





# ANS

# Annual 2019

THE VALUE OF NUCLEAR

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# Meeting Officials

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## *THE VALUE OF NUCLEAR*

2019 Annual Meeting



**GENERAL CHAIR**  
Timothy O'Connor  
*Xcel Energy*



**ASSISTANT GENERAL COCHAIR**  
Patrick Burke  
*Xcel Energy*



**ASSISTANT GENERAL COCHAIR**  
Renee Eickstadt  
*Xcel Energy*



**ASSISTANT GENERAL COCHAIR**  
Peter Gardner  
*Xcel Energy*



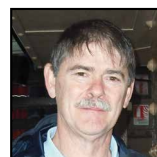
**ASSISTANT GENERAL COCHAIR**  
Pamela Gorman  
*Xcel Energy*



**ASSISTANT GENERAL COCHAIR**  
Michelle Kelly  
*Xcel Energy, WIN Sponsor*



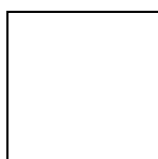
**TECHNICAL PROGRAM CHAIR**  
Sue Aggarwal  
*NMNTI*



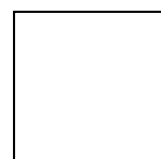
**ASSISTANT TECHNICAL PROGRAM CHAIR**  
James J. Byrne  
*Byrne & Associates*



**STUDENT PROGRAM CHAIR**  
Amanda Bachmann  
*University of Tennessee, Knoxville*



**MEDIA CHAIR**  
Randy Fordice  
*Xcel Energy*



**TECHNICAL TOUR CHAIR**  
Jon Kapitz  
*Xcel Energy*

# Daily Schedule

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## Sunday, June 9

7:00 am-7:00 pm	Registration
6:00-8:00 pm	ANS President's Opening Reception

## Monday, June 10

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

# Daily Schedule

## Tuesday, June 11

7:00 am-5:00 pm	Registration
7:30-8:00 am	Continental Breakfast
8:00-10:00 am	ANS President's Special Session
10:00-10:15 am	Coffee Break
10:15 am-12:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• University Research in Fuel Cycle and Waste Management—I</li> <li>• Advancement of On-Line Monitoring Systems for Operations in Nuclear Fuel Recycling Applications</li> <li>• Thermal Hydraulics of Accident-Tolerant Fuels</li> <li>• Computational Methods: General</li> <li>• General Topics in Decommissioning</li> <li>• Credible Accident Sequences in NCS—Panel</li> <li>• ANS Nuclear Grand Challenges</li> <li>• Fuel and Materials for Molten Salt Reactors</li> <li>• Advanced and Small Modular Reactors (ASMR): 3 Pathways for Deployment—Panel</li> <li>• Reactor Analysis Methods—I</li> </ul>
12:00 pm-1:30 pm	Lunch on Own
1:30-3:40 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• University Research in Fuel Cycle and Waste Management—II</li> <li>• Challenges Associated with Material Transport into and Waste Removal from Hot Cell R&amp;D Facilities Worldwide—Panel</li> <li>• Scaling Methodologies for SET and IET—Panel</li> <li>• Transport Methods</li> <li>• Water Technologies and Nuclear Power Update—Panel</li> <li>• Real World Applications of Sensitivity/Uncertainty</li> <li>• Focus on Communications: Meanwhile in Canada—How Communications Helped the Nuclear Industry to Expand—I—Panel</li> <li>• Nuclear Science User Facilities—II</li> <li>• Radiation Protection and Shielding: General,</li> <li>• Overview of the Versatile Test Reactor—III</li> </ul>
3:40-3:55 pm	Coffee Break
3:55-6:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• Recycle and Reuse of Used Nuclear Fuel Resources</li> <li>• Progress in Consolidated Interim Storage and Next Steps—Panel</li> <li>• Multiphase CFD and Large Eddy/Direct Numerical Simulations</li> <li>• Creating a Successful Career—Panel</li> <li>• Reactor Physics: General—I</li> <li>• High-Assay Low Enriched Uranium (HALEU): Current Activities and Future Supply—Panel</li> <li>• Focus on Communications: What are Your Non-Nuclear Friends REALLY Thinking?—II –Panel</li> <li>• Accident Tolerant Fuels—I</li> <li>• Molten Salt Reactors—I</li> <li>• The Consortium for the Advanced Simulation of Light Water Reactors</li> </ul>



# Daily Schedule

## Wednesday, June 12

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

# Daily Schedule

## Thursday, June 13

7:00 am-10:00 am

7:30-8:00 am

8:00-10:10 am

Registration

Continental Breakfast

ANS Technical Sessions

- 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

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

10:25 am-12:35 pm

ANS Technical Sessions

- 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



# #ANSMeeting



# General Information

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## 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

## ATTENDEE MEAL FUNCTIONS

### Continental Breakfast & Breaks

Continental Breakfast, and morning and afternoon beverages and snacks will be provided to all registered meeting attendees, Monday-Thursday.

### ANS President's Opening Reception

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).

## 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

# General Information

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## HOTEL ACCOMMODATIONS

### Hyatt Regency Minneapolis

1300 Nicollet Mall, Minneapolis, MN 55403

### Hotel Phone Number:

Call 877-803-7534 to speak directly with a Hyatt representative. Please advise you are with ANS or ANS Annual Meeting and you will be extended the prevailing rate. For additional questions, please contact the ANS meetings department at [meetings@ans.org](mailto:meetings@ans.org). Check-in: 3 pm Check-out: 12 pm

### Reservation Link:

To receive the group rate, your reservation may be booked through the ANS Official Housing Link: visit [ansannual.org/hotelground/](http://ansannual.org/hotelground/) and click on “**Reserve Your Room Here!**” On the same page there is also a government rate link available by clicking on “**For a Government rate, Reserve Your Room Now!**”

## MESSAGE TO ATTENDEES

ANS has made every effort to secure the best possible nightly room rate for you at the Hyatt Regency Minneapolis. That rate results from a negotiated overall package of event needs including but not limited to: sleeping rooms, meeting room space and other requirements.

Please help ANS keep the costs of this event as low as possible by booking your housing needs at the host hotel and through the reservation process created by ANS. Reserving your rooms elsewhere means you are booking outside the contracted room block, jeopardizing ANS’s ability to meet its contracted obligations. Unfortunately if this happens, event costs will continue to increase if ANS falls short of its minimum room block guarantee. ANS appreciates your support and understanding of this important issue. Thank you!

## TRAVEL INFORMATION

**Airport:** Minneapolis–Saint Paul International Airport (MSP), also less commonly known as Wold–Chamberlain Field, is located 12 miles from the hotel. MSP is the largest and busiest airport in the six-state Upper Midwest region of the United States of America.

**Amtrak Station:** 8 miles from the hotel

**Public Transit Centers:** Greyhound Bus Station: located 7 blocks from the hotel.

Light Rail Station: 8 blocks from the hotel and takes you towards downtown, Mall of America, the airport, and St. Paul.

### Self Parking

\$5– 0-20 minutes

\$10 -21-40 minutes

\$15- 41-60 minutes

\$24- 61 minutes+/Daily

### Valet Parking

\$15/Hourly- 0-2 Hours

\$20/Hourly- 2-4 Hours

\$39/Hourly 4+ Hours/Daily

# General Information

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## OTHER THINGS TO ATTEND

### **Teacher's Workshop**

Saturday: 9:30 am-4:00 pm

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

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: 12:30-1:30 pm

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

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.

### **Mentor Meeting**

Sunday: 5:00-6:00 pm

All attendees, from seasoned professionals to students, are encouraged to attend this informal one-hour open discussion. Prior mentor/mentoring experience is not required. Simply come share your insights, ask questions, and network in this mentoring experience beneficial to all.

### **Attention Runners: ANS Fun Run**

Tuesday: 6:00 am

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!

# General Information

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## 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 contacts 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](http://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](mailto:rfine@ans.org).

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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

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## 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

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## SUNDAY, JUNE 9

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### ANS President's Opening Reception

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

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### Opening Plenary: The Value of Nuclear

8:00-11:00 am

Speakers to be announced.

### OPD Honors & Awards Dinner

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 TBA. Tickets may be purchased online or at the Registration Desk, space is limited.

## TUESDAY, JUNE 11

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

8:00-10:00 am

**Chair:** John Kelly (*President, ANS*)

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.

# Plenary, Special Sessions and Events

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## WEDNESDAY, JUNE 12

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### General Chair's Special Session

8:00-10:00 am

Speakers to be announced.

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### Focus on Communications Workshop

4:00-6:00 pm

Details to come

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### ANS Annual Business Meeting

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.

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## THURSDAY, JUNE 13

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### Technical Tour: Monticello Nuclear Generating Plant

8:30 am-3:30 pm

Cost: \$60

The Monticello Nuclear Generating Plant is a single unit boiling water reactor located at Monticello, MN, approximately 40 miles from Minneapolis-St Paul. The reactor provides about 10 percent of the electricity used by Xcel Energy's customers in Minnesota, North Dakota, South Dakota, Wisconsin and Michigan. The tour will include:

- Training center, including simulator demonstration
  - Plant tour in non-radiological controlled areas
  - Dry cask storage facility
- 

### Technical Tour: Prairie Island Nuclear Generating Station

8:30 am-3:30 pm

Cost: \$60

Prairie Island's two pressurized water reactors generate about 30 percent of the electricity used by Xcel Energy's customers in Minnesota, North Dakota, South Dakota, Wisconsin and Michigan. The plant is located on a 520-acre site about 40 miles southeast of Minneapolis-St. Paul and about five miles north of Red Wing, Minn. The tour will include:

- Training center, including simulator demonstration
- Plant tour in non-radiological controlled areas
- Dry cask storage facility
- FLEX equipment storage building



# Technical Sessions by Division

(Asterisks indicate special sessions)

## SPECIAL SESSIONS

- \*Opening Plenary: The Value of Nuclear, Mon. am (8:00-11:30 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 in Pre-College Space—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: What are Your Non-Nuclear Friends REALLY Thinking?—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

- Progress in Consolidated Interim Storage and Next Steps—Panel, Tues. pm
- 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  
High-Assay Low Enriched Uranium (HALEU): Current Activities and Future Supply, Tues. pm

## OPERATIONS AND POWER (OPD)

Thermal Energy Storage Systems, Mon. pm  
Advanced and Small Modular Reactors (ASMR): 3 Pathways for Deployment—Panel, Tues. am  
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 PHYSICS (RPD) CONTINUED

Reactor Analysis Methods—II, Wed. pm  
Reactor Physics: General—I, Tues. pm  
Reactor Physics: General—II, Wed. am  
Reactor Physics: General—III, Thurs am  
Molten Salt Reactors—I, Tues. pm  
Molten Salt Reactors—II, Wed. pm  
The Consortium for the Advanced Simulation of 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  
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  
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

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**MONDAY, JUNE 10**  
**TECHNICAL SESSIONS - 1:00 PM**

**The WIPP-20th Anniversary—Panel**

**Sponsored by** FCWMD. **Session Organizer:** Jean-Francois Lucchini (*LANL*)

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*)

**Other panelists to be announced.**

**Isotopes and Radiation: General**

**Sponsored by** IRD. **Session Organizer:** Igor Jovanovic (*Univ of Michigan*)

Niowave's Domestic Radioisotope Production from Uranium and Radium, Amanda K. Grimm, Chase H. Boulware, Terry L. Grimm, William A. Peters, Mike A. Zamiara (*Niowave, Inc.*)

Efficiency Optimization of a Positron Moderator Foil, Raed Alsulami, Mubarak Albarqi (*Missouri Univ Sci Technol*), Safwan Jaradat (*Higher Colleges of Technology,*), Joseph T. Graham, Shoaib Usman (*Missouri Univ Sci Technol*)

Neutron Depth Profiling Measurement for Borophosphosilicate Glass (BPSG), Mubarak Albarqi, Raed Alsulami, Joseph T. Graham (*Missouri Univ Sci Technol*)

Isotopic Transmutation by Heavy Electron Catalysis, Thomas J. Dolan (*Univ of Illinois*), Anthony C. Zupero (*Tionesta Applied Research Corp*)

Application of Pb Isotopes in Uranium-Cobalt Mineralization, Manny Mathuthu (*North-West Univ*)

Data-Driven Methodology for Predicting Isotope Production at Material Testing Reactors, Jorge Navarro (*ORNL*)

**Experimental Thermal Hydraulics—**

**Sponsored by** THD. **Session Organizer:** Xiaodong Sun (*Univ of Michigan*)

Turbulent Flow Measurements of the Under-Expanded Free Jet and Jet Impinging on a Flat Surface, Duy-Thien Nguyen, Blake Maher, Camila F. Matozinhos, Gabriel C. Q. Tomaz, Yassin Hassan (*Texas A&M*)

Temperature Measurements in Sub-Cooled Boiling Using Laser Induced Fluorescence Technique (LIF), Bandar A. Alkudhiri, Yassin Hassan (*Texas A&M*)

Temperature Measurement of Direct Contact Condensation of Steam Using Backlight Aided LIF, Joseph Seo, Sero Yang, Yassin A. Hassan (*Texas A&M*)

Facility for Simulating Transient Boiling Behavior Under PWR Conditions, Colby B. Jensen, Charles P. Folsom, Nicolas Eric Woolstenhulme, Nicholas Smith (*INL*), Kevin Joe Terrill, Richard N. Christensen (*Univ of Idaho*)

Experimental Research of Jet Diameter on Heat Transfer in a Small Steel Containment, Shengfei Wang (*North China Electric Power Univ*), Yusheng Liu (*Nuclear and Radiation Safety Center*), Xiaowei Jiang (*The Reactor System Design Technology Laboratory*)

**MONDAY, JUNE 10**

**TECHNICAL SESSIONS - 1:00 PM**

### **Current Issues in Computational Methods—Roundtable**

**Sponsored by** MCD; **Cosponsored by** THD, RPD, FED. **Session Organizer:** David P. Griesheimer (*NNL*)

#### **“Exascale Computing Project”**

In 2016 the U.S. Department of Energy established the Exascale Computing Project (ECP), a 7 year, ~\$5 billion effort intended to deliver a capable exascale computing system (10<sup>18</sup> 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:** Jeffrey A. Favorite (*LANL*), All invited.

