



ANS Winter Meeting & Expo

2019

Official Program

A large satellite-style image of Earth at night, showing city lights and the dark oceans against a starry space background.

NUCLEAR
TECHNOLOGY
FOR THE U.S. AND
THE WORLD



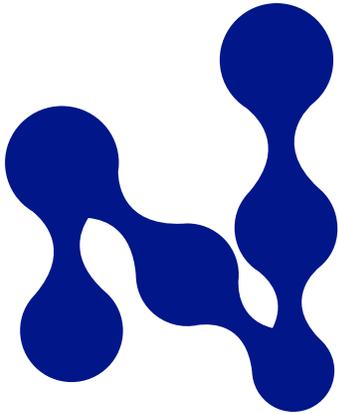
November 17-21, 2019
Washington D.C.
Marriott Wardman Park



ANS Winter Meeting & Expo

Our most sincere thanks to our sponsors for their support of the 2019 Winter Meeting & Expo.

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ANS welcomes the Girija Shukla Student Program Chairs of the 2019 Winter Meeting
In honor of Girija Shukla, the Student Program Chairs are supported by a generous donation from the Shukla Family.

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Organizing Committee

Nuclear Technology for the U.S. and the World

2019 Winter Meeting



GENERAL CHAIR
John L. Hopkins
NuScale Power, LLC



ASSISTANT GENERAL CHAIR
Lenka Kollar
NuScale Power, LLC



ASSISTANT GENERAL CHAIR
Diane Hughes
NuScale Power, LLC



TECHNICAL PROGRAM CHAIR
Jeffery R. Brault



ASSISTANT TECHNICAL PROGRAM CHAIR
Jared A. Johnson
ORNL



ASSISTANT TECHNICAL PROGRAM CHAIR & FINANCE COCHAIR
James Behrens
U. S. Navy, Ret.



FINANCE COCHAIR
Jaime Sumpter
NuScale Power, LLC



STUDENT PROGRAM COCHAIR
Meryem Murphy
Virginia Commonwealth University



STUDENT PROGRAM COCHAIR
John Lathrop
University of Maryland



TECHNICAL TOUR COCHAIR
Jeff Gorman
Dominion Engineering, Inc.



TECHNICAL TOUR COCHAIR
Steve Mirsky
NuScale Power, LLC

Daily Schedule

Saturday, November 16

7:30-8:15 am	YPC Check-in	Virginia AB
8:15 am-5:45 pm	YPC Sessions	Maryland AB

Sunday, November 17

7:00 am-7:00 pm	Registration	Convention Reg. Desk
6:00-8:00 pm	ANS President's Opening Reception in Technology Expo	Exhibit Hall A
6:00-8:00 pm	ANS Nuclear Technology Expo	Exhibit Hall A

Monday, November 18

7:00 am-5:00 pm	Registration	Convention Reg. Desk
7:30 am-4:00 pm	ANS Nuclear Technology Expo	Exhibit Hall A
7:30-8:00 am	Continental Breakfast in Technology Expo	Exhibit Hall A
8:00-11:30 am	Opening Plenary 	Marriott Salon 1, 2, 3
11:30 am-1:00 pm	Lunch in Technology Expo	Exhibit Hall A
1:00-3:35 pm	Panel—A Day in the Life of Reactor Engineers at Sites	Maryland AB
1:00-3:35 pm	Technical Sessions <ul style="list-style-type: none"> • Thermal Energy Storage Systems and Coupling Challenges—I • Student Design Competition • Dwight D. Eisenhower Award Special Session—I • Dwight D. Eisenhower Award Special Session—II • Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—I • Recent Nuclear Criticality Safety Program Technical Accomplishments • Current Issues in Computational Methods—Roundtable • Advanced Manufacturing and Transient Fuel Performance • Experimental Thermal Hydraulics—I • Developments in Data Analytics for Nuclear Power Applications • The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—I • Perspectives on the ANS Congressional Fellowship—Panel • Computational Thermal Hydraulics—I • Reactor Analysis Methods—I • Steve Bowman Memorial Session: Evolution of SCALE—Panel • Innovations in Fuel Cycle Research Awards—I 	Virginia A Virginia C Delaware A Delaware A
3:35-3:55 pm	Refreshment Break in Technology Expo	Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony A Balcony B Washington 5 Washington 4 Maryland C
3:50-6:00 pm	Protected Activity and Employee Protection—Experiences and Best Practices: Increasing the Awareness of the Impacts of Adverse Employment Decisions Related to Protected Activity	Exhibit Hall A & B South Maryland AB
3:55-6:00 pm	Technical Sessions <ul style="list-style-type: none"> • Thermal Energy Storage Systems and Coupling Challenges—II • New Construction Around the World—Panel • Nuclear Installations Safety: General • ANS Position Statement 41 on the Effect of Low Levels of Radiation—Panel • Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—II • Impacts to Criticality Safety from Recent Revisions to DOE Standards—Panel • Best Practices of Nuclear Software Quality Assurance—Panel • Post-Irradiation Examination • General Thermal Hydraulics—I • Advanced Reactor Instrumentation • The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—II • Pitch your PhD—Panel • Computational Thermal Hydraulics—II • Nuclear Data for Advanced Reactor Applications—I • Versatile Test Reactor—Current Developments—I • Innovations in Fuel Cycle Research Awards—II 	Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony A Balcony B Washington 5 Washington 4 Maryland C

Daily Schedule

Tuesday, November 19

7:00 am-5:00 pm	Registration	Convention Reg. Desk
7:30 am-1:30 pm	ANS Nuclear Technology Expo	Exhibit Hall A
7:30-8:00 am	Continental Breakfast in Technology Expo	Exhibit Hall A
8:00-11:30 am	ANS President's Special Session	Marriott Salon 1, 2, 3
10:00-10:15 am	Refreshment Break in Technology Expo	Exhibit Hall A
10:15 am-12:00 pm	TMI-2 40 Years Later Part I and II	Maryland AB
10:15 am-12:00 pm	Technical Sessions <ul style="list-style-type: none"> • MicroReactors–Panel • Versatile Test Reactor—I • Advanced Risk Topics and Safety Assessments for Advanced Reactor Designs • SMR Safeguards–Panel • Fuel Cycle Updates from a Regulatory Perspective–Panel • Implications of NCS Analysis Process Drift–Panel • Monte Carlo and Multiphysics • Nuclear Science User Facilities—I • Thermal-Hydraulic Challenges for Micro-Reactors–Panel • General Topics in Human Factors, Instrumentation and Control—I • Overview of the Various Environmental Standards Projects–Panel • The Fastest Path to Achieving Zero Emissions: Nuclear's Role–Panel • Educational Nuclear Thermal Hydraulics Issues and Challenges–Panel • Innovations in Advanced Reactor Technology and Design Through the ARPA-E MEITNER Program–Papers/Panel • Versatile Test Reactor—Current Developments—II • Space Nuclear Power Systems 	Virginia A Virginia B Virginia C Delaware A Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony A Balcony B
11:30 am-1:30 pm	Student Poster Session in Technology Expo	Washington 5 Washington 4 Maryland C
12:00-1:15 pm	Lunch in Technology Expo	Exhibit Hall A
1:15-3:40 pm	Technical Sessions <ul style="list-style-type: none"> • Thermal Energy Storage Systems and Coupling Challenges—III • Focus on Communications—I—Communicating with Policy Makers–Panel • Focus on Communications—II—Meet the Media–Panel • Table Top Exercise/Workshop • Progress in Consolidated Interim Storage and Next Steps–Panel • Data, Analysis and Operations in Nuclear Criticality Safety—I • Computational Methods and Mathematical Modeling • Plutonium Handbook—I–Panel • Young Professional Thermal Hydraulics Research Competition • Digital I&C Upgrades–Panel • Integrated Energy Systems: Integrating Nuclear Plants with Renewable Sources Through Alternative Applications Beyond the Grid–Panel • Radiation Protection and Shielding: General • Experimental Thermal Hydraulics—II • Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—I • Versatile Test Reactor—Current Developments—III • Research by U.S. DOE NEUP Sponsored Students—I 	Exhibit Hall A
1:30-3:40 pm	Export Control for Utilities: What's the Big Deal?	Virginia A Virginia C Virginia C Delaware A Delaware B Hoover Coolidge Harding Wilson A Wilson B
3:40-3:55 pm	Refreshment Break	Wilson C Balcony A Balcony B
3:55-6:00 pm	Technical Sessions <ul style="list-style-type: none"> • Cutting Edge Techniques in Education, Training and Distance Education—I • Isotopes and Radiation Division: General • Future Directions for the Defense Nuclear Facilities Safety Board–Panel • Critical and Subcritical Experiments—I • Used Fuel and High-Level Waste Management—Einstein's Definition of Insanity?–Panel • Computational Tools for Radiation Protection and Shielding—I • Deterministic Transport Methods • Sensors and In-Pile Instrumentation • Multiscale and Multi-Physics Thermal Hydraulics • Digital I&C Modernization • General Topics in Decommissioning—I • How to Give Technical Presentations–Panel • General Thermal Hydraulics—II • Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—II • “Hands On” Core Design–Panel • Research by U.S. DOE NEUP Sponsored Students—II 	Washington 5 Washington 4 Maryland C Maryland AB Marriott Foyer



Daily Schedule

Wednesday, November 20

7:00 am-5:00 pm	Registration	Convention Reg. Desk
7:30-8:00 am	Continental Breakfast	Ballroom Foyer
8:00-10:00 am	General Chair's Special Session	Marriott Salon 1, 2, 3
10:00-10:15 am	Refreshment Break	Ballroom Foyer
10:15 am-12:00 pm	Technical Sessions <ul style="list-style-type: none"> • Operations and Power: General—I • The Role of Innovation in Nuclear Development—Panel • Atmospheric Transport Considerations for Radiation Protection and Shielding • Nuclear Thermal Propulsion • Introduction to NCSD Mentor Match and Membership Challenge Debrief—Panel • Analytical Solutions and Benchmarking • Nuclear Science User Facilities—II • Two-Phase Flow Thermal Hydraulics • Online Monitoring Technologies for Instrumentation and Control (I&C) Systems in Nuclear Facilities—Panel • Advanced and Innovative Technologies for Decommissioning of Nuclear Facilities and Environmental Remediation of Radiological Contamination—Panel • Diversity and Inclusion in Nuclear—Panel • Spent Fuel Storage and Transportation • Reactor Physics: General—I • Research Reactors in Support of Advanced Reactors R&D—Panel • ABET Accreditation Challenges: Transition and Implementation—Panel • NSG: What Is It and Why Should We Care? Looking at Global Non-Proliferation Regimes and Their Impact on International Business 	Virginia A Virginia B Virginia C Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony A Balcony B Washington 5 Washington 4 Maryland C Maryland AB
12:00-1:15 pm	Lunch on Own	
1:15-3:40 pm	Technical Sessions <ul style="list-style-type: none"> • Versatile Test Reactor—II—Panel • Current Applications of Dynamic PRA—Panel • Critical and Subcritical Experiments—II • Current University Research on Pyroprocessing • Computational Tools for Radiation Protection and Shielding—II • Machine Learning and Reduced and Order Modeling • Nuclear Fuels and Materials in Fast Reactors • Experimental Thermal Hydraulics—III • Cybersecurity for Nuclear Installations • International Decommissioning—Paper/Panel • Computational Thermal Hydraulics—III • Reactor Physics: General—II • Reactor Analysis Methods—II 	Virginia B Virginia C Delaware A Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony B Washington 5 Washington 4 Maryland AB
3:00-6:00 pm	Technical Session: Storm the Hill briefing and Communications Workshop	Maryland AB
3:40-3:55 pm	Refreshment Break	Ballroom Foyer
3:55-6:00 pm	Technical Sessions <ul style="list-style-type: none"> • Operations and Power: General—II • Realizing the Benefits of Risk-Informed and Performance-Based Approaches—Panel • Impact of Radiological Sources on Nuclear Nonproliferation • Safeguards and Material Accountancy Strategies for Molten Salt Systems • Data, Analysis and Operations in Nuclear Criticality Safety—II • Nuclear Data and Uncertainty Quantification • Nuclear Fuels • General Thermal Hydraulics—III • Advances in Nuclear Cybersecurity Research and Development—Panel • Plutonium Handbook—II—Panel • Experimental Thermal Hydraulics—IV • Reactor Physics Design, Validation and Operational Experience • Nuclear Data for Advanced Reactor Applications—II • [ANS Nuclear Grand Challenge] Advanced Material Testing Using Accelerators—Panel 	Virginia A Virginia C Delaware A Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Balcony B Washington 5 Washington 4 Maryland C

Daily Schedule

Thursday, November 21

7:00-10:30 am	Registration	Convention Reg. Desk
7:30-8:00 am	Continental Breakfast	Ballroom Foyer
8:00-10:10 am	Technical Sessions <ul style="list-style-type: none"> • Operations and Power: General—III • Radiation Detection and Imaging—I • Cutting Edge Techniques in Education, Training and Distance Education—II • Non-Reactor Nuclear Facility Consensus Standards—Roundtable • Fuel Cycle and Waste Management: General—I • Data, Analysis and Operations in Nuclear Criticality Safety—III • Fuel and Materials for Molten Salt Reactors and Aging of Materials • Accident Tolerant Fuels—I • General Thermal Hydraulics—IV • General Topics in Human Factors, Instrumentation and Control—II • General Topics in Decommissioning—II • Accelerator Applications: General • Reactor Physics: General—III 	Virginia A Virginia B Virginia C Delaware A Delaware B Hoover Coolidge Harding Wilson A Wilson B Wilson C Washington 5 Washington 4 Ballroom Foyer
10:10-10:25 am	Refreshment Break	
10:25 am-12:35 pm	Technical Sessions <ul style="list-style-type: none"> • Radiation Detection and Imaging—II • Biology and Medicine Division: General • Advances in Remote Inspection System Design • Emerging International Topics in Nuclear Installations Safety • Fuel Cycle and Waste Management: General—II • Data, Analysis and Operations in Nuclear Criticality Safety—IV • Fusion Energy Applications • Accident Tolerant Fuels—II • Computational Thermal Hydraulics—IV • General Topics in Human Factors, Instrumentation and Control—III 	Virginia A Virginia B Washington 5 Wilson C Delaware B Hoover Coolidge Harding Wilson A Wilson B

Scan this code or visit your app store and download “Attendee Hub” to access the free Winter 2019 app.



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

If you already have Attendee Hub on your phone:

1. From the event homescreen, tap the three white lines icon on the top left.
2. Choose Switch Event, then **search ANS Winter Meeting 2019**.

Once you have the app, follow the instructions below to log in.

An app invitation will be sent to the email that you used to register for the meeting by ANS Meetings. Open the invitation, tap **Verify Account**, then tap **Open App** to complete the verification and log in.

If you did not receive an invitation or deleted it, retrieve your verification code by opening Attendee Hub. On the top left of the event homescreen, **tap the three white lines icon**. Then tap **Log in for more features**, enter your name and tap **Next**. Tap **Resend Code** to have a verification code sent to your email address.



The Winter Meeting 2019 event will not be available in the app until November 10. Even if the Attendee Hub app is not available for your device, you may still use our online event guide at

event.crowdcompass.com/answinter2019

General Information

MEETING INFORMATION

The 2019 ANS Winter Meeting promises to be one of the year's most exciting and informative educational and networking events for attendees from every facet of nuclear science and technology. The theme for this meeting is "Nuclear Technology for the U.S. and the World."

In addition, the Technology Expo will give attendees a glimpse into the applications of new technology through three days of exhibits and special events. The Expo will also give attendees many opportunities to network with each other and establish new professional relationships while having food and fun in a friendly and informal setting.

The 2019 ANS Winter Meeting and Technology Expo is the premier North American nuclear science and technology conference. If you're interested in expanding your knowledge, sharing ideas, and networking in one of the world's most exciting entertainment destinations, don't miss this opportunity. Please join us at the 2019 ANS Winter Meeting.

REGISTRATION

Location: **Convention Registration Desk**

Name badges must be worn during all technical sessions, in the expo, and at events. Certain events require a ticket and may entail an additional cost.

REGISTRATION HOURS

Sunday, November 17	7:00 am-7:00 pm
Monday, November 18	7:00 am-5:00 pm
Tuesday, November 19	7:00 am-5:00 pm
Wednesday, November 20	7:00 am-5:00 pm
Thursday, November 21	7:00-10:30 am

TECHNOLOGY EXPO HOURS

Location: **Exhibit Hall A**

Join us and visit with our exhibitors in the Expo! Learn about new technology, products, and services that are being offered. Continental breakfast, breaks, lunches, and reception will be hosted in the Expo. For more information or to view the floor plan and exhibitors see pages 74-76.

Sunday, November 17	6:00-8:00 pm
Monday, November 18	7:30 am-4:00 pm
Tuesday, November 19	7:30 am-1:30 pm

FREE MEETING WIFI

Network: **MARRIOTT CONFERENCE** Password: **ANS2019**

Instructions for Wireless Connection

1. Check for any available wireless signals.
2. Connect to **SSID: MARRIOTT CONFERENCE**
3. Launch a web browser.
4. When prompted, enter the Conference Code **ANS2019** and click on "submit".
5. The conference Welcome Page will display and you can now browse the Internet

If you encounter any technical difficulties, Please dial extension **5217** on any hotel house phone or call the **PSAV Manager on Duty at 202-369-4081.**

If you are roaming throughout the Hotel, your Computer will sometimes disconnect and you will need to re-associate with another Wireless Access Point. VPN's are not meant to stay connected all the time for security reasons and you may be required to re-establish your VPN connectivity when your current session expires.

General Information

NOTICE TO SPEAKERS

After printing your badge, all speakers and session chairs must check in at the Speaker Desk located near the ANS Registration Desk.

ATTENDEE MEAL FUNCTIONS

YPC19 Division Luncheon

Saturday, November 16 - 12:45-1:45 pm - Virginia AB

YPC19 Breaks

Saturday, November 16 - 10:30-10:45 am - Virginia AB

Saturday, November 16 - 3:45-4:00 pm - Virginia AB

ANS President's Opening Reception

This reception is a ticketed event on Sunday evening from 6:00-8:00 pm. Reception and (2) drink tickets are included with a full meeting registration. Additional reception tickets are available for purchase at the following cost: \$125 (Adult) / \$50 (Child, under 21)

Continental Breakfast

Continental breakfast will be provided to all registered meeting attendees Monday-Thursday.

Lunch & Breaks in the Technology Expo

Lunch will be provided to all registered meeting attendees Monday and Tuesday. Daily coffee breaks will also be provided Monday-Thursday.

EMBEDDED TOPICAL MEETING YPC19

The Young Professionals Congress 2019 (YPC19) will be held on Saturday, November 16, at 8:00 am. For additional information in regards to the YPC19, visit pages 70-73.

ANS BUSINESS OFFICE

Location: **Park 8228**
Sunday-Wednesday:
8:00 am-5:00 pm

ANS MEDIA CENTER

Location: **Park 8226**
Monday-Tuesday:
7:45 am-4:00 pm

Wednesday:
7:45 am-12:00 pm

ANS STUDENT OFFICE

Location: **Park 8229**
Sunday-Wednesday:
8:00 am-5:00 pm

Thursday:
8:00 am-1:00 pm

ANS welcomes the Girija Shukla Student Program Chairs of the 2019 Winter Meeting

In honor of Girija Shukla, the Student Program Chairs are supported by a generous donation from the Shukla Family.



AZI Isotopes was founded for production of medical isotopes and research, featuring a 70-MeV high-current proton cyclotron, irradiation cells, and chemical processing facilities. Facilities are under construction near Grissom Airport in Miami County, Indiana.

Senior professional staff openings are in Nuclear Engineering, Nuclear Physics, and Nuclear Chemistry.

Interested persons may contact
cjupiter@azisocorp.com.

General Information

OTHER THINGS TO ATTEND

Teacher's Workshop

Saturday: 8:30 am-4:00 pm – Coolidge

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.

First-Time Attendee Orientation

Sunday: 1:00-2:00 pm – Washington 2

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 – Maryland AB

Attendance at the 2019 ANS Winter Meeting is an exciting professional opportunity for college and graduate students. For information on the Student Program, see the Student Program Instructions document on the Winter Meeting webpage. Students participating in this program should attend this meeting.

Mentor Meeting

Sunday: 5:00-6:00 pm – Wilson C

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 – Hotel Lobby

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

Diversity Networking Social

Tuesday

Networking Games - 6:00-8:00 pm – Maryland AB

Networking Social - 8:00-10:00 pm – Macintyre'e 2621 Connecticut Ave NW, Washington, DC 20852

Join us for a series of networking games and competitions followed by a social at a nearby bar. First, get to know your fellow ANS members better and expand your network with Human Bingo. Players are challenged to identify other players who meet a given set of criteria in order to fill out their bingo card. Next, put your engineering skills to the test with Marshmallow Tower. Build the tallest freestanding tower as a team using nothing more than the provided materials. But watch out, teams will be scrambled periodically! The networking games will take place at the conference hotel from 6-8 pm and the networking social will take place at Macintyre's from 8-10 pm (see above for address)!

General Information

ABOUT ANS

Mission

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

Statement on Diversity

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

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

Respectful Behavior Policy (Abbreviated)

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

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

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

The designated contact for reports at the 2019 Winter Meeting is Paula Cappelletti, ANS Director of Meetings and Exhibits. She can be reached at 708-579-8214, or you can leave a message at the ANS Registration Desk for her to contact you directly.

The complete Respectful Behavior Policy can be found at www.ans.org/about/rbp.

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

General Information

ANS CODE OF ETHICS

Preamble

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

Fundamental Principle

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

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

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

Principles of Professional Conduct

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

Plenary, Special Sessions & Events

SUNDAY, NOVEMBER 17

ANS President's Opening Reception in Technology Expo

Location: Exhibit Hall A **Time:** 6:00-8:00 pm

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

MONDAY, NOVEMBER 18

Opening Plenary: Nuclear Technology for the U.S.

Session Organizer and Chair: John L. Hopkins (*NuScale Power*)

Location: Marriott Salon 1, 2, 3 **Time:** 8:00-11:30 am

Speakers: Dr. Rita Baranwal (*Assistant Secretary of the Office of Nuclear Energy, U.S. Department of Energy (DOE)*)
Kristine Svinicki (*Chairman of the U.S. Nuclear Regulatory Commission*)
Ann Bisconti, PhD (*President, Bisconti Research*)
Patrick Landais, PhD (*High Commissioner for Atomic Energy, France*)
Dr. Ashley Finan (*Director of the National Reactor Innovation Center*)

Sponsored by:



Operations and Power Division (OPD) Dinner

Location: District Kitchen, 2606 Connecticut Ave NW **Time:** 6:00-9:00 pm

Join the Operations and Power Division to celebrate a successful year as a division. The OPD Dinner will be hosted at District Kitchen. This event is not included in your registration fee.

