pm:** EBSD Characterization of Metallic Nuclear Fuel, Fidelma Di Lemma, Daniel Murray, James Madden, Alex Winston, Cynthia Adkins, Jan-Fong Jue, Jason Harp (*INL*), Assel Aitkaliyeva (*Univ. Florida*), Dennis Keiser (*INL*)
- 2:00 pm:** Thermal-Hydraulics and Neutronics Overview of the DISECT Experiment, W. J. Williams (*INL, Purdue*), C. Hale (*INL*), E. Sikik (*SCK-CEN*), M. Sprenger (*INL*), G. Borghmans (*SCK-CEN*), D. M. Wachs (*INL*), S. Van den Berghe (*SCK-CEN*), M. A. Okuniewski (*Purdue*), T. Maddock (*INL*), B. Boer (*SCK-CEN*)
- 2:25 pm:** Thermal Transport Measurement of a UN/U₃Si₂ Accident Tolerant Fuel Using a Square-Wave Pulse Thermoreflectance Technique, Scott C. Middlemas, Zilong Hua, W. Tanner Yorgason, Robert S. Schley, David H. Hurley (*INL*)
- 2:50 pm:** X-Ray Computed Tomography Analysis of Neutron-Irradiated SiC Composite Tube, Takaaki Koyanagi, Yutai Katoh (*ORNL*), Gyanender Singh (*U. T., Knoxville*), Christian M. Petrie (*ORNL*), Christian P. Deck (*General Atomics*), Kurt A. Terrani (*ORNL*)
- 3:15 pm:** Post-Irradiation Analysis at the Nanoscale of 14YWT after Neutron Irradiation (16.6 dpa) at 386°C and 412°C, Maria A. Auger (*Univ. Carlos III de Madrid*), David T. Hoelzer (*ORNL*)

Radiation Protection and Shielding: General

Sponsored by RPSD

Session Organizer: Irina I. Popova (*ORNL*)

Chair: Edward S. Lum (*LANL*)

Location: Greenway B **Time:** 1:30-3:40 pm

- 1:35 pm:** Key Results of the ANS/HPS Conference on Low Level Radiation, Alan E. Waltar (*retired*)
- 2:00 pm:** Neutron Spectrum Unfolding with a Planar Miniaturized Fast-Neutron Detector, Luke A. Stegeman, Quentin Pease, Tyler J. Hieber, Dipta Sarkar, Samuel W. Oxandale (*Kansas State*), Steven L. Bellinger (*Radiation Detection Technologies*), Zayd C. Leseman, Amir A. Bahadori (*Kansas State*)
- 2:25 pm:** Three-Dimensional Charge Distribution for Electrostatic Space Radiation Shielding, Rajarshi Pal Chowdhury, Luke Stegeman (*Kansas State*), Janet E. Barzilla (*Leidos, NASA*), Dan J. Fry, Ashish Goel (*NASA*), Matthew L. Lund (*Univ. Utah*), Stojan M. Madzunkov (*NASA*), Amir A. Bahadori (*Kansas State*)
- 2:50 pm:** Dissecting Air Secondary Gamma Dose Contribution for a 14 MeV Neutron Source in Air, E. S. Lum, M. L. Fensin, K. C. Kelley, S. S. McCready (*LANL*)
- 3:15 pm:** Insulating Boron-Containing PDMS-Based Materials for Space and Nuclear Applications, Joseph H. Dumont, Eamonn Murphy, Kwan-Soo Lee, Andrea Labouriau (*LANL*)

Overview of the Versatile Test Reactor—III

Sponsored by RPD; Cosponsored by MCD, THD, YMG

Session Organizer and Chair: Florent Heidet (*ANL*)

Location: Greenway I **Time:** 1:30-3:40 pm

- 1:35 pm:** Evaluation of Pressure Drop for Possible Reflector Designs for the Versatile Test Reactor Using Nek5000, Dillon R. Shaver, Haomin Yuan, Florent Heidet (*ANL*)
- 2:00 pm:** Preliminary Evaluation of Fuel Management Strategies for the Versatile Test Reactor, Abdalla Abou-Jaoude, Sam Bays, Gilles Youinou (*INL*), Florent Heidet (*ANL*)
- 2:25 pm:** Fuel Loading Optimization and Planning for the Versatile Test Reactor, Michael Jarrett, Florent Heidet (*ANL*)
- 2:50 pm:** Versatile Test Reactor Preliminary Safety Analysis, Tyler Sumner, Tingzhou Fei, Nicolas Stauff, Thomas Fanning, Florent Heidet (*ANL*)
- 3:15 pm:** Probabilistic Risk Assessment Approach for the Versatile Test Reactor, David Grabaskas (*ANL*), Jason Andrus (*INL*), Dennis Henneke, Jonathan Li (*GE-Hitachi*), Matthew Bucknor, Acacia J. Brunett, Matthew Bucknor, Thomas Fanning (*ANL*)

TUESDAY, JUNE 11

TECHNICAL SESSIONS – 3:55 PM

Recycle and Reuse of Used Nuclear Fuel Resources

Sponsored by FCWMD

Session Organizer and Chair: Guillermo Daniel Del Cul (ORNL)

Location: Greenway A Time: 3:55-5:40 pm

- 4:00 pm:** An Update on the Operational Status of the Savannah River Site H-Canyon, Tracy Stover (*Savannah River Nuclear Solutions*)
- 4:25 pm:** Plans for Treatment of Research Reactor UNF at LaHague, Paul Murray, Sven Bader (*Orano*)
- 4:50 pm:** New Reconditioning Strategies for Spent Nuclear Fuel Rods, Craig Barnes, Jordan R. Travis, Breanna K. Vestal (*U.T., Knoxville*), Guillermo Daniel DelCul (*ORNL*), David F. McLaughlin (*Westinghouse*)
- 5:15 pm:** Gaseous Preparation of Zirconium Clad Nuclear Fuel for Recycling, Rick Demmer, Julia Tripp, Melissa Warner, Richard Tillotson, Amy Welty (*INL*), Lonnie Olson (*INL, retired*)

Multiphase CFD and Large Eddy/Direct Numerical Simulations

Sponsored by THD

Session Organizer: Lane Carasik (*USNC - Space*)

Co-chairs: Matthew D. Zimmer (*NCSU*), Ed Komen (*NRG*)

Location: Greenway D Time: 3:55-5:15 pm

- 4:00 pm:** Bubble Formation Through Submerged Vertical Orifices with Horizontal Air Inflow, Naveen Pillai, Katharina Stapelmann, Igor A. Bolotnov (*NCSU*)
- 4:25 pm:** Investigation on Bubble Deformation and Break-Up Dynamics Using Interface Tracking Method, Yuqiao Fan, Igor Bolotnov (*NCSU*)
- 4:50 pm:** Large Eddy Simulation of the Turbulent Flow Around a Helical Coil Steam Generator Geometry for a Small Modular Reactor, Samuel J. Lee, Yassin A. Hassan (*Texas A&M*)

Creating a Successful Career—Panel

Sponsored by YMG

Session Organizer: Kelsey Amundson (*U. C., Berkeley*)

Chair: Harsh Desai (*NEI*)

Location: Greenway E Time: 3:55-6:05 pm

Everyone has a unique plan for their careers, whether it is to become a subject matter expert, or lead an organization, or simply try various jobs. Navigating a career path has implications for job responsibilities, work and life balance, family management, and most importantly professional and personal growth. In this session, we will discuss unique personal experiences that shaped successful careers.

Panelists:

Gene Carpenter (*DOE*)

Todd Allen (*UMich*)

Marilyn Kray (*Exelon Corp*)

Lori Braase (*INL/GAIN*)



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TUESDAY, JUNE 11
TECHNICAL SESSIONS – 3:55 PM

Reactor Physics: General—I

Sponsored by RPD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: Yunlin Xu (*Purdue Univ*)

Location: Greenway F **Time:** 3:55-6:05 pm

- 4:00 pm:** Uncertainty Quantification of SMR Core Linear Power Using Polynomial Chaos Method, Syed Bahauddin Alam (*FAEC, Rhode Island Nucl. Sci. Centre*), Bader Almutairi (*Missouri Univ. S&T, Kuwait Inst. Sci. Res.*), Tuhfatur Ridwan (*Cambridge*), Dinesh Kumar (*FAEC, Uppsala Univ.*), Cameron S. Goodwin (*Rhode Island Nucl. Sci. Centre*)
- 4:25 pm:** Uncertainty Quantification on Core Input Parameter for SFR Core Using Polynomial Chaos, Syed Bahauddin Alam (*FAEC, Rhode Island Nucl. Sci. Centre*), Bader Almutairi (*Missouri Univ. S&T, Kuwait Inst. Sci. Res.*), Tuhfatur Ridwan (*Cambridge*), Denish Kumar (*FAEC, Uppsala Univ.*), Cameron S. Goodwin (*Rhode Island Nucl. Sci. Centre*)
- 4:50 pm:** Reactor Physics Analysis of Thorium-Based Fuel for Long-Life SMR Cores Using Seed-Blanket Fuel Concept, Bader Almutairi (*Missouri S&T, Kuwait Inst. Sci. Res.*), Dinesh Kumar (*FAEC, Uppsala Univ.*), Tuhfatur Ridwan (*Cambridge*), Syed Bahauddin Alam (*FAEC, Rhode Island Nucl. Sci. Centre*), Geoff Parks (*Cambridge*), Cameron S. Goodwin (*Rhode Island Nucl. Sci. Centre*), Shoaib Usman (*Missouri S&T*)
- 5:15 pm:** Performance Improvement of the Linear System Solver for CMFD Acceleration in PROTEUS-MOC, Yeon Sang Jung, Changho Lee (*ANL*)
- 5:40 pm:** 3D SPN Transport and Diffusion Approaches for the Sodium-Cooled Fast Reactor Core Using Deterministic Method, Dinesh Kumar (*FAEC, Uppsala Univ.*), Bader Almutairi (*Missouri S&T, Kuwait Inst. Sci. Res.*), Tuhfatur Ridwan (*Cambridge*), Syed Bahauddin Alam (*FAEC, Rhode Island Nucl. Sci. Centre*), Cameron S. Goodwin (*Rhode Island Nucl. Sci. Centre*)

Focus on Communications: Working with Students (K and Up)—II—Panel

Session Organizer and Chair: Margaret E. Harding (*4 Factor Consulting, LLC*)

Sponsored by ETWDD; **Cosponsored by** YMG

Location: Greenway H **Time:** 3:55-6:05 pm

A panel discussion with people who have worked with students in various formats teaching about STEM as well as nuclear technology. How to begin the conversation with young people of all ages, considering what they know and don't know and biases in their education and experiences.