First Assessment of the New Atomic Data Used in ENDF/B-VIII, Maria Grazia Pia (*INFN*), Tullio Basaglia (*CERN*), Matteo Bonanomi, Federico Cattorini (*Univ of Milano Bicocca*), Chansoo Choi (*Hanyang Univ*), Min Cheol Han (*INFN*), Gabriela Hoff (*Univ of Cagliari*), Chan Hyeong Kim, Sung Hun Kim (*Hanyang Univ*), Matteo Marcoli (*Univ of Milano Bicocca*), Paolo Saracco (*INFN*)

Electron Transport Algorithms in the Integrated TIGER Series (ITS) Codes, Brian C. Franke, Ronald P. Kensek (*SNL*)

Monte Carlo Neutronics Analysis of the SNS STS Monolith, Igor Remec, F. X. Gallmeier (*ORNL*)

Adjoint-Enabled Multidimensional Optimization of Satellite Radiation Shields, Shawn D. Pautz, Don E. Bruss, Brian M. Adams, Brian C. Franke, Ethan Blansett (*SNL*)

### **Rejuvenate Nuclear Technology Infrastructure and Facilities—Panel**

**Sponsored by** NCSD; **Cosponsored by** DESD.

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

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*)

Gary Brassart (*Westinghouse*)

Marilyn Kray (*Exelon*)

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**MONDAY, JUNE 10**  
TECHNICAL SESSIONS - 1:00 PM

**Teaching the Value of Nuclear—Nuclear Science in the Pre-College Space—Panel**  
Sponsored by ETWDD.

For coming generations to understand the value of nuclear, they must first understand the science. Reaching students in the pre-college space, ANS's Navigating Nuclear: Energizing Our World™ curriculum provides fact-based, standards-aligned activities, lessons, career explorations, and project ideas to clarify common misconceptions surrounding nuclear science and explore its role in future technological applications. This panel session will explore developing local outreach activities that use Navigating Nuclear materials as well as tools created by ANS to ensure educators have the current background knowledge necessary to teach nuclear science with confidence. Navigating Nuclear is an ANS Center for Nuclear Science and Technology Information program developed in conjunction with Discovery Education.

**Panelists:**

Mary Lou Dunzik-Gougar (*Idaho State Univ*)  
Eric Loewen (*GE Hitachi Nuclear Energy*)

**Nuclear Science User Facilities—I**

Sponsored by MSTD. Session Organizer: J. Rory Kennedy (*INL*)

Irradiation Damage Behavior in Novel High-Entropy Carbide Ceramics, Fei Wang, Xueliang Yan (*Univ of Nebraska-Lincoln*), Lin Shao (*Texas A&M*), Michael Nastasi, Bai Cui (*Univ of Nebraska-Lincoln*)

Radiation Damage in High Entropy Alloys, Calvin A. Parkin, Michael Moorehead, Mohamed S. Elbakhshwan, Kumar Sridharan, Adrien Couet (*Univ of Wisconsin, Madison*)

Evaluation of Nb-Rich Clustering in a Zr-1.0%Nb Alloy Following Kr<sup>2+</sup> Irradiation at 310 °C, Saheed Bayonle Adisa (*Univ of Idaho*), Jing Hu (*ANL*), Mathew J. Swenson (*Univ of Idaho*)

Nb Redistribution in Proton Irradiated Zr1.0Nb, Zefeng Yu, Adrien Couet (*Univ of Wisconsin, Madison*)

TEM Study of Nickel Under In-Situ Helium/Krypton Dual-Beam Irradiation, Wei-Ying Chen, Meimei Li (*ANL*)

Development of the FaMUS Methodology for Quantify Materials Understanding and its Application to the NSUF Research Portfolio, Simon Martin Pimblott, J. Rory Kennedy (*INL*)

**Thermal Energy Storage Systems**

Sponsored by OPD. Session Organizer: Piyush Sabharwall (*INL*)

Meeting Low-Carbon Industrial Heat Demand with High-Temperature Reactors Using Co-Generation and Heat Storage, Charles W. Forsberg (*MIT*)

Economic and Low-Carbon Incentives for Dispatchable Electricity from Base-Load Reactors with Heat Storage, Charles W. Forsberg (*MIT*)

Potential of Chemical-Absorption Heat Pumps for Thermoamplification in Nuclear Hybrid Energy Systems, Paul Duncan Armatis (*Oregon State Univ*), Aman Gupta (*Univ of Idaho*), Piyush Sabharwall (*INL*), Vivek P. Utgikar (*Univ of Idaho*)

Experimental Investigation and Analysis of Ca(OH)<sub>2</sub>/CaO Chemical Heat Pump for Thermal Energy Storage, Aman Gupta, Vivek P. Utgikar (*Univ of Idaho*), Paul D. Armatis (*Oregon State Univ*), Piyush Sabharwall (*INL*), Brian M. Fronk (*Oregon State Univ*)

Value of a Zero Carbon Electric Generation Financial Future Instrument, John K. Downing (*John Downing Consulting, LLC*)

## 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:** Florent Heidet (*ANL*)

The Versatile Test Reactor program is a recently initiated program as part of the US 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*)  
John Herczeg (*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:** Robert T. Jubin (*ORNL*)

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

Kinetic Study of AgOZ and AgO-Aerogel Aged in Off-Gas Streams from Spent Nuclear Fuel Reprocessing System, Seungrag Choi, Yue Nan (*Syracuse Univ*), Alexander Wiechert, Austin P. Ladshaw, Sotira Yiaccoumi (*Georgia Tech*), Costas Tsouris (*Georgia Tech/ORNL*), Lawrence L. Tavlarides (*Syracuse Univ*)

Extended Duration Adsorption of Elemental Iodine by AgZ under Prototypical Vessel Off-Gas Conditions, Robert T. Jubin, Stephanie H. Bruffey, Jacob Jordan (*ORNL*)

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

Removal of Krypton from Process Off Gases Using Metal Organic Frameworks, Praveen Kumar Thallapally (*PNNL*)

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

**Sponsored by** NISD. **Session Organizer:** Matthew R. Denman (*Kairos Power LLC*)

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*)

Numerical Investigation of Flow in Rod Bundle Subchannels on Natural Convection: Effect of Twisted Tapes, Salman M. Alzahrani, Shoaib Usman (*Missouri Univ Sci Technol*)

S-RELAP5 and RELAP5/MOD2-B&W Validation for Long Term Core Cooling Following a Large-Break LOCA, C. K. Nithianandan, Andrei E. Burghilea, Kent C. Abel, Robert L. Baxter, Gordon Wissinger, John Klingenfus (*Framatome Inc.*)

Preliminary Heater Rod Design for Transient Critical Heat Flux Experiments in TREAT, Richard O. Hernandez (*Penn State*), Charles P. Folsom, Nicolas Eric Woolstenhulme, Colby B. Jensen (*INL*), Nicholas R. Brown (*Univ of Tennessee-Knoxville*)

Point Kinetics and Reactivity Feedback Modeling in SAM, Guojun Hu, Guanheng Zhang, Rui Hu (*ANL*), Joseph M. Kelly (*NRC*)

Effect of Off-Nominal Channel Thickness for MITR LEU Conversion, Dakota Allen, Lin-Wen Hu, Kaichao Sun, Akshay Dave (*MIT*), Son Hong Pham, David Jaluvka, Erik H. Wilson (*ANL*)

**Pitch your PhD—Panel**

**Sponsored by** YMG; **Cosponsored by** ETWDD. **Session Organizer:** Nicolas E. Stauff (*ANL*)

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:** Jeffrey A. Favorite (*LANL*), All invited.

Evaluating Importance Maps for TRIPOLI-4<sup>®</sup> Using Deterministic or On-Line Methods, Davide Mancusi, Michel Nowak (*CEA*), Eric Dumonteil (*IRSN*), Henri Louvin, Emiliano Masiello, Daniele Sciannandrone (*CEA*)

SINBAD Database—Ongoing Activities, Ivan Alexander Kodeli (*Jozef Stefan Inst*)

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*)

Effects of Statistical Uncertainty in Activation Calculations Based on Monte Carlo Radiation Transport, Jason D. Haverkamp (*KAPL*)

**Nuclear Nonproliferation Policy Division: General**

**Sponsored by** NNPDP. **Session Organizer:** Kelsey Amundson (*Univ of California, Berkeley*)

Conversion of Miniature Neutron Source Reactors to Low Enriched Uranium Fuel, James A. Morman, Francesc Puig, John G. Stevens (*ANL*)

Japanese Plutonium Balance Outlook to 2050: A Monte Carlo Approach, Shutaro Takeda (*Kyoto Univ*)

Investigation on Iran's Nuclear Weapon Latency Time in Case of Non-Compliance with JCPOA, Kavita Rathore (*Texas A&M*), Sunil Sunny Chirayath (*Nuclear Security Science & Policy Inst*)

Will Revisionist States Give Up Their Bomb? : A Quantitative Analysis of the Revisionist Experience and Nuclear Proliferation Decision, Minjung Kim (*Georgetown Univ*)



## MONDAY, JUNE 10

TECHNICAL SESSIONS - 3:50 PM

### Training, Human Performance and Workforce Development

**Sponsored by** ETWDD. **Session Organizer:** Lisa M. Marshall (*NCSU*)

Nuclear Science and Technology Training for Secondary School Teachers at Argonne National Laboratory, David Grabaskas, Sunaree Hamilton, Natalie Zender (*ANL*)

Nuclear Power Technology Training Based on MR Technology, Yifen Chen, Jianxiang Zheng, Huai'en Xie, Yichun Wu (*Xiamen Univ*)

New Toys and Tricks for Old Dogs, Rizwan Uddin (*Univ of Illinois*)

How to Recognize and Arrest Declining Performance, Gary R. Cavanaugh (*Marathon Consulting Group*)

### Fusion Energy Applications

**Sponsored by** FED. **Session Organizer:** Arnold Lumsdaine (*ORNL*)

Neutronics Experiments for Advanced Nuclear Systems at HINEG Facility, Yican Wu, Yongfeng Wang, Zhigang Wang, Qi Yang, Wen Wang, Canjun Liang, Size Chen, Jun Gao, Taosheng Li, Lijuan Hao, Jing Song, Pengcheng Long, Chao Liu, Fang Wang, Liqin Hu, FDS Team (*CAS*)

Tritium Management in the Magnetized Target Fusion Device, Taylor James Glover, Haseeb ur Rehman, Yonghee Kim (*KAIST*)

Numerical Simulation of Observed Plasma Asymmetries in Tokamaks, Salah Ud-Din Khan (*King Saud Univ*)

Estimation of Eddy Current on Pakistan Metallic Spherical Tokamak, Shahab-Ud-Din Khan (*National Tokamak Fusion Program*), Riaz Khan, Zia Ur Rehman, Sehrish Shakir, Shahid Hussain (*National Tokamak Fusion Program, Atomic Energy Commission*)

### Data, Analysis and Operations in Nuclear Criticality Safety—I

**Sponsored by** NCSU. **Session Organizer:** Theresa Cutler (*LANL*)

Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation, Jennifer L. Alwin, Forrest B. Brown (*LANL*)