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Plenary, Special Sessions & Events

TUESDAY, NOVEMBER 19

ANS President's Special Session

7th SMR Vendor Roundtable: SMR Deployment and Export from the U.S., Canada, and U.K.

Session Organizer: Marilyn Kray (*ANS President*)

Location: Marriott Salon 1, 2, 3 **Time:** 8:00 am-11:30 am

Large and Small Modular Reactors are increasingly being deployed and exported globally, primarily by Russia and China. The U.S., Canada, and the U.K. are promoting the development of advanced large and small reactors. National labs, which were the origin of many designs, are now supporting the deployment of first-of-a-kind reactors for domestic use and for exports that can compete with other nations. Leadership by the U.S., with cooperation from other leading partners like Canada and the U.K., is crucial to safeguarding the energy security gained through deployment and export from governments that share American values of clean, reliable, and secure nuclear power.

The President's Special Session will feature the 7th SMR Vendor Roundtable, a format started by the Canadian Nuclear Laboratories. It has featured interactions from more than 30 reactor vendors in previous Roundtables that included policymakers, regulators, customers, and national laboratories from around the world.

Prior to the Roundtable discussion, U.S. Senator James Risch, Chairman, Senate Foreign Relations Committee, will deliver a keynote presentation on the importance of deploying and exporting SMR/Advanced Reactors in the U.S. with Canada and the U.K.

The Roundtable will feature representatives from the following 12 SMR vendors:

Donald Wolf (<i>Advanced Reactor Concepts Chairman, CEO & Co-Founder</i>)	Jeff Harper (<i>X-Energy Vice President for Strategy and Business Development</i>)
Rory O'Sullivan (<i>Moltex Chief Executive</i>)	Tara Neider (<i>TerraPower Senior Vice President of Program Development and Lab Facilities</i>)
John Hopkins (<i>NuScale Chairman and CEO</i>)	Caroline Cochran (<i>Oklo Co-Founder and COO</i>)
Kirk Schnoebelen (<i>U-Battery</i>)	Thomas Marcille (<i>Holtec Reactor Physicist</i>)
Mark Mitchell (<i>Ultrasafe Nuclear Corporation</i>)	Mark Peres (<i>Kairos Power Vice President Engineering</i>)
Kenneth Canavan (<i>Westinghouse Chief Technology Officer (CTO)</i>)	Robin Rickman (<i>Terrestrial Energy USA Vice President Business Development</i>)
Jon Ball (<i>GE Nuclear Executive Vice President Nuclear Plant Projects</i>)	

The Roundtable will cover topics in these four areas:

Government and Labs Enabling Deployment in the U.S., Canada, and the U.K.

Corey McDaniel (<i>CNL</i>)	Dan Mathers (<i>BEIS</i>)	John Wagner (<i>INL</i>)
Diane Cameron (<i>NRCAN</i>)	Kathryn McCarthy (<i>CNL</i>)	Fiona Rayment (<i>NNL</i>)

Increasing Regulatory Effectiveness for SMRs in the U.S., Canada, and the U.K.

Bonita Chan (<i>CNL</i>)	Jammal Ramzi (<i>CSNC</i>)
Bill Magwood, IV (<i>OECD</i>)	Robert Taylor (<i>NRC</i>)

Supply Chain Support of Efforts to Enable Deployment and Export

David Blee (<i>NIC</i>)	Greg Meyer (<i>Fluor</i>)
William Fox (<i>SNC Lavalin</i>)	Gary Wolski (<i>Curtiss-Wright</i>)

Customers Supporting Deployment and Exports in the U.S., Canada, and the U.K. and Beyond

John Kotek (<i>NEI</i>)	Doug Hunter (<i>UAMPS</i>)
Dan Stout (<i>TVA</i>)	Dominique Miniere (<i>OPG</i>)

Student Poster Session in Technology Expo

Location: Exhibit Hall A **Time:** 11:30 am-1:30 pm

Stop by the Exhibit Hall and join us for lunch, posters, and networking! Student technical posters will be on display Tuesday during the lunch hour in the Technology Expo. During this time, presenters will stand beside their posters to answer questions and informally discuss the topic of their poster. A complete list of posters may be found on pages 34 and 35.

Sponsored by:



Plenary, Special Sessions & Events

WEDNESDAY, NOVEMBER 20

General Chair's Special Session: Nuclear Technology for the World: Opportunities and Challenges

Session Organizer and Chair: John L. Hopkins (*NuScale Power*)

Location: Marriott Salon 1, 2, 3 **Time:** 8:00-10:00 am

The panelists will discuss the main opportunities and challenges to expanding the peaceful use of nuclear technology worldwide. This is not limited to nuclear energy, but also other applications, such as medical and agricultural uses of nuclear technology.

Moderator: John L. Hopkins (*Chairman & Chief Executive Officer, NuScale Power*)

Speakers: William D. Magwood, IV (*Director-General, Nuclear Energy Agency*)

Lisa Thiele (*Senior General Counsel, Canadian Nuclear Safety Commission*)

Kirsty Gogan (*Cofounder and Managing Partner, LucidCatalyst, Cofounder and Global Director, Energy for Humanity*)

Josh Freed (*Senior Vice President, Clean Energy Program Third Way*)

THURSDAY, NOVEMBER 21

Technical Tour: NIST

Time: 7:45 am-12:30 pm

Registration for the tour has closed. Boarding will begin at 7:30 am in the hotel lobby and buses will leave at 7:45 am.

The NIST Center for Neutron Research is part of the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland. Its activities focus on providing neutron measurement capabilities to the U.S. research community.

It is a national center for research using thermal and cold neutrons, offering its instrumentation for use by all qualified applicants. Many of its instruments rely on intense beams of cold neutrons emanating from an advanced liquid hydrogen moderator.



Utility and Operations Series

MONDAY, NOVEMBER 18

Panel—A Day in the Life of Reactor Engineers at Sites

Location: Maryland AB **Time:** 1:00-3:35 pm

This panel will provide some insights into the Reactor Engineer position at a nuclear plant. The requests and support needs vary depending on the status of the plant as well as planning for future core alterations.

Moderator: Rebecca Steinman (*Exelon Nuclear*)

Panelists: Chris Ehmke (*Lead Reactor Engineer, Callaway, Ameren*)
Nicole Lipps (*Principal Reactor Engineer, Calvert Cliffs Station, Exelon*)
Shawn Pinney (*Reactor Engineering Manager, Limerick Station, Exelon*)
Andrew Zuchelli (*Reactor Engineer, Hope Creek, PSEG*)

Protected Activity and Employee Protection—Experiences and Best Practices: Increasing the Awareness of the Impacts of Adverse Employment Decisions Related to Protected Activity

Location: Maryland AB **Time:** 3:50-6:00 pm

Protected Activity can be broadly defined as an individual reporting potential or alleged violations or non-compliances of regulated activity. There are multiple lessons learned across the industry related to the nexus of protected activity, employment decisions by management, and other associated discrimination activities. The personal and professional consequences for these adverse actions are severe. Awareness of those consequences and repercussions need to be expanded, and the general understanding of the specific circumstances that may apply to these situations can be improved.

Moderator: Dan Churchman (*Southern Nuclear*)

Speaker: Thomas B. Saunders (*Site Oversight Director Vogtle Units 3&4, Southern Company*)

TUESDAY, NOVEMBER 19

TMI-2 40 Years Later Part I and II

Location: Maryland AB **Time:** 10:15 am-12:00 pm

Part I: This session will provide a discussion of the TMI-2 Cleanup Program from people that were intimately involved. They will discuss lessons learned from the accident cleanup as it affected their organization and how they carried these lessons on to their careers following the completion of the cleanup. In addition this session will describe the status of TMI-2 today and future plans for the facility especially in light of the permanent cessation of operations of TMI-1.

Moderator: James Byrne (*Byrne & Associates*)

Panelists: Jack Devine (*Former Vice President GPU Nuclear*)
Lake Barrett (*Former Deputy Project Director of the NRC TMI-2 Program Office*)
James Byrne (*Byrne & Associates*)

Part II: TMI-2 today: How the TMI-1 shutdown affects activities at TMI-2 and the future of TMI-2.

Presenter: Greg Halnon (*Chief Nuclear Officer GPU Nuclear*)

Export Control for Utilities: What's the Big Deal?

Location: Maryland AB **Time:** 1:30-3:40 pm

10 CFR Part 810 was updated in February of 2015. Nearly five years later many utilities are still struggling with becoming compliant with the regulation and trying to understand their obligations under these regulations. This panel will explore the implications of non-compliance and discuss some of the considerations that will help utilities understand why this is important to them and how they can approach export control compliance.

Moderator: Margaret Harding (*4 Factor Consulting*)

Panelists: Katie Strangis (*Senior Policy advisor, DOE/NNSA, Non-Proliferation and Arms Control*)
Clint Cantrell (*Special Agent/Computer Forensics Agent, Homeland Security Investigations*)
Dominic Casino (*State INR Intelligence Analyst, Nuclear Power*)
Mike Palmer (*Superintendent, Corporate & Personnel Security*)

Technical Sessions by Division

SPECIAL SESSIONS

- *Opening Plenary, Mon. am (8:00-11:30 am)
- *ANS President's Special Session, Tues. am (8:00-12:00 pm)
- *General Chair's Special Session, Wed. am (8:00-10:00 am)

(Asterisks indicate special sessions)
(Sessions in parentheses are cosponsored by the division)

ACCELERATOR APPLICATIONS (AAD)

[ANS Nuclear Grand Challenge] Advanced Material Testing Using Accelerators—Panel, Wed. pm
Accelerator Applications: General, Thurs. am

AEROSPACE NUCLEAR SCIENCE AND TECHNOLOGY (ANST)

Space Nuclear Power Systems, Tues. am
Nuclear Thermal Propulsion, Wed. am

BIOLOGY AND MEDICINE (BMD)

(Isotopes and Radiation Division: General), Tues. pm
Biology and Medicine Division: General, Thurs. am

DECOMMISSIONING AND ENVIRONMENTAL SCIENCES (DESD)

The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—I, Mon. pm
The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—II, Mon. pm
Overview of the Various Environmental Standards Projects—Panel, Tues. am
Integrated Energy Systems: Integrating Nuclear Plants with Renewable Sources Through Alternative Applications Beyond the Grid—Panel, Tues. pm
General Topics in Decommissioning—I, Tues. pm
General Topics in Decommissioning—II, Thurs. am
Advanced and Innovative Technologies for Decommissioning of Nuclear Facilities and Environmental Remediation of Radiological Contamination—Panel, Wed. am
International Decommissioning—Paper/Panel, Wed. pm

EDUCATION, TRAINING, AND WORKFORCE DEVELOPMENT (ETWDD)

Student Design Competition, Mon. pm
Innovations in Fuel Cycle Research Awards—I, Mon. pm
Innovations in Fuel Cycle Research Awards—II, Mon. pm
(Pitch your PhD—Panel), Mon. pm
Focus on Communications—I—Communicating with Policy Makers—Panel, Tues. pm
Focus on Communications—II—Meet the Media—Panel, Tues. pm
Research by U.S. DOE NEUP Sponsored Students—I, Tues. pm
Research by U.S. DOE NEUP Sponsored Students—II, Tues. pm
Cutting Edge Techniques in Education, Training and Distance Education—I, Tues. pm
Cutting Edge Techniques in Education, Training and Distance Education—II, Thurs. am
ABET Accrediation Changes: Transition and Implementation—Panel, Wed. am

FUEL CYCLE AND WASTE MANAGEMENT (FCWMD)

Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—I, Mon. pm
Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—II, Mon. pm
Fuel Cycle Updates from a Regulatory Perspective—Panel, Tues. am
Progress in Consolidated Interim Storage and Next Steps—Panel, Tues. pm
Used Fuel and High-Level Waste Management—Einstein's Definition of Insanity?—Panel, Tues. pm
Spent Fuel Storage and Transportation, Wed. am
Current University Research on Pyroprocessing, Wed. pm
Safeguards and Material Accountancy Strategies for Molten Salt Systems, Wed. pm
Fuel Cycle and Waste Management: General—I, Thurs. am
Fuel Cycle and Waste Management: General—II, Thurs. am

FUSION ENERGY (FED)

Fusion Energy Applications, Thurs. am

HUMAN FACTORS, INSTRUMENTATION, AND CONTROLS (HFICD)

Developments in Data Analytics for Nuclear Power Applications, Mon. pm
Advanced Reactor Instrumentation, Mon. pm
General Topics in Human Factors, Instrumentation and Control—I, Tues. am
General Topics in Human Factors, Instrumentation and Control—II, Thurs. am
General Topics in Human Factors, Instrumentation and Control—III, Thurs. am
Digital I&C Upgrades—Panel, Tues. pm
Digital I&C Modernization, Tues. pm
Online Monitoring Technologies for Instrumentation and Control (I&C) Systems in Nuclear Facilities—Panel, Wed. am
Cybersecurity for Nuclear Installations, Wed. pm
Advances in Nuclear Cybersecurity Research and Development—Panel, Wed. pm

ISOTOPES AND RADIATION (IRD)

Isotopes and Radiation Division: General, Tues. pm
Radiation Detection and Imaging—I, Thurs. am
Radiation Detection and Imaging—II, Thurs. am

Technical Sessions by Division

MATERIALS SCIENCE AND TECHNOLOGY (MSTD)

Advanced Manufacturing and Transient Fuel Performance, Mon. pm
Post-Irradiation Examination, Mon. pm
(Versatile Test Reactor—Current Developments—I), Mon. pm
(Versatile Test Reactor—Current Developments—II), Tues. am
(Versatile Test Reactor—Current Developments—III), Tues. pm
Nuclear Science User Facilities—I, Tues. am
Nuclear Science User Facilities—II, Wed. am
Plutonium Handbook—I–Panel, Tues. pm
Plutonium Handbook—II–Panel, Wed. pm
Sensors and In-Pile Instrumentation, Tues. pm
Nuclear Fuels and Materials in Fast Reactors, Wed. pm
Nuclear Fuels, Wed. pm
Fuel and Materials for Molten Salt Reactors and Aging of Materials, Thurs. am
Accident Tolerant Fuels—I, Thurs. am
Accident Tolerant Fuels—II, Thurs. am

MATHEMATICS AND COMPUTATION (MCD)

Current Issues in Computational Methods–Roundtable, Mon. pm
(Steve Bowman Memorial Session: Evolution of SCALE–Panel), Mon. pm
Best Practices of Nuclear Software Quality Assurance–Panel, Mon. pm
(Versatile Test Reactor—Current Developments—I), Mon. pm
(Versatile Test Reactor—Current Developments—II), Tues. am
(Versatile Test Reactor—Current Developments—III), Tues. pm
Monte Carlo and Multiphysics, Tues. am
Computational Methods and Mathematical Modeling, Tues. pm
Deterministic Transport Methods, Tues. pm
Analytical Solutions and Benchmarking, Wed. am
Machine Learning and Reduced and Order Modeling, Wed. pm
Nuclear Data and Uncertainty Quantification, Wed. pm

NUCLEAR CRITICALITY SAFETY (NCSD)

Recent Nuclear Criticality Safety Program Technical Accomplishments, Mon. pm
(Steve Bowman Memorial Session: Evolution of SCALE–Panel), Mon. pm
Impacts to Criticality Safety from Recent Revisions to DOE Standards–Panel, Mon. pm
Implications of NCS Analysis Process Drift–Panel, Tues. am
Data, Analysis and Operations in Nuclear Criticality Safety—I, Tues. pm
Data, Analysis and Operations in Nuclear Criticality Safety—II, Wed. pm
Data, Analysis and Operations in Nuclear Criticality Safety—III, Thurs. am
Data, Analysis and Operations in Nuclear Criticality Safety—IV, Thurs. am
(Critical and Subcritical Experiments—I), Tues. pm
(Critical and Subcritical Experiments—II), Wed. pm
Introduction to NCSD Mentor Match and Membership Challenge Debrief–Panel, Wed. am

NUCLEAR INSTALLATIONS SAFETY (NISD)

Nuclear Installations Safety: General, Mon. pm
(MicroReactors–Panel), Tues. am
Advanced Risk Topics and Safety Assessments for Advanced Reactor Designs, Tues. am
Future Directions for the Defense Nuclear Facilities Safety Board–Panel, Tues. pm
Current Applications of Dynamic PRA–Panel, Wed. pm
Realizing the Benefits of Risk-Informed and Performance-Based Approaches–Panel, Wed. pm
Non-Reactor Nuclear Facility Consensus Standards–Roundtable, Thurs. am
Emerging International Topics in Nuclear Installations Safety, Thurs. am

NUCLEAR NONPROLIFERATION POLICY (NNPD)

Dwight D. Eisenhower Award Special Session—I, Mon. pm
Dwight D. Eisenhower Award Special Session—II, Mon. pm
SMR Safeguards–Panel, Tues. am
Table Top Exercise/Workshop, Tues. pm
Critical and Subcritical Experiments—I, Tues. pm
Critical and Subcritical Experiments—II, Wed. pm
NSG: What Is It and Why Should We Care? Looking at Global Non-Proliferation Regimes and Their Impact on International Business, Wed. am
(Cybersecurity for Nuclear Installations), Wed. pm
Impact of Radiological Sources on Nuclear Nonproliferation, Wed. pm

OPERATIONS AND POWER (OPD)

Thermal Energy Storage Systems and Coupling Challenges—I, Mon. pm
Thermal Energy Storage Systems and Coupling Challenges—II, Mon. pm
Thermal Energy Storage Systems and Coupling Challenges—III, Tues. pm
New Construction Around the World–Panel, Mon. pm
MicroReactors–Panel, Tues. am
Versatile Test Reactor—I, Tues. am
Versatile Test Reactor—II–Panel, Wed. pm
(Integrated Energy Systems: Integrating Nuclear Plants with Renewable Sources Through Alternative Applications Beyond the Grid–Panel), Tues. pm
The Role of Innovation in Nuclear Development–Panel, Wed. am
Operations and Power: General—I, Wed. am
Operations and Power: General—II, Wed. pm
Operations and Power: General—III, Thurs. am

Technical Sessions by Division

RADIATION PROTECTION AND SHIELDING (RPSD)

- ANS Position Statement 41 on the Effect of Low-Levels of Radiation—Panel, Mon. pm
- Radiation Protection and Shielding: General, Tues. pm
- Computational Tools for Radiation Protection and Shielding—I, Tues. pm
- Computational Tools for Radiation Protection and Shielding—II, Wed. pm
- Atmospheric Transport Considerations for Radiation Protection and Shielding, Wed. am

REACTOR PHYSICS (RPD)

- Reactor Analysis Methods—I, Mon. pm
- Reactor Analysis Methods—II, Wed. pm
- Steve Bowman Memorial Session: Evolution of Scale—Panel, Mon. pm
- Nuclear Data for Advanced Reactor Applications—I, Mon. pm
- Nuclear Data for Advanced Reactor Applications—II, Wed. pm
- Versatile Test Reactor—Current Developments—I, Mon. pm
- Versatile Test Reactor—Current Developments—II, Tues. am
- Versatile Test Reactor—Current Developments—III, Tues. pm
- Innovations in Advanced Reactor Technology and Design Through the ARPA-E MEITNER Program—Papers/Panel, Tues. am
- Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—I, Tues. pm
- Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—II, Tues. pm
- “Hands On” Core Design—Panel, Tues. pm
- Reactor Physics: General—I, Wed. am
- Reactor Physics: General—II, Wed. pm
- Reactor Physics: General—III, Thurs. am
- Research Reactors in Support of Advanced Reactors R&D—Panel, Wed. am
- Reactor Physics Design, Validation and Operational Experience, Wed. pm

ROBOTICS AND REMOTE SYSTEMS (RRSD)

- (Advanced and Innovative Technologies for Decommissioning of Nuclear Facilities and Environmental Remediation of Radiological Contamination—Panel), Wed. am
- Advances in Remote Inspection System Design, Thurs. am

THERMAL HYDRAULICS (THD)

- Experimental Thermal Hydraulics—I, Mon. pm
- Experimental Thermal Hydraulics—II, Tues. pm
- Experimental Thermal Hydraulics—III, Wed. pm
- Experimental Thermal Hydraulics—IV, Wed. pm
- Computational Thermal Hydraulics—I, Mon. pm
- Computational Thermal Hydraulics—II, Mon. pm
- Computerized Thermal Hydraulics—III, Wed. pm
- Computational Thermal Hydraulics—IV, Thurs. am
- General Thermal Hydraulics—I, Mon. pm
- General Thermal Hydraulics—II, Tues. pm
- General Thermal Hydraulics—III, Wed. pm
- General Thermal Hydraulics—IV, Thurs. am
- (Versatile Test Reactor—Current Developments—I), Mon. pm
- (Versatile Test Reactor—Current Developments—II), Tues. am
- (Versatile Test Reactor—Current Developments—III), Tues. pm
- Thermal-Hydraulic Challenges for Micro-Reactors—Panel, Tues. am
- Educational Nuclear Thermal Hydraulics Issues and Challenges—Panel, Tues. am
- Young Professional Thermal Hydraulics Research Competition, Tues. pm
- Multiscale and Multi-Physics Thermal Hydraulics, Tues. pm
- Two-Phase Flow Thermal Hydraulics, Wed. am

YOUNG MEMBERS GROUP (YMG)

- (Student Design Competition), Mon. pm
- Perspectives on the ANS Congressional Fellowship—Panel, Mon. pm
- Pitch your PhD—Panel, Mon. pm
- Diversity and Inclusion in Nuclear—Panel, Wed. am
- (Focus on Communications—I—Communicating with Policy Makers—Panel), Tues. pm
- (Focus on Communications—II—Meet the Media—Panel), Tues. pm
- How to Give Technical Presentations—Panel, Tues. pm
- The Fastest Path to Achieving Zero Emissions: Nuclear's Role—Panel, Tues. am
- Nuclear Advocacy—Storm the Hill Training—I—Panel, Wed. pm
- Nuclear Advocacy—Storm the Hill Training—II—Panel, Wed. pm



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MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 1:00 PM

Thermal Energy Storage Systems and Coupling Challenges—I

Sponsored by OPD

Session Organizer: Piyush Sabharwall (INL) Chair: Vivek P. Utgikar (Univ of Idaho)

Location: Virginia A Time: 1:00-2:45 pm

- 1:05 pm:** Effect of Thermal Energy Storage Integration on Overall Nuclear Power Plant Efficiency, Mohamed Ali, Ahmed K. Alkaabi, Saeed A. Alameri, Mohammad Alrwashdeh (Khalifa Univ)
- 1:30 pm:** Nuclear Heat Storage and Recovery System Design for the APR1400, Robert M. Field, Andrew Tetteh Ashong, Kafilat Funmilola Amuda (KEPCO)
- 1:55 pm:** Thermodynamic Evaluation of Thermal Energy Storage Applied to the APR1400, Anna Kluba, Robert M. Field (KEPCO)
- 2:20 pm:** Heat Storage for Gen IV Reactors for Variable Electricity from Base-Load Reactors: Workshop Summary, Charles Forsberg (MIT), Hans D. Gougar, Piyush Sabharwall (INL)

Student Design Competition

Sponsored by ETWDD

Session Organizer and Chair: Travis Knight (Univ South Carolina)

Location: Virginia C Time: 1:00-3:00 pm

The following undergraduate and graduate entries have been selected by a panel of judges from industry as finalists in the 2019 Student Design Competition. Oral presentations will be made by students in front of a second panel of judges who will determine the undergraduate winner.