Panelists:

Alyse Huffman (*ANS Congressional Fellow*)

Candace Davidson (*Penn State*)

Lane Carasik (*USNC-Space*)

Julie Ezold (*ORNL*)

Accident Tolerant Fuels—I

Sponsored by MSTD

Session Organizer and Chair: Kenneth J. Geelhood (*PNNL*)

Location: Greenway J **Time:** 3:55-4:50 pm

- 4:00 pm:** Potential Impact of Accident Tolerant Fuel Thermal Properties on Rod Ejection and Small-Break Loss-of-Coolant Accidents, Robert F. Kile (*U. T., Knoxville, Penn State*), Aaron J. Wysocki, Andrew T. Nelson (*ORNL*), Nicholas R. Brown (*U. T., Knoxville*)
- 4:25 pm:** Characterization of the Thermal Conductivities of UO₂ Fuel Pellets with Aligned Molybdenum Metal Particles, Dong Seok Kim, Dong-Joo Kim, Sang-Chae Jeon, Keon Sik Kim, Jong Hun Kim, Ji-Hae Yoon, Jae Ho Yang (*KAERI*)

TUESDAY, JUNE 11
TECHNICAL SESSIONS – 3:55 PM

Molten Salt Reactors—I

Sponsored by RPD; **Cosponsored by** THD
Session Organizer: Florent Heidet (ANL)
Chair: Benjamin Betzler (ORNL)
Location: Greenway | **Time:** 3:55-5:15 pm

- 4:00 pm:** Activation Rates Validation to Support MSR Development, Evžen Losa, Michal Košťál, Jan Šimon (*Research Centre Řež*), Ondřej Chvála (*U. T., Knoxville*), Vlastimil Juříček (*Research Centre Řež*)
- 4:25 pm:** Simulation of Thermal Spectrum MSR Using PROTEUS, T. Fei, B. Feng, F. Heidet (ANL)
- 4:50 pm:** Demonstration of the CFD Code Nek5000 for Molten Salt Applications, Dillon R. Shaver, Bo Feng, Elia Merzari, Florent Heidet (ANL)

Advanced Modeling and Simulation Efforts for Light Water Reactors

Sponsored by RPD
Session Organizer and Chair: Benjamin Collins (ORNL)
Location: Greenway | **Time:** 5:20-6:15 pm

- 5:25 pm:** MPACT Linear Source MOC Validation with Pin Resolved and Temperature Varying Measurements, Kyle Vaughn, Brendan Kochunas, Ethan Cole, Thomas Downar (*Univ. Michigan*)
- 5:50 pm:** A Demonstration of BWR Coupled Analysis and Potential ATF Applications Using CASL's MPACT/CTF, Jacob P. Gorton (*U. T., Knoxville, ORNL*), Benjamin S. Collins (ORNL), Nicholas R. Brown (*U. T., Knoxville*)

Technical
Sessions:
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WEDNESDAY, JUNE 12
TECHNICAL SESSIONS – 10:15 AM

The Importance of Future Fuel Cycle Options in Addressing Growing Worldwide Energy Demand—Panel

Sponsored by FCWMD

Session Organizer: Fiona E. Rayment (*NNL*)

Chair: Stephen Napier (*NNL*)

Location: Greenway A **Time:** 10:15 am-12:00 pm

Worldwide energy demand is increasing, with future energy generation geared toward enhanced economic competitiveness, the enabling of baseload and intermittent supply, and reducing carbon emissions. In many countries the current nuclear fuel cycle is a once-through fuel cycle with direct disposal. However, some advanced reactors may require a closed fuel cycle. It is critical that R&D leadership be preserved to ensure there is an intelligent customer capability in place to inform future decision-making regarding advanced fuel cycles. This panel explores how to maintain thought leadership in closed fuel cycles through the leveraging of international collaboration.

Panelists:

Andrew Worrall (*ORNL*)

Sven Bader (*ORANO*)

Jack Law (*INL*)

Zara Hodgson (*NNL*)

Safety Aspects of Accident-Tolerant Fuel Critical Heat Flux—Panel

Sponsored by NISD

Session Organizer and Chair: Nicholas R. Brown (*U. T., Knoxville*)

Location: Greenway C **Time:** 10:15 am-12:00 pm

This panel will focus on the potential safety impacts of changes in bubble crowding critical heat flux in PWRs and dryout in BWRs due to accident-tolerant fuel cladding. The session is an opportunity to highlight the safety impact of recent heat flux testing efforts in academia, national laboratories, and industry. This panel will include contributions from several ongoing Department of Energy university projects and ongoing efforts to better understand in-pile critical heat flux behavior at Idaho National Laboratory.

Panelists:

Mark Anderson (*Univ of Wisconsin*)

Colby Jensen (*INL*)

Youho Lee (*Seoul National Univ*)

Seungmin Oh (*GE Global Nuclear Fuel*)

Emilio Baglietto (*MIT*)

Guoqiang Wang (*Westinghouse*)

Experimental Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Jun Wang (*U. W. Madison*)

Co-chairs: Yassin A. Hassan (*Texas A&M*), Ran Kong (*Purdue Univ*)

Location: Greenway D **Time:** 10:15-am-12:00 pm

10:20 am: An Investigation to Develop Measurement Techniques for Quantifying Fission Product Transport in a Gas-Cooled Fast Reactor—Versatile Test Reactor Program, D. Orea, B. H. Choi, D. T. Nguyen, R. Vaghetto, N. K. Anand, Y. A. Hassan (*Texas A&M*), Piyush Sabharwall (*INL*)

10:45 am: Experimental Study on Non-Condensable Gas Effect on Heat Transfer Coefficient in Steam/Air Direct Contact Condensation, Joseph Seo, Sero Yang, Kimoon Lee, Yassin Hassan (*Texas A&M*)

11:10 am: Assessment of Potential Improvements in Level II PRAs for Advanced Reactors based on Improved Aerosol Removal Mechanisms, Rohan Biwalkar, Sola Talabi (*Pittsburgh Technical*), Kenneth Redus (*Redus and Assoc.*)

11:35 am: Numerical Simulation and Experimental Study on Natural Vibration Characteristics of Heat Exchanger in a LMFBR Intermediate Heat Exchanger, Mengmeng Liu, Guangdong Song (*China Inst. Atomic Energy*)

Technical
Sessions:
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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 10:15 AM

Innovations in Nuclear Education—Panel

Sponsored by YMG; **Cosponsored by** ETWDD

Session Organizer: Matthew Jeffrey Jasica (*Sandia*)

Chair: Lisa Marshall (*NCSU*)

Location: Greenway E **Time:** 10:15 am-12:00 pm

With many approaches to engineering education and a variety of tools available to educators, it can be difficult to know where to start. Educators at various points in their careers will discuss their experiences in the classroom and on effective practices (and their risks) for connecting with students and fellow educators. Possible discussion topics such as the effectiveness of different approaches in the classroom, incorporating current events in the nuclear industry into the classroom, and interdisciplinary collaboration.

Panelists:

Paul Wilson (*Univ of Wisconsin*)

Jamie Coble (*Univ of Tennessee*)

Katy Huff (*Univ of Illinois*)

Lisa Marshall (*NCSU*)

Reactor Physics: General—II

Sponsored by RPD; **Cosponsored by** ANSTD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: John Bess (*INL*)

Location: Greenway F **Time:** 10:15 am-12:00 pm

10:20 am: Investigating Simple Physical Means to Reduce TREAT Core Neutron Lifetime, John D. Bess, Thomas V. Holschuh II, Nicolas E. Woolstenhulme (*INL*)

10:45 am: Preliminary Neutronics Analysis for a Compact Heat-Pipe Cooled Fast Reactor Core, Qin Zeng, Yao Zhou, Ying Shi, Chenghao Li, Putong Wang (*South China Univ.*)

11:10 am: Operation of a Subcritical Reactor for Radioisotope Production, Faisal Y. Odeh, Alex C. Bakken, Amanda K. Grimm, Terry L. Grimm, Nathan C. Johnson, Christine M. Krizmanich, Mayir Mamtimin, William A. Peters, Kristin A. Shannon, Milan Stika, Robert N. Wahlen (*Niowave*)

11:35 am: Development of a Lead-Bismuth Cooled Subcritical Fast/Thermal Reactor, Mayir Mamtimin, Terry L. Grimm, Faisal Y. Odeh, William A. Peters, Robert N. Wahlen (*Niowave*), Puran Deng, Won-Sik Yang (*Univ. Michigan*), Stuart A. Maloy, Keith A. Woloshun (*INL*)

Operational Reviews: How Facilities Meet ANSI/ANS-8.1 Section 4.1.6—Panel

Sponsored by NCSU

Session Organizer: Kristan M. Wessels (*Y-12*)

Chair: Amber J. McCarthy (*Y-12*)

Location: Greenway G **Time:** 10:15 am-12:00 pm

This session addresses the different methods facilities use to perform their annual review of fissile operations required by ANSI/ANS-8.1 Section 4.1.6. Speakers will discuss topics including (but not limited to) which personnel participate in the operational reviews, the methods used to document the reviews, and how it is ensured that process drift is not occurring. Lessons learned and good practices associated with operational reviews will be discussed.

Panelists:

Mandy Bowles Tomaszewski (*LANL*)

David Erickson (*SRS*)

Tom Young (*Y-12*)

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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 10:15 AM

Highlights of the 2019 NPIC-HMIT Conference: Instrumentation and Controls—I–Panel

Sponsored by HFICD

Session Organizer: Pradeep Ramuhalli (*PNNL*)

Chair: Carol Smidts (*Ohio State*)

Location: Greenway H **Time:** 10:15 am-12:00 pm

HFICD hosted the 11th Nuclear Plant Instrumentation and Controls and Human Machine Interface Technology Conference (NPIC-HMIT 2019) in Orlando, FL February 11-14, 2019. Leading national and international practitioners in advanced I&C solutions for NPPs from academia, national labs, utilities, vendors, and regulators presented their current research and development efforts to over 300 attendees. Panelists will present their latest I&C advances in digital implementation, cybersecurity, online monitoring and condition assessment, and other current topics.

Panelists:

Brendan Heidrich (*INL*)

Craig Primer (*INL*)

Chris Petrie (*ORNL*)

Carol Smidts (*Ohio State*)

Richard Wood (*Univ of Tennessee, Knoxville*)

Accident Tolerant Fuels—II

Sponsored by MSTD

Session Organizer and Chair: Kenneth J. Geelhood (*PNNL*)

Location: Greenway J **Time:** 10:15 am-12:00 pm

10:20 am: Oxidation of Cold Spray Cr Coatings in High Temperature Steam Environments, Hwasung Yeom, Tyler Dabney, Greg Johnson, Benjamin Maier, Kumar Sridharan (*U. W., Madison*)

10:45 am: Development of Cold Spray FeCrAl Coatings for Accident Tolerant Fuel, Tyler Dabney, Greg Johnson, Benjamin Maier, Hwasung Yeom, Kumar Sridharan (*U. W., Madison*)

11:10 am: Development of Cold-Sprayed Chromium Coatings for Accident Tolerant Fuel Cladding, Greg Johnson, Benjamin Maier, Tyler Dabney, Hwasung Yeom, Kumar Sridharan (*U. W., Madison*)

11:35 am: Successful Operation of the SNS Mercury Target at 1.4 MW, Mark Wendel, Drew Winder (*ORNL*)

Results of the April 2019 “Fastest Path to Zero” Summit and Unconference–Panel

Sponsored by OPD

Session Organizer and Chair: Todd R. Allen (*U. W., Madison*)

Location: Greenway B **Time:** 10:15 am-12:00 pm

The University of Michigan and Third Way co-hosted an ambitious, day-long conference on April 8, 2019 - “The Fastest Path to Zero” - in Ann Arbor, MI. The concept is simple: convening experts across a number of fields to discuss what roadmaps we can create for the United States to achieve net zero emissions by 2050 (0x50). The audience and participants included high-level clean energy and climate leaders, policymakers, and media as well as faculty from across the University of Michigan’s energy policy and engineering programs, including the Global CO2 Initiative, Nuclear Engineering Department, and Energy Institute.

This panel will discuss the key lessons from the summit and UN conference and how they apply to the application of nuclear energy to meeting climate goals.

Panelists:

John Kotek (*NEI*)

Shannon Bragg Sitton (*INL*)

Katie Mummah (*Univ of Wisconsin*)

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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 1:30 PM

Prospects for a High-Assay Low Enriched Uranium Supply to Support Advanced Reactors and Advanced LWR Fuel Applications—Panel

Sponsored by FCWMD; Cosponsored by NNPd

Session Organizers and Cochairs: Everett Redmond (*NEI*), Morris Hassler (*Y-12/CNS*)

Location: Greenway A Time: 1:30-3:40 pm

Many advanced reactor designs and even some applications of light water reactor fuels require use of low-enriched uranium (LEU) with ²³⁵U enrichments between 5% and 20%, which fall outside of current commercial regulatory, transportation, and fuel supply infrastructures and regimes. The availability of high-assay LEU represents a potential barrier for demonstration and commercialization of advanced reactors as well as the deployment of certain accident-tolerant LWR fuel concepts and the pursuit of higher LWR fuel burnups. This panel will feature key stakeholders from government, national laboratories, and industry and will provide perspectives on the current status and path forward for establishing high-assay LEU fuel infrastructure in the United States.