Initial Investigations of the Criticality Safety Validation Basis for HA-LEU Transportation, Bradley T. Rearden, William J. Marshall, Justin B. Clarity, Andrew M. Holcomb (*ORNL*), Friederike Bostelmann (*Oak Ridge Associated Univ*), John M. Scaglione (*ORNL*)

Minimum Accident of Concern for Uranyl Sulfate Solutions, Joseph A. Christensen (*SHINE Medical Technologies*), R.A. Borelli (*Center for Advanced Energy Studies*), Charles S. Henkel, Brian A. Matthews (*Nuclear Safety & Technology Services*)

Performance of Nanofluids as Coolants in PWR-Neutronics Case Study, Rana Tarek Abdellatif, Amal Abdalla Alhammadi, Fatima Ibrahim Alhamadi, Bassam A. Khuwaileh (*Univ of Sharjah*)

### Overview of the Versatile Test Reactor—II

**Sponsored by** RPD; **Cosponsored by** MCD, THD, YMG. **Session Organizer:** Florent Heidet (*ANL*)

Overview of the Versatile Test Reactor Core Design Activities, Florent Heidet (*ANL*), Gilles J. Youinou (*INL*), Jordi Roglans-Ribas (*ANL*)

Assessment of High Quality Plutonium-Fueled Core Configurations for the Versatile Test Reactor, Bo Feng, Florent Heidet (*ANL*)

Assessment of Low Enriched Uranium Fueled Core Configurations for the Versatile Test Reactor, Nicolas E. Stauff, Florent Heidet (*ANL*)

Preliminary In-Vessel Shielding Analysis for the Versatile Test Reactor, Tingzhou Fei (*ANL*), Samuel E. Bays (*INL*), Florent Heidet (*ANL*)

Preliminary Control Rod Lifetime Assessment for the Versatile Test Reactor, Zhaopeng Zhong (*ANL*), Abdalla Abou-Jaoude (*INL*), Florent Heidet (*ANL*)

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:** Jack D. Law (*INL*)

Life-Cycle Assessment of Small-Modular Nuclear Reactors Using Current U.S. Fuel Cycle, Kara Michelle Godsey, Lindsay Shuller-Nickles, Michael Carbajales-Dale (*Clemson Univ*)

Decay Heat of Fission Materials and Thermal Propagation Through Bentonite Buffer Materials and the Rock Mass Structure, J. Kramer Hall, Samuel Frimpong (*Missouri Univ Sci Technol*)

Safety Evaluation of a Spent Fuel Dry-Storage Canister with Various Fill Materials, Jeremy W. King (*Texas A&M*), Sunil Sunny Chirayath (*Nuclear Security Science & Policy Inst*), 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. Ordonez, Mariah M. Ramirez, Sidney A. Ricketts, Rainbow Y. Suh (*Texas A&M*)

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 James Rocco, Frederick van Steenderen (*Univ of Wisconsin, Madison*), Kenneth Ross (*PNNL*), John H. Kessler (*J Kessler and Assoc LLC*), Gary Cannell (*Fluor Corp.*), Jay Rozzi (*Creare LLC*), Kumar Sridharan, Frank E. Pfefferkorn (*Univ of Wisconsin, Madison*)

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

**Sponsored by** FCWMD. **Session Organizer:** Patricia D. Paviet (*PNNL*)

Advances in Online Spectroscopic Monitoring for Application Throughout the Nuclear Fuel Cycle, Samuel A. Bryan (*PNNL*), Gilbert L. Nelson (*College of Idaho*), Amanda M. Lines (*PNNL*), Job M. Bello (*Spectra Solutions Inc*)

Square Wave Voltammetry Analysis of Metal Ions in Molten Salt Reactors, Huan Zhang, Suhee Choi, Michael F. Simpson (*Univ of Utah*)

Use of Machine Learning with On-Line Monitoring Systems for Reprocessing, Benjamin B. Cipiti, Nathan T. Shoman (*SNL*)

Fiber-Optic Laser-Induced Breakdown Spectroscopy in High Temperature/Radiation Environment, Yichen Zhao, Haori Yang (*Oregon State Univ*)

**Thermal Hydraulics of Accident-Tolerant Fuels**

**Sponsored by** THD. **Session Organizer:** Wade R. Marcum (*Oregon State Univ*)

Critical Heat Flux Study with Different Substrate Conditions for Accident Tolerant Fuel Cladding Development, Hang Jin Jo, Emilio L. Gutierrez, Hwasung Yeom, Kumar Sridharan, Michael Corradini (*Univ of Wisconsin, Madison*)

Thermal Hydraulic Performances Analysis of CR-Coated Zircaloy Clad During Station Blackout Accident, Jun Wang, Hwasung Yeom, Michael L. Corradini (*Univ of Wisconsin, Madison*)

Sensitivity of Critical Heat Flux for ATF FeCrAl Alloy Using RELAP5-3D and RAVEN, Jacob Preston Gorton, Nicholas R. Brown (*Univ of Tennessee, Knoxville*)

Potential Impact of Increased Critical Heat Flux for FeCrAl Clad Fuels in Hot Zero-Power Rod-Ejection Accidents, Robert Kile, Nicholas R. Brown (*Univ of Tennessee*)

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## TUESDAY, JUNE 11

TECHNICAL SESSIONS - 10:15 AM

### Computational Methods: General

**Sponsored by** MCD. **Session Organizer:** Steven P. Hamilton (*ORNL*)

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

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

Data-Analysis Methods in Detecting, Visualizing and Predicting NPP Component Ageing Phenomena, Miki Sirola, John Einar Hulsund (*Inst for Energy Technology*)

A Multi-Tree Structural Graphical Method for Breaking Logical Loops, Ao Yang, Huifang Miao, Huai En Hsieh, Li Ning (*Xiamen Univ*)

### General Topics in Decommissioning

**Sponsored by** DESD.

Operability Evaluation of Residual Heat Removal Pump for Full System Decontamination of Kori-1 Nuclear Power Plant, HakSoo Kim, ChoRong Kim (*KHNP Central Research Inst*)

The RESRAD Code Applications for Radiological Safety Analysis of Nuclear Power Plants Decommissioning, Huai En Hsieh, Hui-Fang Miao (*Xiamen Univ*), Wen-Yu Wang, Yen-Cheng Liu, Bau-Shei Pei (*Natl Tsing Hua Univ*)

Experimental Investigation of Partitioning Ratio of Co Between Ingot and Slag After Melting Process of Radioactive Metal Waste, Byung Gi Park (*Soonchunhyang Univ*), Bongsoo Lee (*Chung-Ang Univ*), Byum Kyu Kim, Hwajeong Han (*Soonchunhyang Univ*)

### Credible Accident Sequences in NCS–Panel

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

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 Bowels (*LANL*)

David Erickson (*SRNS*)

Jerry Hicks (*DOE, retired*)

Deb Hill (*NNL/Sellefield*)

Brandon O'Donnell (*BWXT*)

Lon Paulson (*GE Hitachi*)

Randy Shackelford (*NFS*)

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**TUESDAY, JUNE 11**  
**TECHNICAL SESSIONS - 10:15 AM**

**ANS Nuclear Grand Challenges**

**Sponsored by** ETWDD. **Session Organizer:** Lisa M. Marshall (*NCSU*)

Addressing Fears of Nuclear Through Free-Choice Learning, Jonathan Gomez (*Y-12 Consolidated Nuclear Security & NCSU*)

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

Examining the Role of Cultural Value on Nuclear Acceptance in China, Dongqin Xia, Yazhou Li, Yanling He, Tingting Zhang, FDS Team (*CAS*)

Communication Challenge for Nuclear Industry in the Era of Fake News and Social Media, Punam Thakur (*New Mexico State Univ*), Anderson L. Ward (*DOE-CBFO*)

**Fuel and Materials for Molten Salt Reactors**

**Sponsored by** MSTD. **Session Organizer:** Kenneth J. Geelhood (*PNNL*)

Technological Aspects of MSR Fuel Cycle, Martin Straka (*UJV Rez, a.s.*), Jan Uhlir (*Research Centre Rez*), Lorant Szatmary (*UJV Rez*), Martin Marecek (*Research Centre Rez*)

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*)

First-Principles Investigation on the Effect of Salt Species Adsorption on Cr Surface Segregation in Ni-Cr Alloys, Jacob Startt, Stephen S. Raiman (*ORNL*), Chaitanya S. Deo (*Georgia Tech*)

Characterization of Nuclear Graphite for Molten Salt Reactors (MSR), Nidia C. Gallego, Cristian Contescu, Tim Burchell, James C. Keiser, Stephen Raiman (*ORNL*), Karol Putyera (*Eurofins EAG Materials Science*), Lou Qualls (*ORNL*)

**Advanced and Small Modular Reactors (ASMR): 3 Pathways for Deployment—Panel**

**Sponsored by** OPD. **Session Organizer:** Rosemary Yeremian (*Thermodyne Eng, LTD.*)

The development of advanced and small modular reactors represents a new and disruptive force in the area of electricity generation and combined heat and power. Despite the tendency to treat these technologies as one, there are three different pathways for their deployment. This panel will explore the different criteria and driving factors for ASMR deployment in: on-grid applications, industrial/mining applications, and for remote communities.

**Panelists to be announced.**

**Reactor Analysis Methods—I**

**Sponsored by** RPD; **Cosponsored by** THD. **Session Organizer:** Pavel V. Tsvetkov (*Texas A&M*)

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

Mesh and Effect on Thermal Hydraulic Calculations, Alok Jha (*Nuclear Power Corporation of India Limited*), Anurag Gupta (*BARC*)

Measurement of Reactor Kinetics Parameters in TREAT During Temperature Limited Transients, Thomas V. Holschuh, Daniel Michael Wachs (*INL*)

Burnup Calculation Methodology for a Small-Scale Fuel Irradiation Experiment in the High Flux Isotope Reactor (HFIR), Joseph R. Burns, Christian M. Petrie (*ORNL*), David Chandler (*UT-Battelle/ORNL*)

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**TECHNICAL SESSIONS - 1:30 PM**

### **University Research in Fuel Cycle and Waste Management—II**

**Sponsored by** FCWMD; **Cosponsored by** ETWDD. **Session Organizer:** Jack D. Law (*INL*)

Bismuthate Behavior with Used Nuclear Fuel Species in Nitric Acid, Jeffrey Donald Einkauf, Andrew Wilcox, Jonathan D. Burns (*Texas A&M*)

Comparison of DEHiBA and DHOA for Neptunium Separation, Jarrod Gogolski (*CSM*), Peter R. Zalupski, Dean R. Peterman (*INL*), Mark P. Jensen (*CSM*)

Design and Implementation of a Flowsheet Solvent Extraction Simulator, Taha Azzaoui (*Univ of Massachusetts-Lowell*), Kevin Lawrence Lyon (*INL*), Valmor F. de Almeida (*Univ of Massachusetts - Lowell*)

Radiolytic Degradation of Uranyl-Loaded Tributyl Phosphate by High and Low LET Radiation, Randy Ngelale (*Univ of California, Irvine*)

Extraction Kinetics and Hydrodynamics in a Miniature Annular Centrifugal Contactor, Tro Babikian, Mikael Nilsson (*Univ of California, Irvine*)

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

**Sponsored by** FCWMD. **Session Organizer:** Stephen Napier (*NNL*)

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**

Rory Kennedy (*INL*)

Des Wright (*NNL*)

Jared Johnson (*ORNL*)

Daniel Rochwerger (*CEA*)

Bob Oelrich (*Westinghouse*)

### **Scaling Methodologies for SET and IET—Panel**

**Sponsored by** THD. **Session Organizer:** Yassin A. Hassan (*Texas A&M*)

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*)

Annalisa Manera (*Univ of Michigan*)

Cesare Frepoli (*F PoliSolutions LLC*)

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**TECHNICAL SESSIONS - 1:30 PM**

**Transport Methods**

**Sponsored by** MCD. **Session Organizer:** Steven P. Hamilton (*ORNL*)

Conditional Point Sampling: A Novel Monte Carlo Method for Radiation Transport in Stochastic Media, Emily H. Vu (*Univ of California, Berkeley*), Aaron J. Olson (*SNL*)

Calculation of Parametric Variance Using Variance Deconvolution, Aaron J. Olson (*SNL*)

Enhancements to the Discrete Generalized Multigroup Method, Richard L. Reed, Jeremy A. Roberts (*Kansas State Univ*)

Angular Adaptivity with Filtered Pn Methods, Steven Dargaville (*Imperial College London*), A.G. Buchan (*Queen Mary Univ*), R. P. P. Smedley-Stevenson (*AWE*), P. N. Nicholas Smith (*Wood PLC*), C. C. Pain (*Imperial College London*)

Weighted Average Calculation of the Method of Characteristics, Gil Soo Lee (*KINS*), Adriaan Buijs (*McMaster Univ*), Chae-Yong Yang (*KINS*)