Undergraduate Category

- 1:05 pm:** Equilibrium Core Design of a NuScale Designed Small Modular Reactor Using CASL's Virtual Environment for Reactor Applications (VERA), M. Hines, M. Underwood, A. Naylor, M. Burrell, L. Clowers, K. Knecht, G. I. Maldonado (U.T., Knoxville)
- 1:30 pm:** Design of a Zirconium Critical Benchmark, Ngai To Yu, Chad Meece, Robert Jacob, Gabriella Bruno, Ryan O'Neill (RPI)

Graduate Category

- 2:00 pm:** Fusion-Fission Hybrid Reactor for Waste Transmutation, Yerkebulan Ali, Brian Arko, Jonathan Karpesky, Adam Parler, Jeffrey King (CSM)
- 2:30 pm:** Design of the Molten Salt Nuclear Battery (MSNB), Eugene Engmann, John Peterson, James Richards, Derreck Blight, Winfred Sowah, Joseph Warner (Univ Idaho)



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Technical Sessions:
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MONDAY, NOVEMBER 18
TECHNICAL SESSIONS - 1:00 PM

Dwight D. Eisenhower Award Special Session—I: Honoring the 2019 Award Recipients—Panel

Sponsored by NNPD

Session Organizer: James Behrens (*U.S. Navy, retired*) **Cochairs:** Susan Eisenhower (*Eisenhower Institute*), James Behrens (*U.S. Navy, retired*)

Location: Delaware A **Time:** 1:05-2:15 pm

The Nuclear Nonproliferation Policy Division introduced the Dwight D. Eisenhower Award in 2015 to acknowledge and honor individuals who have made outstanding contributions to the field of nuclear nonproliferation. Previous recipients include: Former U.S. Secretary of State George P. Shultz, Distinguished Physicist Dr. Sidney D. Drell in 2015 and Senator Samuel A. Nunn, Jr., Senator Richard G. Lugar, and Distinguished Scientist Dr. Siegfried S. Hecker in 2017.

The Award has recently been elevated in importance, expanded in scope to include all aspects of nuclear policy by the ANS National Honors & Awards Committee and renamed the Eisenhower Medal. For 2019, the Eisenhower Medal will honor Dr. Richard A. Meserve, Carnegie Institution and Dr. John J. Hamre, CSIS. This panel session will begin by honoring the two 2019 recipients and will then turn to current topics which include:

- Reviewing the existing U.S. commercial reactor fleet
- Utilizing advance technologies and new reactor designs
- Status of the nuclear fuel cycle
- International cooperation and communication
- National security for a safe and secure world
- Current environment and climate issues requiring action

Panel discussions linking nuclear policy with nuclear technology will be emphasized.

Panelists:

Richard A. Meserve (*President Emeritus, Carnegie Institution for Science*)

Dan Poneman (*President and CEO, Centrus Energy Corp*)

William Magwood (*Director-General, OECD-NEA*)

Pete Lyons (*Former Assistant Secretary of Energy, Office of Nuclear Energy (NE-1)*)

John Kotek (*VP for Policy and Public Affairs, Nuclear Energy Institute*)

Adm. James O. Ellis, Jr. (*Senior Fellow, Hoover Inst, Stanford*)

Dwight D. Eisenhower Award Special Session—II: Nuclear Nonproliferation Policy—Panel

Sponsored by NNPD; Cosponsored by YMG

Session Organizers: James Behrens (*U.S. Navy, retired*), Kelsey Amundson **Chair:** Alicia Swift (*Consolidated Nuclear Security*)

Location: Delaware A **Time:** 2:15-3:35 pm

This discussion will focus on the interplay between nonproliferation efforts and U.S. competitiveness in global markets. We will evaluate the role of nuclear policy and nuclear technology to facilitate, or interfere with, the expansion of nuclear for peaceful purposes. Topics that will be discussed include:

- Decline of the industrial base supporting nuclear pursuits in our nation and suggestions on what is needed to revitalize and save this valuable national security asset,
- As Fiftieth Anniversary of entry-into-force approaches, give historical review of the 1970 treaty, entitled “Treaty on the Non-proliferation of Nuclear Weapons (NPT)” and its “three pillars” of nonproliferation, arms control & disarmament, and peaceful uses of nuclear energy;
- Review of current events in nuclear nonproliferation (e.g., North Korea and Iran).

Panelists:

Rebecca Hersman (*CSIS Director, Project on Nuclear Issues and Senior Advisor, International Security Program*)

Michelle Scott (*Senior Advisor to Assistant Secretary for Nuclear Energy (DOE NE-1)*)

Gene Carpenter (*Director, Office of Nuclear Safety and Environmental Assessments (DOE EA-31)*)

Morris Hassler (*Senior Director, Global Security and Strategic Partnerships, Consolidated Nuclear Security*)

Several additional panelists will likely be added. Panelists from Panel #1 are invited, and encouraged, to participate in Panel #2.

MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 1:00 PM

Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—I

Sponsored by FCWMD

Session Organizer: Kaushik Banerjee (*ORNL*) **Cochairs:** Robert (Bob) Clark (*DOE*), John Scaglione (*ORNL*)

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

- 1:05 pm:** Comparative Cost Analysis for Disposal of DPCs Relative to Repackaging, Abdelhalim Alsaed (*Enviro Nuclear Services*), Ernest Hardin (*Sandia*)
- 1:30 pm:** Criticality Analysis for Direct Disposal of Dual-Purpose Canisters, Justin B. Clarity, Kaushik Banerjee, Henrik Liljenfeldt, Paul Miller, John M. Scaglione (*ORNL*)
- 1:55 pm:** Development of Terrenus: A Multiphysics Code for Spent Nuclear Fuel Canister Criticality Analysis, Gregory G. Davidson, Seth R. Johnson, Stylianos Chatzidakis (*ORNL*)
- 2:20 pm:** Consequences of Nuclear Criticality in Dual Purpose Canisters After Disposal, Laura Price (*Sandia*)
- 2:45 pm:** Initial Development of a TH Model for Disposal of 37 PWR Dual-Purpose Canister in Alluvium, Scott L. Painter, Zhufeng Fang, Rob Howard, Kaushik Banerjee (*ORNL*)

Recent Nuclear Criticality Safety Program Technical Accomplishments

Sponsored by NCS

Session Organizer: Lori Scott (*NCSP*) **Cochairs:** Angela Chambers (*NNSA*), Douglas G. Bowen (*ORNL*)

Location: Hoover **Time:** 1:00-3:35 pm

- 1:05 pm:** International Criticality Benchmark Comparison for Nuclear Data Validation, Isabelle Duhamel (*IRSN*), J. L. Alwin, F. B. Brown, M. E. Rising, K. Y. Spencer (*LANL*), D. Heinrichs, S. Kim (*LLNL*), B. J. Marshall, E. M. Saylor (*ORNL*)
- 1:30 pm:** Recent SCALE Activities Within the Nuclear Criticality Safety Program, W. A. Wieselquist (*ORNL*)
- 1:55 pm:** Automated Acceleration and Convergence Testing for Monte Carlo Nuclear Criticality Safety Calculations, Forrest B. Brown (*LANL*)
- 2:20 pm:** Evaluation and Validation of ^{181}Ta Unresolved Resonance Region Cross Section, Jesse M. Brown, Amanda Youmans (*RPI*), Michael J. Rapp (*Naval Nuclear Lab.*), Ezekiel Blain (*RPI*), Devin P. Barry (*Naval Nuclear Lab.*), Yaron Danon (*RPI*)
- 2:45 pm:** Time Series Neutron Data from Subcritical Experiments for Validation of Radiation Transport Codes, Anthony J. Nelson, William Zywiec, Soon S. Kim (*LLNL*), Wilfried Monange (*IRSN*), David Heinrichs (*LLNL*)
- 3:10 pm:** Sandia BUCCX Titanium and Aluminum Sleeve Experiments, David E. Ames, Gary A. Harms, John T. Ford, Rafe D. Campbell (*Sandia*)

Current Issues in Computational Methods—Roundtable

Sponsored by MCD

Session Organizer and Chair: Robert Grove (*ORNL*)

Location: Coolidge **Time:** 1:00-3:35 pm

Advanced Computing Architectures for Production Nuclear Applications

Advanced computing architectures such as GPUs and other accelerators have become ubiquitous among the world's largest supercomputers. It is anticipated that these architectures will become more prevalent not just in the supercomputing arena, but throughout all computing scales. This roundtable will focus on the impact that advanced architectures are having, or are expected to have, on production computational nuclear applications. The panelists will speak to challenges associated with migrating from proof-of-concept or research investigations toward production-ready software implementations. Additionally, the panel will discuss the effect that accelerators are having on applications or institutions that may not be targeting leadership class computing resources.

Panelists:

Teresa Bailey (*LLNL*)
Randall Baker (*LANL*)
Elliott Biondo (*ORNL*)
Kyle Remley (*NNL*)

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MONDAY, NOVEMBER 18
TECHNICAL SESSIONS - 1:00 PM

Advanced Manufacturing and Transient Fuel Performance

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Kallie E. Metzger (*Westinghouse*)

Location: Harding **Time:** 1:00-3:35 pm

- 1:05 pm:** Pulsed Thermal Tomography Nondestructive Evaluation of Additively Manufactured Reactor Structural Materials, Alexander Heifetz, J. G. Sun (*ANL*), Dmitry Shribak (*ANL, Univ Chicago*), Tiffany Liu (*ANL, Univ California, Berkeley*), Thomas Elmer, Peter Kozak, Sasan Bakhtiari (*ANL*), Boris Khaykovich (*MIT*), William Cleary (*Westinghouse*)
- 1:30 pm:** TEM Analysis of Additively Manufactured Stainless Steels Prior to Neutron Irradiation, Ryan Collette, Jeffrey King, Behnam Amin-Ahmadi (*CSM*)
- 1:55 pm:** Neutron Irradiation Effects on Additively Manufactured Stainless Steels and Inconels: Pre-Irradiation Mechanical Property Testing, Mark Graham, Charlie Becquet, Jeffrey King (*CSM*)
- 2:20 pm:** Neutron Irradiation Effects on Additively Manufactured Stainless Steels and Inconels: Pre-Irradiation Thermophysical Property Testing, Mark Graham, Jeffrey King (*CSM*)
- 2:45 pm:** Determining Failure Thresholds for Coated Zircaloy Claddings in Reactivity Initiated Accidents, D. Kamerman, C. Folsom, N. Woolstenhulme, C. Jensen, D. Wachs (*INL*)
- 3:10 pm:** Bison Fuel Performance Studies on the Effect of Narrowing TREAT's Pulse Width, C. Folsom, C. Davis, N. Woolstenhulme (*INL*)

Experimental Thermal Hydraulics—

Sponsored by THD

Session Organizer: Shanbin Shi (*RPI*) **Cochairs:** Mark L. Kimber (*Texas A&M*), Philippe M. Bardet (*George Washington Univ*)

Location: Wilson A **Time:** 1:00-3:35 pm

- 1:05 pm:** Deployment of Time Resolved Particle Image Velocimetry Between Two PWR Surrogate Bundles, Roberto Capanna (*George Washington Univ*), Lorenzo Longo, Fabienne Bazin, Guillaume Ricciardi (*CEA*), Philippe Bardet (*George Washington Univ*)
- 1:30 pm:** Compressed Air Cannon for Relaxation Coefficient Measurements in Water Hammer, Roberto Capanna, Philippe Bardet (*George Washington Univ*)
- 1:55 pm:** Experimental Study on the Coolability of Fuel Rods Under Forced Injection of Artificial Seawater, Seth C. Eckels, Zayed Ahmed, Daniel Franken, Steven J. Eckels, Hitesh Bindra (*Kansas State*)
- 2:20 pm:** Pool Boiling CHF Experiments Using Micron and Submicron Porous Silica Particles, Min Suk Lee, Dong Hoon Kam, Yong Hoon Jeong (*KAIST*)
- 2:45 pm:** The Research of Boiling Heat Transfer and CHF Correlation Derived on a Downward Facing Surface, Huai-En Hsieh, Hui-Fang Miao (*Xiamen Univ*), Mei-Shiue Chen, Bau-Shei Pei (*National Tsing Hua Univ*)
- 3:10 pm:** Development of a Non-Nuclear Microreactor Test Bed, D. P. Guillen (*INL*), H. Trelue (*LANL*), J. O'Brien, P. Sabharwall (*INL*), R. S. Reid (*ORNL*), T. Unruh (*INL*), T. Jay Harrison (*ORNL*), T.-L. Sham (*ANL*)

Developments in Data Analytics for Nuclear Power Applications

Sponsored by HFICD

Session Organizer: Jamie Coble (*U.T., Knoxville*) **Chair:** Carol S. Smidts (*Ohio State*)

Location: Wilson B **Time:** 1:00-2:45 pm

- 1:05 pm:** Practical Considerations for Intermittent Fault Detection in Nuclear Power Plant Circuits, Bryan McConkey, Trevor Jones, Phil Zarb, Brent Shumaker (*Analysis and Measurement Services Corp.*)
- 1:30 pm:** Nuclear Power Plant Parameter Prediction Strategy for Human Error Detection, Junyong Bae, Seung Jun Lee (*UNIST*)
- 1:55 pm:** Abnormal State Diagnosis Considering Noise Using Gated Recurrent Unit Network, Ji Hyeon Shin, Jae Min Kim, Seung Jun Lee (*UNIST*)
- 2:20 pm:** Improved Explicability for Pump Diagnostics in Nuclear Power Plants, Andrew T. Young, Graeme M. West, Blair D. Brown, Bruce Stephen, Stephen D .J. McArthur (*Univ Strathclyde*)

MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 1:00 PM

The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—I

Sponsored by DESD

Session Organizers: Yoon Chang (ANL), Jan Van Erp (Consultant) **Cochairs:** Yoon Chang (ANL), Fiona Rayment (NNL)

Location: Wilson C **Time:** 1:00-3:35 pm

This session addresses the all-important objective of attaining within the next few decades a low-carbon sustainable energy supply system that is capable of large-scale application. While the major part of the session will deal with resolving remaining technical aspects, the important issues of economic viability and reliability will also have to be addressed.

Keynote Address: “Essential Role of Nuclear Energy in Reducing GHG Emissions” James Hansen (Columbia Univ and former Director, NASA Goddard Inst)

Panelists:

Alexander Bychkov (former Deputy Director General, IAEA, and former Director General, Research Inst of Atomic Reactors, Russia)

Frank Carre (Scientific Director, Nuclear Energy Division, CEA Saclay Research Center, France)

Tom O'Connor (VTR Program Director, DOE-NE)

Jaewoon Yoo (Director, SFRA, KAERI)

Sama Bilbao y Leon (Head, Division of Nuclear Technology Development and Economics, OECD-NEA)

Perspectives on the ANS Congressional Fellowship—Panel

Sponsored by YMG

Session Organizer and Chair: Harsh Desai (NEI)

Location: Balcony A **Time:** 1:00-3:35 pm

Learn about the ANS Congressional Fellowship program. This session will feature current and former Fellows' experience and the need for public policy engagement on nuclear issues and will highlight career development opportunities in public policy. The panel members will also discuss working with policy makers and the benefits of their Fellowship experience on their current and future endeavors.

Panelists:

Alyse Huffman (U.S. House of Representatives Science, Space, and Technology Committee, current ANS Congressional Fellow)

Chad Boyer (Westinghouse, 2012 ANS Congressional Fellow)

Ben Reinke (DOE, 2016 ANS Congressional Fellow)

Craig Piercy (ANS Washington Representative)

Computational Thermal Hydraulics—I

Sponsored by THD

Session Organizer: David Pointer (ORNL) **Cochairs:** Maria N. Avramova (NCSU), Matthew Zimmer (NCSU)

Location: Balcony B **Time:** 1:00-3:35 pm

1:05 pm: Integration of the Nek5000 Computational Fluid Dynamics Code to the NEAMS Workbench: Modeling of the Turbulent Flow in a High-Flux Isotope Reactor Channel, Marc-Olivier G. Delchini, Robert A. Lefebvre, Mark L. Baird, Paul L. Miller, W. David Pointer (ORNL)

1:30 pm: Lagrangian CFD Analyses of Airborne Particles from Dropped Shipping Containers for Use in DOE M441.1-1 Calculations, M. Alsharif (Consolidated Nuclear Security Y-12), Y. He, S. M. McGuffie (Porter McGuffie Inc.)

1:55 pm: Computational Modeling of Flow Through Twisted Tape Geometry, Jack Fletcher, Monica Gehrig (Missouri Univ Sci. & Technol.)

2:20 pm: CFD Modeling of the Density Evolution Inside of the HENRI System, Silvino A. Balderrama, Guillaume P. Mignot, Wade R. Marcum (Oregon State), Nicolas E. Woolstenhulme (INL)

2:45 pm: Application and Verification of the Nek5000 Regularized κ - ω Turbulence Model to Pipe Flow Using Higher-Order Data and PEPT Data, L. B. Carasik (FAST Research Group), C. Wiggins (FAST Research Group, U.T., Knoxville), D. R. Shaver (ANL)

3:10 pm: Thermal Stratification Analysis for Sodium-Cooled Fast Reactors: Development of the 1-D System Model, Cihang Lu, Zeyun Wu (VCU), James Schneider, Mark Anderson (U.W., Madison), Liangyu Xu, Emilio Baglietto (MIT), Matthew Bucknor, Matthew Weathered (ANL), Sarah Morgan (VCU), Sama Bilbao y Leon (OECD)

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MONDAY, NOVEMBER 18 TECHNICAL SESSIONS - 1:00 PM

Reactor Analysis Methods—I

Sponsored by RPD

Session Organizer: Pavel Tsvetkov (*Texas A&M*) **Chair:** William Walters (*PSU*)

Location: Washington 5 **Time:** 1:00-2:45 pm

1:05 pm: C5G7 MOX Benchmark Calculation with the High-Performance Pin-by-Pin Two-Step Calculation Procedure, Joo Il Yoon (*KEPCO*), Hyun Sik Hong (*Seoul National Univ*)

1:30 pm: Reduction of Macroscopic and Microscopic Cross Section Table Size for Heterogeneous Core Calculation Using Dimensionality Reduction, Masato Yamamoto, Tomohiro Endo, Akio Yamamoto (*Nagoya Univ*)

1:55 pm: MCNP and SERPENT Monte Carlo Modeling of a Water Level Transient Experiment, A. Talamo, Y. Cao, Y. Gohar (*ANL*), S. Sikorin, S. Mandzik, S. Polazau, T. Hryharovich (*Joint Inst. For Power and Nuclear Research*), V. Valtavirta, J. Leppänen (*VTT*)

2:20 pm: Resonance Calculation Using Energy Spectral Expansion Based on Reduced Order Model: Application to Heterogeneous Geometry, Akio Yamamoto, Ryoichi Kondo, Tomohiro Endo (*Nagoya Univ*), Satoshi Takeda (*Osaka Univ*), Hiroki Koike, Kazuya Yamaji, Daisuke Sato (*Mitsubishi*)

Steve Bowman Memorial Session: Evolution of SCALE—Panel

Sponsored by RPD; Cosponsored by MCD, NCS

Session Organizer and Chair: William Wieselquist (*ORNL*)

Location: Washington 4 **Time:** 1:00-3:35 pm

This session is dedicated to the memory of Mr. Steve Bowman. In this panel session we will present the evolution of the SCALE code package, highlighting the contributions of Steve Bowman, who passed away in October 2018. Mr. Bowman began his nuclear career at the Tennessee Valley Authority (TVA), where he worked from 1980-1984 as a core analyst. He then left TVA for Virginia Power in 1984, serving as an analyst and code developer of the NOMAD code system. In 1989, Mr. Bowman joined Oak Ridge National Laboratory where he would stay until his retirement in 2018. He became involved with SCALE early in his ORNL career. From 1993-1995, he successfully ported SCALE to a PC (version 4.4), developed the ORIGEN-ARP GUI interface, and drove development of the SCALE ENDF/B-V 44-group nuclear data libraries. Mr. Bowman became the manager of the SCALE code system in 1995, a position he would hold for 14 years. The panel will present a survey of SCALE records focusing on Mr. Bowman's achievements, with lighthearted user and sponsor feedback collected over the years. The panel will close with the opportunity for audience driven Q&A.