Panelists:

Advanced Reactor Needs and Perspectives, Pete Pappano (*X-Energy*)

Enrichment and Transportation Issues, Melissa Mann (*URENCO*)

Economic Analysis of Using Enrichments of up to 8% for the Existing Fleet, Fred Smith (*EPRI*)

NNSA Plans for Meeting HALEU Supply Needs and Conversion of Research Reactors to HALEU,

Jeffery Chamberlin (*NNSA*)

DOE and NASA Related Needs for HALEU Including Space Reactors and Medical Isotope Production,

Lloyd Jollay (*Y-12 National Security Complex*)

DOE NE Efforts to Provide Interim Supply of HALEU for Industry, Daniel Vega (*DOE-NE*)

Irradiation Experiments—I

Sponsored by IRD

Session Organizer and Chair: Brenden J. Heidrich (*INL*)

Location: Greenway C Time: 1:30-3:40 pm

- 1:35 pm:** Qualification of U-10Mo Base Fuel Over Design Envelop of U.S. High Performance Research Reactor Using Mini-Plate Irradiation Testing in ATR, Margaret A. Marshall, Irina Glagolenko, Nicholas D. Meacham, Dong O. Choe, Paul E. Gilbreath, Grant L. Hawkes, Doug S. Crawford, Erik S. Rosvall, James D. Wiest (*INL*)
- 2:00 pm:** Neutronic Analysis of Mini-Plate Experiments in the ATR for High-Performance Research Reactor LEU Conversion, Paul Gilbreath, Dong O. Choe, Margaret A. Marshall (*INL*)
- 2:25 pm:** Thermal Model of Oxide Growth in Mini-Plate Experiments in the Advanced Test Reactor, Grant Hawkes, Dong O. Choe (*INL*)
- 2:50 pm:** Structural Safety Analysis Overview for the U.S. HPRR Mini-Plate (MP-2) Experiment, Erik S. Rosvall (*INL*)
- 3:15 pm:** Design of a Pressurized Fuel Rod Weld System, N. S. Oldham, C. C. Baker, B. P. Durtschi, D. E. Stacey (*INL*)

Experiments on Two-Phase Flow and Heat Transfer Fundamentals

Sponsored by THD

Session Organizer: Robert P. Martin (*BWXT*)

Cochairs: Ran Kong (*Purdue Univ*), Fan-Bill Cheung (*Penn State*)

Location: Greenway D Time: 1:30-3:15 pm

- 1:35 pm:** Steady State Predictions of Reflood Characteristics in a Rod Bundle, Grant R. Garrett, Yue Jin, Faith R. Beck, Fan-Bill Cheung (*Penn State*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)
- 2:00 pm:** Effect of Fouling on Quenching of Simulated Fuel Rods, Faith R. Beck, Yue Jin, Grant Garrett, Fan-Bill Cheung (*Penn State*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)
- 2:25 pm:** Effect of Thermal Effusivity on Nanoparticle Deposited Surface CHF, Ji Yong Kim, In Cheol Bang (*UNIST*)
- 2:50 pm:** The Statistical Analyses on the Bubble Contact Diameters in the Vertical Narrow Channel, Qi Lu, Yu Liu, Wei Liu, Xi Chen, Hangxing He, Linglan Zhou (*Nuclear Power Inst. China*)

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WEDNESDAY, JUNE 12
TECHNICAL SESSIONS – 1:30 PM

Severe Accident Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Guillaume P. Mignot (*Oregon State*)

Cochairs: John C. Luxat (*McMaster Univ*), Ling Zou (*ANL*)

Location: Greenway E **Time:** 1:30-3:15 pm

1:35 pm: Injectable Sacrificial Material Safety System to Mitigate Molten Corium in Containment, David L. Y. Louie, Yifeng Wang, Rekha Rao, Alec Kucala, Jessica Kruichak, William Chavez (*Sandia*)

2:00 pm: Experimental Investigation on Ex-Vessel Debris Bed Formation Using Simulant Particles, Sang Mo An, Sang Ho Kim, Jin Ho Park (*KAERI*)

2:25 pm: Development of Simplified Ex-Vessel Debris Bed Coolability Model, Jaehoon Jung, Sang Mo An, Sang Ho Kim (*KAERI*)

2:50 pm: Calculation and Study on DCP of Hydrogen Igniter Design in PWR with Large Containment, Ding Chao (*Tsinghua Univ.*), Yang Zhiyi, Chai Guohan (*Nuclear Radiation Saftey Center*), Zhou Zhiwei (*Tsinghua Univ.*)

License Transfers for Decommissioning—Panel

Sponsored by DESD

Session Organizer and Chair: Gerard P. van Noordennen (*EnergySolutions*)

Location: Greenway F **Time:** 1:30-3:40 pm

This session will discuss the subject of the operating licensee transferring their license at the end of life to an organization that specializes in decommissioning nuclear facilities.

Panelists:

Pilgrim and Oyster Creek Experience, Pam Cowan (*Holtec*)

Zion Experience, Tony Orawiec (*Exelon*)

LaCrosse Experience, Lane Peters (*Dairyland Power Cooperative*)

Zion and LaCrosse Experience, Gerald P. Van Noordennen (*EnergySolutions*)

Nuclear Installations Safety: General—I

Sponsored by NISD

Session Organizer and Chair: Zachary Jankovsky (*Sandia*)

Location: Greenway G **Time:** 1:30-3:40 pm

1:35 pm: A New Computational Tool for Rapid Uncertainty and Sensitivity Analysis of Sodium Reactor Source Term, David Grabaskas, James Jerden, Matthew Bucknor (*ANL*)

2:00 pm: Protected and Unprotected Transient Performance and Sensitivity in a B&B Core, Chris Keckler (*U. C., Berkeley*), Thomas Fanning (*ANL*), Massimiliano Fratoni, Ehud Greenspan (*U. C., Berkeley*)

2:25 pm: A Few Comparative Risk Lessons from WIPP, Norbert T. Rempe (*Individual*)

2:50 pm: Risk-Informed Enhanced Resilient Plant Systems Analysis, Zhegang Ma, Hongbin Zhang (*INL*)

3:15 pm: Hybrid Methodology of Deterministic and Probabilistic Safety Assessment Focusing on DSA, Bokyung Kim, Hee Cheon No (*KAIST*)

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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 1:30 PM

Highlights of the 2019 NPIC-HMIT Conference: Human Factors Engineering—II—Panel

Sponsored by HFICD

Session Organizer: Ronald L. Boring (*INL*)

Chair: Carol S. Smidts (*Ohio State*)

Location: Greenway H Time: 1:30-2:40 pm

HFICD hosted the 11th Nuclear Plant Instrumentation and Controls and Human Machine Interface Technology Conference (NPIC-HMIT 2019) in Orlando, FL February 11-14, 2019. Leading national and international practitioners in advanced human factors engineering and human-machine interface solutions for NPPs from academia, national labs, utilities, vendors, and regulators presented their current research and development efforts to over 300 attendees. Panelists will present their latest HFE advances in control room design, operator support systems, human performance and reliability, and other current topics.

At the opening of this session, HFICD will recognize its 2019 award winners for the Don Miller Award, the H.M. Hashemian Mid-Career Award, and the Ted Quinn Early Career Award. Please see the Honors and Awards brochure for more information about our awardees.

Panelists:

Yunfei Zhao (*Ohio State*)

Robert Bruneau (*SNL*)

Poong Hyun Seong (*KAIST*)

General Topics in Human Factors Engineering

Sponsored by HFICD

Session Organizer and Chair: Jamie Baalis Coble (U. T., Knoxville)

Location: Greenway H Time: 2:45-3:40 pm

2:50 pm: Development of New Performance Shaping Factors' Taxonomy for a Human Reliability Analysis, Seongkeun Kang, Poong Hyun Seong (*KAIST*)

3:15 pm: An Approach to Multi-Unit Human Reliability Analysis: Application of SPAR-H, Jooyoung Park, Awwal Mohammed Arigi, Jonghyun Kim (*Chosun Univ.*)

Fuel and Materials for Fast Reactors

Sponsored by MSTD

Session Organizer: Kenneth J. Geelhood (*PNNL*)

Chair: Kallie E. Metzger (*Westinghouse*)

Location: Greenway J Time: 1:30-3:40 pm

1:35 pm: Bison Metallic Fuel Modeling Capabilities, A. Casagrande, S. R. Novascone (*INL*)

2:00 pm: High-Power Lead-Bismuth Targets and Material Studies, Robert N. Wahlen, Terry L. Grimm, Mayir Mamtimin, Faisal Y. Odeh, William A. Peters (*Niowave*), Stuart A. Maloy, Eric Olivas, Keith A. Woloshun (*LANL*)

2:25 pm: Characterization of Annealed U-10Zr Fuel with Additive Antimony for Immobilizing Fission Product Lanthanides, Weiqian Zhuo (*Virginia Tech*), Michael T. Benson, Yi Xie, Robert D. Mariani (*INL*), Jinsuo Zhanga (*Virginia Tech*)

2:50 pm: High Borated Molybdenum Alloyed Stainless Steels for Thermal Neutron Absorption, Tomáš Studecký (*COMTES FHT*)

3:15 pm: Diffusion Behaviors Between Fe and Pd-Containing Metallic Fuel, Yi Xie, Michael T. Benson, Lingfeng He, James A. King (*INL*)

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WEDNESDAY, JUNE 12
TECHNICAL SESSIONS – 1:30 PM

Advanced/Gen-IV Reactors—I

Sponsored by OPD

Session Organizer: Piyush Sabharwall (*INL*)

Chair: Vivek P. Utgikar (*Univ of Idaho*)

Location: Greenway B **Time:** 1:30-3:40 pm

- 1:35 pm:** Conceptual Design Considerations for KAIST Hybrid Micro Modular Reactor (H-MMR), Jin Young Heo, In Woo Son, Ye Seul Kim, Jeong Ik Lee (*KAIST*)
- 2:00 pm:** Experimental Verification of the In-Vessel CEDM for Small Modular Reactors, Park Jinseok, Lee Wonho, Lee Myounggoo, Cho Yeonho, Kim Hyunmin, Maeng Chulsoo (*KEPCO*)
- 2:25 pm:** A Modular High-Temperature Gas-Cooled Reactor (MHTGR) with Decreased Power Density and In-Core Stored Heat for Variable Electricity and Industrial Heat, Charles Forsberg (*MIT*)
- 2:50 pm:** Economic Assessment of Nuclear Hybrid Energy Systems: Nuclear-Renewable-Water Integration in Arizona, Aaron S. Epiney, Cristian Rabiti, Paul Talbot, James Richards (*INL*)
- 3:15 pm:** Conceptual Design of China Lead-Based Mini-Reactor CLEAR-M10d, Zhumin Zhao, Liqin Hu, Yican Wu (*FDS*)

Reactor Physics Design, Validation, and Operational Experience—I

Sponsored by RPD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: Ayodeji Alajo (*MUST*)

Location: Greenway I **Time:** 1:30-3:15 pm

- 1:35 pm:** Achieving High-Power Configuration in Missouri S&T Reactor (MSTR) for Potential Uprate, Thaqal Alhuzaymi (*King Abdulaziz City, Missouri Univ. S&T*), Ayodeji B. Alajo (*Missouri Univ. S&T*)
- 2:00 pm:** Low-Power Core Reconfiguration for Missouri S&T Reactor (MSTR), Thaqal Alhuzaymi (*King Abdulaziz City, Missouri Univ. S&T*), Ayodeji B. Alajo (*Missouri Univ. S&T*)
- 2:25 pm:** A Zero-Power Hybrid Fast and Thermal Subcritical Testbed, P. Deng, W. S. Yang (*Univ. Michigan*), F. Y. Odeh, M. Mamtimin (*Niowave*)
- 2:50 pm:** Revisiting Saxton Plutonium Project MOX Fuel Experiments as International Benchmarks, John D. Bess, Margaret A. Marshall, Brittney Saenz (*INL*)