**Water Technologies and Nuclear Power Update–Panel**

**Sponsored by** DESD. **Session Organizer:** Leah Parks (*NRC*)

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:**

Steven Scroggs (*FP&L*)

Ibrahim Khamis (*IAEA*)

Jeffrey Brown (*APS*)

Aaron Wilson (*INL*)

Eric Schwarz (*Exelon*)

Youssef Shatilla (*Masdar Inst*)

**Real World Applications of Sensitivity/Uncertainty**

**Sponsored by** NCS D. **Session Organizers:** Jennifer L. Alwin (*LANL*), Natasha Glazener (*LANL*)

Whisper Sensitivity Study of the NMIS ATR Fuel Storage Racks, Konner Matthew Casanova (*Idaho State Univ*)

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

Preliminary TSUNAMI Assessment of the Impact of Accident Tolerant Fuel Concepts on Reactor Physics Validation, William J. Marshall, Jinan Yang, Ugur Mertuyrek, Matthew A. Jessee (*ORNL*)

A Method for Performing keff Validation of As-Loaded Criticality Safety Calculations Using UNF-ST&DARDS, Justin B. Clarity, William J. Marshall, Kaushik Banerjee, John M. Scaglione (*ORNL*)



**TUESDAY, JUNE 11**  
TECHNICAL SESSIONS - 1:30 PM

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

**Sponsored by** ETWDD; **Cosponsored by** YMG. **Session Organizer:** Mimi H. Limbach (*Potomac Communication Group, Inc.*)

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*)

### **Nuclear Science User Facilities—II**

**Sponsored by** MSTD. **Session Organizer:** J. Rory Kennedy (*INL*)

EBS Characterization of Metallic Nuclear Fuel, Fidelma Giulia Di Lemma, Daniel Murray, James Madden, Cynthia A. Adkins, Jan-Fong Jue, Jason M. Harp (*INL*), Assel Aitkaliyeva (*Univ of Florida*), Dennis D. Keiser (*INL*)

Thermal Hydraulics and Neutronics Overview of the DISECT Experiments, Walter J. Williams (*Purdue Univ*), Cody Hale (*INL*), Emre Sikik (*Studiecentrum voor Kernenergie Centre d'Étude de l'énergie Nucléaire*), Thomas Maddock, Dan Michael Wachs (*INL*), Sven Van Den Berghe (*Studiecentrum voor Kernenergie Centre d'Étude de l'énergie Nucléaire*), Maria A. Okuniewski (*Purdue Univ*)

Thermal Transport Measurement of a UN/U<sub>3</sub>Si<sub>2</sub> Accident Tolerant Fuel Using a Square-Wave Pulse Thermorefectance Technique, Scott C. Middlemas, Zilong Hua (*INL*), W. Tanner Yorgason (*Utah State Univ*), Robert S. Schley, David H. Hurley (*INL*)

X-Ray Computed Tomography Analysis of Neutron-Irradiated SiC Composite Tube, Takaaki Koyanagi, Yutai Katoh, Gyanender Singh, Christian M. Petrie (*ORNL*), Christian P. Deck (*General Atomics*), Kurt A. Terrani (*ORNL*)

Post-Irradiation Analysis at the Nanoscale of 14YWT After Neutron Irradiation (16.6 dpa) at 386°C and 412°C, Maria A Auger (*Universidad Carlos III de Madrid*), David T. Hoelzer (*ORNL*)

### **Radiation Protection and Shielding: General**

**Sponsored by** RPSD. **Session Organizer:** Irina I. Popova (*ORNL*)

Key Results of the ANS/HPS Conference on Low Level Radiation, Alan E. Waltar (*Atomic Talk*)

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 Univ*), Steven L. Bellinger (*Radiation Detection Technologies, Inc*), Zayd C. Leseman, Amir A. Bahadori (*Kansas State Univ*)

Three-Dimensional Charge Distribution for Electrostatic Space Radiation Shielding, Rajarshi Pal Chowdhury, Luke Stegeman, Amir A. Bahadori (*Kansas State Univ*), Dan Fry (*NASA Johnson Space Center*), Ashish Goel (*NASA Jet Propulsion Lab*), Janet Barzilla (*NASA Johnson Space Center*), Matthew Lund (*Univ of Utah*), Stojan Madjunkov (*NASA Jet Propulsion Lab*)

Dissecting Air Secondary Gamma Dose Contribution for a 14 MeV Neutron Source in Air, Edward S. Lum, Michael Lorne Fensin, Karen Corzine Kelley, Steven S. McCready (*LANL*)

Insulating Boron-Containing PDMS-Based Materials for Space and Nuclear Applications, Joseph Henry Dumont, Eamonn Murphy, Kwan-Soo Lee, Andrea Labouriau (*LANL*)

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**TUESDAY, JUNE 11**  
**TECHNICAL SESSIONS - 1:30 PM**

**Overview of the Versatile Test Reactor—III**

**Sponsored by** RPD; **Cosponsored by** MCD, THD, YMG. **Session Organizer:** Florent Heidet (ANL)

Evaluation of Pressure Drop for Possible Reflector Designs for the Versatile Test Reactor Using Nek5000, Dillon R. Shaver, Haomin Yuan, Florent Heidet (ANL)

Preliminary Evaluation of Fuel Management Strategies for the Versatile Test Reactor, Abdalla Abou-Jaoude, Samuel E. Bays, Gilles J. Youinou (INL), Florent Heidet (ANL)

Fuel Loading Optimization and Planning for the Versatile Test Reactor, Michael G. Jarrett (ANL), Florent Heidet (ANL)

Versatile Test Reactor Preliminary Safety Analysis, Tyler S. Sumner, Tingzhou Fei, Nicolas E. Stauff, Thomas H. Fanning, Florent Heidet (ANL)

Probabilistic Risk Assessment Approach for the Versatile Test Reactor, David Grabaskas, Thomas H. Fanning (ANL)

A Model for Scoping Analysis of Cartridge Loop Transient Response Under Off-Normal Operating Events for the Versatile Test Reactor, Mitchell T. Farmer, Tyler S. Sumner, Thomas H. Fanning (ANL)

**TECHNICAL SESSIONS - 3:55 PM**

**Recycle and Reuse of Used Nuclear Fuel Resources**

**Sponsored by** FCWMD. **Session Organizer:** Guillermo Daniel Del Cul (ORNL)

An Update on the Operational Status of the Savannah River Site H-Canyon, Tracy E. Stover (SRNS) Plans for Treatment of Research Reactor Used Fuels at La Hague, Sven O. Bader (Orano Federal Services LLC), Paul A. Murray (Framatome Inc.)

New Reconditioning Strategies for Spent Nuclear Fuel Rods, Jordan Travis, Craig Barnes, Breanna Vestal (Univ of Tennessee), Guillermo Daniel Del Cul (ORNL), David F. McLaughlin (Westinghouse)

Gaseous Preparation of Zirconium Clad Nuclear Fuel for Recycling, Rick Demmer, Julia Tripp, Melissa Warner, Richard Tillotson, Amy K. Welty (INL)

Separation of Mo from U-10Mo-Zr Alloy by Nitrogen Trifluoride, Bruce K. McNamara (PNNL)

**Progress in Consolidated Interim Storage and Next Steps—Panel**

**Sponsored by** FCWMD. **Session Organizer:** Sven O. Bader (Orano Federal Services LLC)

With two applications for licenses for consolidated interim storage facilities for commercial UNF/SNF currently under review by the NRC, the intent of this panel is to discuss what actions are necessary to make the use of these facilities become a reality. This objective of the panel is to address issues ancillary to the 10CFR72 license application activities such as, but not limited to, discussing (1) what is or could be (or should not be) the DOE's role in this activity; (2) what issues, if any, arise with transporting the UNF/SNF from an owner-controlled site ("deinventory") to these consolidated facilities; (3) what legislative "options" could help/support these consolidated facilities and which ones could not help/support; and (4) what commercial/federal drivers can be enacted to support this activity?

**Panelists:**

Jeff Isakson (Integrated Storage Partners)

Myron Kaczmarek (Holtec)

Nancy Bushman (DOE Office of Nuclear Energy)

Darrell Dunn (NRC)

Rod McCullum (NEI)

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**TECHNICAL SESSIONS - 3:55 PM**

### **Multiphase CFD and Large Eddy/Direct Numerical Simulations**

**Sponsored by** THD. **Session Organizer:** Lane B. Carasik (*USNC - Space*)

Bubble Formation Through Submerged Vertical Orifices with Horizontal Air Inflow, Naveen Pillai, Katharina Stapelmann, Igor A. Bolotnov (*NCSU*)

Investigation on Bubble Deformation and Break-Up Dynamics Using Interface Tracking Method, Yuqiao Fan, Igor A. Bolotnov (*NCSU*)

Large Eddy Simulation of the Turbulent Flow Around a Helical Coil Steam Generator Geometry for a Small Modular Reactor, Samuel Jongoh Lee, Yassin A. Hassan (*Texas A&M*)

Multiphase CFD Analysis of C-Tube Heat Exchanger in PRHR System, Soumitra Mangesh Vadnerkar, Xue Yang (*Texas A&M*), Jun Wang (*Univ of Wisconsin, Madison*)

### **Creating a Successful Career—Panel**

**Sponsored by** YMG. **Session Organizer:** Kelsey Amundson (*Univ of California, Berkeley*)

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 to be announced.**

### **Reactor Physics: General—I**

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

Uncertainty Quantification of SMR Core Linear Power Using Polynomial Chaos Method, Bader Almutairi (*Missouri Univ Sci Technol*), Syed Bahauddin Alam, Denish Kumar (*French Atomic Energy Commission*), Cameron S. Goodwin (*Rhode Island Nuclear Science Center*)

Uncertainty Quantification on Core Input Parameter for SFR Core Using Polynomial Chaos, Bader Almutairi (*Missouri Univ Sci Technol*), Syed Bahauddin Alam, Denish Kumar (*French Atomic Energy Commission*), Cameron S. Goodwin (*Rhode Island Nuclear Science Center*)

Reactor Physics Analysis of Thorium-Based Fuel for Long-Life SMR Cores, Bader Almutairi (*Missouri Univ of Science & Technol*), Dinesh Kumar, Syed Bahauddin Alam (*French Atomic Energy Commission*), Cameron S. Goodwin (*Rhode Island Nuclear Science Center*)

Performance Improvement of Linear System Solver for CMFD Acceleration in PROTEUS-MOC, Yeon Sang Jung, Changho Lee (*ANL*)

3D SPN Transport and Diffusion Approaches for the Sodium-Cooled Fast Reactor Core Using Deterministic Method, Bader Almutairi (*Missouri Univ Sci Technol*), Dinesh Kumar, Syed Bahauddin Alam (*French Atomic Energy Commission*), Cameron S. Goodwin (*Rhode Island Nuclear Science Center*)

### **High-Assay Low Enriched Uranium (HALEU): Current Activities and Future Supply—Panel**

**Sponsored by** NNPD. **Session Organizer:** Morris E. Hassler (*Pantex Plant/Y-12 National Security Complex*)

This panel will discuss current progress in converting highly enriched uranium research and medical production reactors, gaps in the supply chain for HALEU, and potential near- and long-term efforts to fill the supply chain gaps. Panelists will include members from the Department of Energy, DOE laboratories and sites, and commercial nuclear fuel cycle professionals that will discuss the challenges and potential solutions going forward for HALEU-fueled reactors.

**Panelists:**

Christopher Landers (*DOE NNSA*)

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

**Other panelists to be confirmed.**

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**TUESDAY, JUNE 11**  
**TECHNICAL SESSIONS - 3:55 PM**

**Focus on Communications: What are Your Non-Nuclear Friends REALLY Thinking?—II –Panel**

**Sponsored by** ETWDD; **Cosponsored by** YMG. **Session Organizer:** Margaret Harding (*4FactorsConsulting*)

Controversial topics have always been hard to talk about. In today's divisive political climate, they can be impossible. How do you stay friends with people who may or may not agree with you about nuclear power? This panel will explore the relationships we all have outside the nuclear bubble and how/if conversations might happen or not to help people answer the question: Why Nuclear?