Panelists:

Mark DeHart (*INL*)

Germina Ilas (*ORNL*)

Matt Jessee (*ORNL*)

Richard Lee (*NRC*)

Rob Lefebvre (*ORNL*)

Cecil Parks (*ORNL*)

Brad Rearden (*ORNL*)

William Wieselquist (*ORNL*)

Innovations in Fuel Cycle Research Awards—I

Sponsored by ETWDD

Session Organizer: Cathy Dixon (*West Texas A&M*) **Cochairs:** Andrew Griffith (*DOE*), Cathy Dixon (*West Texas A&M*)

Location: Maryland C **Time:** 1:00-2:45 pm

1:05 pm: Synthesis of the First All-Uranium(V) Borate, Kristen Pace, Vancho Kocevski, Hans-Conrad zur Loye (*Univ South Carolina*)

1:30 pm: Incorporating Variable Moderation Elements into the FHR Design to Increase Both Cycle Length and Discharge Burnup, Vedant Mehta (*LANL, Georgia Tech.*), Dan Kotlyar (*Georgia Tech.*)

1:55 pm: Overstepping Löwenstein's Rule: A Route to Unique Uranium Aluminophosphate Frameworks, Christian A. Juillerat, Vladislav V. Klepov, Hans-Conrad zur Loye (*Univ South Carolina*)

2:20 pm: Photopolymerized Plastic Scintillators Capable of Neutron and Gamma Ray Discrimination, Allison Lim, Adam C. Mahl, Joseph Latta, Henok A. Yemam, Uwe Greife, Alan Sellinger (*CSM*)

MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 3:55 PM

Thermal Energy Storage Systems and Coupling Challenges—II

Sponsored by OPD

Session Organizer: Piyush Sabharwall (*INL*) **Chair:** Vivek P. Utgikar (*Univ of Idaho*)

Location: Virginia A **Time:** 3:55-5:15 pm

4:00 pm: Theoretical Background and Case Study for the Exergo-Economic Optimization of a Large-Scale Electricity Storage System Using Supercritical Carbon Dioxide, Baptiste Py (*Ecole Nationale Supérieure des Mines, KAIST*), Yong Hoon Jeong (*KAIST*)

4:25 pm: Assessment of Small Modular Reactors (SMRs) for Load-Following Capabilities, Y. Ismail, B. P. Bromley (*CNL*)

4:50 pm: Phase Change Material Candidates for High-Temperature Nuclear Reactor Heat Storage, W. Neal Mann, Sheldon Landsberger, Michael E. Webber (*Univ Texas, Austin*)

New Construction Around the World—Panel

Sponsored by OPD

Session Organizer and Chair: Edward Quinn (*Technology Resources*)

Location: Virginia B **Time:** 3:55-6:00 pm

This session will provide the latest input on new construction activities around the world, including engineering and licensing status and plans for future additions. Speakers from the U.S. DOE, NRC, and international organizations will discuss their perspectives on the latest changes and upcoming plans and trends for large and small reactor development.

Panelists:

Andrew Richards (*DOE*)

William Reckley (*NRC*)

Kathy McCarthy (*CNL*)

Nuclear Installations Safety: General

Sponsored by NISD

Session Organizer: Andrew Clark (*SNL*) **Chair:** Zachary Jankovsky (*SNL*)

Location: Virginia C **Time:** 3:55-5:40 pm

4:00 pm: Data-Driven Safety Margin Management Using Reduced Order Modeling, Jun Liao, Clarence L. Worrell, James P. Spring (*Westinghouse*)

4:25 pm: Development of Efficient Data Sampling Method to Construct Surrogate Model of Severe Accident Analysis Code for SBO Aiming Probabilistic Safety Margin Analysis, Masaki Matsushita, Tomohiro Endo, Akio Yamamoto (*Nagoya Univ*)

4:50 pm: Easily-Adapted Quantification Tools for Operating Events' Significance, Chang-Ju Lee, Dongju Jang (*KINS*)

5:15 pm: Feedwater Pipe Break-Induced Hydraulic Loads on Nuclear Steam Generator Tubes, Jong Chull Jo, Jae Jun Jeong, Byong-Jo Yun (*Pusan National Univ*)

ANS Position Statement 41 on the Effect of Low Levels of Radiation—Panel

Sponsored by RPSD

Session Organizer: Shaheen Azim Dewji (*Texas A&M*) **Cochairs:** Nolan Hertel (*Georgia Tech*), Alan Waltar (*ANS Past President*)

Location: Delaware A **Time:** 3:55-6:00 pm

The writing group of ANS PS41 will discuss issues, concerns, and technical considerations that contributed to the revision of the ANS statement on the effects of low levels of radiation.

Panelists:

Robin Elgart (*NASA*)

Pedro Vaz (*IST*)

Jerry Puskin (*EPA-Retired*)

Craig Piercy (*ANS Washington Representative*)

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MONDAY, NOVEMBER 18 TECHNICAL SESSIONS - 3:55 PM

Feasibility Assessment for Direct Disposal of Dual-Purpose Canisters Used for Spent Nuclear Fuel Storage—II

Sponsored by FCWMD

Session Organizer: Kaushik Banerjee (*ORNL*) **Cochairs:** Timothy Gunter (*DOE*), Ernest Hardin (*SNL*)

Location: Delaware B **Time:** 3:55-6:05 pm

4:00 pm: Dual Purpose Canister Filling Demonstration, Nesrin O. Cetiner, Elliott J. Fountain, Venugopal K. Varma, Elvis E. Dominguez-Ontiveros, Kaushik Banerjee (*ORNL*)

4:25 pm: Progress Toward the Development of Cement Fillers for Dual Purpose Canisters, Mark J. Rigali (*Sandia*), Mark L. F. Phillips (*PRRC*), Patrick D. Burton, Eduardo Basurto, Ernest L. Hardin (*Sandia*)

4:50 pm: Dual Purpose Canister Heating Evaluation for Casting of High Temperature Fillers, Emilian Popov, Kaushik Banerjee (*ORNL*)

5:15 pm: Demonstration and Feasibility Analyses of Using the Dual-Purpose Canister Drain Pipe to Support the Filling Process, Elvis Dominguez-Ontiveros, Kaushik Banerjee (*ORNL*)

5:40 pm: Options for Modifying Existing and Future DPCs for Disposal, Ernest Hardin (*Sandia*), Abdelhalim Alsaed (*Enviro Nuclear Services*), Branko Damjanac (*Itasca Consulting Group*)

Impacts to Criticality Safety from Recent Revisions to DOE Standards—Panel,

Sponsored by NCS

Session Organizers: Andrew Prichard (*PNNL*), John Miller (*SNL*), Kevin Kimball (*CNS, ret.*)

Chair: Joseph A. Christensen (*SHINE Medical Technologies*)

Location: Hoover **Time:** 3:55-6:00 pm

Over the last couple of years, there have been several changes to DOE Orders and Standards that impact nuclear criticality safety (NCS) practices (e.g., 420.1C, 3009, 3007). NCS programs across the complex are starting to implement these changes. This panel session will have experts from various sites across the complex to discuss the basis and reasoning behind the changes, how these changes were/are being implemented, and the lessons learned during implementation. The panel will also explore any unintended consequences from these changes and if the expected benefits from these changes are being realized.

Panelists:

David Erickson (*SRS*)

Chris Haught (*CNS*)

David Heinrichs (*LLNL*)

John Miller (*SNL*)

Garrett Smith (*DOE*)

Best Practices of Nuclear Software Quality Assurance—Panel

Sponsored by MCD

Session Organizer: Travis Trahan (*LANL*) **Cochairs:** Travis Trahan (*LANL*), Brendan M. Kochunas (*Univ of Michigan*)

Location: Coolidge **Time:** 3:55-6:00 pm

Quality assurance is a ubiquitous and essential part of all software projects and is receiving increasing attention across the scientific community as modeling and simulation plays an increasingly important role in the scientific method. Best practices for software quality assurance (SQA) are also constantly evolving. There are many levels of software projects in the nuclear engineering community—from small, rapid prototyping R&D efforts to multi-institution, multi-million-dollar DOE programs—and the quality assurance practices consequently must be applicable and flexible enough to accommodate this range of projects. In particular, a key aspect of these best practices is the appropriate allocation of human resources. Understanding modern SQA practices and their value within the context of various projects and objectives informs the selection of “best practices.” In this panel we will explore and discuss current strategies for nuclear software quality assurance. Panelists have experience in industry, national labs, academia, and regulatory space. They will discuss their experiences and provide their opinions on best practices for nuclear software quality assurance.

Panelists:

Roscoe Bartlett (*SNL*)

Forrest Brown (*LANL*)

Greg Galletti (*NRC*)

Scott Palmtag (*NCSU/ORNL*)

Cody Permann (*INL*)

MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 3:55 PM

Post-Irradiation Examination

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Colby B. Jensen (*INL*)

Location: Harding **Time:** 3:55-6:05 pm

- 4:00 pm:** Investigating Oklo Fuel Fission Product Retention by NAUTILUS, TEM, NanoSIMS, Evan Groopman, David Willingham, Kate Burgess (*U.S. Naval Research Lab*), Larry Nittler (*Carnegie Inst.*), Rhonda Stroud (*U.S. Naval Research Lab*), Alex Meshik, Olga Pravdivtseva (*Washington Univ, St. Louis*)
- 4:25 pm:** Post-Irradiation Examination Results of Miniature Fuel Specimens Irradiated in the High Flux Isotope Reactor, A. G. Le Coq, R. N. Morris, C. M. Petrie, J. R. Burns (*ORNL*)
- 4:50 pm:** Feasibility Testing of Delayed Scintillator Screens for Indirect Digital Neutron Radiography of Irradiated Nuclear Fuel, William Chuirazzi (*INL, Ohio State*), Aaron Craft, Nicholas Boulton (*INL*), Andrew Smolinski (*Ohio State*), Amanda Smolinski (*Idaho State*), Mike Ruddell, Kyrone Riley, Glen Papaioannou (*Ohio State*)
- 5:15 pm:** Long-Term Thermal Testing of Irradiated TRISO Fuel Particles from the AGR-2 Experiment, Tyler J. Gerczak, John D. Hunn, Zach Burns, Darren J. Skitt (*ORNL*)
- 5:40 pm:** Microstructural Evolution of Metallic Fuel After a Power Transient, F. G. Di Lemma, K. Wright, L. Capriotti, B. Miller, D. Murray, C. Jensen (*INL*)

General Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Jinyong Feng (*MIT*) **Cochairs:** Jinyong Feng (*MIT*), Minghui Chen (*Univ of New Mexico*)

Location: Wilson A **Time:** 3:55-6:05 pm

- 4:00 pm:** Leaky-Vessel Decay-Heat-Removal System for Fluid-Fuel Molten Salt Reactors, Charles Forsberg (*MIT*)
- 4:25 pm:** Validation of SAM Using CIET Experimental Data, Ling Zou, Rui Hu (*ANL*)
- 4:50 pm:** Using GOTHICTM and RAVEN to Explore Thermal-Hydraulic System Response, Patrick Skelton, Je rey Lane (*Zachry Nuclear Engineering*)
- 5:15 pm:** Benchmark Exercise on Flow Mixing in Cold Leg of a Pressurized Water Reactor, Daniel Orea, Rodolfo Vaghetto, Thien Nguyen, Vasileios Kyriakopoulos, Yassin Hassan (*Texas A&M*)
- 5:40 pm:** Numerical Investigation of Molten Lead Flow in a Closed Loop to Estimate Pressure Demand, Khaled Talaat, Sang Lee (*Univ New Mexico*), Youho Lee (*Seoul National Univ*), Osman Anderoglu, Cemal Cakez, Shuprio Ghosh (*Univ New Mexico*), Keith Woloshun, Seung Jun Kim, Stuart Maloy, Cetin Unal (*LANL*), Michael Ickes, Paolo Ferroni (*Westinghouse*)

Advanced Reactor Instrumentation

Sponsored by HFICD

Session Organizer: Jamie Coble (*U.T., Knoxville*) **Chair:** Sacit M. Cetiner (*ORNL*)

Location: Wilson B **Time:** 3:55-6:05 pm

- 4:00 pm:** A Calibration Method for Raman Distributed Temperature Sensor in Nuclear Power Plant, Meiqiong Xiang, Yanyang Liu, Xianguo Qing, Jialiang Zhu, Qian Wu, Biwei Zhu, Sijie Xu (*Nuclear Power Inst*)
- 4:25 pm:** High Flux Neutron Detection Using Silicon Carbide from Near-Core Locations, Praneeth Kandlakunta, Chuting Tan, Nathan Smith, Sha Xue, Neil Taylor (*Ohio State*), R. Gregory Downing, Vasil Hlinka (*AwareAbility Technologies*), Lei R. Cao (*Ohio State*)
- 4:50 pm:** A Novel Waveguide Concept for Ultrasonic Thermometry Applications, Nesrin O. Cetiner, Sacit M. Cetiner, Michael J. Roberts, Venu K. Varma, Govindarajan Muralidharan, Thomas R. Muth, Rose A. Montgomery (*ORNL*)
- 5:15 pm:** Wireless Signal Transfer Application of LVDT in Nuclear Reactors, Yuan Gao, Jerry Potts, Heng Ban (*Univ Pittsburgh*), Daniel Wachs (*INL*)
- 5:40 pm:** Optimization Study for an Eddy Current Flow Meter, Kellen M. Oleksak (*ORNL, U.T., Knoxville*), Sacit M. Cetiner (*ORNL*), Aly Fathy (*U.T., Knoxville*)

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MONDAY, NOVEMBER 18
TECHNICAL SESSIONS - 3:55 PM

The Path Towards a Low-Carbon Sustainable Energy Supply System—Panel—II

Sponsored by DESD

Session Organizers: Yoon Chang (*ANL*), Jan Van Erp (*Consultant*) **Cochairs:** Frank Carre (*CEA*), William Hannum (*Consultant*)

Location: Wilson C **Time:** 3:55-6:00 pm

This session addresses the all-important objective of attaining within the next few decades a low-carbon sustainable energy supply system that is capable of large-scale application. While the major part of the session will deal with resolving remaining technical aspects, the important issues of economic viability and reliability will also have to be addressed.

Panelists:

Fiona Rayment (*Executive Director, NIRO, National Nuclear Laboratory, UK*)

Donald Wolf (*CEO, Advanced Reactor Concepts LLC*)

Yutaka Sagayama (*Assistant to the President, Japan Atomic Energy Agency*)

Yoon Chang (*Argonne Distinguished Fellow, ANL*)

William Hannum (*Consultant*)

Pitch your PhD—Panel

Sponsored by YMG; Cosponsored by ETWDD

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

Location: Balcony A **Time:** 3:55-6:00 pm

This session will showcase the latest PhD research done in the field of nuclear engineering. Students in the process of finishing their PhD will have 3 minutes to present their thesis and to captivate an audience of peers who will vote for the best pitches. The winners will receive \$500 (first place) and \$250 (second place) awards given out during the conference. In addition to this monetary incentive, the winners will have their pitch published in ANS News, and the best pitch may be invited to give a webinar on their PhD by GEN IV Forum!

Computational Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Igor Bolotnov (*NCSU*) **Cochairs:** Bao-Wen Yang (*Xi'an Jiaotong Univ*), Adrian Tentner (*ANL*)

Location: Balcony B **Time:** 3:55-6:05 pm

4:00 pm: SAS4A Simulations of Post-Failure Fuel Relocation in the BI3 CABRI-1 Oxide Fuel Experiment, A. Tentner, A. Karahan (*ANL*), K. Kawada (*JAEA*)

4:25 pm: A Theoretical Model for Diffusiophoresis in iPWR Containment Vessels, Rohan Biwalkar, Sola Talabi (*Pittsburgh Technical*), Kenneth Redus (*Redus and Assoc.*)

4:50 pm: Overview of the Small Modular and Advanced Reactor Testing Center, Rohan Biwalkar, Sola Talabi (*Pittsburgh Technical*), Kenneth Redus (*Redus and Assoc.*)

5:15 pm: Effect of the Thermal Expansion of the Used Nuclear Fuel Cask's Basket on Temperature During Vacuum Drying, Megan Higley, Mustafa Hadj-Nacer, Miles Greiner (*Univ Nevada, Reno*)

5:40 pm: Modification of CUPID Code for Wall Condensation Phenomena in the Presence of Non-Condensable Gas Mixture Containing a Light Gas, Chang Won Lee, Hyoung Kyu Cho (*Seoul National Univ*)

THD Award Ceremony and Lecture

After the conclusion of this session, an honors and awards session will follow. The recipient of the Technical Achievement Award, Professor Shripad Revankar will deliver a lecture on "Effects of Non-Condensable on Passive Condenser Systems."

MONDAY, NOVEMBER 18

TECHNICAL SESSIONS - 3:55 PM

Nuclear Data for Advanced Reactor Applications—I

Sponsored by RPD

Session Organizer: Bradley Rearden (*ORNL*) Cochairs: Bradley Rearden (*ORNL*), Vladimir Sobes (*ORNL*)

Location: Washington 5 Time: 3:55-5:40 pm

- 4:00 pm:** Sensitivity and Uncertainty Analysis of the Advanced Burner Reactor Core Using NEAMS Workbench, Kaiyue Zeng (*NCSU*), Nicolas E. Stauff (*ANL*), Jason Hou (*NCSU*)
- 4:25 pm:** Development of Neural Thermal Scattering (NeTS) Modules for Reactor Physics Applications, C. A. Manring, A. I. Hawari (*NCSU*)
- 4:50 pm:** Development of Processing Tool to Generate Covariance of Multigroup Thermal Scattering Matrix, Hansol Park, Aaron G. Tumalak (*Univ Michigan*), Vladimir Sobes (*ORNL*), Won Sik Yang, Brian C. Kiedrowski (*Univ Michigan*)
- 5:15 pm:** Hydrogen Vacancy Effect on Yttrium Hydride (YH_{1.97}) Thermal Neutron Scattering Law, Vedant Mehta (*LANL, Georgia Tech.*), Michael W. D. Cooper (*LANL*), Dan Kotlyar (*Georgia Tech.*)

Versatile Test Reactor—Current Developments—I

Sponsored by RPD; Cosponsored by MSTD, MCD

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

Location: Washington 4 Time: 3:55-6:30 pm

- 4:00 pm:** Safety Design Strategy for the Versatile Test Reactor, Douglas M. Gerstner, Jason Andrus (*INL*), David Grabaskas, Matthew Bucknor (*ANL*)
- 4:25 pm:** Shutdown Worth Requirements for the Versatile Test Reactor, Florent Heidet (*ANL*)
- 4:50 pm:** Approach to Hot Channel Factors for the Versatile Test Reactor Design, Aurelien Bergeron, Earl Feldman, Florent Heidet (*ANL*)
- 5:15 pm:** Steady-State Fuel Performance Analysis for the Versatile Test Reactor with LIFE-METAL, Aaron Oaks, Walid Mohamed, Abdellatif Yacout, Florent Heidet (*ANL*)
- 5:40 pm:** Detailed Isotopic Fuel Composition for the Versatile Test Reactor, Alisha Kasam-Griffith, Florent Heidet (*ANL*)
- 6:05 pm:** Application of the Licensing Modernization Project Approach to the Authorization of the Versatile Test Reactor, David Grabaskas (*ANL*), Jason Andrus (*INL*), Dennis Henneke (*GE-Hitachi*), Matthew Bucknor (*ANL*), Jonathan Li (*GE-Hitachi*), Doug Gerstner (*INL*), Matthew Warner (*GE-Hitachi*), Thomas Fanning (*ANL*)

Innovations in Fuel Cycle Research Awards—II

Sponsored by ETWDD

Session Organizer: Cathy Dixon (*West Texas A&M*) Cochairs: Stephen Kung (*DOE*), Sal Golub (*DOE*)

Location: Maryland C Time: 3:55-5:15 pm

- 4:00 pm:** Bis-(2-ethylhexyl) Phosphoric Acid Functionalized Carbon Nanoparticles for Chromatographic Lanthanide Separations, Erin R. Bertelsen, Brian G. Trewyn, Jenifer C. Shafer (*CSM*)
- 4:25 pm:** An Overview of Methodologies for Cybersecurity Vulnerability Assessments Conducted in Nuclear Power Plants, John Peterson, Michael Haney, R. A. Borrelli (*Univ of Idaho*)
- 4:50 pm:** In-Pile OFDR Sensing with Fiber Bragg Gratings in Sapphire Optical Fiber, Kelly M. McCary (*INL, Ohio State*), Brandon Wilson (*ORNL*), Joshua Daw, Patrick Calderoni (*Ohio State*), Christian Petrie (*ORNL*), Thomas Blue (*Ohio State*)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 10:15 AM

MicroReactors—Panel

Sponsored by OPD; Cosponsored by NISD

Session Organizers: Piyush Sabharwall (INL), Zachary Jankovsky (SNL) **Cochairs:** Piyush Sabharwall (INL), Zachary Jankovsky (SNL)

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

The objective of this panel is to briefly talk about ongoing efforts in national laboratories, government organizations (e.g., NRC, DOE, DOD), and the industry to support the development of microreactors.

Panelists:

- Piyush Sabharwall (INL)
- Zachary Jankovsky (SNL)
- Steve Mirsky (NuScale)
- Paul Marotta (MicroNuclear LLC)
- Stu Magruder (NRC)

Versatile Test Reactor—

Sponsored by OPD

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

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

10:20 am: Preliminary Design of Cartridge Loops in Support of the Fuel Testing Campaign of the VTR, Silvino A. Balderrama Prieto, Piyush Sabharwall (INL), Mitchell T. Farmer (ANL)

10:45 am: Numerical Investigation of Fluid Flow in a Square Channel—Versatile Test Reactor Program, Yung-Hee Choi, Daniel Orea, Thien Nguyen, N. K. Anand, I Yassin Hassan (Texas A&M), Piyush Sabharwall (INL)

11:10 am: Experimental Investigation of Surrogate Particle Transport in a Turbulent Channel Flow: Versatile Test Reactor Program, D. Orea, R. Chavez, D. T. Nguyen, R. Vaghetto, N. K. Anand, Y. A. Hassan (Texas A&M), Piyush Sabharwall (INL)

11:35 am: Assessment of Lead Loop Design and Demonstration of a Generic Closed Loop Modeling for System Analysis, Seung Jun Kim, Keith Woloshun, Cetin Unal, Russel Johns (LANL)

Advanced Risk Topics and Safety Assessments for Advanced Reactor Designs

Sponsored by NISD

Session Organizer: Andrew Clark (SNL) **Chair:** Matthew R. Denman (Kairos Power)

Location: Virginia C **Time:** 10:15-11:35 am

10:20 am: Considerations for Early-Stage Safety Assessments for Advanced Reactor Designs, Brandon Chisholm, Steve Krahn, Megan Harkema (Vanderebilt), Andrew Sowder (EPRI), Carole Leach (Vanderebilt)

10:45 am: Integrated Probabilistic Risk Assessment (I-PRA) Importance Ranking for Fire PRA of Nuclear Power Plants, Ha Bui, Tatsuya Sakurahara, Seyed Reihani, John Biersdorf, Zahra Mohaghegh (Univ Illinois)

11:10 am: Development of Severe Accident Mitigation Technology and Analysis Method for Small Integral Reactor, Rae-Joon Park, Donggun Son, Hyung Seok Kang, Sang-Mo An (KAERI)

**Advanced Technology Instrumentation
for
Air Sampling and Air Flow Calibration**



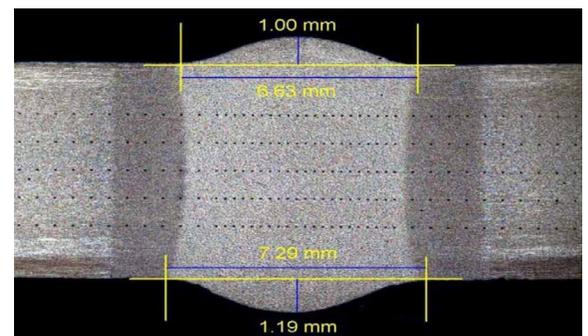
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TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 10:15 AM

SMR Safeguards–Panel

Sponsored by NNP

Session Organizer and Chair: Chloe Verschuren (LANL)

Location: Delaware A Time: 10:15 am-12:00 pm

Given the increasing international demand for advanced and nuclear material accounting reactor technologies, specifically small modular reactors (SMRs), the development of robust safeguards and nuclear material accounting approaches appropriate for these rapidly evolving SMRs is crucial. It is necessary to consider how the nuclear industry can best leverage U.S. excellence and leadership in international safeguards innovations and nuclear material accountancy as producers of SMRs look to export their technology. This panel aims to explore holistic approaches to combining laboratory and industry input for SMR safeguards prior to export.