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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 3:55 PM

Molten Salt Chemistry and Corrosion

Sponsored by FCWMD

Session Organizer and Chair: Jinsuo Zhang (*Virginia Tech*)

Location: Greenway A Time: 3:55-5:15 pm

- 4:00 pm:** On-Line Monitoring for Spectroelectrochemical Characterization of Uranium Within Molten Salts, Shirmir D. Branch, Amanda M. Lines, Gregg J. Lumetta, Samuel A. Bryan (*PNNL*)
- 4:25 pm:** Molecular Dynamics Simulations of Structures and Transport Properties of UCl_3 -NaCl Molten Salts, Bo Li (*U.C., Riverside*), Sheng Dai (*ORNL*), De-en Jiang (*U.C., Riverside*)
- 4:50 pm:** Electrochemical Corrosion Monitoring in Molten $MgCl_2$ -NaCl-KCl, Suhee Choi, Olivia Dale, Michael F. Simpson (*Univ. Utah*)

Irradiation Experiments—II

Sponsored by IRD

Session Organizer and Chair: Padhraic L. Mulligan (*ORNL*)

Location: Greenway C Time: 3:55-6:05 pm

- 4:00 pm:** An Expert System to Assist Researchers with Nuclear Materials Experiment Design, Brenden J. Heidrich (*INL*), Jordan M. Argyle (*Univ. Idaho*)
- 4:25 pm:** Neural Network Coupled with MCNP for Neutron Depth Profiling, Mubarak Albarqi, Raed Alsulami (*Missouri S&T, King Abdul Azziz City*), Joseph Graham (*Missouri S&T*)
- 4:50 pm:** Activation and Decay Heat Calculations Supporting MIMIC Experiment Design in TREAT, John D. Bess, Connie M. Hill, James R. Parry, Nicolas E. Woolstenhulme, Colby B. Jensen (*INL*)
- 5:15 pm:** Overview of 12 Irradiation Deployment Activities in TREAT, N. Woolstenhulme, J. Bess, P. Calderoni, B. Heidrich, D. Hurley, C. Jensen, R. Schley, K. Tsai (*INL*)
- 5:40 pm:** MCNP Analysis of the Aqua-SETH Experiment in TREAT, Connie M. Hill, Nicolas E. Woolstenhulme, D. Devin Imholte, John D. Bess (*INL*)

General Thermal Hydraulics

Sponsored by THD

Session Organizer: Elia Merzari (*ANL*)

Co-chairs: Steven A. Arndt (*NRC*), Bao-Wen Yang (*X'ian Jiaotong Univ*)

Location: Greenway D Time: 3:55-5:40 pm

- 4:00 pm:** Thermal Analysis for SRS Saltstone Disposal Facility, Enrique Molina (*U. T., Rio Grande*), Si Y. Lee (*SRNL*)
- 4:25 pm:** Thermal-Hydraulic Design of Visual 3D Printed Integral Test Facility Toward Nuclear Innovation Platform, Kyung Mo Kim, Ji Hyun Kim, In Cheol Bang (*UNIST*)
- 4:50 pm:** Optimization of Airfoil PCHE for the Recuperator of Nitrogen Brayton Cycle, Jin Gyu Kwon, Joo Hyun Park, Tae Ho Kim, Moo Hwan Kim (*POSTECH*)
- 5:15 pm:** Development of Regulatory Audit Framework for Asymmetric Events of the Non-LOCA, Il Suk Lee (*KINS, Korea Univ.*), Dong H. Yoon, Tae H. Kim, Ahn D. Shin (*KINS*), Yong C. Kim (*Korea Univ.*)

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WEDNESDAY, JUNE 12
TECHNICAL SESSIONS – 3:55 PM

Severe Accident Thermal Hydraulics—II

Sponsored by THD

Session Organizer: John C. Luxat (*McMaster Univ.*)

Cochairs: Guillaume P. Mignot (*Oregon State Univ.*), John Luxat (*McMaster Univ.*)

Location: Greenway E **Time:** 3:55-5:40 pm

- 4:00 pm:** Effect of Subcooling on Flow Boiling CHF Using a Full Scale 2-D Curved Test Section for ERVC, Xiang Zhang, Daogui Tian, Bin Jiang, Lian Chen (*SNPTC*)
- 4:25 pm:** Analysis of Core Coolability During a Severe Accident with Delayed External Injection for CPR1000, Zhi'ao Huang, Huifang Miao, Huai-En Hsieh, Ning Li (*Xiamen Univ.*)
- 4:50 pm:** A Zero-Dimensional Model for Dryout Heat Flux of Debris Bed Considering Interfacial Friction Between Two Phases, Dong Yeol Yeo, Hee Cheon No (*KAIST*)
- 5:15 pm:** Analysis of PWR SBO Scenarios Under Refueling Condition Using MAAP5, Peng Yuan, Xiaoli Wu (*Nuclear Power Inst. China*)

Molten Salt Reactors—II

Sponsored by RPD

Session Organizer: Florent Heidet (*ANL*)

Chair: Benjamin Betzler (*ORNL*)

Location: Greenway F **Time:** 3:55-5:40 pm

- 4:00 pm:** Design Optimization and Burnup Analysis for Molten Chloride Fast Reactor, L. Y He (*Shanghai Inst. App. Phys.*), G. C Li (*Tsinghua Univ.*)
- 4:25 pm:** Chemical Overview of Molten Salts, Robin V. Roper (*Univ. Idaho*), Piyush Sabharwall (*INL*), Richard Christensen (*Univ. Idaho*)
- 4:50 pm:** A Versatile Experimental Salt Irradiation Loop (VESIL) in the Advanced Test Reactor, Abdalla Abou-Jaoude, Joe Palmer, James W. Sterbentz, Patrick Calderoni (*INL*)
- 5:15 pm:** Design of a Small Modular Molten Salt Reactor, Lance Bullerwell (*NCSU*), Nicholas Smith (*Southern Co.*), Jason Hou (*NCSU*)

Data, Analysis, and Operations in Nuclear Criticality Safety—II

Sponsored by NCSD

Session Organizer: Theresa Cutler (*LANL*)

Chair: Hailey M. Green (*Y-12*)

Location: Greenway G **Time:** 3:55-5:40 pm

- 4:00 pm:** The Effect of Phase Disengagement on Criticality Safety Calculations for Aqueous Separations, Tracy Stover (*Savannah River Solutions*)
- 4:25 pm:** On the Use of Nature of Process Arguments, Tracy Stover, John Lint, Joshua Butler, Jaclyn Fitzpatrick (*Savannah River Nuclear Solutions*), Tara Smith, Kevin McCann (*SRNL*), Brett Clinton, Brittany Williamson (*Savannah River Nuclear Solutions*)
- 4:50 pm:** Carbon Reactivity Effect with Fissile Mass and Hydrogenous Moderation Control, Brandon M. O'Donnell (*BWXT*)
- 5:15 pm:** Mission Change from Enrichment to Deactivation Impact on Nuclear Criticality Safety, Tom Hines (*PPPO*), Matthew Wilson (*Paschal Solutions*), John Justice (*Enercon*), David Little (*Fluor-BWXT*), Brandon Little (*Value Added Solutions*)

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WEDNESDAY, JUNE 12

TECHNICAL SESSIONS – 3:55 PM

Highlights of 2019 ANS Probabilistic Safety Assessment and Analysis (PSA 2019)–Panel

Sponsored by NISD

Session Organizer and Chair: Kevin R. O’Kula (*AECOM Technical Services*)

Location: Greenway H Time: 3:55-6:05 pm

This session will feature a panel of speakers to present the highlights from the PSA 2019 conference, which was held April 28 to May 3 in Charleston, SC.

Panelists:

Zachary Jankovsky (*SNL*)

Mohammad Modarres (*Univ of Maryland*)

Tunc Aldemir (*Ohio State*)

Computational Tools for Radiation Protection and Shielding—I

Sponsored by RPSD

Session Organizer: Irina I. Popova (*ORNL*)

Chair: Igor Remec (*ORNL*)

Location: Greenway J Time: 3:55-5:40 pm

4:00 pm: Effects of Season, Altitude, and Areal Density on Neutron Transport in Air, L. M. Rolison, M. L. Fensin, K. C. Kelley, S. S. McCreedy (*LANL*)

4:25 pm: Validation of the Shift Monte Carlo Code—Neutron Field Measurements in a Concrete Labyrinth, Jackson N. Wagner (*Texas A&M*), Douglas E. Peplow (*ORNL*)

4:50 pm: Comparison of MCCAD and DAGMC for Predictive Capability with BGA Inspection Systems, Michael P. Pfeifer, Nathanael Simerl (*Kansas State*), John Porter (*Honeywell*), Walter J. McNeil, Amir A. Bahadori (*Kansas State*)

5:15 pm: Radiation Assessment of Nuclear Accident in the Greater Bay Area of China, Junjie Cai, Jiyun Zhao (*City Univ. Hong Kong*)

Computational Tools for Radiation Protection and Shielding—II

Sponsored by RPSD

Session Organizer: Irina I. Popova (*ORNL*)

Chair: Igor Remec (*ORNL*)

Location: Greenway J Time: 5:45-7:05 pm

5:50 pm: Comparing Two Methods for Approaching Nested DXTRAN Spheres as a Weight Shield, M. L. Fensin, K. C. Kelley, L. M. Rolison, E. S. Lum and S. S. McCreedy (*LANL*)

6:15 pm: Validation of Shielding Analysis Capability of SuperMC3.3 with Dogleg Duct Streaming Experiment in FNS, Jun Zou, Bin Wu, Lijuan Hao, Jing Song, Pengcheng Long (*Inst. Nucl. Energy Safety Technol.*)

6:40 pm: Derivative of an (α ,n) Neutron Source with Respect to Nuclear Data, Jeffrey A. Favorite (*LANL*)

Advanced Gen-IV Reactors—II

Sponsored by OPD

Session Organizer and Chair: James (Vince) V. Gilbert (*Model Performance, LLC*)

Location: Greenway B Time: 3:55-4:50 pm

4:00 pm: A Study of Passive Features of a Small Modular Reactor, Jun Chen, Huifang Miao, Huai-En Hsieh, Zhi’ao Huang (*Xiamen Univ.*), Xingwei Shi (*Nucl. Radiat. Safety Center*)

4:25 pm: Floating Micro-Modular-Reactor Concept for Localized Power Outages, Kristin Smith, Pavel Tsvetkov, Moo-Hyun Kim, Lin Shao, Sunil Chirayath (*Texas A&M*)

Technical
Sessions:
Wednesday
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12

WEDNESDAY, JUNE 12
TECHNICAL SESSIONS – 3:55 PM

Operations and Power Division: General

Sponsored by OPD

Session Organizer: Rosemary Yeremian (*Thermodyne Engineering*)

Chair: Vivek Utgikar (*Univ of Idaho*)

Location: Greenway B **Time:** 4:55-5:50 pm

5:00 pm: Development of Frequency Response Function for ABWR, Shunsuke Konno, Junichi Kitamura (*Hitachi-GE*)

5:25 pm: Financial Analysis of Modular Nuclear Reactors, Pedro Mena, Leslie Kerby (*Idaho State*)

Reactor Analysis Methods—II

Sponsored by RPD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: Akio Yamamoto (*Nagoya Univ*)

Location: Greenway I **Time:** 3:55-5:40 pm

4:00 pm: Equilibrium Cycle Convergence During Predicted Bifurcation Using PARCS/PATHS for BWRs, P. Yarsky, A. Bielen (*NRC*)