**Panelists to be announced.**

**Accident Tolerant Fuels—I**

**Sponsored by** MSTD. **Session Organizer:** Kenneth J. Geelhood (*PNNL*)

Overview of General Atomics SiGA SiC-SiC Composite Development for Accident Tolerant Fuel, Christian P. Deck, Sean Gonderman, George Jacobsen, Jon Sheeder, Sarah Oswald, Rolf Haefelfinger, Kirill Shapovalov, Hesham E. Khalifa, Jack Gazza (*General Atomics*), John Lyons, Peng Xu (*Westinghouse*), Takaaki Koyanagi, Christian M. Petrie (*ORNL*), Christina A. Back (*General Atomics*)

Thermal-Mechanical Analyses of Accident Tolerant Fuels Under Accident Conditions, Hangbok Choi, Chris Ellis, Jack Gazza, Christina Back (*General Atomics*)

Potential Impact of Accident Tolerant Fuel Thermal Properties on Rod Ejection and Small-Break Loss-of-Coolant Accidents, Robert Kile (*Univ of Tennessee*), Andrew T. Nelson (*ORNL*), Nicholas R. Brown (*Univ of Tennessee*)

Characterization of the Thermal Conductivities of UO<sub>2</sub> 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*)

**Molten Salt Reactors—I**

**Sponsored by** RPD; **Cosponsored by** THD. **Session Organizer:** Florent Heidet (*ANL*)

Activation Rates Validation to Support MSR Development, Evzen Losa, Michal Košťál, Jan Šimon (*Research Centre Řež*), Ondřej Chvála (*Univ of Tennessee, Knoxville*), Vlastimil Juříček (*Research Centre Řež*)

Simulation of Thermal Spectrum MSR Using PROTEUS, Tingzhou Fei, Bo Feng, Florent Heidet (*ANL*)

Demonstration of the CFD Code Nek5000 for Molten Salt Applications, Dillon R. Shaver, Bo Feng, Elia Merzari, Florent Heidet (*ANL*)

**The Consortium for the Advanced Simulation of Light Water Reactors**

**Sponsored by** RPD. **Session Organizer:** Benjamin S. Collins (*ORNL*)

Validation of MPACT with Linear Source for Various Temperatures, Kyle C. Vaughn, Brendan M. Kochunas, Ethan Cole, Thomas J. Downar (*Univ of Michigan*)

A Demonstration of BWR Coupled Analysis and Potential ATF Applications Using CASL's MPACT/CTF, Jacob Preston Gorton (*Univ of Tennessee*), Benjamin S. Collins (*ORNL*), Nicholas R. Brown (*Univ of Tennessee*)

## 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*)

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*)  
Emmanuel Touron (*CEA*)  
Sven Bader (*ORANO*)  
Jack Law (*INL*)  
Zara Hodgson (*NNL*)

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

**Sponsored by** NISD. **Session Organizer:** Nicholas R. Brown (*Univ of Tennessee*)

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*)  
Zeses Karoutas (*Westinghouse*)

### Experimental Thermal Hydraulics—II

**Sponsored by** THD. **Session Organizer:** Jun Wang (*Univ of Wisconsin, Madison*)

An Investigation to Develop Measurement Techniques for Quantifying Fission Product Transport in a Gas-Cooled Fast Reactor—Versatile Test Reactor Program, Daniel Orea, Byung-Hee Choi, Duy-Thien Nguyen, Rodolfo Vaghetto, N. K. Anand, Yassin A. Hassan (*Texas A&M*), Piyush Sabharwall (*INL*)

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

Assessment of Potential Improvements in Level II PRAs for Advanced Reactors Based on Improved Aerosol Removal Mechanisms, Rohan Milind Biwalkar, Sola Talabi (*Pittsburgh Technical LLC*), Kenneth Redus (*Redus and Assoc LLC*)

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

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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 (*SNL*)

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 to be announced.**

### **Reactor Physics: General—II**

**Sponsored by** RPD; **Cosponsored by** ANSTD. **Session Organizer:** Pavel V. Tsvetkov (*Texas A&M*)

Investigating Simple Physical Means to Reduce TREAT Core Neutron Lifetime, John Darrell Bess, Thomas V. Holschuh, Nicolas Eric Woolstenhulme (*INL*)

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 of Technology*)

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, Inc.*)

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, Inc.*), Puran Deng, Won-Sik Yang (*Univ of Michigan*), Stuart A. Maloy, Keith A. Woloshun (*LANL*)

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

**Sponsored by** NCSD. **Session Organizer:** Kristan M. Wessels (*Y-12 NSC*)

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 to be announced.**

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

**Sponsored by** HFICD. **Session Organizer:** Pradeep Ramuhalli (*ORNL*)

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 to be announced.**

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## WEDNESDAY, JUNE 12

### TECHNICAL SESSIONS - 10:15 AM

#### Accident Tolerant Fuels—II

**Sponsored by** MSTD. **Session Organizer:** Kenneth J. Geelhood (*PNNL*)

Oxidation of Cold Spray Cr Coatings in High Temperature Steam Environments, Hwasung Yeom, Tyler Dabney, Greg Johnson, Benjamin Maier, Kumar Sridharan (*Univ of Wisconsin, Madison*)

Development of Cold Spray FeCrAl Coatings for Accident Tolerant Fuel, Tyler Dabney, Greg Johnson, Ben Maier, Hwasung Yeom, Kumar Sridharan (*Univ of Wisconsin, Madison*)

Development of Cold-Sprayed Chromium Coatings for Accident Tolerant Fuel Cladding, Greg Johnson, Benjamin Maier, Tyler Dabney, Hwasung Yeom, Kumar Sridharan (*Univ of Wisconsin, Madison*)

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:** Todd R. Allen (*Univ of Wisconsin, Madison*)

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 unconference and how they apply to the application of nuclear energy to meeting climate goals.

**Panelists to be announced.**

### TECHNICAL SESSIONS - 1:30 PM

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

**Sponsored by** FCWMD. **Session Organizer:** Andrew G. Sowder (*EPRI*)

Many advanced reactor designs and even some applications of light water reactor fuels require use of low-enriched uranium (LEU) with <sup>235</sup>U 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:

Representative from DOE to be announced.

Melissa Mann (*URENCO*)

Pete Pappano (*X-Energy*)

Fred Smith (*EPRI*)

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**WEDNESDAY, JUNE 12**  
**TECHNICAL SESSIONS - 1:30 PM**

**Irradiation Experiments—I**

**Sponsored by** IRD. **Session Organizer:** Brenden J. Heidrich (*INL*)

Qualification of U-10Mo Base Fuel Over Design Envelop of U.S. High Performance Research Reactor Using Mini-Plate Irradiation Testing in ATR, Margaret 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*)

Neutronic Analysis of Mini-Plate Experiments in the ATR for High Performance Research Reactor LEU Conversion, Paul E. Gilbreath, Dong O. Choe, Margaret A. Marshall (*INL*)

Thermal Model of Oxide Growth in Mini Plate Experiments in the Advanced Test Reactor, Grant L. Hawkes, Dong Choe (*INL*)

Structural Safety Analysis Overview for the U.S. HPRR Mini-Plate (MP-2) Experiment, Erik Rosvall (*INL*)

Design of a Pressurized PWR Fuel Rod Weld System, Nate 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 (*BWX Technol*)

Steady State Predictions of Reflood Characteristics in a Rod Bundle, Grant Robert Garrett, Yue Jin, Faith Rose Beck, Fan-Bill Cheung (*Penn State*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)

Effect of Fouling on Quenching of Simulated Fuel Rods, Faith Rose Beck, Yue Jin, Grant Robert Garrett, Fan-Bill Cheung (*Penn State*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)

Effect of Thermal Effusivity on Nanoparticle Deposited Surface CHF, Ji Yong Kim, In Cheol Bang (*UNIST*)

The Nucleation Boiling on a Vertical Heating Surface, Yu Lin Tseng, Tien Juei Chuang, Yuh Ming Ferng (*Natl Tsing Hua Univ*)

The Statistical Analyses on the Bubble Contact Areas in the Vertical Narrow Channel, Qi Lu, Linglan Zhou, Caifen Shen, Wei Liu, Hangxing He, Luguo Liu (*Nuclear Power Inst of China*)

**Severe Accident Thermal Hydraulics—I**

**Sponsored by** THD. **Session Organizer:** Guillaume P. Mignot (*Oregon State Univ*)

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

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

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

Calculation and Study on DCP of Hydrogen Igniter Design in PWR with Large Containment, Chao Ding (*Tsinghua Univ*), Yang Zhiyi (*Nuclear and Radiation Safety Center of MEE*)

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## WEDNESDAY, JUNE 12

TECHNICAL SESSIONS - 1:30 PM

### License Transfers for Decommissioning—Panel

**Sponsored by** DESD. **Session Organizer:** Gerard P. van Noordennen (*EnergySolutions*)

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*)

Vermont Yankee Experience, Jeff Wagner (*Entergy*)

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:** Zachary Jankovsky (*SNL*)

A New Computational Tool for Rapid Uncertainty and Sensitivity Analysis of Sodium Fast Reactor Source Term, David Grabaskas, James L. Jerden, Matthew D. Bucknor (*ANL*)

Protected and Unprotected Transient Performance and Sensitivity in a B&B Core, Chris Keckler (*Univ of California, Berkeley*), Thomas H. Fanning (*ANL*), Massimiliano Fratoni, Ehud Greenspan (*Univ of California, Berkeley*)

A Few Comparative Risk Lessons from WIPP, Norbert Rempe (*WIPP*)

Coupling RAVEN to SAPHIRE for Performing Time Dependent Probabilistic Risk Assessment, Congjian Wang, Diego Mandelli, Andrea Alfonsi (*INL*), Paul W. Talbot (*Univ of New Mexico*), Stephen T. Wood, James Knudsen, Cristian Rabiti (*INL*)

Hybrid Methodology of Deterministic and Probabilistic Safety Assessment Focusing on DSA, Bokyung Kim (*KAIST*)

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

**Sponsored by** HFICD. **Session Organizer:** Ronald L. Boring (*INL*)

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.

**Panelists to be announced.**

### General Topics in Human Factors Engineering

**Sponsored by** HFICD. **Session Organizer:** Jamie Baalis Coble (*Univ of Tennessee, Knoxville*)

Study on the Dominant Performance Influencing Factors for HRA in the Extreme Condition, Seongkeun Kang, Poong Hyun Seong (*KAIST*)

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

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**WEDNESDAY, JUNE 12**  
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**Fuel and Materials for Fast Reactors**

**Sponsored by** MSTD. **Session Organizer:** Kenneth J. Geelhood (*PNNL*)

Bison Metallic Fuel Modeling Capabilities, Albert Casagrande, Stephen R. Novascone (*INL*)

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

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 Zhang (*Virginia Tech*)

Sensitivity Analysis of Carbide Fuel for Fission Gas Release and Swelling, Hangbok Choi, Robert Schleicher, Christina Back (*General Atomics*)

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

Diffusion Behaviors Between Fe and Pd-Containing Metallic Fuel, Yi Xie (*Virginia Polytechnic Inst and State Univ*), Michael T. Benson, Lingfeng He, James A. King (*INL*)

**Advanced/Gen-IV Reactors—I**

**Sponsored by** OPD. **Session Organizer:** Piyush Sabharwall (*INL*)

Conceptual Design Considerations for KAIST Hybrid Micro Modular Reactor (H-MMR), Jin Young Heo, In Woo Son, Ye Seul Kim, Jeong Ik Lee (*KAIST*)

Experimental Verification of the In-Vessel CEDM for Small Modular Reactors, Jinseok Park, Wonho Lee, Myounggoo Lee, Yeonho Cho, Cheolsoo Maeng, Hyunmin Kim (*KEPCO-ENC*)

A Modular High-Temperature Gas-Cooled Reactor (MHTGR) with Decreased Power Density and In-Core Stored Heat for Variable Electricity and Industrial Heat, Charles W. Forsberg (*MIT*)

Economic Assessment of Nuclear Hybrid Energy Systems: Nuclear-Renewable-Water Integration in Arizona, Aaron S. Epiney, Cristian Rabiti (*INL*), Paul W. Talbot (*Univ of New Mexico*), James Richards (*Univ of Idaho*)

Conceptual Design of China Lead-Based Mini-Reactor CLEAR-M10d, Xueyan Shi (*CAS*)

**Reactor Physics Design, Validation and Operational Experience—I**

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

Achieving High-Power Configuration in Missouri S&T Reactor (MSTR) for Potential Uprate, Thaqal Alhuzaymi, Ayodeji B. Alajo (*Missouri Univ Sci Tech*)

Low-Power Core Reconfiguration for Missouri S&T Reactor (MSTR), Thaqal Alhuzaymi, Ayodeji B. Alajo (*Missouri Univ Sci Tech*)

A Zero-Power Hybrid Fast and Thermal Subcritical Testbed, Puran Deng, Won Sik Yang (*Univ of Michigan*), Faisal Y. Odeh, Mayir Mamtimin (*Niowave, Inc.*)

Revisiting Saxton Plutonium Project MOX Fuel Experiments as International Benchmarks, John Darrell Bess, Margaret Marshall (*INL*), Brittney Saenz (*Univ of Utah*)