Panelists:

Laura Holgate (NTI)

Lenka Kollar (NuScale)

Andrew Worrall (ORNL)

Jackie Kempfer (Third-Way)

Garrett McMath (LANL)

Fuel Cycle Updates from a Regulatory Perspective–Panel

Sponsored by FCWMD

Session Organizer: Sven Bader (Orano) Cochairs: Sven Bader (Orano), Christina Leggett (NRC)

Location: Delaware B Time: 10:15 am-12:00 pm

The focus of this panel is to provide updates on NRC and DOE regulatory activities involving the back end of the fuel cycle. This panel will cover recent NRC rulemaking activities involving regulations related to disposal, interim storage, and transportation (e.g., 10CFR60, 61, 63, 71, and 72) and will provide an update on DOE's recent request for public comment on its interpretation of high-level waste. Finally, this panel will examine the status of currently submitted applications to the NRC related to the back end of the fuel cycle (e.g., consolidated interim storage applications).

Panelists:

Tim McCartin (NRC)

Paul Dickman (ANL)

Tim Frazier (GE)

Rod McCullum (NEI)

Implications of NCS Analysis Process Drift–Panel

Sponsored by NCS

Session Organizers: Christopher Haught (Consolidated Nuclear Security), John Miller (SNL), Andrew Prichard (PNNL) Chair: Brandon Little (Value Added Solutions)

Location: Hoover Time: 10:15 am-12:00 pm

All new processes with fissionable material are evaluated for criticality safety before operations are started; a common problem is that with time the processes change. This panel session will discuss specific operations, the types of changes that have occurred, and the impact of process drift on criticality safety. The focus of the panel session is identifying lessons learned and how they might apply to other organizations.

Panelists:

Chris Haught (CNS)

Andrew Prichard (PNNL)

Monte Carlo and Multiphysics

Sponsored by MCD

Organizer: Steven Hamilton (ORNL) Chair: Jeffery D. Densmore (UNNPP)

Location: Coolidge Time: 10:15 am-12:00 pm

10:20 am: Preliminary Results for Particle Tracking on Weight Window Isosurface Geometries for Monte Carlo Variance Reduction, Kalin R. Kiesling, Paul P. H. Wilson (U.W., Madison)

10:45 am: Thermal Radiation Transport in Random Media with Temperature Dependent Opacities, Corey M. Skinner, Anil K. Prinja (Univ New Mexico)

11:10 am: An Arbitrary Lagrangian Eulerian Solver for Shock Imploding Fissile Materials, Eric Cervi, Antonio Cammi (Politecnico di Milano)

11:35 am: A Coupled Neutronics Shock Physics Solver: Implementation of an S_N Neutron Transport Module, Eric Cervi, Antonio Cammi (Politecnico di Milano)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 10:15 AM

Nuclear Science User Facilities—I

Sponsored by MSTD

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

Location: Harding Time: 10:15 am-12:00 pm

- 10:20 am:** Advanced Test Reactor I-Loop Irradiation Facility and Flux Booster Element, Keith Means (MPR), Thomas Maddock, Nicolas Woolstenhulme, Nate Oldham, Kendell Horman (INL)
- 10:45 am:** Neutron Radiography and Radiation Effects Testing Using a High-Flux Electrically Driven Neutron Generator, Ross Radel, Michael Taylor, Chris Seyfert, Josh McCumber, Lucas Jacobson, Evan Sengbusch (Phoenix LLC)
- 11:10 am:** Progress in Critically Assessing the NSUF Research Portfolio, Simon M. Pimblott, J. Rory Kennedy (INL)
- 11:35 am:** Assessment of Additively-Manufactured Zircaloy-2 for LWR Applications, Jonna M. Partezana, William T. Cleary, Peng Xu (Westinghouse)

Thermal-Hydraulic Challenges for Micro-Reactors—Panel

Sponsored by THD

Session Organizers and Cochairs: Annalisa Manera (Univ Michigan), Donna P. Guillen (INL)

Location: Wilson A Time: 10:15 am-12:00 pm

Microreactors are very small nuclear reactors designed to operate in the 5- to 20-MWt range. Proposed designs for this new breed of reactor are very different from those of their gigawatt-scale cousins, incorporating components such as heat pipes, organic Rankine cycles, and printed circuit heat exchangers that are routinely used for other applications, but not in operational nuclear power plants. Panelists will discuss the unique features that affect the thermal-hydraulic performance and safety of these designs. Current activities under way to test and demonstrate new microreactor concepts will be discussed.

Panelists:

Robert Reid (LANL)

Claudio Filippone (Holos)

Rich Wright (WEC)

Piyush Sabharwall (INL)

Rui Hu (ANL)

General Topics in Human Factors, Instrumentation and Control—I

Sponsored by HFICD

Session Organizer: Jamie Coble (U.T., Knoxville) Chair: Pradeep Ramuhalli (PNNL)

Location: Wilson B Time: 10:15 am-12:00 pm

- 10:20 am:** Novel Neutron-Alpha-Fission Radiation Monitoring Technology Using Tensioned Metastable Fluid Detectors, R. P. Taleyarkhan (Purdue), B. Archambault (Consultant), A. Sansone, N. Boyle, M. Hemesath (Purdue)
- 10:45 am:** Gamma Irradiation of Novel Optical Glasses at Elevated Temperature, H. A. Qiao, M. K. Murphy, B. J. Riley (PNNL), J. R. Roth, S. W. Martin (Iowa State), J. Ballato (Clemson)
- 11:10 am:** An FPGA-Based Framework for Digital Nuclear Pulse Processing, E. Dewey, S. Saxena, B. A. Fallin, A. I. Hawari (NCSU)
- 11:35 am:** Communication in a Nuclear Facility with Elastic Waves Excited with Ultrasonic LiNbO₃ Transducers on Pipes, Alexander Heifetz (ANL, IIT), Xin Huang, Dmitry Shribak (ANL, Univ Chicago), Sasan Bakhtiari (ANL), Jafar Saniee (IIT), Richard Vilim (ANL)

TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 10:15 AM

Overview of the Various Environmental Standards Projects—Panel

Sponsored by DESD

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

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

The ANS Environmental and Siting Consensus Committee (ESCC) has been busy developing several standards in the past few years. These include new standards such as ANS 2.6, “Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites,” ANS 2.22, “Environmental Radiological Monitoring at Nuclear Facilities,” ANS 2.8, “Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities,” ANS 2.16, “Criteria for Modeling Design-Basis Accidental Releases From Nuclear Facilities,” ANS 2.18 “Standard for Evaluating Radionuclide Transport in Surface Water for Nuclear Power Sites,” and others. This panel will provide an overview of the new projects and revisions to existing standards within ESCC.

Panelists:

Carl Mazzola (*Contractor*)

Leah Parks (*NRC*)

Daniel Mussatti (*NRC*)

Bill Ebert (*ANL*)

Joe Kanney (*NRC*)

The Fastest Path to Achieving Zero Emissions: Nuclear’s Role—Panel

Sponsored by YMG

Session Organizer and Chair: Harsh Desai (*NEI*)

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

Avoiding catastrophic impacts of climate change will require near-zero electricity sector CO2 emissions by midcentury, if not sooner. Achieving the “deep decarbonization” of even the electric power sector will require preserving our current fleet of nuclear plants and investing in innovative next-generation technologies. This panel will discuss various scenarios and paths to achieving the zero carbon vision, all of which require nuclear to be part of the portfolio.

Panelists:

Todd Allen (*Univ of Wisconsin, Madison*)

Jeff Navin (*Boundary Stone Partners*)

Rich Powell (*ClearPath and ClearPath Action*)

Erin Burns (*Carbon 180*)

Educational Nuclear Thermal Hydraulics Issues and Challenges—Panel

Sponsored by THD

Session Organizer: Elia Merzari (*Penn State*) **Cochairs:** Elia Merzari (*Penn State*), Lane B. Carasik (*Virginia Commonwealth Univ*)

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

Thermal hydraulics remains one of the core disciplines in the education of nuclear engineers. Professionals with expertise in thermal hydraulics play an important role in the nuclear industry, including academia, utilities, vendors, regulators, and national laboratories. This panel will focus on the current state of thermal hydraulics education for undergraduates and graduate students. We focus particular attention on the challenges posed by the renewed interest in advanced reactors and its implication on the thermal hydraulics curriculum.

Panelists:

Lane Carasik (*Virginia Commonwealth Univ*) - moderator

Wade Marcum (*Oregon State*)

Sama Bilbao y Leon (*NEA*)

Elia Merzari (*Penn State*)

Brian Jackson (*Kairos Power*)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 10:15 AM

Innovations in Advanced Reactor Technology and Design Through the ARPA-E MEITNER Program—Papers/Panel

Sponsored by RPD

Session Organizer: Matthew Jessee (*ORNL*) **Cochairs:** Matthew Jessee (*ORNL*), Rachel Slaybaugh (*DOE*)

Location: Washington 5 **Time:** 10:15 am-12:00 pm

10:20 am: The Impact of Xenon-135 on Load Following Transatomic Power Molten Salt Reactor, Andrei Rykhlevskii, Daniel O'Grady, Tomasz Kozlowski, Kathryn Huff (*Univ Illinois*)

10:45 am: Fabrication of Two-Phase Composite Moderators as Potential Lifetime Reactor Components, Lance Snead (*Stony Brook Univ*), Nicholas Brown (*U.T., Knoxville*), Jason Trelewicz (*Stony Brook Univ*), Caen Ang, Bin Cheng (*U.T., Knoxville*), Xunxiang Hu (*ORNL*), David Sprouster (*Stony Brook Univ*)

11:10 am: Preliminary Reactor Physics Analysis of Alternative Moderators for Modular High Temperature Gas-Cooled Reactors, Edward M. Duchnowski, Nicholas R. Brown (*U.T., Knoxville*), Lance Snead, Jason Trelewicz (*Stony Brook Univ*)

11:35 am: Panel Discussion

The ARPA-E MEITNER program (Modeling-Enhanced Innovations Trailblazing Nuclear Energy Reinvigoration) seeks to develop innovative technologies that can enable designs for lower-cost, safer advanced nuclear reactors. In this special session, the design teams within the MEITNER program will present their designs and recent progress enabled through the MEITNER program and coordination with DOE resources in advanced modeling and simulation tools and computational and experimental facilities.

Panelists:

Rachel Slaybaugh (*Univ of California, Berkeley*)

Matthew Jessee (*ORNL*)

Eric Ingersoll (*Lucid Catalyst*)

Kathryn Huff (*UIUC*)

Versatile Test Reactor—Current Developments—II

Sponsored by RPD; Cosponsored by MSTD, MCD

Session Organizer: Florent Heidet (*ANL*) **Chair:** Matthew Bucknor (*ANL*)

Location: Washington 4 **Time:** 10:15 am-12:25 pm

10:20 am: Sodium Fire Progression Computational Tools for Performing Hazards Analysis of the Versatile Test Reactor, Matthew Bucknor, James Sienicki, Anton Moiseyev (*ANL*)

10:45 am: Calculation of Neutron Damage to Sodium Coolant Inlet Plenum, Samuel E. Bays (*INL*), Tingzhou Fei (*ANL*)

11:10 am: Analysis of Control Rod Worth and B-10(n, α) Measurements in ZPPR-15, Gerardo Aliberti, Michael A. Smith, Richard M. Lell, Florent Heidet (*ANL*)

11:35 am: In-Situ Mechanical and Corrosion Testing for Versatile Test Reactor Application, Guillaume Mignot, Samuel Briggs, Camila Toledo Torres, George Young, Andrew Brittan, Lucas Teeter (*Oregon State*), Adam Wojcik (*Univ College London*), Matthew Waitt (*Matelect*), Julie D. Tucker (*Oregon State*)

12:00 pm: Design and Modeling of a Liquid-Fuel Salt Experiment for the Versatile Test Reactor, Alexander J. Huning, M. Scott Greenwood, Joel McDuffee, Kenneth Thoms (*ORNL*)

Space Nuclear Power Systems

Sponsored by ANSTD

Session Organizer: Jeffrey King (*CSM*) **Chair:** John D. Bess (*INL*)

Location: Maryland C **Time:** 10:15-11:10 am

10:20 am: Gas Tilt-Pad Bearing Performance in a Supercritical CO₂ Brayton Cycle for HTGR for Space Applications, Nathan Colgan, Mark Anderson, Gregory Nellis (*U.W., Madison*), Ken Cragin (*Creare LLC*)

10:45 am: Thermoelectric Characteristics Analysis of TOPAZ-II, Zhiwen Dai, Chenglong Wang, Xiao Liu, Dalin Zhang, Suizheng Qiu, Guanghui Su (*Xi'an Jiaotong Univ*)

TUESDAY, NOVEMBER 19
POSTER SESSION - 11:30 AM

Student Poster Session in Technology Expo

Sponsored by Southern Nuclear

Location: Exhibit Hall A **Time:** 11:30 am-1:30 pm

Biology and Medicine

1. Validation of Quantitative Air-Trapping on CT using Ventilation Imaging on Hyperpolarized Gas MRI, P. G. Hotvedt, K. J. Carey (*Univ of Wisconsin, Madison*), C. Hatt, C. J. Galban (*Univ of Michigan*), S. B. Fain (*Univ of Wisconsin, Madison*)

Fuel Cycle and Waste Management

2. Effect of Using Mullite Membrane on Performance of a Silver/Silver-Chloride Reference Electrode in Eutectic LiCl-KCl Salt, Reggie Jones (*Virginia Commonwealth Univ*)
3. Measurement of Thermal Accommodation Coefficient of Helium on Stainless Steel Surface for Dry Cask Storage, Mitchell G. Lane, Mustafa Hadj-Nacer, Miles Greiner (*Univ of Nevada, Reno*)

Fusion Energy

4. The Use of Divertor End Plates as Diagnostics in the PFRC-2, Justin Cohen (*NCSU*), Samuel Cohen (*PPPL*), Charles Swanson (*Princeton Satellite Systems*)
5. Development of a Plasma Focus as an Intense X-Ray and Fusion Neutron Source, Ngai To Yu (*RPI*)

Human Factors, Instrumentation, and Controls

6. Development and Testing of High-Temperature AIN Vibration Sensors using a Reactor Mock-Up Experiment, Sean P. Kerrigan, Bharat Balagopal, Howuk Kim, Mohamed Bourham, Mo-Yuen Chow, Xiaoning Jiang (*NCSU*)
7. A Cybersecurity Solution Platform for Instrumentation and Control System, Fan Zhang, Jamie Coble (*Univ of Tennessee*)

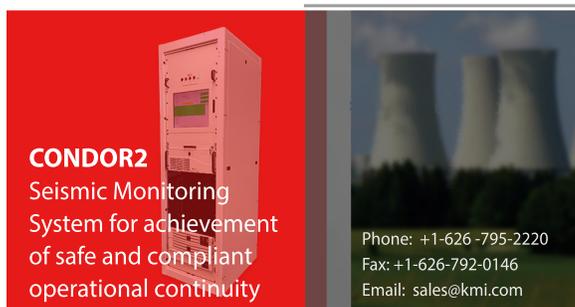
Isotopes and Radiation

8. Radiation From U-232 and U-233, Dustin H. Dealy (*Univ of New Mexico*), Jerrad Auxier, Drew Kornreich (*LANL*)

Materials Science and Technology

9. Morphology of Uranium Dendrites Electrochemically Separated in Molten Salt with the Presence of Cerium, Dimitris Killinger, Supathorn Phongikaroon (*Virginia Commonwealth Univ*)
10. Comparison of In-situ Micro and Ex-situ Meso Scale Tensile Testing for the Evaluation of Mechanical Properties of HT9 Cladding, Lauren Alexandra Nagel, Tanvi Ajantiwalay, Assel Aitkaliyeva (*Univ of Florida*)
11. Deformation Behavior of Cr Coating on SiC as Tested by Micro-Cantilever Method, Deep Patel (*Univ of Michigan*), Takaaki Koyanagi (*ORNL*)
12. Surface Characterization of Chromium Coated Zircaloy-4 Accident Tolerant Fuel Cladding Material, Rajnikant Umretiya, Santiago Vargas, Carlos E. Castano, Jessika Rojas (*Virginia Commonwealth Univ*)

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TUESDAY, NOVEMBER 19
POSTER SESSION - 11:30 AM

Student Poster Session in Technology Expo

Sponsored by Southern Nuclear

Location: Exhibit Hall A **Time:** 11:30 am-1:30 pm

Mathematics and Computation

13. Temperature-Dependent Fission Matrix Method Applied to the TREAT Reactor, Alexander DePillis (*RPI*), William Walters (*Penn State*)
14. Chemical Investigation of Mixed Uranium Oxide and CsI Pellets, Eduardo T. Montoya, Eunja Kim (*Univ of Nevada, Las Vegas*)

Nuclear Criticality Safety

15. Calculating Ideal Geometry for Dry Cask Storage, Cain Manzira (*Univ of New Mexico*)

Nuclear Nonproliferation

16. Exposure Rate Mapping of an Activated KBr Dirty-Bomb with Aerial and Ground-Based Methods, Nathanael A. Simerl, J. Beavers, J. Milburn, D. Damm, M. Dodson, R. Strahler, A. Bahadori, W. McNeil (*Kansas State Univ*)

Operations and Power

17. Energy Systems Analysis for Micro-Reactor Integration, Samuel Dotson, Kathryn Huff (*Univ of Illinois at Urbana-Champaign*)
18. Sizing and Control of Advanced Nuclear Hybrid Energy System, Molly Ross (*Kansas State Univ*), Abhinav Gairola (*INL*), Hitesh Bindra (*Kansas State Univ*)

Radiation Protection and Shielding

19. Statistical Analysis of $\text{Al}_2\text{O}_3\text{:C}$ nanoDot OSLDs, Aleem Tareen, Fatma Abdelrahman (*NCSU*)
20. Molten Salt Loop Radiation Shielding Design, Eman Al Smadi, Yassin A. Hassan (*Texas A&M Univ*)

Reactor Physics

21. Equivalence for a Hybrid Stochastic-Deterministic Reactor Physics Computation Scheme, Guillaume Giudicelli, Kord Smith, Benoit Forget (*MIT*)
22. A Techno-Economic Analysis of an Ultra Small Modular Reactor with Coupled Thermophotovoltaic Power Block, Naiki A. Kaffezakis, Dan Kotlyar, Corey Smith, Ian Miner, Andrew Nelson (*Georgia Tech*)
23. Powering the Red Planet in Pursuit of Becoming Interplanetary Species, Vedant K. Mehta (*Georgia Tech*), Patrick McClure, Michael W. D. Cooper (*LANL*), Dan Kotlyar (*Georgia Tech*)

Thermal Hydraulics

24. Experimental Studies on the Long Term Coolability of Fuel Rods with Seawater Injection, Seth Eckels, Zayed Ahmed, Steven Eckels, Hitesh Bindra (*Kansas State Univ*)
25. Air-Steam-Ingress Experiments with High Temperature Graphite Flow Channels, Connor A. Medlen, Hitesh Bindra (*Kansas State Univ*)
26. Temperature Measurements in Molten Salt Environments, Jady D. Reis, Yassin Hassan, Rodolfo Vaghetto, Se Ro Yang, Ojasvin Arora, William Headley, Denise Chavez, Saya Lee, Seth Fowler, John Valverde (*Texas A&M Univ*)
27. Design Considerations for Modular Separate Effects Test Facility (MSETF), Sierra Tutwiler, Lane B. Carasik (*Virginia Commonwealth Univ*), Cody Wiggins (*U. T. Knoxville, Virginia Commonwealth Univ*), Arturo Cabral (*ANL, Virginia Commonwealth Univ*)
28. Transient Boiling Heat Transfer on Platinum Wire with Extreme Heating Rates, Ezekiel Villarreal, Heng Ban (*Univ of Pittsburgh*)

Nuclear Engineering Lab Experiments

29. An Experimental Study of Supersonic Impinging Jets, Blake R. Maher, Sero Yang, Thien Nguyen, Yassin Hassan (*Texas A&M Univ*)

Co-op or Internship Experience and Results

30. The Effects of Focal Parameters on Optical Detection of Radiation Measurements, Oskar F. Searfus (*Univ of New Mexico*)

TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 1:15 PM

Thermal Energy Storage Systems and Coupling Challenges—III

Sponsored by OPD

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

Location: Virginia A **Time:** 1:15-3:00 pm

1:20 pm: Transient Effects and Material Challenges in Developing Chemical/Absorption Heat Pumps for Nuclear Energy Thermal Storage and Upgrade, Paul D. Armatis (*Oregon State*), Aman Gupta (*Univ Idaho*), Piyush Sabharwall (*INL*), Vivek Utgikar (*Univ Idaho*), Brian M. Fronk (*Oregon State*)

1:45 pm: Performance of an Experimental Ca(OH)₂/CaO Chemical Heat Pump Under Repeated Thermal Cycling, Aman Gupta (*Univ Idaho*), Paul D. Armatis (*Oregon State*), Piyush Sabharwall (*INL*), Vivek Utgikar (*Univ Idaho*), Brian M. Fronk (*Oregon State*)

2:10 pm: Thermal Energy Storage Selection for Near Term Nuclear Integration, Daniel Mikkelson (*NCSU*), Konor Frick (*INL*), J. Michael Doster (*NCSU*), Shannon Bragg-Sitton (*INL*), Elizabeth Worsham (*NCSU*)

2:35 pm: Preliminary Feasibility Study on the Conversion of the High Temperature Test Facility (HTTF) into a Firebrick Thermal Energy Storage System, J. Johnson, B. Leitherer, W. Williams, D. Zimmerly, B. Woods (*Oregon State*)

Focus on Communications—I—Communicating with Policy Makers—Panel

Sponsored by ETWDD; Cosponsored by YMG

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

Location: Virginia C **Time:** 1:15-2:25 pm

Policy decisions at the federal and state levels are vitally important for the nuclear energy industry. Decisions at both levels can determine whether nuclear plants continue operating or shut down, or whether investments are made in advanced technology or not. Consequently, communicating with policy makers clearly and frequently is an important element in the nuclear energy industry's communications efforts. It is also an element in which every ANS member can have a voice. This panel will address the various paths to successful communications about nuclear energy, science, and technology with policy makers. This panel discussion includes professionals who are skilled and experienced in successfully communicating with policy makers at every level.