4:25 pm: Uncertainty Quantification/Reduction of BWR Core Characteristics Considering Cross Section and Thermal-Hydraulics Uncertainties, Motohiro Ito, Akio Yamamoto, Tomohiro Endo (*Nagoya Univ.*), Tsuyoshi Ama (*TEPCO*)

4:50 pm: A New Two-Step Framework with Improved Nodal Equivalence for PWR Depletion Analysis, Kyunghoon Lee (*KAIST & KAERI*), Woosong Kim (*KAERI*), Yonghee Kim (*KAIST*)

5:15 pm: Real Variance Analysis of Unbiased Ratio Estimator in Monte Carlo k-Eigenvalue Calculation, HyeonTae Kim (*KAIST*), YuGwon Jo (*KHNP-CRI*), Yonghee Kim (*KAIST*)

**Technical
Sessions:
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June
12**



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THURSDAY, JUNE 13

TECHNICAL SESSIONS – 8:00 AM

Fuel Cycle and Waste Management: General—I

Sponsored by FCWMD

Session Organizer and Chair: Stephanie H. Bruffey (ORNL)

Location: Greenway A Time: 8:00-9:45 am

- 8:05 am:** Thermodynamic Approach to the Chemical Degradation of Fly Ash-Blended Concrete: Case Study for Korean LILW Trench Type Repository, Sol-Chan Han, Jong-II Yun (KAIST)
- 8:30 am:** Updates on Borated Aluminum Cask Design for Onsite Used Fuel Storage, R. A. Borrelli (Univ. Idaho)
- 8:55 am:** Investigation of Void Formations Using Neutron Measurements in Filler Materials for Dual-Purpose Canisters, Seung Min Woo, Shikha Prasad, Sunil Chirayath (Texas A&M)
- 9:20 am:** Initial Study for De-Inventory of Spent Nuclear Fuel from the Kewaunee Site, Kevin J. Connolly, Matthew R. Feldman (ORNL), Ralph E. Best, Steven J. Maheras (PNNL), Don McGee, Sven O. Bader (Orano)

Irradiation Experiments—III

Sponsored by IRD

Session Organizer: Brenden J. Heidrich (INL)

Chair: Joel McDuffee (ORNL)

Location: Greenway C Time: 8:00-10:10 am

- 8:05 am:** State-of-the-Art Experimental Capabilities at the N.C. State PULSTAR Reactor, A. I. Hawari, S. A. Lassell (NCSU)
- 8:30 am:** The Fission Accelerated Steady State Test (FAST) – A Revised Capsule Design for the Accelerated Testing of Advanced Reactor Fuels, Bryon Curnutt, Geoffrey Beausoleil (INL)
- 8:55 am:** Novel Intermediate Conductivity Experiment (NICE) Capsules for Irradiated Fuel, Brian Durtschi, Charles Folsom, Bryon Curnutt, Nate Oldham, Dan Wachs (INL)
- 9:20 am:** Compressible Metal Foils for Temperature Control During Irradiation, Christian M. Petrie, Padhraic Mulligan, Joel McDuffee (ORNL)
- 9:45 am:** Finite Element Based Surrogate Modeling and Irradiation Capsule Optimization for Large-Scale Neutron Irradiation Campaigns, Padhraic L. Mulligan, Nesrin O. Cetiner, Ryan Gallagher, J. Wilna Geringer, Anne Campbell (ORNL), Martin van Staden (X-Energy)

Computational Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Elia Merzari (ANL)

Cochairs: Kurshad Muftuoglu (GNF), Jun Wang (Univ of Wisconsin, Madison)

Location: Greenway D Time: 8:00-10:10 am

- 8:05 am:** RCIC Terry Turbine Nozzle Simulation with RELAP5-3D, Hongbin Zhang, Tyler Hughes (INL)
- 8:30 am:** CFD Analyses of Water-Based Alumina Nanofluids in Subchannel of a Standard Pressurized Water Reactor, F. Ahmed (Military Inst. Sci. Technol.), N. Ara (Bangladesh Univ. Eng. Technol.), S. B. Alam (FAEC), D. Kumar (FAEC, Uppsala Univ.), B. Almutairi (Missouri Univ. S&T), A. S. Mollah, V. Deshpande (Military Inst. Sci. Technol.), C. S. Goodwin (Rhode Island Nuclear Science Centre)
- 8:55 am:** Study of Vortex Shedding in Helical Coil Steam Generator, Mustafa Alper Yildiz (Texas A&M), Elia Merzari (ANL), Yassin Hassan, Marilyn Delgado (Texas A&M)
- 9:20 am:** Recent Advances in the Coupling of SAS4A/SASSYS-1 and STAR-CCM+ for Sodium-Cooled Fast Reactor Transient Analyses, Adam Kraus, Acacia Brunett (ANL)
- 9:45 am:** Numerical Study on the Thermal Stratification Phenomenon in the Sodium-Cooled Fast Reactor, Dalin Zhang, Shibao Wang, Suizheng Qiu, Guanghui Su (Xi'an Jiaotong Univ.)

Technical
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THURSDAY, JUNE 13
TECHNICAL SESSIONS – 8:00 AM

Advanced Nuclear NOW! Showcasing Technology Near Deployment–Panel

Sponsored by YMG; **Cosponsored by** RPD

Session Organizer and Chair: Abdalla Abou-Jaoude (*INL*)

Location: Greenway E **Time:** 8:00-10:10 am

An accelerator-driven liquid-target isotope production facility? An AI-designed flexible reactor? A heat-pipe reactor for outer space applications? The common feature between the SHINE, UTNE, and KRUSTY projects is that each of their innovative concepts are very close to full deployment. Come join us to learn more about how to bring “paper reactor” designs so close to actual deployment.

Panelists:

Eric Van Abel (*SHINE Medical Technologies*)

Vlad Sobes (*ORNL*)

David Hayes (*LANL*)

Decommissioning Experience in the Midwest–Panel

Sponsored by DESD

Session Organizer and Chair: James J. Byrne (*Byrne & Associates*)

Location: Greenway F **Time:** 8:00-10:10 am

This session will look at the experience gained from decommissioning projects in the Midwest and discuss how the projects were performed and any lessons learned that may be applicable for today’s decommissioning projects.

Panelists:

John Closs (*Xcel Energy (Retired)*)

Andrew Keim (*DOE, Office of Legacy Management*)

Gerry van Noordennen (*EnergySolutions*)

Sharing of Good Industry Practices and/or Lessons Learned in Nuclear Criticality Safety–Panel

Sponsored by NCSD

Session Organizer and Chair: Deborah Ann Hill (*NNL*)

Location: Greenway G **Time:** 8:00-10:10 am

Fundamental to the successful operation of any nuclear site is a first-class safety culture that strives to continually improve in response to good industry practices and operating experience feedback. Speakers will provide examples of either lessons learned and/or specific good practices in their areas, following which an audience discussion will be initiated on alternative good practices and related experiences.

Panelists:

John Miller (*SNL*)

Andrew Prichard (*PNNL*)

Forrest Brown (*LANL*)

Amber McCarthy (*CNS*)

Technical
Sessions:
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THURSDAY, JUNE 13

TECHNICAL SESSIONS – 8:00 AM

Cutting Edge Techniques in Education, Training, and Distance Education

Sponsored by ETWDD

Session Organizer: Lisa M. Marshall (*NCSU*)

Chair: Ron Frass (*EPA National Radiological Response Team*)

Location: Greenway H Time: 8:00-9:45 am

8:05 am: MATLAB PDE Toolbox for Neutron Diffusion Equation, Xue Yang (*Texas A&M, Kingsville*)

8:30 am: Automated Remote Control for Detector System on USMA Subcritical Assembly, Kenneth S. Allen, Samantha Hartman, Garrett Sexton, Robert Thomas (*USMA*)

8:55 am: Seminars for Nuclear Science Public Education in Las Vegas, Nevada, Steven Curtis (*ANS, Nevada Section*)

9:20 am: Developing a Nuclear Science Merit Badge Workshop, Katherine Luebke (*UNLV*), Steven Curtis (*ANS, Nevada Section*)

Post Irradiation Examination and Advanced Measurement Techniques

Sponsored by MSTD

Session Organizer and Chair: Kenneth J. Geelhood (*PNNL*)

Location: Greenway J Time: 8:00-10:10 am

8:05 am: Aging of Aromatic Polyurethanes Bags for Nuclear Storage, Joseph H. Dumont, Eamonn Murphy, Drew Geller, Tristan M. Karns, Timothy A. Stone, Paul H. Smith, Kwan-Soo Lee, Andrea Labouriau (*LANL*)

8:30 am: Preliminary Characterization of RPV Materials Harvested from the Decommissioned Zion Unit 1 Nuclear Power Plant, Mikhail A. Sokolov, Thomas M. Rosseel, Randy K. Nanstad, Xiang Chen (*ORNL*)

8:55 am: Degradation Behavior of Fluoroelastomer under Simulated Severe Accident Environment, Inyoung Song (*UNIST*), Taehyun Lee, Kyungha Ryu (*KIMM*), In Cheol Bang, Ji Hyun Kim (*UNIST*)

9:20 am: First Tests of a Gamma-Blind Fast Neutron Detector Prototype Based on ZnS and Wavelength-Shifting Fibers, Alexander Wolfertz (*ETHZ & PSI*), Robert Adams (*ETHZ*), Grégory Perret (*PSI*)

9:45 am: In-Situ PWSCC Initiation Measurement of Nickel-Based Alloy Under Triaxial Stress State in Simulated PWR Water Environment, Seung Chang Yoo (*UNIST*), Kyoung Joon Choi (*KAERI*), Jong Sung Kim (*Sejong Univ.*), Ji Hyun Kim (*UNIST*)

Nuclear Installations Safety: General—II

Sponsored by NISD

Session Organizer: Zachary Jankovsky (*Sandia*)

Chair: Kevin O’Kula (*AECOM Technical Services*)

Location: Greenway B Time: 8:00-10:10 am

8:05 am: Radiological Accident Source Terms for LWRs: A Historical Perspective, Hossein Nourbakhsh (*NRC*)

8:30 am: Development of a Thermochemical Database for Sodium Fast Reactor Mechanistic Source Term Calculations, James Jerden, David Grabaskas, Matthew Bucknor (*ANL*)

8:55 am: Experimental Approach for the Effects of Various Iodines on Hydrogen Passive Autocatalytic Recombiner (PAR), Hee-Jung Im, Jei-Won Yeon (*KAERI*)

9:20 am: Application of International Radiological Information Exchange (IRIX) Format for Radiation Monitoring Networks, Sanjoy Mukhopadhyay, Stephane Defour, Florian Baciuc, Gurdeep Saluja, Jose Segarra (*IAEA*)

9:45 am: Monte Carlo Simulation of a Multisphere Neutron Spectrometer Based on CLYC Detector, Stuti Surani, Daniel Arizaga, Angela Di Fulvio (*Univ. Illinois*)

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THURSDAY, JUNE 13
TECHNICAL SESSIONS – 8:00 AM

Reactor Physics Design, Validation, and Operational Experience—II

Sponsored by RPD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: Bradley Rearden (*ORNL*)