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**WEDNESDAY, JUNE 12**

**TECHNICAL SESSIONS - 3:55 PM**

### **Molten Salt Chemistry and Corrosion**

**Sponsored by** FCWMD. **Session Organizer:** Jinsuo Zhang (*Virginia Tech*)

On-Line Monitoring for Spectroelectrochemical Characterization of Uranium Within Molten Salts, Shirmir D. Branch, Amanda M. Lines, Samuel A. Bryan, Gregg J. Lumetta (*PNNL*)

Molecular Dynamics Simulations of Structures and Transport Properties of  $UCl_3$ -NaCl Molten Salts, Bo Li, De-en Jiang (*Univ of California, Riverside*), Sheng Dai (*ORNL*)

Electrochemical Corrosion Monitoring in Molten  $MgCl_2$ -NaCl-KCl, Suhee Choi, Olivia Dale, Michael F. Simpson (*Univ of Utah*)

Planning for the Fluorination of  $LiF$ - $BeF_2$ - $UF_4$  Salt Using  $NF_3$ , Kirk F. Sorensen (*Flibe Energy, Inc.*), Randall D. Scheele (*PNNL*), Andrew M. Casella (*Battelle*), Matthew R. Lish (*Flibe Energy, Inc.*)

### **Irradiation Experiments—II**

**Sponsored by** IRD. **Session Organizer:** Padhraic L. Mulligan (*ORNL*)

An Expert System to Assist Researchers with Nuclear Materials Experiment Design, Brenden J. Heidrich (*INL*), Jordan M. Argyle (*Univ of Idaho*)

Neural Network Coupled with MCNP for Neutron Depth Profiling, Mubarak Albarqi, Raed Alsulami, Joseph T. Graham (*Missouri Univ Sci Technol*)

Activation and Decay Heat Calculations Supporting MIMIC Experiment Design in TREAT, John Darrell Bess, Connie M. Hill, James R. Parry, Nicolas Eric Woolstenhulme, Colby B. Jensen (*INL*)

Overview of 12 Irradiation Deployment Activities in TREAT, Nicolas Eric Woolstenhulme, John Darrell Bess, Pattrick Calderoni, Brenden J. Heidrich, David H. Hurley, Colby B. Jensen, Robert Schley, Kevin Tsai (*INL*)

MCNP Analysis of the Aqua-SETH Experiment in TREAT, Connie M. Hill, Nicolas Eric Woolstenhulme, Devin D. Imholte, John Darrell Bess (*INL*)

### **General Thermal Hydraulics**

**Sponsored by** THD. **Session Organizer:** Elia Merzari (*ANL*)

Thermal Analysis for SRS Saltstone Disposal Facility, Si Young Lee (*SRNL*), Enrique Molina (*Univ of Texas Rio Grande Valley*)

Thermal-Hydraulic Design of Visual 3D Printed Integral Test Facility Toward Nuclear Innovation Platform, Kyung Mo Kim, Ji Hyun Kim, In Cheol Bang (*UNIST*)

Optimization of Airfoil PCHE for the Recuperator of Nitrogen Brayton Cycle, Jin Gyu Kwon, Joo Hyun Park, Tae Ho Kim, Moo Hwan Kim (*Pohang Univ of Science and Technology*)

Development of Regulatory Audit Framework for Asymmetric Events of the Non-LOCA, Il Suk Lee (*KINS*)

### **Severe Accident Thermal Hydraulics—II**

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

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*)

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*)

A Zero-Dimensional Model for Two-Phase Flow Through Debris Bed and Prediction of Dryout Heat Flux for Top-Flooding Condition, Dongyeol Yeo, Hee Cheon No (*KAIST*)

Verification of SAMGs in SBO Sequences Under Refueling Condition, Yuan Peng, Xiaoli Wu (*Nuclear Power Inst of China*)

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**Molten Salt Reactors—II**

**Sponsored by** RPD. **Session Organizer:** Florent Heidet (*ANL*)

Design Optimization and Burnup Analyze for Molten Chloride Fast Reactor, Liaoyuan He (*CAS*), Guangchao Li (*Tsinghua Univ*)

Chemical Overview of Molten Salts, Robin V. Roper (*Univ of Idaho*)

A Versatile Experimental Salt Irradiation Loop (VESIL) in the Advanced Test Reactor, Abdalla Abou-Jaoude, Joe J. Palmer, James W. Sterbentz, Patrick Calderoni (*INL*)

Design of a Small Modular Molten Salt Reactor, Lance Bullerwell, Jason Hou (*NCSU*)

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

**Sponsored by** NCSU. **Session Organizer:** Theresa E. Cutler (*LANL*)

The Effect of Phase Disengagement on Criticality Safety Calculations for Aqueous Separations, Tracy E. Stover (*SRNS*)

On the Use of Nature of Process Arguments, Tracy E. Stover, John Lint, Joshua Butler, Jaclyn Fitzpatrick (*SRNS*), Tara Smith (*SRNL*), Brett Clinton, Brittany M. Williamson (*SRNS*)

Carbon Reactivity Effect with Fissile Mass and Hydrogenous Moderation Control, Brandon M. O'Donnell (*BWX Technol*)

Mission Change from Enrichment to Deactivation Impact on Nuclear Criticality Safety, Matthew Albert Wilson (*Paschal Solutions Inc.*), Tom Wayne Hines (*DOE*), Brandon James Little (*Univ of Wisconsin, Madison*), John B. Justice (*Enercon Services Inc.*), David Little (*Fluor-BWXT Portsmouth LLC*)

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

**Sponsored by** NISD. **Session Organizer:** Kevin R. O'Kula (*AECOM Technical Services*)

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 to be announced.**

**Computational Tools for Radiation Protection and Shielding—I**

**Sponsored by** RPSD. **Session Organizer:** Irina I. Popova (*ORNL*)

Effects of Season, Altitude, and Areal Density on Neutron Transport in Air, Lucas M. Rolison, Michael Lorne Fensin, Karen Corzine Kelley, Steve McCready (*LANL*)

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

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

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

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**TECHNICAL SESSIONS - 3:55 PM**

### **Computational Tools for Radiation Protection and Shielding—II**

**Sponsored by** RPSD. **Session Organizer:** Irina I. Popova (*ORNL*)

Comparing Two Methods for Approaching Nested DXTRAN Spheres as a Weight Shield, Michael Lorne Fensin, Karen Corzine Kelley, Lucas M. Rolison, Edward S. Lum, Steven S. McCready (*LANL*)

Validation of Shielding Analysis Capability of SuperMC3.3 with Dogleg Duct Streaming Experiment in FNS, Jun Zou, Lijuan Hao, Jing Song, Pengcheng Long (*CAS*)

Derivative of an ( $\alpha, n$ ) Neutron Source with Respect to Nuclear Data, Jeffrey A. Favorite (*LANL*)

### **Advanced/Gen-IV Reactors—II**

**Sponsored by** OPD. **Session Organizer:** James (Vince) V. Gilbert (*EXCEL Services Corp*)

Strategy and R&D Status of Lead-Based Reactor in China, Yican Wu (*CAS*)

A Study of Passive Safety Features on Small Modular Reactor, Jun Chen, Huifang Miao, Huai-En Hsieh, Zhi'ao Huang (*Xiamen Univ*), Xingwei Shi (*Nuclear and Radiation Safety Center, MEE*)

Floating Micro-Modular-Reactor Concept for Localized Power Outages, Kristin N. Smith, Pavel V. Tsvetkov, Moo-Hyun Kim, Lin Shao (*Texas A&M*), Sunil Sunny Chirayath (*Nuclear Security Science & Policy Inst*)

### **Operations and Power: General**

**Sponsored by** OPD. **Session Organizer:** Rosemary Yeremian (*Thermodyne Engineering, LTd.*)

Impact of Samarium on Power Distribution and Consequent Safety Rod Worths, in the Advanced Test Reactor, Nathan H. Manwaring, Mary Rose Holtz (*INL*)

Development of Frequency Response Function for ABWR, Shunsuke Konno, Junichi Kitamura (*Hitachi-GE Nuclear Energy*)

Financial Analysis of Modular Nuclear Reactors, Pedro A. Mena, Leslie M. Kerby (*Idaho State Univ*)

### **Reactor Analysis Methods—II**

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

Equilibrium Cycle Convergence During Predicted Bifurcation Using PARCS/PATHS for BWRs, Peter J. Yarsky, Andrew Bielen (*NRC*)

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 Systems*)

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

Real Variance Analysis of Unbiased Ratio Estimator in Monte Carlo  $k$ -Eigenvalue Calculation, Hyeontae Kim (*KAIST*), YuGwon Jo (*KHNP-CRI*), Yonghee Kim (*KAIST*)

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**THURSDAY, JUNE 13**  
**TECHNICAL SESSIONS - 8:00 AM**

### **Fuel Cycle and Waste Management: General—I**

**Sponsored by** FCWMD. **Session Organizer:** Stephanie H. Bruffey (*ORNL*)

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*)

Updates on Borated Aluminum Cask Design for Onsite Used Fuel Storage, R. A. Borrelli (*Univ of Idaho*)

Investigation of Void Formations Using Neutron Measurements in Filler Materials for Dual-Purpose Canisters, Seungmin Woo (*Texas A&M*), Shikha Prasad (*IIT-India*), Sunil Sunny Chirayath (*Texas A&M*)

Initial Study for De-Inventory of Spent Nuclear Fuel from the Kewaunee Site, Kevin John Connolly, Matthew R. Feldman (*ORNL*), Ralph E. Best, Steven J. Maheras (*PNNL*), Don McGee (*Framatome Inc.*), Sven O. Bader (*Orano Federal Services LLC*)

### **Irradiation Experiments—III**

**Sponsored by** IRD. **Session Organizer:** Brenden J. Heidrich (*INL*)

State-of-the-Art Experimental Capabilities at the N.C. State Pulsar Reactor, Ayman I. Hawari (*NCSU*)

The Fission Accelerated Steady State Test (FAST)—A Revised Capsule Design for the Accelerated Testing of Advanced Nuclear Fuels, Bryon James Curnutt, Geoffrey Beausoleil (*INL*)

Novel Intermediate Conductivity Experiment (NICE) Capsules for Irradiated Fuel, Brian P. Durtschi (*INL*)

Compressible Metal Foils for Temperature Control During Irradiation, Christian M. Petrie, Padhraic L. Mulligan (*ORNL*), Joel L. McDuffee (*UT-Battelle/ORNL*)

Finite Element Based Surrogate Modeling and Irradiation Capsule Optimization for Large-Scale Neutron Irradiation Campaigns, Padhraic L. Mulligan, Nesrin O. Cetiner, Ryan C. Gallagher, J. Wilna Geringer, Anne A. Campbell (*ORNL*), Martin van Staden (*X-Energy, LLC*)

### **Computational Thermal Hydraulics—II**

**Sponsored by** THD. **Session Organizer:** Elia Merzari (*ANL*)

RCIC Terry Turbine Nozzle Simulation with RELAP5-3D, Hongbin Zhang (*INL*), Tyler Hughes (*Texas A&M*)

CFD Analyses of Water-Based Alumina Nanofluids in Subchannel of a Standard Pressurized Water Reactor, Bader Almutairi (*Missouri Univ Sci Technol*), Farid Ahmed (*Military Inst of Science and Technology, Bangladesh*), Syed Bahauddin Alam, Dinesh Kumar (*French Atomic Energy Commission*), Cameron S. Goodwin (*Rhode Island Nuclear Science Center*)

Study of Vortex Shedding in Helical Coil Steam Generator, Mustafa Alper Yildiz (*Texas A&M*), Elia Merzari (*ANL*), Yassin A. Hassan, Marilyn Delgado (*Texas A&M*)

Recent Advances in the Coupling of SAS4A/SASSYS-1 and STAR-CCM+ for Sodium-Cooled Fast Reactor Transient Analyses, Adam R. Kraus, Acacia J. Brunett (*ANL*)

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*)

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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:** Abdalla Abou-Jaoude (*INL*)

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:**

Wes Hines (*UTK*)  
David Hayes (*LANL*)

**Decommissioning Experience in the Midwest—Panel**

**Sponsored by** DESD. **Session Organizer:** James J. Byrne (*Byrne & Assoc*)

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:**

Thomas LaGuardia (*LaGuardia & Associates, LLC*)  
John Closs (*Xcel Energy (Retired)*)  
Jeffrey Murl (*DOE, Office of Legacy Management*)  
Larry Boing (*ANL*)  
Gerry van Noordennen (*Energy Solutions*)

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

**Sponsored by** NCSD. **Session Organizer:** Deborah Ann Hill (*NNL*)

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*)

**Cutting Edge Techniques in Education, Training and Distance Education**

**Sponsored by** ETWDD. **Session Organizer:** Lisa M. Marshall (*NCSU*)

MATLAB PDE Toolbox for Neutron Diffusion Equation, Xue Yang (*Texas A&M*)