Panelists:

Alyse Huffman (*ANS Congressional Fellow*)

Jeanne Lopatto (*Westinghouse*)

Focus on Communications—II—Meet the Media—Panel

Sponsored by ETWDD; Cosponsored by YMG

Session Organizer and Chair: Laura Hermann (*Potomac Communications*)

Location: Virginia C **Time:** 2:30-3:40 pm

The media is one of the major channels of communication that the nuclear energy industry has with the public. Today that media operates in many formats—print, broadcast, digital, and social among them. In addition, major journalists communicate through a variety of platforms that include the spectrum of social media. With deadlines looming every few hours, how can journalists understand the nuances of nuclear energy technology and science to accurately report on them? And, how can ANS members help them? Major journalists who cover the energy industry will share their perspectives about nuclear energy as well as those areas in which ANS members can help with their coverage of the industry and its news.

Panelists:

Timothy Gardner (*Reuters*)

Gavin Bade (*Politico*)

Umair Irfain (*Vox*)

Geof Brumfiel (*NPR*)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 1:15 PM

Table Top Exercise/Workshop

Sponsored by NNPD; Cosponsored by YMG

Session Organizer: Kelsey Amundson **Cochairs:** Chloe Verschuren (*LANL*), Stefani Buster (*NCSU*)

Location: Delaware A **Time:** 1:15-3:40 pm

Table top exercises are commonly used throughout security and emergency response communities to prepare for numerous disaster scenarios. During this exercise participants will have the opportunity to simulate a nuclear nonproliferation discussion/event (e.g., nuclear smuggling operation, treaty negotiation, etc.). Participants do not need a nuclear security background to participate; however, we do ask that participants show up on time and remain throughout the session.

Progress in Consolidated Interim Storage and Next Steps—Panel

Sponsored by FCWMD

Session Organizer and Chair: Sven Bader (*Orano*)

Location: Delaware B **Time:** 1:15-3:40 pm

With two applications for licenses for consolidated interim storage facilities for commercial used/spent nuclear fuel (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. The objective of this 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) DOE's role in this activity; (2) what issues, if any, arise with moving the UNF/SNF from an owner-controlled site ("deinventory") and transporting the UNF/SNF 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:

Rod McCullum (*NEI*)

Jeff Isakson (*ISP*)

Myron Kaczmarek (*Holtec*)

Edwin Lyman (*UCS*)

Data, Analysis and Operations in Nuclear Criticality Safety—I

Sponsored by NCSU

Session Organizer: Theresa Cutler (*LANL*) **Chair:** Norm F. Schwers (*SNL*)

Location: Hoover **Time:** 1:15-3:25 pm

1:20 pm: The 2019 Edition of the ICSBEP Handbook, John D. Bess (*INL*), Tatiana Ivanova, Ian Hill (*OECD*), Lori Scott (*INL*)

1:45 pm: Redux Analysis of D₂O Reflected Plutonium Foils at Low Temperature, William J. Zywiec, Anthony J. Nelson (*LLNL*)

2:10 pm: Thermal Neutron Scattering Cross Sections of U-10Mo, Andrea A. Saltos, Nickie J. Peters, Karl D. Hammond (*Univ Missouri*)

2:35 pm: The Effect of Size and Shape in Heterogeneous Systems of Small Uranium Pieces, Kristina Yancey Spencer (*LANL*)

3:00 pm: Seventy-Five Years of Nuclear Criticality Safety Documents—A Bibliography, Brian L. Koponen, David P. Heinrichs (*LLNL*)



TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 1:15 PM

Computational Methods and Mathematical Modeling

Sponsored by MCD

Session Organizer: Steven Hamilton (*ORNL*) **Chair:** Dmitry Y. Anistrov (*NCSU*)

Location: Coolidge **Time:** 1:15-3:25 pm

1:20 pm: Optimization of the Rattlesnake Code with Array Variables/Kernels, Yaqi Wang, Derek Gaston, Alexander Lindsay, Vincent Laboure (*INL*)

1:45 pm: Spherical Functional Expansions in MOOSE, Brittany Grayson, Leslie Kerby (*Idaho State*)

2:10 pm: Optimization of Axial Interpolation for the FM Control Rods Algorithm in RAPID, Valerio Mascolino, Alireza Haghighat (*Virginia Tech*), Luka Snoj (*Jožef Stefan Inst.*)

2:35 pm: Investigation of Fission Matrix Homogenization and Iterative Convergence in RAPID, Donghao He, William J. Walters (*Penn State*)

3:00 pm: Theoretical Convergence Study of IpCMFD for Fixed Source Neutron Transport Problems in 2D Cartesian Geometry, Yimeng Chan, Sicong Xiao (*National Univ Singapore*)

Plutonium Handbook—I-Panel

Sponsored MSTD

Session Organizer and Chair: Robert Hanrahan (*NNSA*)

Location: Harding **Time:** 1:15-3:40 pm

Overview of the Plutonium Handbook, 2nd Edition, Natanya Civjan (*LANL*)

Plutonium Nuclear Science in the Plutonium Handbook, 2nd Edition, Mark B. Chadwick, Peter Möller, John E. Lynn (*LANL*)

Aqueous Solution and Coordination Chemistry of Plutonium, David L. Clark (*LANL*)

Mechanical Properties of Plutonium in the Plutonium Handbook, 2nd Edition, Michael F. Stevens (*LANL*)

Young Professional Thermal Hydraulics Research Competition

Sponsored by THD

Session Organizer: Ling Zou (*INL*) **Cochairs:** Ling Zou (*INL*), Matthew D. Zimmer (*NCSU*)

Location: Wilson A **Time:** 1:15-3:50 pm

1:20 pm: Modelling Coolant Chemistry in the MYRRHA Reactor with a Multi-Physics Computational Tool, Alessandro Marino, Jun Lim, Alexander Aerts (*SCK•CEN*)

1:45 pm: Optimizing Nuclear Signal Monitoring with Acoustically Tensioned Metastable Fluid Detector Technology, Nathan Boyle, Brian Archambault (*Purdue*), Rusi Taleyarkhan (*Consultant*)

2:10 pm: Demonstration of a Data-Driven Approach for Error Estimation in Two-Phase Flow Simulation Using Coarse-Mesh CFD, Han Bao (*INL*), Jinyong Feng (*MIT*), Hongbin Zhang (*INL*), Nam Dinh (*NCSU*)

2:35 pm: Bubble Nucleation Characteristics in Subcooled Boiling Flow for Pressure Up to 600 kPa, Yang Zhao, Yu-Chen Lin (*Purdue*), Joshua P. Schlegel (*Missouri Univ Sci. & Technol.*), Mamoru Ishii (*Purdue*), John R. Buchanan Jr. (*Naval Nuclear Lab.*)

3:00 pm: Lagrangian Measurements in Pipe Flow via Positron Emission Particle Tracking, Cody Wiggins (*U.T., Knoxville, Virginia Commonwealth*), Lane Carasik (*Virginia Commonwealth*), Arthur Ruggles (*U.T., Knoxville*)

3:25 pm: TRACE Simulation of a BWR Large Break LOCA with Zircaloy and Cr-Coated Cladding, Yue Jin (*MIT*), Xu Wu (*NCSU*), Koroush Shirvan (*MIT*)

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TUESDAY, NOVEMBER 19 TECHNICAL SESSIONS - 1:15 PM

Digital I&C Upgrades–Panel

Sponsored by HFICD

Session Organizer: Edward Quinn (*Technology Resources*) **Cochairs:** Edward Quinn (*Technology Resources*), Richard T. Wood (*Univ of Tennessee, Knoxville*)

Location: Wilson B **Time:** 1:15-3:40 pm

This session will focus on the major accomplishments of the NRC-NEI Taskforce on streamlining the licensing process for acceptance of digital upgrades at nuclear plants in the United States as well as current and future challenges and scheduled activities. Speakers from NEI, NRC, and utilities will address the issues from their perspectives in a prepared presentation as well as during panel discussion with the audience.

Panelists:

Steve Vaughn (*NEI*)
Steve Arndt (*NRC*)
Clayton Scott (*Framatome*)
Robert Atkinson (*Dominion*)

Integrated Energy Systems: Integrating Nuclear Plants with Renewable Sources Through Alternative Applications Beyond the Grid–Panel

Sponsored by DESD; Cosponsored by OPD

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

Location: Wilson C **Time:** 1:15-3:40 pm

Currently, nuclear reactors are primarily focused on generating electricity for the grid. However, nuclear reactors, in addition to generating electricity, can provide heat and energy for a variety of beneficial applications, including district heating, industrial processes, desalination, and hydrogen production. Even the waste heat produced by such reactors can be harnessed for such applications. Plants can be integrated with renewable energy systems to maximize the contribution of clean energy in meeting our needs across all sectors. Through these alternative uses, and through use of heat storage, nuclear reactors can support grid variability and/or congestion while providing alternative revenue streams during periods of negative electricity pricing. For example, when renewable energy is abundant, the excess heat and electricity from reactors, which are ideally operated 24/7, can be repurposed for an alternative product. This panel will provide an overview of the motivations for waste heat recovery in NPPs and for integrated nuclear hybrid energy systems, the potential technology solutions, the optimization of system design, and plans for demonstration projects.

Panelists:

Jordan Cox (*NREL*)
Shannon Bragg-Sitton (*INL*)
Andrew Sowder (*EPRI*)
Charles Forsberg (*MIT*)

Radiation Protection and Shielding: General

Sponsored by RPSD

Session Organizer and Chair: Irina Popova (*ORNL*)

Location: Balcony A **Time:** 1:15-3:50 pm

1:20 pm: The Double Threshold of Low Dose Radiation, Alan Waltar (*Atomic Talk*), Ludwig Feinendegen (*Heinrich-Heine Univ*)

1:45 pm: Towards Portable Muon Tomography System for Non-Destructive Detection of Nuclear Materials, O. Kamaev, E. T. Rand, K. Hartling, A. Erlandson (*CNL*)

2:10 pm: Improvement of the Self-Sealing Simulation Code Including the Solid Layer, Yonadan Choi, Dong Hoon Kam, Yong Hoon Jeong (*KAIST*)

2:35 pm: Initial Development of Radiation Protection MCNP Modeling in Neutron Activation Analysis (NAA) Laboratories, Jose Rafael Parga (*LANL, U.T., Austin*), Sheldon Landsberger, Kevin. Clarno (*U.T., Austin*)

3:00 pm: Monte Carlo Analysis of Optimally Selected Dose Points for the Additive Dose Method for Retrospective Dosimetry, Ryan P. O'Mara, Robert B. Hayes (*NCSU*)

3:25 pm: Geant4 Simulation for Rotating Pencil Beam Far-Side MV Backscatter Imaging, Shuang Cui, Jyothier K. Nimmagadda, James E. Baciak (*Univ Florida*)

TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 1:15 PM

Experimental Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Mark Kimber (*Texas A&M*) **Cochairs:** Shanbin Shi (*RPI*), Xiaodong Sun (*Univ of Michigan*)

Location: Balcony B **Time:** 1:15-3:25 pm

- 1:20 pm:** Oxygen Concentration Measurements During the Initial Stages of an HTGR Double-Ended Guillotine Break, David Arcilesi (*Univ Idaho*), Tae Kyu Ham (*KHNP*), Xiaodong Sun (*Univ Michigan*), Richard N. Christensen (*Univ Idaho*), Chang H. Oh (*INL*)
- 1:45 pm:** Non-Intrusive Velocity and Temperature Measurements of Buoyant Flows from Inductively Heated Dual-Spheres, Robert Muyschondt, Duy Thien Nguyen, Yassin Hassan, N. K. Anand (*Texas A&M*)
- 2:10 pm:** Lagrangian Velocity Measurements in a Pore-Scale of a Randomly Packed Bed Using Matching-Refractive-Index and Time-Resolved PTV Techniques, T. Nguyen, S. King, Y. A. Hassan (*Texas A&M*)
- 2:35 pm:** Preliminary Parametric Study for PCM Passive Cooling Heat Structure, Jai Oan Cho, Jaehyung Sim, Sung Gil Shin, Jeong Ik Lee (*KAIST*)
- 3:00 pm:** Measurement of Flow in a Mixing Tee Using Ultrasound Doppler Velocimetry for Opaque Fluids, Arturo Cabral (*ANL, VCU*), Sasan Bakhtiari, Thomas W. Elmer, Alexander Heifetz, Darius D. Lisowski (*ANL*), Lane B. Carasik (*VCU*)

Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—I

Sponsored by RPD

Session Organizer: Luiz Leal (*IRSN*) **Cochairs:** Luiz Leal (*IRSN*), Vladimir Sobes (*ORNL*)

Location: Washington 5 **Time:** 1:15-3:50 pm

- 1:20 pm:** Application of Depletion Perturbation Theory for Sensitivity Analysis in the High Flux Isotope Reactor, Keith C. Bledsoe, Germina Iilas, Susan K. Hogle (*ORNL*)
- 1:45 pm:** Development of Perturbed MPACT Multigroup Libraries and the Perturbation Methodology for Subgroup Data, Kang Seog Kim, Matthew A. Jessee (*ORNL*)
- 2:10 pm:** Sensitivity Coefficient Calculations Using Contribution Theory, Christopher M. Perfetti (*Univ New Mexico*)
- 2:35 pm:** Uncertainty Analysis of Pressurized Water Reactor Core Cycle Depletion Calculation, Kaiyue Zeng, Jason Hou, Kostadin N. Ivanov (*NCSU*)
- 3:00 pm:** A Novel Temperature Sensitivity Calculation Methodology for the Serpent Monte Carlo Code, Ville Valtavirta (*VTT*), Manuele Aufiero (*Milano Multiphysics*), Jaakko Leppänen (*VTT*)
- 3:25 pm:** Contributions of Mark Williams to OECD/NEA LWR-UAM Multi-Scale Reactor Physics Framework, Maria Avramova, Jaoson Hou, Kostadin Ivanov (*NCSU*)

Versatile Test Reactor—Current Developments—III

Sponsored by RPD; Cosponsored by MSTD, MCD

Session Organizer: Florent Heidet (*ANL*) **Chair:** Aurelien Bergeron (*ANL*)

Location: Washington 4 **Time:** 1:15-3:25 pm

- 1:20 pm:** Establishment of an Out-of-Pile Lead Loop Facility to Support Lead Cooled Fast Reactor Design, Osman Anderoglu, Cemal Cakez, Shuprio Ghosh, Brian Romero, Khaled Talaat, Sang Lee (*Univ New Mexico*), Youho Lee (*Seoul National Univ*), Keith Woloshun, Seung Jun Kim, Stuart Maloy, Cetin Unal (*LANL*), Michael Ickes, Paolo Ferroni (*Westinghouse*)
- 1:45 pm:** Vehicle Concept for Irradiating Molten Salts in the Versatile Test Reactor, Justin W. Thomas, Todd Lockwood, Julie Jordan, Daniel Eichel, James Vollmer (*TerraPower*)
- 2:10 pm:** Analysis of the VTR In-Core Environment with the “Rabbit” Delivery System Enabling Encapsulated Irradiations, Jonathan B. Scherr, Pavel V. Tsvetkov, Jason Hearne, Sean McDeavitt (*Texas A&M*), David Wootan (*PNNL*)
- 2:35 pm:** Fiber Optic Sensor for Corrosion Monitoring in Molten Salt Irradiation Experiments, Christian M. Petrie (*ORNL*)
- 3:00 pm:** Modeling the IFR-1 Metal Fuel Experiment in Bison Through the NEAMS Workbench, Kaylee M. Cunningham, Jeffrey J. Powers, Robert A. Lefebvre (*ORNL*)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 1:15 PM

Research by U.S. DOE NEUP Sponsored Students—I

Sponsored by ETWDD

Session Organizer and Chair: Andrew Thomas (*INL*)

Location: Maryland C **Time:** 1:15-3:50 pm

- 1:20 pm:** Thermal Stratification Study in a Liquid Sodium Experimental Facility, James Schneider, Mark Anderson (*U.W., Madison*)
- 1:45 pm:** Validation Experiments for Annular Linear Induction Pump, Mohammed Shutayfi, Josh Morsell, Anant Raj, Steven Shannon, Jacob Eapen (*NCSU*)
- 2:10 pm:** CFD Framework for Used Fuel Vacuum Drying Application, Amitav Tikadar, Sudipta Saha, Travis W. Knight, Tanvir I. Farouk, Jamil A. Khan (*Univ South Carolina*)
- 2:35 pm:** Can an Analytical Model be Employed for Simulating Used Fuel Vacuum Drying Process? Sudipta Saha, Amitav Tikadar, Travis W. Knight, Jamil A. Khan, Tanvir I. Farouk (*Univ South Carolina*)
- 3:00 pm:** Distributed Wall Temperature Measurements in a Scaled Water-Cooled RCCS, David Holler, Rodolfo Vaghetto, Yassin Hassan (*Texas A&M*)
- 3:25 pm:** Creep-Fatigue Deformation of an Advanced Austenitic Stainless Steel (Alloy 709), Zeinab Y. Alsmadi (*NCSU*), Abdullah S. Alomari (*King Abdullaziz City*), N. Kumar (*Univ Alabama*), K. L. Murty (*NCSU*)

TECHNICAL SESSIONS - 3:55 PM

Cutting Edge Techniques in Education, Training and Distance Education—I

Sponsored by ETWDD

Session Organizer: Lisa Marshall (*NCSU*) **Chair:** James E. Baciak (*Univ of Florida*)

Location: Virginia A **Time:** 3:55-6:05 pm

- 4:00 pm:** Development of CosMuse: An Integrated Nuclear Power Plant Full Scope Simulation Platform, Shen Mengsi (*SJTU*), Liyankai, Lingmeng (*SJTU, State Power Investment Corp.*)
- 4:25 pm:** Application of cosFlow and cosKind-R in Nuclear Power Plant Simulation, Cao Ying, Wang Xu (*SJTU*), Lin Meng (*SJTU, State Power Investment Corp.*)
- 4:50 pm:** Development of a New Experimental Course in Nuclear Engineering, E. Blain, Y. Danon (*RPI*)
- 5:15 pm:** Internet Reactor Laboratory (IRL): Nuclear Engineering Education Utilizing the PULSTAR Reactor, S. A. Lassell, A. I. Hawari (*NCSU*)
- 5:40 pm:** A PhD Distance Learning Program: A Unique Educational Collaboration with the University of Texas and Los Alamos National Laboratory, Sheldon Landsberger, William Charlton, Kevin. Clarno (*U.T., Austin*), Dan Boravino, Jonathan Mace, Tammy Diaz (*LANL*)

Isotopes and Radiation Division: General

Sponsored by IRD; Cosponsored by BMD

Session Organizer: Igor Jovanovic (*Univ Michigan*) **Chair:** Brenden J. Heidrich (*INL*)

Location: Virginia B **Time:** 3:55-6:05 pm

- 4:00 pm:** Preliminary Study on Using Neutron Generators in Capture Therapy, Walid A. Metwally, Yumna A. Alharahsheh, Entesar Z. Dalah (*Univ Sharjah*), Husam Al-Omari (*Abu Dhabi Polytechnic*)
- 4:25 pm:** Mo-99 Production via DT Fusion Driven Subcritical Assembly, Ross F. Radel (*Phoenix LLC*), Greg R. Piefer, Tracy E. Radel (*SHINE Medical Technologies*)
- 4:50 pm:** Neck Shim Reactivity Worth in the Advanced Test Reactor, Nathan Manwaring (*INL*)
- 5:15 pm:** Application of Neutron-Gamma Technologies in Agriculture, A. Kavetskiy, G. Yakubova, N. Sargsyan (*Auburn Univ*), S. A. Prior, H. A. Torbert (*USDA*), B. A. Chin (*Auburn Univ*)
- 5:40 pm:** An Extended-Temperature, Volumetric Source Model for Betavoltaic Power Generation, Andrew O'Connor, Michele V. Manuel (*Univ Florida*), Harry Shaw (*NASA*)

TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 3:55 PM

Future Directions for the Defense Nuclear Facilities Safety Board—Panel

Sponsored by NISD

Session Organizer and Chair: Charles Martin (*Longenecker & Associates*)

Location: Virginia C **Time:** 3:55-6:00 pm

The Defense Nuclear Facilities Safety Board has been evolving internally through structural changes and process changes, and it has seen changes in its oversight functions. In addition, access to information from the DOE is an emerging issue. This session will explore these changes and the implications for the future of its mission and its impact on DOE nuclear facilities.

In addition, various organizations have proposed changes to legislation and regulations that affect DOE nuclear facilities. In particular, the House version and Senate version of the 2020 National Defense Authorization Act are totally different. The House version gives the Board many new authorities over DOE, while the Senate version recognizes past issues with the Board as noted in the November 2018 National Academy of Public Administration report and has recommendations intended to address these issues. This session is intended to bring these proposals to light and have an open discussion of the pros and cons of the proposed changes.