Location: Greenway I **Time:** 8:00-10:10 am

- 8:05 am:** SPERT III E-Core Critical Experiments Calculation with NECP-X, Chen Zhao, Zhouyu Liu (*Xi'an Jiaotong Univ.*), Thomas Downar (*Univ. Michigan*), Liangzhi Cao (*Xi'an Jiaotong Univ.*)
- 8:30 am:** Simulation of Spherical Fast Burst Reactor Pulses Using MCATK, Scott Dossa (*Univ. Minn.*), Travis J. Trahan (*LANL*)
- 8:55 am:** Utilization of the Precursor-Based Delayed Neutrons Emission Model for a Control Rod Insertion Transient, A. Talamoa, Y. Gohar (*ANL*), S. Sikorin, S. Mandzik, S. Polazau, T. Hryharovich (*Joint Inst. Power and Nucl. Res.*), V. Valtavirta, J. Leppänen (*VTT*)
- 9:20 am:** Comparison of the Reactivity Feedback Effects Between a Molybdenum-Producing PHWR Fuel Bundle and a Standard PHWR Fuel Bundle, Jawad Haroon, Eleodor Nichita (*Ontario Inst. Technol.*)
- 9:45 am:** Overview of Nuclear Data Needs for Nuclear Energy Applications, B. T. Rearden, F. Bostelmann, V. Sobes, A. M. Holcomb (*ORNL*)

TECHNICAL SESSIONS – 10:25 AM

Fuel Cycle and Waste Management: General—II

Sponsored by FCWMD

Session Organizer and Chair: Stephanie H. Bruffey (*ORNL*)

Location: Greenway A **Time:** 10:25 am-12:10 pm

- 10:30 am:** SEPHIS-ACM: A Step Forward in Separations Simulation, Tracy Stover (*Savannah River Nuclear Solutions*), Jeffrey Pike (*SRNL*)
- 10:55 am:** Hydrodynamics of Extraction Devices: Residence Time Distribution in Centrifugal Extractors, Jarod Perko, Vivek Utgikar (*Univ. Idaho*), Kevin Lyon (*INL*)
- 11:20 am:** Niowave's Fuel Fabrication and Recycle for Domestic Radioisotope Production from Fission Fragments, Faisal Y. Odeh, Alex C. Bakken, John Diemer, Amanda K. Grimm, Terry L. Grimm, Nathan C. Johnson, Christine M. Krizmanich, Mayir Mamtimin, William A. Peters, Kristin A. Shannon, Milan Stika, Robert N. Wahlen (*Niowave*)
- 11:45 am:** Understanding Nitrate Chemistry—The Key to Safer and More Efficient TRU Waste Acceptance, Paul B. Duval (*LANL*)

Irradiation Experiments—IV

Sponsored by IRD

Session Organizer and Chair: Brenden J. Heidrich (*INL*)

Location: Greenway C **Time:** 10:25 am-12:10 pm

- 10:30 am:** Design and Encapsulation of Irradiation Experiments for Previously Irradiated Materials, Ryan C. Gallagher, Richard H. Howard (*ORNL*), Grant A. Bickel (*CNL*)
- 10:55 am:** A Review of Molten Salt Irradiation Experiments, Joel McDuffee, Ken Thoms (*ORNL*)
- 11:20 am:** Validation Efforts for the ATRC MC21 Model Using the Last Decade of Experiments, Josh Peterson-Droogh, Joe Nielsen, M. Rose Holtz, Nathan Manwaring (*INL*)
- 11:45 am:** Examination of Corrosion Development in a Chloride Salt Irradiation Experiment, N. Dianne Bull Ezell, Joel McDuffee, Stephen Raiman, Dave Bryant, Josh Schmidlin (*ORNL*)

Technical
Sessions:
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THURSDAY, JUNE 13

TECHNICAL SESSIONS – 10:25 AM

Computational Thermal Hydraulics—III

Sponsored by THD

Session Organizer: Igor A. Bolotnov (NCSU)

Cochairs: Elia Merzari (ANL), Si Young Lee (SRNL)

Location: Greenway D Time: 10:25 am-12:10 pm

10:30 am: Numerical Investigation on the Hemispherical Downward Facing Pool Boiling of a Simulated Reactor Vessel, Xiang Zhang, Daogui Tian, Bin Jiang, Lian Chen (SNPTC)

10:55 am: Uncertainty Assessment for Small Break LOCA of a Generation III Reactor, Ye Yang, Jun Yang, Chengcheng Deng (Huazhong Univ of Science and Technology)

11:20 am: The Application of Dual-Mesh Coupled Heat Transfer Porous Media Model on the Numerical Simulation of a Shell-Tube Heat Exchanger, Guangdong Song (China Inst. Atomic Energy), Qingchuan Yang (Xi'an Jiaotong Univ.), Hongyi Yang (China Inst. Atomic Energy), Binbin Qiu (Xi'an Jiaotong Univ.), Huajin Yu, Mengmeng Liu (China Inst. Atomic Energy)

11:45 am: Preliminary TH Analysis on Steam Generator Tube Rupture Without High Pressure Safety Injection, Jisuk Kim, Man Cheol Kim (Chung-Ang Univ.)

From Nuclear Advocacy to Policy, From Local to Global—Panel

Sponsored by YMG; Cosponsored by ETWDD

Session Organizer: Fidelma Giulia Di Lemma (INL)

Chair: Andrew J. Conant (Georgia Tech)

Location: Greenway E Time: 10:25 am-12:35 pm

The debate on the role of nuclear energy has been heavily discussed in many U.S. states as well as around the world. In this session we will explore the role advocacy has on local and global policy. Our esteemed panelists will discuss their personal experiences in influencing policy and discuss actions that attendees can take to become more involved.

Panelists:

Natalia Saraeva (DOE)

Eric Meyer (Generation Atomic)

Kathryn (Katie) Mummah (Univ of Wisconsin, Madison)

Data, Analysis, and Operations in Nuclear Criticality Safety—III

Sponsored by NCSU

Session Organizer: Theresa E. Cutler (LANL)

Chair: Tom Young (DOE)

Location: Greenway G Time: 10:25-11:45 am

10:30 am: Criticality Evaluation of SMART Fuel Storage with MCNP6, Sungwook Choi, Bon-Seung Koo (KAERI)

10:55 am: User Experiences with ICSBEP Distributed Sensitivity Data Profiles with the SCALE Sensitivity and Uncertainty Methods as of Winter 2019, Justin B. Clarity, William J. Marshall, Ellen M. Saylor (ORNL)

11:20 am: Validation of k_{eff} Calculations for Extended BWR Burnup Credit Calculations, W. J. Marshall, J. B. Clarity, S. M. Bowman (ORNL)

General Topics in Instrumentation and Controls

Sponsored by HFICD

Session Organizer: Jamie Baalis Coble (U. T., Knoxville)

Chair: Richard Wood (Univ of Tennessee, Knoxville)

Location: Greenway H Time: 10:25-11:45 am

10:30 am: Development of a Signal Reconstruction Model for NPPs Under Emergency Situation, Seung Geun Kim, Poong Hyun Seong (KAIST)

10:55 am: An Artificial Neural Network Based Anomaly Detection Algorithm for Nuclear Power Plants, Jason Hou, Kan Ni, Ayman Hawari (NCSU)

11:20 am: Nuclear Main Control Room Obsolescence and Cyber Security Regulations Are New Challenges to Overcome, Otto P. Fest (OTTEK Corp.)

Technical
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THURSDAY, JUNE 13
TECHNICAL SESSIONS – 10:25 AM

Advanced Manufacturing and Material Science: General

Sponsored by MSTD

Session Organizer: Kenneth J. Geelhood (*PNNL*)

Chair: Colby B. Jensen (*INL*)

Location: Greenway J **Time:** 10:25 am-12:35 pm

10:30 am: Development of Cold Spray Process for Manufacturing of Oxide Dispersion Strengthened (ODS) Steel Cladding Tubes, Mia Lenling, Hwasung Yeom, Benjamin Maier, Greg Johnson, Tyler Dabney (*U. W., Madison*), Jeff Graham, Peter Hosemann (*U. C., Berkeley*), David Hoelzer (*ORNL*), Stuart Maloy (*LANL*), Kumar Sridharan (*U. W., Madison*)

10:55 am: Embedding Fiber-Optic Strain Sensors Using Ultrasonic Additive Manufacturing, Christian M. Petrie, Niyanth Sridharan (*ORNL*), Adam Hehr, Mark Norfolk (*Fabrisonic*), John Sheridan (*Sheridan Solutions*)

11:20 am: 3D Printing Assisted 4H-SiC Schottky Diodes Fabricated for Alpha Particle Spectroscopy, Neil Taylor (*Ohio State*), Chaochao Dun, Mortaza Saeidjavash, Wenzheng Kuang, Yanliang Zhang (*Notre Dame*), Lei R Cao (*Ohio State*)

11:45 am: BISON Fuel Performance Simulations of TREAT Transients, David Kamerman, Nicolas Eric Woolstenhulme, Colby Jensen, Dan Wachs (*INL*)

12:10 pm: Effect of Interstitial Point Defect on Thermal Transport in Uranium Dioxide and Plutonium Dioxide, Katherine Mitchell, Alex Resnick, Jungkyu Park, Eduardo B. Farfán, Tien Yee, Andrew Hummel (*Kennesaw State*)

Reactor Physics: General—III

Sponsored by RPD; **Cosponsored by** ANSTD

Session Organizer: Pavel V. Tsvetkov (*Texas A&M*)

Chair: Kristin Smith (*Texas A&M*)

Location: Greenway B **Time:** 10:25-11:45 pm

10:30 am: Physics Assessment of Energy Deposition Distribution in Pressure-Tube Heavy Water Reactor Lattices with Uranium-Based and Thorium-Based Fuels, B. P. Bromley, J. Alexander, H. Yan, A.V. Colton, S. Golesorkhi (*CNL*)

10:55 am: Numerical Evaluation of the Pin-by-Pin Isotope Inventory Considering the Effects of Neutron Flux Level and Neutron Spectrum, Zafar Iqbal Zafar, Myung Hyun Kim, Tae-Yang Noh (*Kyung Hee Univ.*)

11:20 am: TOPAZ-II and the HITEC: A Thermionic Reactor Design Comparison, Austin Lo, Jon Morell (*U. C., Berkeley*)

Current Topics in Risk Analysis

Sponsored by NISD

Session Organizer: Zachary Jankovsky (*Sandia*)

Chair: Charles Martin (*National Security Technologies, LLC*)

Location: Greenway I **Time:** 10:25 am-11:45 am

10:30 am: Key Regulatory Issues of Probabilistic Safety Analysis in Korea, Seungwoo Lee, Arryum Kin, Bogyung Kim, Dohyung Kim (*Korea Inst. Nucl. Safety*)

10:55 am: On-Site Electrical Systems and Components Reliability Study in NPPs, Gary Wang (*NRC*), Zhegang Ma, Nancy Lybeck (*INL*), Don Marksberry, John Lane (*NRC*)

11:20 am: Coupling RAVEN to SAPHIRE for Performing Time Dependent Probabilistic Risk Assessment, C. Wang, D. Mandelli, A. Alfonsi, P. W. Talbot, S. T. Wood, J. K. Knudsen, C. Rabiti (*INL*)

Technical
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Committee Meetings