Automated Remote Control for Detector System on USMA Subcritical Assembly, Kenneth S. Allen, Samantha Hartman, Garrett Sexton, Robert Thomas (*United States Military Academy*)

Seminars for Nuclear Science Public Education in Las Vegas, Nevada, Steven P. Curtis (*Readiness Resource Group*)

Developing a Nuclear Science Merit Badge Workshop, Katherine Luebke (*UNLV*), Steven P. Curtis (*Readiness Resource Group*)

Technical  
Sessions:  
Thursday  
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**THURSDAY, JUNE 13**  
**TECHNICAL SESSIONS - 8:00 AM**

### **Post Irradiation Examination and Advanced Measurement Techniques**

**Sponsored by** MSTD. **Session Organizer:** Kenneth J. Geelhood (*PNNL*)

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

Preliminary Characterization of RPV Materials Harvested from the Decommissioned Zion Unit 1 Nuclear Power Plant, Mikhail A. Sokolov, Thomas M. Rosseel, Xiang Chen (*ORNL*), Randy K. Nanstad (*R&S Consultants, LLC*)

Degradation Behavior of Fluoroelastomer Under Simulated Severe Accident Environment, Inyoung Song (*UNIST*), Taehyun Lee, Kyungha Ryu (*Korea Inst of Machinery and Materials*), In Cheol Bang, Ji Hyun Kim (*UNIST*)

First Tests of a Gamma-Blind Fast Neutron Detector Prototype Based on ZnS and Wavelength-Shifting Fibers, Alexander Wolfertz (*PSI*), Robert E. Adams (*ETH Zurich*), Gregory Perret (*PSI*)

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 (*SNL*)

Radiological Accident Source Terms for LWRs: A Historical Perspective, Hossein P. Nourbakhsh (*NRC*)

Development of a Thermochemical Database for Sodium Fast Reactor Mechanistic Source Term Calculations, James L. Jerden, David Grabaskas, Matthew D. Bucknor (*ANL*)

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

Application of International Radiological Information Exchange (IRIX) Format for Radiation Monitoring Networks, Sanjoy Mukhopadhyay (*Natl Security Tech LLC*)

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

### **Reactor Physics Design, Validation and Operational Experience—II**

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

SPERT III E-Core Critical Experiments Calculation with NECP-X, Chen Zhao, Zhouyu Liu (*Xi'an Jiaotong Univ*), Thomas J. Downar (*Univ of Michigan*), Liangzhi Cao (*Xi'an Jiaotong Univ*)

Simulation of Spherical Fast Burst Reactor Pulses Using MCATK, Scott Dossa (*Univ of Minnesota*), Travis J. Trahan (*LANL*)

Utilization of the Precursor-Based Delayed Neutrons Emission Model for a Control Rod Insertion Transient, Alberto Talamo (*ANL*)

Comparison of the Reactivity Feedback Effects Between a Molybdenum-Producing PHWR Fuel Bundle and a Standard PHWR Fuel Bundle, Jawad Haroon (*UOIT*), Eleodor M. Nichita (*Univ of Ontario Inst of Tech*)

Overview of Nuclear Data Needs for Nuclear Energy Applications, Bradley T. Rearden (*ORNL*), Friederike Bostelmann (*Oak Ridge Associated Univ*), Vladimir Sobes, Andrew M. Holcomb (*ORNL*)

Technical  
Sessions:  
Thursday  
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## THURSDAY, JUNE 13

TECHNICAL SESSIONS - 10:25 AM

### Fuel Cycle and Waste Management: General—II

**Sponsored by** FCWMD. **Session Organizer:** Stephanie H. Bruffey (*ORNL*)

SEPHIS-ACM: A Step Forward in Separations Simulation, Tracy E. Stover (*SRNS*), Jeffrey Pike (*SRNL*)

Hydrodynamics of Extraction Devices: Residence Time Distribution in Centrifugal Extractors, Vivek P. Utgikar, Jarod Perko (*Univ of Idaho*), Kevin Lawrence Lyon (*INL*)

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, Inc.*)

Understanding Nitrate Chemistry—The Key to Safer and More Efficient TRU Waste Acceptance, Paul Bernard Duval (*LANL*)

### Irradiation Experiments—IV

**Sponsored by** IRD. **Session Organizer:** Brenden J. Heidrich (*INL*)

Design and Encapsulation of Irradiation Experiments for Previously Irradiated Materials, Ryan C. Gallagher, Richard H. Howard (*ORNL*), Grant A. Bickel (*CNL*)

A Review of Molten Salt Irradiation Experiments, Joel L. McDuffee (*UT-Battelle/ORNL*), Ken Thoms (*ORNL*)

Validation Efforts for ATRC MC21 Models Using the Last Ten Years of Experiments, Joshua L. Peterson (*ORNL*), Joseph W. Nielsen (*Battelle Energy Alliance*), Mary Rose Holtz, Nathan H. Manwaring (*INL*)

Examination of Corrosion Development in a Chloride Salt Irradiation Experiment, N. Dianne B. Ezell (*ORNL*), Joel L. McDuffee (*UT-Battelle/ORNL*), Stephen S. Raiman, Dave Bryant, Josh Schmidlin (*ORNL*)

### Computational Thermal Hydraulics—III

**Sponsored by** THD. **Session Organizer:** Igor A. Bolotnov (*NCSU*)

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

Uncertainty Assessment for Small Break LOCA of a Chinese Generation III Reactor, Ye Yang, Jun Yang (*Huazhong Univ of Science and Technology*), Chengcheng Deng (*Tsinghua Univ*)

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

PSA Perspective on Steam Generator Tube Rupture Without High Pressure Safety Injection, Ji Suk Kim, Man Cheol Kim (*Chung-Ang Univ*)

Technical  
Sessions:  
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**THURSDAY, JUNE 13**  
**TECHNICAL SESSIONS - 10:25 AM**

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

**Sponsored by** YMG; **Cosponsored by** ETWDD. **Session Organizer:** Fidelma Giulia Di Lemma (*INL*)

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 to be announced.**

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

**Sponsored by** NCS. **Session Organizer:** Theresa E. Cutler (*LANL*)

Criticality Evaluation of SMART Fuel Storage with MCNP6, Sungwook Choi, Bon-Seung Koo (*KAERI*)

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*)

Validation of keff Calculations for Extended BWR Burnup Credit Calculations, William J. Marshall, Justin B. Clarity, Stephen M. Bowman (*ORNL*)

Redux Analysis of D2O-Reflected Plutonium Foils at Low Temperature, William J. Zywiec (*George Washington Univ*), Anthony J. Nelson (*LLNL*)

**General Topics in Instrumentation and Control**

**Sponsored by** HFICD. **Session Organizer:** Jamie Baalis Coble (*Univ of Tennessee, Knoxville*)

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

Power Distribution Control Strategy in Lead-Cooled Fast Reactor Based on Distributed Parameter Control Method, Minghan Yang (*INEST*)

Control System Validation Platform Development Based on Simulator for China Lead-Based Research Reactor, Jjunjun Zhang, Minghan Yang, Shuai Chen, Yang Li, Han Tang, FDS Team (*CAS*)

An Artificial Neural Network Based Anomaly Detection Algorithm for Nuclear Power Plants, Jason Hou, Kan Ni, Ayman I. Hawari (*NCSU*)

Nuclear Main Control Room Obsolescence and Cyber Security Regulations are New Challenges to Overcome, Otto P. Fest (*OTTEK Corp.*)

Technical  
Sessions:  
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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*)

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 (*Univ of Wisconsin, Madison*), Jeffrey J. Graham, Peter Hosemann (*Univ of California, Berkeley*), David T. Hoelzer (*ORNL*), Stuart A. Maloy (*LANL*), Kumar Sridharan (*Univ of Wisconsin, Madison*)

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

3D Printing Assisted 4H-SiC Schottky Diodes Fabricated for Alpha Particle Spectroscopy, Neil Rutger Taylor, Lei Raymond Cao (*Ohio State*), Chaochao Dun, Mortaza Saeidjavash, Wenzheng Kuang, Yanliang Zhang (*Univ of Notre Dame*)

BISON Fuel Performance Simulations of TREAT Transients, David W. Kamerman, Nicolas Eric Woolstenhulme, Colby B. Jensen, Daniel Michael Wachs (*INL*)

Effect of Interstitial Point Defect on Thermal Transport in Oxide Fuels, Katherine A. Mitchell, Alex Resnick, Jungkyu Park, Eduardo B. Farfán, Tien Yee, Andrew Hummel (*Kennesaw State Univ*)

**Reactor Physics: General— III**

**Sponsored by** RPD; **Cosponsored by** ANSTD. **Session Organizer:** Pavel V. Tsvetkov (*Texas A&M*)

Implementation of Depletion Architecture in the MAMMOTH Reactor Physics Application, Olin William Calvin (*Univ of Florida*), Javier Ortensi, Sebastian Schunert, Yaqi Wang, Mark David DeHart (*INL*), Sedat Goluoglu (*Univ of Florida*)

Physics Assessment of Energy Deposition Distribution in Pressure-Tube Heavy Water Reactor Lattices with Uranium-Based and Thorium-Based Fuels, Blair P. Bromley (*Canadian Nuclear Society*), Jude Alexander, Huiping Yan, Ashlea V. Colton, Sourena Golesorkhi (*CNL*)

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 (*Kyung Hee Univ*)

TOPAZ-II and the HITEC: A Thermionic Reactor Design Comparison, Austin Troy Lo (*Univ of California, Berkeley*)

**Current Topics in Risk Analysis**

**Sponsored by** NISD. **Session Organizer:** Zachary Jankovsky (*SNL*)

Key Regulatory Issues of PSA in Korea, Seungwoo Lee, Ar ryum Kim, Bo gym Kim, Do Hyung Kim (*KINS*)

Nuclear Power Plant Evacuation: Gaps, Strategies, and Activity Scheduling, Adam Stein, Paul Fischbeck (*Carnegie Mellon Univ*), Sola Talabi (*Pittsburgh Technical College*)

On-Site Electrical Systems and Components Reliability Study In NPPs, Z. Gary Wang, Don G. Marksberry, John Lane (*NRC*), Zhegang Ma, Nancy Lybeck (*INL*)

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

Technical  
Sessions:  
Thursday  
June  
13

# Committee Meetings

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## NATIONAL COMMITTEES

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### Accreditation, Polices & Procedures

SUNDAY, 11 AM - 12 PM

### ANS Annual Business Meeting

WEDNESDAY, 5:45 PM - 7 PM

### Board of Directors

#### *Professional Division Reports*

WEDNESDAY, 4 PM - 5:30 PM

#### *ANS Board of Directors*

THURSDAY, 7:30 AM - 4:30 PM

### Bylaws & Rules

SUNDAY, 4 PM - 5:30 PM

### Communications

SUNDAY, 4 PM - 6 PM

### Finance Meeting

TUESDAY, 2 PM - 6 PM

### Honors & Awards

MONDAY, 4 PM - 6 PM

### International

SUNDAY, 11:30 AM - 1:30 PM

### Local Sections Committee Workshop

SUNDAY, 9:30 AM - 12 PM

### Membership

SUNDAY, 10 AM - 12 PM

### National Program

#### *NPC Screening*

SUNDAY, 10 AM - 12 PM

#### *NPC National Meeting Subcommittee*

WEDNESDAY, 11:30 AM - 1 PM

#### *NPC Program*

WEDNESDAY, 4 PM - 6 PM

### NEED

SUNDAY, 11 AM - 12 PM

### President's Meeting w/Committee Chairs & Division Chairs

SUNDAY, 8 AM - 9:30 AM

### Professional Development Coordination Committee

TUESDAY, 5 PM - 6 PM

### Professional Divisions Committee

TUESDAY, 4 PM - 5:30 PM

### Professional Divisions

#### *Training Workshop*

SATURDAY, 6:30 PM - 8 PM

### Professional Engineering Exam

#### *PEEC Item Writers Group*

SATURDAY, 5 PM - 10 PM

#### *PEEC Committee*

SUNDAY, 4 PM - 6 PM

#### *PEEC Education & Training*

SATURDAY, 9 PM - 10 PM

## NATIONAL COMMITTEES

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### Public Policy

WEDNESDAY, 12:30 PM - 2:30 PM

### Publications Steering

#### *Meetings, Proceedings & Transactions*

SUNDAY, 9 AM - 10 AM

#### *Book Publishing*

SUNDAY, 11 AM - 12:30 PM

#### *Technical Journals*

SUNDAY, 1 PM - 4 PM

#### *Publications Steering Committee*

MONDAY, 4:30 PM - 6:30 PM

#### *FS&T Editorial Advisory Committee*

SUNDAY, 4:30 PM - 5:30 PM

### Scholarship Policy & Coordination

MONDAY, 12 PM - 1 PM

### Student Sections

#### *Executive*

MONDAY, 6 PM - 8 PM

## SPECIAL COMMITTEES

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### Special Committee on Congressional Fellow