Panelists:

Steven L. Krahn (*Vanderbilt Univ*)

Glenn George (*Bates White Economic Consulting*)

Charles R. “Chip” Martin (*Executive Consultant, Longenecker & Associates*)

Kevin Carroll (*LLNL*)

Bob DeGrasse (*Bechtel and former staff member on House Committee on Armed Services*)

Critical and Subcritical Experiments—I

Sponsored by NNP; Cosponsored by NCS

Session Organizer: Jesson Hutchinson (*LANL*) **Chair:** Bill Myers (*LANL*)

Location: Delaware A **Time:** 3:55-5:40 pm

4:00 pm: Designing Critical Experiments Using Gaussian Process Optimization, Isaac Michaud, Noah Kleedtke, Jesson Hutchinson, Travis Smith, Robert Little, Travis Grove, Michael Rising (*LANL*)

4:25 pm: Adding (α, n) Emission to an Existing Subcritical Benchmark Statistical Uncertainty Method, J. Hutchinson, J. Arthur, T. Cutler, T. Grove, M. Nelson (*LANL*)

4:50 pm: Optimization of Binning Parameters in the Feynman Variance-to-Mean Method for Delayed Neutron Reinterrogation, A. Harvis, J. Determan, J. Hutchinson, W. Myers (*LANL*)

5:15 pm: Investigation of Nuclear Safeguards Attributes Through Neutronics Simulation of Pebble Bed Reactor Core, Dany Mulyana, Sunil S. Chirayath (*Texas A&M*)

Used Fuel and High-Level Waste Management—Einstein’s Definition of Insanity?—Panel

Sponsored by FCWMD

Session Organizer and Chair: Steven Nesbit (*LMBT Consulting*)

Location: Delaware B **Time:** 3:55-6:00 pm

Progress on high-level radioactive waste (HLW) management in the United States ground to a halt in 2010 when the Yucca Mountain project was cancelled. The HLW management program remains at a standstill, and lack of progress threatens to dampen enthusiasm for advanced nuclear energy systems. 2019 has seen considerable interest in Congress in making fundamental changes to the waste program, with authorization bills introduced in the House and the Senate. Is there any real prospect for change, or are we doomed to keep trying the same things with the same result? This panel will discuss new legislative initiatives and new technologies that might help us deal with this very old issue.

Panelists:

Lisa Marshall (*NCSU*)

Tyler Owens (*Energy and Water Development Committee*)

Lake Barrett (*former Acting Director of the DOE*)

Peter Spencer (*U.S. House of Representatives Committee on Energy and Commerce*)

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TUESDAY, NOVEMBER 19
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Computational Tools for Radiation Protection and Shielding—I

Sponsored by RPSD

Session Organizer: Michael Fensin (*LANL*) **Chair:** Christopher M. Perfetti (*Univ of New Mexico*)

Location: Hoover **Time:** 3:55-6:05 pm

- 4:00 pm:** I3d2vtk: An MCNPTools Utility to Enable LNK3DNT File Visualization and Post-Processing, Joel A. Kulesza, Jennifer L. Alwin, Jesson D. Hutchinson, Erik F. Shores, Robert C. Little (*LANL*)
- 4:25 pm:** Analysis of Dose Rates Around a Silo-Type LILW Repository Using ADVANTG, Luka Snoj, Domen Kotnik, Bor Kos (*Jožef Stefan Inst., Univ Ljubljana*)
- 4:50 pm:** Application of Global Weight Window Generator Based on Particle Density Uniformity in Deep-Penetration Shielding Calculation, Peng He, Bin Wu, Lijuan Hao, Guangyao Sun (*Inst. of Nuclear Safety Technology*)
- 5:15 pm:** An Overview of the Modernized Generalized Spallation Model, Chase Juneau, Clell Solomon, Leslie Kerby (*LANL*)
- 5:40 pm:** Analysis of Operational History Effects on the Shielding Calculation of the KN-12 Cask Using Monaco/MAVRIC, Ye Seul Cho, Ser Gi Hong (*Kyung Hee Univ*)

Deterministic Transport Methods

Sponsored MCD

Session Organizer: Steven Hamilton (*ORNL*) **Chair:** Barry D. Ganapol (*Univ of Arizona*)

Location: Coolidge **Time:** 3:55-5:40 pm

- 4:00 pm:** A Discontinuous Finite-Element Formulation of the Gray Radiative Heat Transfer P_1 Equations Using a Moving Mesh Partial Differential Equation, Hans Hammer, HyeongKae Park, Luis Chacón, William Taitano (*LANL*)
- 4:25 pm:** Axially Quadratic Discontinuous Finite Elements for Neutron Transport Reactor Simulations, Robert F. Turner, Jean C. Ragusa (*Texas A&M*)
- 4:50 pm:** A Modified Step Characteristic Method for Solving the S_N Transport Equation, Dean Wang (*Ohio State*), Zeyun Wu (*VCU*)
- 5:15 pm:** A High-Order / Low-Order (HOLO) Algorithm with Low-Rank Evolution for Time-Dependent Transport Calculations, Zhuogang Peng, Ryan McClarren (*Notre Dame*)

Sensors and In-Pile Instrumentation

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Colby B. Jensen (*INL*)

Location: Harding **Time:** 3:55-6:05 pm

- 4:00 pm:** Fiber Optic Pressure and Temperature Sensors for Gen IV Reactor Environments, Steven Derek Rountree, Anastasia Stuckner, Matthew T. Viele Haggerty (*Luna Innovations*), Mohan Wang, Kevin Chen (*Univ Pittsburgh*)
- 4:25 pm:** Optical Data Method for MARCH-Based Tests in TREAT Reactor, David Coy, Casey Cadman (*Univ Pittsburgh*), Nicholas Woolstenhume, Austin Fleming (*INL*), Heng Ban (*Univ Pittsburgh*)
- 4:50 pm:** The Development of an Optical Fiber Based Gamma Thermometer, Anthony Birri, Thomas E. Blue (*Ohio State Univ*)
- 5:15 pm:** High Speed Boiling Detector Based on Electrical Impedance Measurement for Advanced In-Pile Boiling Studies, C. Jensen, A. Fleming, K. Condie, J. Svoboda, E. Larsen (*INL*)
- 5:40 pm:** Transient Needle Probe Technique for In-Pile Thermal Conductivity Measurements, Austin Fleming (*INL*), Courtney Hollar (*Boise State*), Kurt Davis, Colby Jensen (*INL*), David Estrada (*Boise State*)

TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 3:55 PM

Multiscale and Multi-Physics Thermal Hydraulics

Sponsored by THD

Session Organizer: David Pointer (*ORNL*) **Cochairs:** Rui Hu (*ANL*), Hisashi Ninokata (*Politecnico Milano*)

Location: Wilson A **Time:** 3:55-6:05 pm

- 4:00 pm:** Coupling of CUPID and nTER for Pin-by-Pin Subchannel Thermal-Hydraulics and Neutronics Analysis, Youyeon Choi, Hyoung Kyu Cho (*Seoul National Univ*), Jin Young Cho (*KAERI*)
- 4:25 pm:** Preliminary Investigation of Fuel Rod Burst Potential Under LBLOCA with Burnup Extension, Hongbin Zhang, Cole Blakely, Jianguo Yu (*INL*)
- 4:50 pm:** Thermal Analysis of a Heat Pipe Cooled Reactor Core Based Unit Assembly Using Coupled FLUENT and ANLHTP, San Lee, Hyoung Kyu Cho (*Seoul National Univ*), Changho Lee, Taek K. Kim (*ANL*)
- 5:15 pm:** Preliminary Design Evaluation of a Natural Circulation Molten Salt Irradiation Loop, Sandesh Bhaskar, Abdalla Abou-Jaoude (*INL*)
- 5:40 pm:** A Physics-Informed Machine Learning-Aided Framework for Predicting Departure from Nucleate Boiling in Rod Bundles, Xingang Zhao, Koroush Shirvan (*INL*), Robert K. Salko (*ORNL*)

Digital I&C Modernization

Sponsored by HFICD

Session Organizer: Jamie Coble (*U.T., Knoxville*) **Cochairs:** Edward L. Quinn (*Technology Resources*), Richard T. Wood (*Univ of Tennessee, Knoxville*)

Location: Wilson B **Time:** 3:55-5:40 pm

- 4:00 pm:** Demonstration of Integrated Hazard Analysis for Digital Reactor Trip Systems, Tate Shorthill (*Univ Pittsburgh*), Han Bao, Hongbin Zhang (*INL*), Heng Ban (*Univ Pittsburgh*)
- 4:25 pm:** Automated Exhaustive Test Case Generation for Safety-Critical Software, Sang Hun Lee (*RPI*), Seung Jun Lee (*UNIST*), Sung Min Shin (*LAERI*), Eun-chan Lee (*Korea Hydro & Nuclear Power*), Hyun Gook Kang (*RPI*)
- 4:50 pm:** Development of an Obsolescence Cost Model for Nuclear Power Plants, Michael D. Muhlheim (*ORNL*), Paul J. Hunton (*INL*), Peter A. Sandborn (*Univ Maryland*), Edward L. Quinn (*Technol. Resources*), Richard E. Hale (*ORNL*), Robert T. England (*INL*)
- 5:15 pm:** Advanced Diverse Protection System Features for CCF + Large Break LOCA in Advanced Power Reactor 1400, Jin kwon Jung, Yoon Hee Lee, Hyeong Pyo Hong, Jae Hee Yun (*KEPCO*)

General Topics in Decommissioning—I

Sponsored by DESD

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

Location: Wilson C **Time:** 3:55-5:15 pm

- 4:00 pm:** Development of New Equipment for Recovering Old Nuclear Wastes, Aurélie Ithurbide, Roger Serrano, Jean-Claude Masy
- 4:25 pm:** Developing a Procedure of Safety Assessment for Decommissioning Activities, Ken-ichi Tanaka (*Inst of Applied Energy*), Isao Yamaoka, Takashi Muramatsu (*Japan Nuclear Safety Inst*)
- 4:50 pm:** Lessons Learned Pave Paths for the Future, Glenn S. K. Williams, Allen C. Church (*FMI Energy Holdings*)

How to Give Technical Presentations—Panel

Sponsored by YMG

Session Organizer and Chair: Kelsey Amundson

Location: Balcony A **Time:** 3:55-6:00 pm

As engineers or scientists we are tasked with presenting technical information to a variety of audiences. Being able to effectively communicate your results can make all the difference in obtaining approval for a project or continued financial support. In this session we will focus on how to display and communicate results to different audiences.

Panelists:

Harsh Desai (*NEI*)

Laura Hermann (*Potomac Communications Group*)

Todd Allen (*Univ of Michigan*)

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TUESDAY, NOVEMBER 19
TECHNICAL SESSIONS - 3:55 PM

General Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Igor Bolotnov (*NCSU*) **Cochairs:** Mohammad A. Hawila (*HTRI*), Guillaume Mignot (*Oregon State Univ*)

Location: Balcony B **Time:** 3:55-6:05 pm

- 4:00 pm:** Decay Heat in Nuclear Power Plants: Heat Exchanger Design and Evaluation Using Xchanger Suite® (Case Study), Mohammad A. Hawila (*Heat Transfer Research Inc.*)
- 4:25 pm:** Sensitivity Analysis of Erosion/Deposition Coefficient for Crud Properties in Pressurized Water Reactors, Beomjun Jang, Chongkuk Chun (*KEPCO*)
- 4:50 pm:** Thermal-Hydraulic Analysis for Main Steam Line Break for Containment Pressure and Radioactivity Suppression System (CPRSS) of SMART Reactor, Kyung Jun Kang, Ji Han Chun, Jong Wook Kim, Han-Ok Kang (*KAERI*), Seong Su Jeon (*FNC Technol. Co.*), Keung Ku Kim, Moon Jung, Young-In Kim (*KAERI*)
- 5:15 pm:** Preliminary Design Study of Supercritical CO₂ Cycle for Small Modular Reactor Application, Yoonhan Ahn, Yong Hwan Yoo (*KAERI*)
- 5:40 pm:** Fiber Optic Sensing Application in Quenching Temperature Measurement, Paul Hurley, Juliana P. Duarte (*Virginia Tech*)

Mark Williams Memorial Session: Sensitivity/Uncertainty Analysis in Reactor Physics—II

Sponsored by RPD

Session Organizer: Luiz Leal (*IRSN*) **Cochairs:** Vladimir Sobes (*ORNL*), Luiz Leal (*IRSN*)

Location: Washington 5 **Time:** 3:55-6:05 pm

- 4:00 pm:** Some Innovations of Dr. Mark Williams for the Practical Application of Sensitivity and Uncertainty Analysis to Reactor Analysis and Criticality Safety, B. T. Rearden (*ORNL*)
- 4:25 pm:** Quantifying SCALE/TRITON Code Discrepancy Using Spent Fuel Assay Data from SFCOMPO-2.0, Dean Reid Price, Tomasz Kozlowski (*Univ Illinois*)
- 4:50 pm:** Uncertainty Analysis of UAM-LWR Benchmark with MCS, Yunki Jo, Woonghee Lee, Chidong Kong, Deokjung Lee (*UNIST*)
- 5:15 pm:** Monte Carlo Uncertainty Quantification in UF₆ Cylinder Neutron Emissions, Ryan P. O'Mara (*NCSU*), Will Wieselquist, Cihangir Celik (*ORNL*)
- 5:40 pm:** Dr. Mark Williams' Three Contributions to Nuclear Data Covariance, Dorothea Wiarda, Marco Pigni, Vladimir Sobes, Bradley T. Rearden (*ORNL*)



TUESDAY, NOVEMBER 19

TECHNICAL SESSIONS - 3:55 PM

“Hands On” Core Design–Panel

Sponsored by RPD

Session Organizer and Chair: Amanda Lang (*Duke*)

Location: Washington 4 **Time:** 3:55-6:00 pm

This session will include representative core designs and rely on audience participation for improvements and ideas in the style of a “design sprint.” The audience will attempt to meet design goals such as power peaking, energy requirements, peak boron concentration, and burnup limits by leveraging feed size, enrichment, burnable poison, loading pattern, etc. A variety of reactor types will be represented. Discussion will focus on collaborative solutions to recurring core design constraints.

Panelists:

Amanda Lang (*Duke Energy*)

Erin Wehlage (*Studsvik*)

Research by U.S. DOE NEUP Sponsored Students—II

Sponsored by ETWDD

Session Organizer: Andrew Thomas (*INL*) **Chair:** Gregory A. Bala (*INL*)

Location: Maryland C **Time:** 3:55-6:05 pm

4:00 pm: Evaluation of Surface Characteristics of FeCrAl Alloy Accident Tolerant Fuel Cladding Material After Critical Heat Flux Testing Under Atmospheric Pressure, Rajnikant Umretiya, Robert Uhorchuk (*VCU*), Mark Anderson, Barret Elward (*U.W., Madison*), Sama Bilbao y Leon (*VCU*), Raul B. Rebak (*GE*), Jessika Rojas (*VCU*)

4:25 pm: Exploratory Study into the Effectiveness of Active Monitoring Techniques, Arvind Sundaram, Hany S. Abdel-Khalik (*Purdue*), Oussama Ashy (*WSC Inc.*)

4:50 pm: Diffusion of Silver and Ruthenium Fission Products in Virgin Nuclear Graphite, Kevin R. Graydon, Mikhail Klimov, Edward Dein, Kevin R. Coffey, Yongho Sohn (*Univ Central Florida*)

5:15 pm: Off-Site Dose Prediction for Decision Making Using Recurrent Neural Networks, Bing Zha, Alper Yilmaz, Tunc Aldemir (*Ohio State*)

5:40 pm: Oxidation Effects of Air and Steam Ingress on Material Properties of Graphite in HTGRs, Connor Medlen, Hitesh Bindra (*Kansas State*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 10:15 AM

Operations and Power: General—I

Sponsored by OPD

Session Organizer: Chad Boyer (*Westinghouse*) **Chair:** Erin M. Wehlage (*Studsvik*)

Location: Virginia A **Time:** 10:15-12:00 pm

10:20 am: Efficiency Analysis of Hybrid Rankine Cycle for HTR-NHR Combined NPP, Li Bowen, Dong Zhe, Liu Miao (*Tsinghua Univ*)

10:45 am: Sodium Cooled Reactor Containment Building Footprint Optimization, Michael Smith (*Univ North Carolina*), John McEntire, Paul Murray (*Orano*), Thomas Koch (*Univ North Carolina*)

11:10 am: High Cost of Nuclear Power Plants in the U.S. and Systematic Approach to the Issue, Efe G. Kurt, Mark DeHart, Phillip Finck (*INL*)

11:35 am: Establishing the Requirements for Japan's Future Nuclear Energy Systems, W. Robb Stewart, Jacopo Buongiorno, Koroush Shirvan, Emilio Baglietto, Charles Forsberg, Michael Driscoll (*MIT*)

The Role of Innovation in Nuclear Development—Panel

Sponsored by OPD

Session Organizer and Chair: Fiona Rayment (*NNL*)

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

This panel explores the need for innovation within the nuclear sector in support of the existing fleet, for new power plant construction, and for advanced technologies. Innovation is a heavily used word within our sector today, and yet it seems to be difficult to implement. This international panel explores the need for innovation, the areas where innovation is needed, and some of the solutions being implemented.

Panelists:

Kirsty Hewitson (*NNL*)

Ed Bradley (*IAEA*)

Sama Bilbao y Leon (*NEA*)

Heather Feldman (*EPRI*)

Andy Worrall (*ORNL*)

Kathy McCarthy (*CNL*)

Atmospheric Transport Considerations for Radiation Protection and Shielding

Sponsored by RPSD

Session Organizer: Michael Fensin (*LANL*) **Chair:** Lucas M. Rolison (*LANL*)

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

10:20 am: Deconvolution of Uncertainty Components in Transuranic Air Sample Assay Measurements, S. Joseph Cope, Robert B. Hayes (*NCSU*)

10:45 am: Comparison of Atmospheric Dispersion and Deposition Factors Between Different Approaches, Seung-Hee Lee (*KEPCO*), Won-Tae Hwang (*KAERI*), Chang-Lak Kim (*KEPCO*)

11:10 am: Considerations for Angle and Energy Dependent Dose Response Function Utilization for Neutron Transport in Air, M. L. Fensin, K. C. Kelley, S. S. McCready (*LANL*)

11:35 am: Atmospheric Gamma-Ray Transport from a Radioactive Cloud to a Low Earth Orbit Satellite Using MCNP, Jacob W. Inman (*Georgia Tech*), Brandon A. Wilson, Vincent J. Jodoin (*ORNL*)

Nuclear Thermal Propulsion

Sponsored by ANSTD

Session Organizer and Chair: Jeffrey King (*CSM*)

Location: Delaware B **Time:** 10:15-11:10 am

10:20 am: Capture of Decay Heat to Produce Thrust in a Nuclear Propulsion Rocket, William G. Culbreth, Kimberly Gonzalez (*UNLV*)

10:45 am: A Pathway for Fully Ceramic Microencapsulated (FCM) Fuels in Nuclear Thermal Propulsion (NTP), Caen Ang (*U.T., Knoxville*), Lance Snead (*Stony Brook Univ*), Alex Gordon (*U.T., Knoxville*), Kelsa Benensky (*NASA*), Sam Judd (*USNC-Space*), David Sprouster (*Stony Brook Univ*), Yutai Kato (*U.T., Knoxville*)

Technical Sessions: Wednesday November 20

WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 10:15 AM

Introduction to NCS D Mentor Match and Membership Challenge Debrief–Panel

Sponsored by NCS D

Session Organizers: Hannah Morbach (*BWXT*), Jennifer Alwin (*LANL*), John Miller (*SNL*),
MacKenzie Gorham (*DOE-ID*) **Chair:** Jennifer Alwin (*LANL*)

Location: Hoover **Time:** 10:15 am-12:00 pm

This session will describe the NCS D Mentor Match program, which leverages a modular framework to connect mentors and mentees based on past experience, desired skillsets, and communication preferences. NCS D Mentor Match allows participants to focus on areas such as calculational methods, conducting walkdowns, writing CSEs, responding to reviewer and/or regulator questions/comments, CAAS analysis, validation, in situ experiments, work/life balance, university teaching, hand calculations, presenting at ANS meetings, critical experiments, solution processing analysis, vault storage analysis, understanding ANS standards ... to name a few. The program will also connect participants based on communication preferences and identify expectations for the program.

Panelists:

Jen Alwin (*LANL*)

Mackenzie Gorham (*DOE-ID*)

James Bunsen (*LANL*)

Analytical Solutions and Benchmarking

Sponsored by MCD

Session Organizer: Steven Hamilton (*ORNL*) **Chair:** William J. Walters (*PSU*)

Location: Coolidge **Time:** 10:15-11:35 am

10:20 am: Analytic Discrete-Ordinates Solution for Time-Dependent Transport in Semi-Infinite Media, Jeffery D. Densmore, Gabriel Kooreman (*Naval Nuclear Lab.*)

10:45 am: Monoenergetic Time Dependent Diffusion in 1D Heterogeneous Media, B. Ganapol (*Univ Arizona*), M. DeHart, F. Gleicher, S. Schunert R. Martineau (*INL*)

11:10 am: Extending Wang's 1D Sn Analytic Solution to Heterogeneous Problems with No Iteration on Interfacial Fluxes, Zeyun Wu (*VCU*)

Nuclear Science User Facilities—II

Sponsored by MST D

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

Location: Harding **Time:** 10:15-11:35 am

10:20 am: High Power Irradiation Testing of TRISO Particles in Miniature Fuel Specimens in HFIR, Ryan Latta, Blaise Collin, Micah Hackett (*Kairos*), Nicholas Brown (*U.T., Knoxville*), John Hunn, Christian Petrie, Tyler Gerczak, Grant Helmeich (*ORNL*)

10:45 am: X-Ray Diffraction-Computed Tomography (XRD-CT) Facility at NSLS-II for Nuclear Materials, Mehmet Topsakal, David Sprouster, Lynne Ecker (*BNL*)

11:10 am: MCNP5 Validation with a High-Reactivity Experiment in the Advanced Test Reactor Critical Facility, Joseph W. Nielsen, David W. Nigg (*INL*), Jeong Sik Yim (*KAERI*)

Two-Phase Flow Thermal Hydraulics

Sponsored by THD

Session Organizer: Mamoru Ishii (*Purdue*) **Cochairs:** Subash Sharma (*Univ of Massachusetts Lowell*),
Dillon R. Shaver (*ANL*)

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

10:20 am: Experimental Investigation of Local Fluid Temperature Profiles in Sub-Cooled Boiling Flows, Zhuoran Dang, Yang Zhao (*Purdue*), Jingyu Du (*Purdue, Tsinghua Univ*) Mamoru Ishii (*Purdue*)

10:45 am: An Entrainment Rate Correlation for Annular Flow, Guanyi Wang (*Purdue*), Pravin Sawant (*NuScale*), Mamoru Ishii (*Purdue*)

11:10 am: Effect of Break Size on Flow Instabilities in a PWR-Type Small Modular Reactor, Yu-Chen Lin, Akshay Kumar Khandelwal (*Purdue*), Sipeng Wang (*Purdue, Xi'an Jiaotong Univ*), Mamoru Ishii (*Purdue*)

11:35 am: Potential Flow Model for Seismic Excitation of PWR Assemblies Under Axial Flow, Roberto Capanna, Guillaume Ricciardi (*CEA*), Emmanuelle Sarrouy, Christophe Eloy (*Aix Marseille Univ*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 10:15 AM

Online Monitoring Technologies for Instrumentation and Control (I&C) Systems in Nuclear Facilities—Panel

Sponsored by HFICD

Session Organizer and Chair: Brent Shumaker (*AMS*)

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

The purpose of this panel session is to provide examples of practical implementations of online monitoring (OLM) technologies in nuclear facilities and present leading research that is being performed in the areas of monitoring, diagnostics, and prognostics of nuclear instrumentation and control (I&C) systems. OLM technologies today are providing the nuclear industry with innovative means to improve safety and efficiency and are poised to become an even greater part of the infrastructure of future nuclear facilities. The roundtable will include panelists from key stakeholders, users, and researchers of OLM technologies who will share their perspectives on how OLM implementations are benefitting existing nuclear facilities, how these technologies can be expanded for future implementations, and technological/regulatory challenges that must be addressed to ensure that the benefits of these technologies are fully realized.