NATIONAL COMMITTEES

Accreditation Policies & Procedures

SUNDAY, 11 AM - 12 PM | LAKESHORE A

ANS Annual Business Meeting

WEDNESDAY, 5:45 PM - 7 PM | LAKESHORE C

Board of Directors

ANS Board of Directors

WEDNESDAY, 4 PM - 5:30 PM | NICOLLET BC

ANS Board of Directors

WEDNESDAY, 7:30 PM - 8:30 PM | NICOLLET BC

ANS Board of Directors

THURSDAY, 7:30 AM - 2:30 PM | NICOLLET BC

Bylaws & Rules

SUNDAY, 4 PM - 5:30 PM | LAKESHORE B

Communications

SUNDAY, 4 PM - 5:30 PM | GREAT LAKES A3

Diversity and Inclusion in ANS

MONDAY, 1:30 PM - 3:30 PM | REGENCY ROOM

Finance Meeting

TUESDAY, 2 PM - 6 PM | LAKESHORE B

Honors & Awards

MONDAY, 4 PM - 6 PM | LAKESHORE C

International

SUNDAY, 11:30 AM - 1:30 PM | LAKE HARRIET

Local Sections Committee Workshop

SUNDAY, 9:30 AM - 12 PM | GREAT LAKES A3

Membership

SUNDAY, 10 AM - 11:30 AM | LAKESHORE C

National Program

NPC Screening

SUNDAY, 10 AM - 12 PM | GREAT LAKES A2

NPC National Meeting Subcommittee

TUESDAY, 11:30 AM - 1 PM | LAKESHORE A

NPC Program

TUESDAY, 5:30 PM - 7:30 PM | LAKE BEMIDJI

NEED

MONDAY, 11 AM - 12 PM | LAKESHORE C

President's Meeting w/Committee Chairs & Division Chairs

SUNDAY, 8 AM - 9:30 AM | REGENCY ROOM

Professional Development Coordination Committee

TUESDAY, 5 PM - 6 PM | LAKE NOKOMIS

Professional Divisions Committee

TUESDAY, 4 PM - 5:30 PM | LAKESHORE A

Professional Divisions

Training Workshop

SATURDAY, 6:30 PM - 8 PM | LAKESHORE B

Professional Engineering Exam

PEEC Item Writers Group

SATURDAY, 5 PM - 10 PM | LAKESHORE C

PEEC Exam Prep Subcommittee

SUNDAY 9 AM - 10 AM | GREENWAY B

NATIONAL COMMITTEES

Professional Engineering Exam Continued

Information Session on Nuclear Engineering

PE Exam Module Program

SUNDAY, 10 AM - 12 PM | LAKESHORE B

PEEC Item Writers Training

SUNDAY, 10 AM - 1 PM | GREENWAY B

PEEC Committee

SUNDAY, 4 PM - 6 PM | GREENWAY C

Public Policy

WEDNESDAY, 12:30 PM - 2:30 PM | REGENCY ROOM

Publications Steering

Meetings, Proceedings & Transactions

SUNDAY, 9 AM - 10 AM | GREENWAY C

Book Publishing

SUNDAY, 11 AM - 12:30 PM | GREENWAY C

Technical Journals

SUNDAY, 1 PM - 4 PM | GREENWAY C

FS&T Editorial Advisory Committee

SUNDAY, 4:30 PM - 5:30 PM | LAKESHORE C

Publications Steering Committee

MONDAY, 4:30 PM - 6:30 PM | LAKESHORE B

Nuclear News Editorial Advisory

SUNDAY, 4-5:30 PM | LAKE OF THE ISLES

Scholarship Policy & Coordination

MONDAY, 12 PM - 1 PM | LAKESHORE C

Student Sections

Executive

MONDAY, 6 PM - 8 PM | REGENCY ROOM

SPECIAL COMMITTEES

Special Committee on Congressional Fellow

TUESDAY, 3:30 PM - 4:30 PM | LAKE BEMIDJI

OTHER COMMITTEES

Christian Nuclear Fellowship

MONDAY, 7 PM - 8:30 PM | LAKESHORE A

Christian Nuclear Fellowship Breakfast

WEDNESDAY, 7 AM - 8:30 AM | LAKE BEMIDJI

Korea Nuclear Society

MONDAY, 4:30 PM - 6:30 PM | LAKESHORE A

NEDHO

SUNDAY, 4 PM - 6 PM | LAKE HARRIET

NURETH

TUESDAY, 7 PM - 9 PM | LAKESHORE B

UWC Planning Committee

SUNDAY, 12 PM - 1 PM | GREAT LAKES A1

Young Professionals Congress 2019 Planning Committee

TUESDAY, 12 PM - 1 PM | LAKE MINNETONKA

Committee Meetings

DIVISION COMMITTEES

Accelerator Applications

Executive

MONDAY, 11:30 AM - 1:30 PM | LAKESHORE B

Aerospace Nuclear Science & Technology

SUNDAY, 12 PM - 1 PM | LAKESHORE A

Decommissioning and Environmental Sciences

Program

SUNDAY, 3:30 PM - 4:30 PM | GREENWAY B

Executive

SUNDAY, 4:30 PM - 5:30 PM | GREENWAY B

Education, Training & Workforce Development

Program

SUNDAY, 10:30 AM - 12 PM | LAKE MINNETONKA

Alpha Nu Sigma

SUNDAY, 1 PM - 2 PM | LAKESHORE A

University/Industry/Government Relations

SUNDAY, 1:30 PM - 2 PM | LAKE MINNETONKA

Executive

SUNDAY, 2 PM - 4 PM | LAKE MINNETONKA

Fuel Cycle & Waste Management

Program

SUNDAY, 12 PM - 1 PM | GREAT LAKES B

Executive

SUNDAY, 1 PM - 2:30 PM | GREAT LAKES B

Fusion Energy

Executive

TUESDAY, 6 PM - 8 PM | LAKESHORE A

Human Factors, Instrumentation, and Controls

Program

SUNDAY, 11 AM - 12 PM | LAKE BEMIDJI

Executive

SUNDAY, 12 PM - 2:30 PM | LAKE BEMIDJI

Isotopes and Radiation

Joint Program Committee-I&R/BM

SUNDAY, 1:30 PM - 2:30 PM | GREENWAY A

Executive

SUNDAY, 2:30 PM - 4:30 PM | GREENWAY A

Materials Science & Technology

Executive

MONDAY, 6:45 PM - 8:45 PM | LAKESHORE C

Mathematics & Computation

Program

SUNDAY, 1 PM - 2 PM | LAKESHORE B

Executive

SUNDAY, 2 PM - 4 PM | LAKESHORE B

DIVISION COMMITTEES

Nuclear Criticality Safety

Education

SUNDAY, 1 PM - 2 PM | GREAT LAKES C

Program

SUNDAY, 2 PM - 3 PM | GREAT LAKES C

Executive

SUNDAY, 3 PM - 4:30 PM | GREAT LAKES C

Nuclear Installations Safety

Program

SUNDAY, 4 PM - 6 PM | LAKE MINNETONKA

Executive

MONDAY, 7:30 PM - 9 PM | LAKESHORE B

Nuclear Nonproliferation Policy

Program

SUNDAY, 2:30 PM - 3:30 PM | LAKESHORE A

Executive

SUNDAY, 3:30 PM - 4:30 PM | LAKESHORE A

Operations & Power

Program

SUNDAY, 1:30 PM - 3 PM | GREAT LAKES A1

Executive

SUNDAY, 3:30 PM - 6 PM | GREAT LAKES A1

Radiation Protection & Shielding

Program

SUNDAY, 1 PM - 2 PM | GREAT LAKES A3

Executive

SUNDAY, 2 PM - 4 PM | GREAT LAKES A3

Reactor Physics

Program

SUNDAY, 2 PM - 3:30 PM | GREAT LAKES A2

Executive

SUNDAY, 3:30 PM - 6 PM | GREAT LAKES A2

Robotics & Remote Systems

Executive

SUNDAY, 12 PM - 4 PM | LAKESHORE C

Thermal Hydraulics

Program

SUNDAY, 2:30 PM - 4:30 PM | LAKE BEMIDJI

Executive

SUNDAY, 4:30 PM - 6 PM | LAKE BEMIDJI

Young Members Group (TG)

Program

MONDAY, 10:30 AM - 11:30 AM | LAKESHORE A

Executive

MONDAY, 11:30 AM - 12:30 PM | LAKESHORE A

Committee Meetings

STANDARDS COMMITTEES

ANS-3.15, Cybersecurity Standard

SUNDAY 2 PM - 5 PM | CEDAR LAKE

ANS-8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors

MONDAY 8 AM - 10 AM | LAKE NOKOMIS

ANS-8.12, Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors

TUESDAY 3:30 PM - 6 PM | LAKE OF THE ISLES

ANS-8.20, Nuclear Criticality Safety Training

SUNDAY 10 AM - 12 PM | LAKE OF THE ISLES

ANS-8.26, Criticality Safety Engineer Training and Qualification Program

SUNDAY, 11 AM - 1 PM | CEDAR LAKE

ANS-8.28, Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety

TUESDAY 3 PM - 5 PM | CEDAR LAKE

ANS-8.3, Criticality Accident Alarm System

MONDAY 10 AM - 11:30 AM | LAKE NOKOMIS

ANS-19, Reactor Physics Subcommittee

MONDAY 9 AM - 10:30 AM | LAKE OF THE ISLES

ANS-19.3, Steady-State Neutronics Methods for Power Reactor Analysis

MONDAY 8 AM - 9 AM | LAKE OF THE ISLES

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)

MONDAY 10 AM - 12 PM | CEDAR LAKE

New and Used Fuel (Design Only) Subcommittee

MONDAY 1:30 PM - 4:30 PM | LAKE OF THE ISLES

Risk-informed, Performance-based Principles and Policy Committee (RP3C)

MONDAY 2:30 PM - 6 PM | CEDAR LAKE

Standards Board

TUESDAY 8:30 AM - 5 PM | LAKESHORE C

Standards Forum

WEDNESDAY 8 AM - 10 AM | GREENWAY A

Committee/Division/Other Meetings Daily

Saturday, June 8

9:30 am-4:00 pm	Teacher's Workshop	Lakeshore A
5:00 pm - 10:00 pm	Professional Engineering Exam Committee-Item Writers Group	Lakeshore C
6:30 pm - 8:00 pm	Professional Divisions Committee-Training Workshop	Lakeshore B