TUESDAY, 3:30 PM - 4:30 PM

## OTHER COMMITTEES

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### Christian Nuclear Fellowship

MONDAY, 7 PM - 8:30 PM

### Christian Nuclear Fellowship Breakfast

WEDNESDAY, 7 AM - 8:30 AM

### Korea Nuclear Society

MONDAY, 4:30 PM - 6:30 PM

### NEDHO

SUNDAY, 4PM - 6 PM

### NURETH

TUESDAY, 7 PM - 9 PM

### UWC Planning Committee

SUNDAY, 12 PM - 1 PM

# Committee Meetings

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## DIVISION COMMITTEES

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### Accelerator Applications

#### *Executive*

MONDAY, 11:30 AM - 1:30 PM

### Aerospace Nuclear Science & Technology

SUNDAY, 12 PM - 1 PM

### Biology & Medicine

#### *Executive*

SUNDAY, 4 PM - 5:30 PM

### Decommissioning and Environmental Sciences

#### *Program*

SUNDAY, 3:30 PM - 4:30 PM

#### *Executive*

SUNDAY, 4:30 PM - 5:30 PM

### Education, Training & Workforce Development

#### *Program*

SUNDAY, 10:30 AM - 12 PM

#### *Alpha Nu Sigma*

SUNDAY, 1 PM - 2 PM

#### *University/Industry/Government Relations*

SUNDAY, 1:30 PM - 2 PM

#### *Executive*

SUNDAY, 2 PM - 4 PM

### Fuel Cycle & Waste Management

#### *Program*

SUNDAY, 12 PM - 1 PM

#### *Executive*

SUNDAY, 1 PM - 2:30 PM

### Fusion Energy

#### *Executive*

TUESDAY, 6 PM - 8 PM

### Human Factors, Instrumentation, and Controls

#### *Program*

SUNDAY, 11 AM - 12 PM

#### *Executive*

SUNDAY, 12 PM - 2:30 PM

### Isotopes and Radiation

#### *Joint Program Committee-I&R/BM*

SUNDAY, 1:30 PM - 2:30 PM

#### *Executive*

SUNDAY, 2:30 PM - 4:30 PM

### Materials Science & Technology

#### *Executive*

MONDAY, 6:45 PM - 8:45 PM

### Mathematics & Computation

#### *Program*

SUNDAY, 1 PM - 2 PM

#### *Executive*

SUNDAY, 2 PM - 4 PM

## DIVISION COMMITTEES

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### Nuclear Criticality Safety

#### *Education Meeting*

SUNDAY, 1 PM - 2 PM

#### *Program*

SUNDAY, 2 PM - 3 PM

#### *Executive*

SUNDAY, 3 PM - 4:30 PM

### Nuclear Installations Safety

#### *Program*

SUNDAY, 4 PM - 6 PM

#### *Executive*

MONDAY, 7:30 PM - 9 PM

### Nuclear Nonproliferation Policy

#### *Program*

SUNDAY, 2:30 PM - 3:30 PM

#### *Executive*

SUNDAY, 3:30 PM - 4:30 PM

### Operations & Power

#### *Program*

SUNDAY, 1:30 PM - 3 PM

#### *Executive*

SUNDAY, 3:30 PM - 6 PM

### Radiation Protection & Shielding

#### *Program*

SUNDAY, 1 PM - 2 PM

#### *Executive*

SUNDAY, 2 PM - 4 PM

### Reactor Physics

#### *Program*

SUNDAY, 2 PM - 3:30 PM

#### *Executive*

SUNDAY, 3:30 PM - 6 PM

### Robotics & Remote Systems

#### *Executive*

SUNDAY, 12 PM - 4 PM

### Thermal Hydraulics

#### *Program*

SUNDAY, 2:30 PM - 4:30 PM

#### *Executive*

SUNDAY, 4:30 PM - 6 PM

### Young Members Group (TG)

#### *Program*

MONDAY, 10 AM - 11 AM

#### *Executive*

MONDAY, 12:30 PM - 1:30 PM

# Committee Meetings

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## STANDARDS COMMITTEES

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

MONDAY 8 AM - 10 AM

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

TUESDAY 3:30 PM - 6 PM

**ANS-8.20, Nuclear Criticality Safety Training**

SUNDAY 10 AM - 12 PM

**ANS-8.26, Criticality Safety Engineer Training and Qualification Program**

SUNDAY, 11 AM - 1 PM

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

TUESDAY 3 PM - 5 PM

**ANS-8.3, Criticality Accident Alarm System**

MONDAY 10 AM - 10:30 AM

**ANS-19, Reactor Physics Subcommittee**

MONDAY 9 AM - 10:30 AM

**ANS-19.10, Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals**

MONDAY 10:30 AM - 11:30 AM

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

MONDAY 8 AM - 9 AM

**Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)**

MONDAY 10 AM - 12 PM

**New and Used Fuel (Design Only) Subcommittee**

MONDAY 1:30 PM - 4:30 PM

**Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)**

MONDAY 8 AM - 10 AM

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

MONDAY 2:30 PM - 6 PM

**Standards Board**

TUESDAY 8:30 AM - 5 PM



# Committee/Division/Other Meetings Daily

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## Saturday, June 8

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5:00 pm - 10:00 pm Professional Engineering Exam Committee-Item Writers Group  
6:30 pm - 8:00 pm Professional Divisions Committee-Training Workshop

## Sunday, June 9

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8:00 am - 9:30 am President's Meeting with Committee & Division Chairs  
9:00 am - 10:00 am Publications Steering-Meetings, Proceedings & Transactions Committee  
9:30 am - 12:00 pm Local Sections Committee Workshop  
10:00 am - 12:00 pm ANS-8.20, Nuclear Criticality Safety Training  
10:00 am - 12:00 pm National Program Committee-NPC Screening  
10:00 am - 12:00 pm Membership Committee  
10:00 am - 1:00 pm Professional Engineering Exam Committee Education & Training Item Writers Training and Workshop  
10:30 am - 12:00 pm Education, Training & Workforce Development Division-Program Committee  
11:00 am - 12:00 pm Accreditation, Policies & Procedures Committee  
11:00 am - 12:00 pm NEED Committee  
11:00 am - 12:30 pm Publications Steering Committee-Book Publishing  
11:00 am - 12:00 pm Human Factors, Instrumentation & Controls Division-Program Committee  
11:00 am - 1:00 pm ANS-8.26, Criticality Safety Engineer Training and Qualification Program  
11:30 am - 1:30 pm International Committee  
12:00 pm - 1:00 pm Fuel Cycle & Waste Management Division-Program Committee  
12:00 pm - 1:00 pm UWC Planning Committee  
12:00 pm - 1:00 pm Aerospace Nuclear Science & Technology Division  
12:00 pm - 2:30 pm Human Factors, Instrumentation & Controls Division-Executive Committee  
12:00 pm - 4:00 pm Robotics & Remote Systems Division-Executive Committee  
1:00 pm - 2:00 pm Education, Training & Workforce Development Division-Alpha Nu Sigma National Honor Society  
1:00 pm - 2:00 pm Mathematics & Computation Division-Program Committee  
1:00 pm - 2:00 pm Nuclear Criticality Safety Division-Education Meeting  
1:00 pm - 2:00 pm Alpha Nu Sigma  
1:00 pm - 2:00 pm Radiation Protection & Shielding Division-Program Committee  
1:00 pm - 2:30 pm Fuel Cycle & Waste Management Division-Executive Committee  
1:00 pm - 4:00 pm Publications Steering Committee-Technical Journals  
1:30 pm - 2:30 pm Isotopes & Radiation Division-Joint Program Committee-I&R/BM  
1:30 pm - 2:00 pm Education, Training & Workforce Development Division-University/Industry/Government Relations Committee  
1:30 pm - 3:00 pm Operations & Power Division-Program Committee  
2:00 pm - 3:00 pm Nuclear Criticality Safety Division-Program Committee  
2:00 pm - 3:30 pm Reactor Physics-Program Committee  
2:00 pm - 4:00 pm Education Training & Workforce Development Division-Executive Committee  
2:00 pm - 4:00 pm Mathematics & Computation Division-Executive Committee  
2:00 pm - 4:00 pm Radiation Protection & Shielding Division-Executive Committee  
2:30 pm - 3:30 pm Nuclear Nonproliferation Policy Division-Program Committee  
2:30 pm - 4:30 pm Thermal Hydraulics Division-Program Committee  
2:30 pm - 4:30 pm Isotopes & Radiation Division-Executive Committee  
3:00 pm - 4:30 pm Nuclear Criticality Safety Division-Executive Committee  
3:30 pm - 4:30 pm Decommissioning and Environmental Sciences Division-Program Committee  
3:30 pm - 4:30 pm Nuclear Nonproliferation Policy Division-Executive Committee  
3:30 pm - 6:00 pm Operations & Power Division-Executive Committee  
3:30 pm - 6:00 pm Reactor Physics Division-Executive Committee  
4:00 pm - 5:00 pm Membership, Communications, and Professional Development Coordination Committees  
4:00 pm - 5:30 pm Biology & Medicine Division-Executive Committee  
4:00 pm - 5:30 pm Bylaws & Rules Committee  
4:00 pm - 6:00 pm Communications Committee  
4:00 pm - 6:00 pm NEDHO  
4:00 pm - 6:00 pm Nuclear Installations Safety Division- Program Committee  
4:00 pm - 6:00 pm Professional Engineering Exam Committee-Committee Meeting  
4:30 pm - 5:30 pm Decommissioning and Environmental Sciences Division-Executive Committee  
4:30 pm - 5:30 pm Publications Steering Committee-FS&T Editorial Advisory Committee  
4:30 pm - 6:00 pm Thermal Hydraulics Division-Executive Committee

# Committee/Division/Other Meetings Daily

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## Monday, June 10

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8:00 am – 9:00 am	ANS-19.3, Steady-State Neutronics Methods for Power Reactor Analysis
8:00 am – 10:00 am	ANS-8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors
8:00 am – 10:00 am	Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)
9:00 am – 10:30 am	ANS-19, Reactor Physics Subcommittee
10:00 am – 10:30 am	ANS-8.3, Criticality Accident Alarm System
10:00 am - 11:00 am	Young Member Group-Program
10:00 am – 12:00 pm	Fuel, Waste, and Decommissioning Consensus Committee (FWDC)
10:30 am – 11:30 am	ANS-19.10, Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals
11:30 am - 1:30 pm	Accelerator Applications Division-Executive Committee
12:00 pm - 1:00 pm	Scholarship Policy & Coordination Committee
12:30 pm - 1:30 pm	Young Member Group-Executive
1:30 pm – 4:30 pm	New and Used Fuel (Design Only) Subcommittee
2:30 pm – 6:00 pm	Risk-informed, Performance-based Principles and Policy Committee (RP3C)
4:00 pm - 6:00 pm	Honors & Awards Committee
4:30 pm - 6:30 pm	Korea Nuclear Society
4:30 pm - 6:30 pm	Publications Steering Committee
6:00 pm - 8:00 pm	Student Sections Committee- Executive Committee
6:45 pm - 8:45 pm	Materials Science & Technology Division-Executive Committee
7:00 pm - 8:30 pm	Christian Nuclear Fellowship
7:30 pm - 9:00 pm	Nuclear Installations Safety Division-Executive Committee

## Tuesday, June 11

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8:30 am - 5:00 pm	Standards Board
2:00 pm - 6:00 pm	Finance Committee
3:00 pm – 5:00 pm	ANS-8.28, Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety
3:30 pm – 4:30 pm	Special Committee on Congressional Fellow
3:30 pm – 6:00 pm	ANS-8.12, Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors
4:00 pm - 5:30 pm	Professional Divisions Committee
5:00 pm - 6:00 pm	Professional Development Coordination Committee
6:00 pm - 8:00 pm	Fusion Energy Division-Executive Committee
7:00 pm - 9:00 pm	NURETH

## Wednesday, June 12

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7:00 am - 8:30 am	Christian Nuclear Fellowship Breakfast
11:30 am - 1:00 pm	National Program Committee-NPC National Meeting Subcommittee
12:30 pm - 2:30 pm	Public Policy Committee
4:00 pm - 5:30 pm	Board of Directors-Professional Division Reports
4:00 pm - 6:00 pm	National Program Committee - NPC Program
5:45 pm - 7:00 pm	ANS Annual Business Meeting

## Thursday, June 13

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7:30 am - 4:30 pm	ANS Board of Directors Meeting
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# 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