Sunday, June 9

8:00 am - 9:30 am	President's Meeting with Committee & Division Chairs	Regency Room
9:00 am - 10:00 am	Publications Steering-Meetings, Proceedings & Transactions Committee	Greenway C
9:00 am - 10:00 am	PEEC Exam Prep Subcommittee	Greenway B
9:30 am - 12:00 pm	Local Sections Committee Workshop	Great Lakes A3
10:00 am - 12:00 pm	ANS-8.20, Nuclear Criticality Safety Training	Lake of the Isles
10:00 am - 12:00 pm	National Program Committee-NPC Screening	Great Lakes A2
10:00 am - 11:30 am	Membership Committee	Lakeshore C
10:00 am - 12:00 pm	Information Session on Nuclear Engineering PE Exam Module Program	Lakeshore B
10:00 am - 1:00 pm	Professional Engineering Exam Committee; Item Writers Training	Greenway B
10:30 am - 12:00 pm	Education, Training & Workforce Development Division-Program Committee	Lake Minnetonka
11:00 am - 12:00 pm	Accreditation Policies & Procedures Committee	Lakeshore A
11:00 am - 12:30 pm	Publications Steering Committee-Book Publishing	Greenway C
11:00 am - 12:00 pm	Human Factors, Instrumentation & Controls Division-Program Committee	Lake Bemidji
11:00 am - 1:00 pm	ANS-8.26, Criticality Safety Engineer Training and Qualification Program	Cedar Lake
11:30 am - 1:30 pm	International Committee	Lake Harriet
12:00 pm - 1:00 pm	Fuel Cycle & Waste Management Division-Program Committee	Great Lakes B
12:00 pm - 1:00 pm	UWC Planning Committee	Great Lakes A1
12:00 pm - 1:00 pm	Aerospace Nuclear Science & Technology Division	Lakeshore A
12:00 pm - 2:30 pm	Human Factors, Instrumentation & Controls Division-Executive Committee	Lake Bemidji
12:00 pm - 4:00 pm	Robotics & Remote Systems Division-Executive Committee	Lakeshore C
1:00 pm - 2:00 pm	Education, Training & Workforce Development Division-Alpha Nu Sigma National Honor Society	Lakeshore A
1:00 pm - 2:00 pm	Mathematics & Computation Division-Program Committee	Lakeshore B
1:00 pm - 2:00 pm	Nuclear Criticality Safety Division-Education Meeting	Great Lakes C
1:00 pm - 2:00 pm	Radiation Protection & Shielding Division-Program Committee	Great Lakes A3
1:00 pm - 2:30 pm	Fuel Cycle & Waste Management Division-Executive Committee	Great Lakes B
1:00 pm - 4:00 pm	Publications Steering Committee-Technical Journals	Greenway C
1:30 pm - 2:30 pm	Isotopes & Radiation Division-Joint Program Committee-I&R/BM	Greenway A
1:30 pm - 2:00 pm	Education, Training & Workforce Development Division-University/Industry/Government Relations Committee	Lake Minnetonka
1:30 pm - 3:00 pm	Operations & Power Division-Program Committee	Great Lakes A1
2:00 pm - 3:00 pm	Nuclear Criticality Safety Division-Program Committee	Great Lakes C
2:00 pm - 3:30 pm	Reactor Physics-Program Committee	Great Lakes A2
2:00 pm - 4:00 pm	Education Training & Workforce Development Division-Executive Committee	Lake Minnetonka
2:00 pm - 4:00 pm	Mathematics & Computation Division-Executive Committee	Lakeshore B
2:00 pm - 4:00 pm	Radiation Protection & Shielding Division-Executive Committee	Great Lakes A3
2:00 pm - 5:00 pm	ANS-3.15, Cybersecurity Standard	Cedar Lake
2:30 pm - 3:30 pm	Nuclear Nonproliferation Policy Division-Program Committee	Lakeshore A
2:30 pm - 4:30 pm	Thermal Hydraulics Division-Program Committee	Lake Bemidji
2:30 pm - 4:30 pm	Isotopes & Radiation Division-Executive Committee	Greenway A
3:00 pm - 4:30 pm	Nuclear Criticality Safety Division-Executive Committee	Great Lakes C
3:30 pm - 4:30 pm	Decommissioning and Environmental Sciences Division-Program Committee	Greenway B
3:30 pm - 4:30 pm	Nuclear Nonproliferation Policy Division-Executive Committee	Lakeshore A
3:30 pm - 6:00 pm	Operations & Power Division-Executive Committee	Great Lakes A1
3:30 pm - 6:00 pm	Reactor Physics Division-Executive Committee	Great Lakes A2
4:00 pm - 5:30 pm	Bylaws & Rules Committee	Lakeshore B
4:00 pm - 5:30 pm	Communications Committee	Great Lakes A3
4:00 pm - 6:00 pm	NEDHO	Lake Harriet
4:00 pm - 6:00 pm	Nuclear Installations Safety Division- Program Committee	Lake Minnetonka
4:00 pm - 6:00 pm	Professional Engineering Exam Committee-Committee Meeting	Greenway C
4:00 pm - 5:30 pm	Nuclear News Editorial Advisory	Lake of the Isles
4:30 pm - 5:30 pm	Decommissioning and Environmental Sciences Division-Executive Committee	Greenway B
4:30 pm - 5:30 pm	Publications Steering Committee-FS&T Editorial Advisory Committee	Lakeshore C
4:30 pm - 6:00 pm	Thermal Hydraulics Division-Executive Committee	Lake Bemidji

Committee/Division/Other Meetings Daily

Monday, June 10

8:00 am – 9:00 am	ANS-19.3, Steady-State Neutronics Methods for Power Reactor Analysis	Lake of the Isles
8:00 am – 10:00 am	ANS-8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	Lake Nokomis
9:00 am – 10:30 am	ANS-19, Reactor Physics Subcommittee	Lake of the Isles
10:00 am – 11:30 am	ANS-8.3, Criticality Accident Alarm System	Lake Nokomis
10:00 am - 11:00 am	Young Member Group-Program Committee	Lakeshore A
10:00 am – 12:00 pm	Fuel, Waste, and Decommissioning Consensus Committee (FWDC)	Cedar Lake
11:00 am - 12:00 pm	NEED Committee	Lakeshore C
11:30 am - 1:30 pm	Accelerator Applications Division-Executive Committee	Lakeshore B
12:00 pm - 1:00 pm	Scholarship Policy & Coordination Committee	Lakeshore C
12:30 pm - 1:30 pm	Young Member Group-Executive	Lakeshore A
1:30 pm – 3:30 pm	Diversity and Inclusion in ANS	Regency Room
1:30 pm – 4:30 pm	New and Used Fuel (Design Only) Subcommittee	Lake of the Isles
2:30 pm – 6:00 pm	Risk-informed, Performance-based Principles and Policy Committee (RP3C)	Cedar Lake
4:00 pm - 6:00 pm	Honors & Awards Committee	Lakeshore C
4:30 pm - 6:30 pm	Korea Nuclear Society	Lakeshore A
4:30 pm - 6:30 pm	Publications Steering Committee	Lakeshore B
6:00 pm - 8:00 pm	Student Sections Committee- Executive Committee	Regency Room
6:45 pm - 8:45 pm	Materials Science & Technology Division-Executive Committee	Lakeshore C
7:00 pm - 8:30 pm	Christian Nuclear Fellowship	Lakeshore A
7:30 pm - 9:00 pm	Nuclear Installations Safety Division-Executive Committee	Lakeshore B

Tuesday, June 11

8:30 am - 5:00 pm	Standards Board	Lakeshore C
11:30 am - 1:00 pm	National Program Committee-NPC National Meeting Subcommittee	Lakeshore A
12:00 pm - 1:00 pm	Young Professionals Congress 2019 Planning Committee	Lake Minnetonka
2:00 pm - 6:00 pm	Finance Committee	Lakeshore B
3:00 pm – 5:00 pm	ANS-8.28, Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Cedar Lake
3:30 pm – 4:30 pm	Special Committee on Congressional Fellow	Lake Bemidji
3:30 pm – 6:00 pm	ANS-8.12, Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors	Lake of the Isles
4:00 pm - 5:30 pm	Professional Divisions Committee	Lakeshore A
5:00 pm - 6:00 pm	Professional Development Coordination Committee	Lake Nokomis
5:30 pm - 7:30 pm	National Program Committee - NPC Program	Lake Bemidji
6:00 pm - 8:00 pm	Fusion Energy Division-Executive Committee	Lakeshore A
7:00 pm - 9:00 pm	NURETH	Lakeshore B

Wednesday, June 12

7:00 am - 8:30 am	Christian Nuclear Fellowship Breakfast	Lake Bemidji
8:00 am – 10:00 am	Standards Forum	Greenway A
12:30 pm - 2:30 pm	Public Policy Committee	Regency Room
4:00 pm - 5:30 pm	Board of Directors Meeting	Nicollet BC
5:45 pm - 7:00 pm	ANS Annual Business Meeting	Lakeshore C
7:30 pm - 8:30 pm	ANS Board of Directors Meeting	Nicollet BC

Thursday, June 13

7:30 am - 2:30 pm	ANS Board of Directors Meeting	Nicollet BC
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ANS Organization Membership

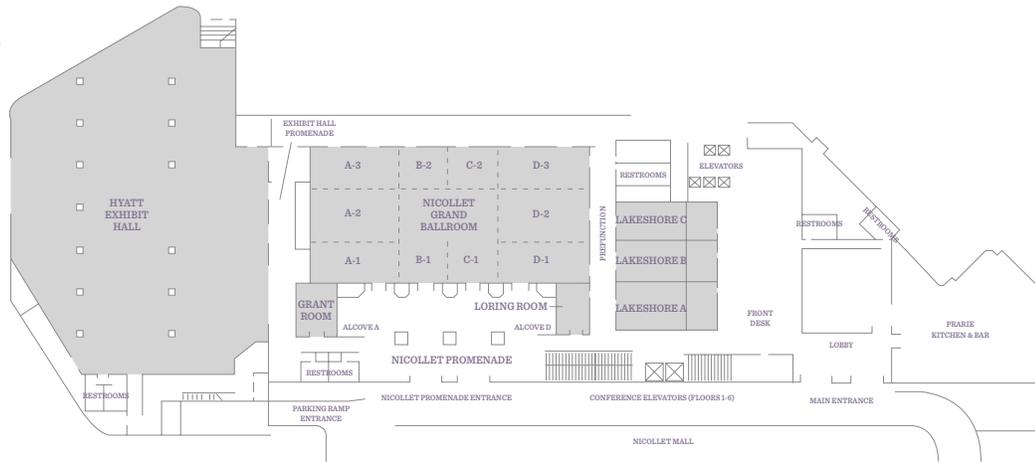
The American Nuclear Society salutes our Organization Members as sharing in our mission to promote nuclear science and technology to benefit humanity.*

AGT Global Logistics	EXCEL Services Corporation	Nutherm International, Inc.
Alphasource Inc.	Exelon Generation Company	Ontario Power Generation
Ameren Missouri-Callaway Energy Center	F&J Specialty Products Inc.	O TEK Corporation
American Electric Power	FirstEnergy	Pacific Gas and Electric Company
American Nuclear Insurers	Framatome Inc.	Power System Sentinel Technologies, LLC
Arizona Public Service Co.	Frham Safety Products, Inc.	Procedure Solutions Management, LLC
Barnhart Nuclear Services	Hagley Museum & Library	Reef Industries, Inc.
Bechtel Nuclear, Security & Environmental	Idaho National Laboratory	RSCC Nuclear Cable
Black & Veatch	James C. White Company	S&ME, Inc.
Burns & McDonnell	Kinectrics, Inc.	Sargent & Lundy
BWX Technologies, Inc.	Kinometrics Inc.	Savannah River National Laboratory
Canadian Nuclear Laboratories	KUKA Systems UK Ltd	Southern Nuclear Operating Co.
ChemStaff	L3 MAPPS Inc.	Susquehanna Nuclear, LLC
Copperleaf Technologies	Los Alamos National Laboratory	Teledyne Brown Engineering, Inc.
Dominion Generation	Maxeta Technologies	Terrestrial Energy Inc.
Dragons De Veracruz	McCallum-Turner, Inc.	Thermo Fisher Scientific
Duke Energy Corporation	Mega-Tech Services, LLC	TradeTech
EK USA	Model Performance, LLC	Tri Tool, Inc.
Electric Power Research Institute (EPRI)	Navarro Research & Engineering	TW Metals
Electrical Builders, Inc. (EBI)	Nawah Energy Company	United Controls International
Energy Northwest	NRSL-Institute of Nuclear Energy Research	ValvTechnologies
Energy Steel	Nuclear Electric Insurance Limited	Vistra Energy
Engineered Solutions, Inc.	Nuclear Energy Institute	Western Services Corporation
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*Post-print roster updates at ans.org/orgmembers/memberlist.

Hotel Floor Plans

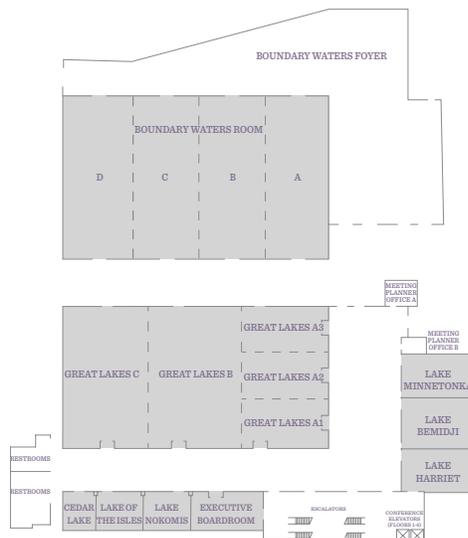
Main Level Meeting Rooms Floor plan



Second Level Meeting Rooms Floor plan



Fourth Floor Meeting Rooms Floor plan



See you at future



ANS Annual Meetings



2020 ANNUAL MEETING: JUNE 7-11

Arizona Grand Resort & Spa, Phoenix, AZ

2021 ANNUAL MEETING: JUNE 13-17

Omni / Convention Center, Providence, RI

2022 ANNUAL MEETING: JUNE 12-16

Hilton Anaheim, Anaheim, CA

2023 ANNUAL MEETING: JUNE 11-15

Marriott Indianapolis Downtown, Indianapolis, IN