Panelists:

Daniel Steik (*Advanced Test Reactor*)

Brent Shumaker (*AMS*)

Jamie Coble (*Univ of Tennessee*)

Ted Quinn (*Technology Resource*)

Clint Carter (*Fleet Modernization*)

Advanced and Innovative Technologies for Decommissioning of Nuclear Facilities and Environmental Remediation of Radiological Contamination—Panel

Sponsored by DESD; Cosponsored by RRSB

Session Organizers: Bobby M. Abu-Eid (*NRC*), Leah Parks (*NRC*) **Chair:** Leonel E. Lagos (*FIU*)

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

Numerous nuclear power reactors around the world have shut down or will over the next several years. These reactors will eventually need to complete decommissioning in accordance with applicable regulatory requirements. The monetary investment in decommissioning of power reactors worldwide is estimated at \$150 billion for the next decade. In addition, significant environmental remediation remains to be done at legacy sites with contaminated soil and groundwater. This panel session will focus on innovative technologies for efficient, robust, and cost-effective decommissioning as well as remediation at radiologically contaminated sites, including use of rapid survey and characterization technologies. Examples of new technologies include remote and robotic technologies, remote mobile monitoring systems, nanotechnology materials in groundwater remediation, advanced modeling and 3-D visualization for characterization, and “end-state” risk analysis in support of site closure decisions. Panelists from industry, government, academia, and international organizations involved in decommissioning and environmental remediation will discuss the potential applications, as well as potential regulatory implications, of the new technologies.

Panelists:

Rob Seifert (*DOE*)

Olena Mykolaichuk (*IAEA*)

Leo Lagos (*Florida International Univ*)

Sven Bader (*ORANO*)

Diversity and Inclusion in Nuclear—Panel

Sponsored by YMG

Session Organizer and Chair: Kalin Kiesling (*Univ of Wisconsin, Madison*)

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

Research shows diversity and inclusion are key enablers for innovation and effective teams. This session will investigate why we want to and how we can advocate and promote diversity and inclusion in our workspaces. We will begin by viewing a TED talk (<https://tinyurl.com/ANSDIA2019>) and follow with a facilitated discussion about best practices for and lessons learned while building a diverse and inclusive workforce.

Panelists:

Lisa Marshall (*NCSU*)

Lane Carasik (*Virginia Commonwealth Univ*)

Paul Wilson (*Univ of Wisconsin, Madison*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 10:15 AM

Spent Fuel Storage and Transportation

Sponsored by FCWMD

Session Organizer: Stephanie Bruffey (*ORNL*) **Chair:** R. A. Borrelli (*Univ of Idaho*)

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

10:20 am: Study on Radionuclide Dispersion for Accident Condition of Spent Fuel Highway Transport, Chun-hua Chen, Li-wei Chen, Xiao-lei Zheng, Jin Wang, Fang Wang (*FDS*)

10:45 am: Characterization and Drying of Oxyhydroxides for Dry Storage of Aluminum-Clad Spent Fuel, Matthew Shalloo (*Univ South Carolina*), Roderick Fuentes, Anna d'Entremont, Robert Sindelar (*SRNL*), Travis W. Knight (*U.T., Knoxville*)

11:10 am: Safeguards Approaches for Remote Monitoring System of Spent Nuclear Fuel Dry Cask Storage, Athena Sagadevan, Sunil Chirayath (*Texas A&M*)

11:35 am: Development of Sensor Transport System with Tunable Magnetic Wheel, So-Hee Park, Along Wang, Young-Woo Park, Myunggyu D.Noh (*Chungnam National Univ*)

Reactor Physics: General—I

Sponsored by RPD

Session Organizer: Pavel Tsvetkov (*Texas A&M*) **Chair:** Akio Yamamoto (*Nagoya Univ*)

Location: Washington 5 **Time:** 10:15 am-12:00 pm

10:20 am: Investigating Increased Volumetric Capacity BUSTER Test Vehicle Variants for TREAT, John D. Bess, Nicolas E. Woolstenhulme, Connie M. Hill (*INL*)

10:45 am: Hot-Channel and Burnup Analysis for Potential High-Power Configuration of Missouri S&T Reactor, Thaqal Alhuzaymi (*King Abdulaziz City for Science and Technology, Missouri Univ Sci. & Technol.*), Ayodeji B. Alajo (*Missouri Univ Sci. & Technol.*)

11:10 am: Study on Transmutation System of LLFP Using Fast Reactors, Toshio Wakabayashi, Makoto Takahashi (*Tohoku Univ*), Satoshi Chiba (*Tokyo Inst. Technol.*), Naoyuki Takaki (*Tokyo City Univ*), Yoshiaki Tachi (*JAEA*)

11:35 am: Fast Reactor Input Deck Generator (FRIDGe), Ryan Stewart, Todd Palmer (*Oregon State*)

Research Reactors in Support of Advanced Reactors R&D—Panel

Sponsored by RPD

Session Organizer and Chair: Pavel Tsvetkov (*Texas A&M*)

Location: Washington 4 **Time:** 10:15 am-12:00 pm

A number of research reactors are in operation. Many of those reactors are being operated at university campuses serving as both educational and R&D instruments. The design space of research reactors is dominated by light water systems. Research reactors carry important R&D programs in support of current and future developments. This panel will discuss ongoing efforts involving research reactors focusing on the significant opportunities offered by these systems in support of advanced reactor R&D. Attention will be given to perspectives to develop, license, and deploy advanced non-light-water research reactors.

Panelists:

Steven Lynch (*NRC*)

Alice Caponiti (*DOE*)

Steve Biegalski (*Georgia Tech*)

Sean McDeavitt (*Texas A&M*)

Rusty Towell (*Abilene Christian Univ*)

Kevin Clarno (*Univ of Texas at Austin*)

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WEDNESDAY, NOVEMBER 20
TECHNICAL SESSIONS - 10:15 AM

ABET Accreditation Changes: Transition and Implementation–Panel

Sponsored by ETWDD

Session Organizers and Cochairs: Walid Metwally (*Univ of Sharjah*), Youssef Shatilla (*Khalifa Univ*)

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

Recent changes to ABET Criteria 3 and 5 have been made and will take effect starting for the 2019–2020 accreditation cycle. The criteria changes have been an ongoing effort over the past 10 years by ABET and involved numerous stakeholders. In addition to the criteria changes there have been explicit definitions made for ABET terminology. The purpose of this panel is to introduce these ABET changes and discuss how institutions can transition and implement the new criteria.

Panelists:

Walid Metwally (*Univ of Sharjah*)

Youssef Shatilla (*Khalifa Univ*)

Garry Young (*Entergy Corp*)

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

NSG: What Is It and Why Should We Care? Looking at Global Non-Proliferation Regimes and Their Impact on International Business

Sponsored by NNPD

Session Organizer and Chair: Margaret Harding (*4 Factor Consulting*)

Location: Maryland AB **Time:** 10:15 am-12:00 pm

U.S. companies from utilities to major reactor vendors, advanced reactor developers to consultants are all looking to add international business to their portfolio. Sometimes as buyers and sometimes as sellers, the opportunity to take advantage of the globally growing market in nuclear is an important part of the commercial nuclear landscape. This means dealing with various regulatory regimes, particularly in the area of export control. The Nuclear Suppliers Group represents a key crossroads between key nations supplying nuclear technology around the world. This panel aims to lift the green curtain, to help us all understand better why and how the NSG does what it does.

Speakers:

Madeleine Foley (*DOE/NNSA*)

Richard Goorevich (*US, Urenco*)

Kees Jan Steenhoeck (*Urenco Ltd*)

Nate Harsch (*Westinghouse*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 1:15 PM

Versatile Test Reactor—II—Panel

Sponsored by RPD

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

Location: Virginia B Time: 1:15-3:40 pm

This session will highlight mainly university research and development in support of cartridge loop development for gas-cooled fast reactor, sodium-cooled fast reactor, molten salt-cooled fast reactor, lead-cooled fast reactor, and rabbit systems.

Panelists:

Piyush Sabharwall (*INL*)

NK Anand (*Texas A&M*)

Michael Simpson (*Univ of Utah*)

Richard Christensen (*Univ of Idaho*)

Mark Anderson (*Univ of Wisconsin*)

Osman Anderoglu (*Univ of New Mexico*)

Current Applications of Dynamic PRA—Panel

Sponsored by NISD

Session Organizer: Matthew Denman (*Kairos*) Chair: Jordan Hagaman (*Kairos Power*)

Location: Virginia C Time: 1:15-3:40 pm

This panel will bring together practitioners and decision-makers in the world of dynamic probabilistic risk assessment for a frank and honest conversation about this field's potential and challenges. The panel will consist of representatives from industry, nuclear regulators, national laboratories, and academia.

Panelists:

Matthew Denman (*Kairos Power*)

Michelle Gonzalez (*NRC*)

Zachary Jankovsky (*SNL*)

Askin Guler Yigitoglu (*ORNL*)

Katrina Groth (*Univ of Maryland*)

Mihai Diaconeasa (*NC State*)

Critical and Subcritical Experiments—II

Sponsored by NNP; Cosponsored by NCS

Session Organizer: Jesson Hutchinson (*LANL*) Chair: David K. Hayes (*LANL*)

Location: Delaware A Time: 1:15-3:00 pm

1:20 pm: Preliminary Designs for Criticality Safety Benchmarks—Iron/Steel/Chromium Series, Nicholas Thompson, Jesson Hutchinson, Theresa Cutler, William Myers, David Hayes (*LANL*)

1:45 pm: Prompt Neutron Decay Constant Measurements on a Copper Reflected Intermediate Enrichment Uranium System with Lead Intersitial, George McKenzie, Travis Grove, Rene Sanchez (*LANL*)

2:10 pm: Jupiter: A Proposed Benchmark for Lead Void Worth with Plutonium, Alex McSpaden, Joetta Goda, Theresa Cutler, George McKenzie, Jesson Hutchinson, Nicholas Thompson (*LANL*)

2:35 pm: Two-Exponential Rossi-Alpha Analysis of Copper- and Polyethylene-Reflected Plutonium, M. Y. Hua (*Univ Michigan, LANL*), C. A. Bravo (*Univ Michigan*), J. D. Hutchinson, G. E. McKenzie (*LANL*), S. A. Pozzi (*Univ Michigan*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 1:15 PM

Current University Research on Pyroprocessing

Sponsored by FCWMD

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

Location: Delaware B Time: 1:15-3:25 pm

- 1:20 pm:** Electrochemical Behavior of Tellurium Species in LiCl-KCl Molten Salts, Brandon Day, Nikunja Shrestha, Vivek Utgikar, Krishnan S. Raja (*Univ Idaho*), Guy Fredrickson, Steven Frank (*INL*)
- 1:45 pm:** Redox Behavior of Iodide Species in LiCl-KCl at 450 – 550 °C, Nikunja Shrestha, Brandon Day, Vivek Utgikar, Krishnan S. Raja (*Univ Idaho*), Guy Fredrickson, Steven Frank (*INL*)
- 2:10 pm:** Magnetic Field Effects on the Electrochemical Behaviors of Ce in LiCl-KCl Molten Salt, Wentao Zhou, Xubo Gu, Dezhong Wang (*Shanghai Jiao Tong Univ*)
- 2:35 pm:** Electrochemical Deposition of Fission Products into Liquid Metals from Molten Salts, Hojong Kim (*Penn State*)
- 3:00 pm:** Understanding Thermodynamic Phase Diagrams of Molten Salt Systems via Decision Tree Regression, Miroslava Dobroňová (*VCU, Slovak Univ Technol.*) Dimitris Killinger, Supathorn Phongikaroon (*VCU*)

Computational Tools for Radiation Protection and Shielding—II

Sponsored by RPSD

Session Organizer: Michael Fensin (*LANL*) Chair: Robert B. Hayes (*NCSU*)

Location: Hoover Time: 1:15-3:50 pm

- 1:20 pm:** Calculating the Differential Physics of Neutron Transport in Nitrogen Based on Integral Experiments from the Livermore Pulsed Sphere Program, L. M. Rolison, M. L. Fensin, K. C. Kelley, S. S. McCready (*LANL*)
- 1:45 pm:** Experimental Benchmark for the DRF Methodology Using VENUS-3 Problem, Meng-Jen Wang, Alireza Haghighat (*VCU*)
- 2:10 pm:** Attila and MCNP6.2 Validation with the JASPER-IHX Benchmark for Sodium-Cooled Fast Reactor Shielding Applications, Nicholas H. Whitman (*Oregon State*), Jacob S. Hader (*TerraPower*)
- 2:35 pm:** Fluence Near the Surface of an Absorbing Sphere, Amir A. Bahadori, Michael P. Pfeifer, J. Kenneth Shultis (*Kansas State*)
- 3:00 pm:** Monte Carlo Source Descriptions for Unenriched Uranium Fuel and a PuBe Neutron Source, Cliff Ghiglieri, Jeffrey King (*CSM*)
- 3:25 pm:** Comparison of MCNP6.1-Computed Dosimetric Quantities Using Spherical and Full-Body Computational Phantoms, S. R. McHale, E. R. Walker (*U.S. Naval Academy*)

Machine Learning and Reduced Order Modeling

Sponsored by MCD

Session Organizer: Steven Hamilton (*ORNL*) Chair: Travis Trahan (*LANL*)

Location: Coolidge Time: 1:15-3:50 pm

- 1:20 pm:** Accelerating Radiation SN Transport Solves Using Artificial Neural Networks, Mauricio E. Tano, Jean C. Ragusa (*Texas A&M*)
- 1:45 pm:** Machine Learning Accident Classification Using Nuclear Reactor Data, Pedro Mena, Leslie Kerby (*Idaho State*)
- 2:10 pm:** Acceleration of the Flattened Power Method with Dynamic Mode Decomposition, Leidong Xu, Richard L. Reed, Jeremy A. Roberts (*Kansas State*)
- 2:35 pm:** Data-Driven Grey Reduced-Order Model for Thermal Radiative Transfer Problems Based on Low-Order Quasidiffusion Equations and Proper Orthogonal Decomposition, Joseph Coale, Dmitriy Anistratov (*NCSU*)
- 3:00 pm:** Reduced Order Model with Constrained Optimization for Navier-Stokes Equations, Ping-Hsuan Tsai, Kento Kaneko, Paul F. Fischer (*Univ Illinois*)
- 3:25 pm:** Model-Order Reduction of Buoyancy-Driven Heat-Transfer, Kento Kaneko, Ping-Hsuan Tsai, Paul Fischer (*Univ Illinois*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 1:15 PM

Nuclear Fuels and Materials in Fast Reactors

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (PNNL) Chair: Jake R. Quincey (Univ of Wisconsin, Madison)

Location: Harding Time: 1:15-3:50 pm

- 1:20 pm:** Sensitivity Analysis of Silicon Carbide Composite Clad Uranium Carbide Fuel for a Long-Life Gas-Cooled Fast Reactor under Normal Operation, Hangbok Choi, John Bolin (*General Atomics*)
- 1:45 pm:** Utilization of Several Post-Irradiation Measurement Techniques to Determine Axial Growth in EBR-II Fuel, Travis Wright (*Texas A&M*), Douglas L. Porter (*INL*)
- 2:10 pm:** Microstructural Evolution of Neutron Irradiated T91 Steel in ATR, T. P. Davis, D. E. J. Armstrong (*Oxford*), P. Hosemann (*U.C., Berkeley*)
- 2:35 pm:** An Innovative Approach to Composite Moderators Containing Zirconium Hydrides, Caen Ang (*U.T., Knoxville*), Lance Snead, Jason Trelewicz (*Stony Brook Univ*)
- 3:00 pm:** Mechanisms Engineering Test Loop (METL): A Liquid Sodium Component Test Facility, E. Kent, C. Grandy, D. Kultgen, M. Weathered (*ANL*)
- 3:25 pm:** A Simplified Mechanistic Approach for Modeling Thermal Conductivity of Metallic Nuclear Fuels, Tsvetoslav R. Pavlov (*INL*)

Experimental Thermal Hydraulics—III

Sponsored by THD

Session Organizer: Fan-Bill Cheung (*Penn State*) Cochairs: Yue Jin (*MIT*), Jun Wang (*Univ of Wisconsin, Madison*)

Location: Wilson A Time: 1:15-3:25 pm

- 1:20 pm:** Design of a High-Temperature Fluoride Salt Test Facility (HT-FSTF), Sheng Zhang, Hsun-Chia Lin, Keyong Cheng, Xiaodong Sun (*Univ Michigan*)
- 1:45 pm:** Fast Responding Pressure Sensitive Paint Measurements in a Helical Coil Steam Generator Model, Garland Alec Porter, Marilyn Delgado, Yassin Hassan (*Texas A&M*)
- 2:10 pm:** Design of Heat Pipe Test Facilities for Micro Reactor Applications, Minjee Cho, Benjamin Wang, Shanbin Shi (*RPI*)
- 2:35 pm:** Sliding Bubble Velocity Prediction on the Lower Part of a Horizontal Tube Heater Based on Force Balance Analysis, Jae Soon Kim, Yu-Na Kim (*KAERI*), Hyoung Kyu Cho (*Seoul National Univ*)
- 3:00 pm:** Far Field Analysis of Helium/Air Mixing in Scaled-Down HTGR, Joseph Hafen, Jason Palmer, Richard Christensen (*Univ Idaho*)

Cybersecurity for Nuclear Installations

Sponsored by HFICD; Cosponsored by NNPD

Session Organizer: Jamie Coble (*U.T., Knoxville*) Chair: R. A. Borrelli (*Univ of Idaho*)

Location: Wilson B Time: 1:15-3:00 pm

- 1:20 pm:** Application of Control Process Variables for Cyber Attack Detection and Diagnosis in NPPs, Chanyoung Lee, Poong Hyun Seong (*KAIST*)
- 1:45 pm:** Lessons Learned about Network Defenses of Nuclear Power Plants: A Critical Analysis of Internal Cyberattacks, Brandyn M. Campos, Miltiadis Alamaniotis (*U.T., Austin*)
- 2:10 pm:** Enhancing the Resilience of Key Equipment to False Data Injection Attacks in NPPs, Fan Zhang, Trentin Payne, J. Wesley Hines, Jamie Coble (*U.T., Knoxville*)
- 2:35 pm:** Malware Detection in Critical Infrastructures Using the Electromagnetic Emissions of PLCs, Constantinos Koliadis, R. A. Borrelli (*Univ Idaho*), Daniel Barbara, Angelos Stavrou (*George Mason*)

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WEDNESDAY, NOVEMBER 20
TECHNICAL SESSIONS - 1:15 PM

International Decommissioning—Paper/Panel

Sponsored by DESD

Session Organizer: James Byrne (*Byrne & Associates*) **Chair:** Mark S. Campagna (*U.S. Navy, ret.*)

Location: Wilson C **Time:** 1:15-3:40 pm

1:20 pm: The Decommissioning and Waste Management programme of the Joint Research Centre of the European Commission, Stéphane Brémier, Vincenzo Rondinella, Paolo Peerani, Francesco Basile, Riccardo Casale (*European Commission*)

1:45 pm: Panel Discussion

This session will look at the status of various decommissioning projects being performed outside the United States.

Panelists:

Mark S. Campagna (*U.S. Navy, ret.*)

Tatsuro Kobayashi (*TEPCO*)

Bumkyung Seo (*KAERI*)

Computational Thermal Hydraulics—III

Sponsored by THD

Session Organizer: Bao-Wen Yang (*Xi'an Jiaotong Univ*) **Cochairs:** Steven Arndt (*NRC*), Martin Bertodano (*Purdue Univ*)

Location: Balcony B **Time:** 1:15-3:25 pm

1:20 pm: Density Wave Instability Verification of 1D Two-Fluid CFD Model, Krishna Chetty, Rita Appiah, Alexander Lopez-de-Bertodano, Christopher Sweeney, Subash Sharma (*UMass Lowell*), John Buchanan (*Naval Nuclear Lab.*), Martin Lopez-de-Bertodano (*Purdue*)

1:45 pm: Performance Evaluation of Accident Tolerant Fuels (ATF) and Reactor Core Isolation Cooling (RCIC) for Boiling Water Reactor, Jun Wang, Ryan Maurice Dailey, Michael Corradini (*U.W., Madison*)

2:10 pm: Numerical Investigation to Validate Post-CHF Regimes with Droplet Breakup Behaviors in a 3-Field System Code, Seung Hyun Yoon, Kyung Doo Kim, Kwiseok Ha, Jaeseok Heo, Byung-Hyun You, Seung Wook Lee (*KAERI*)

2:35 pm: Reduction of Steam Partial Pressure by Silica Gel Considering Free Volume, Dong Hoon Kam, Yong Hoon Jeong (*KAIST*)

3:00 pm: Benchmarking GOTHIC to the Molten Salt Reactor Experiment, Rodney Harvill, Jeff Lane, John Link, Anita Gates (*Zachry Nuclear Engineering*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 1:15 PM

Reactor Physics: General—II

Sponsored by RPD

Session Organizer: Pavel Tsvetkov (*Texas A&M*) **Chair:** William Walters (*PSU*)

Location: Washington 5 **Time:** 1:15-3:50 pm

1:20 pm: Two-Year PWR Core Design with Burnup and Enrichment Extension Using VERA-CS, Cole Blakely, Hongbin Zhang, Jianguo Yu (*INL*)

1:45 pm: Evaluation of Updated Monte Carlo Models for the Penn State Breazeale Reactor, Benjamin Karl Harris, William J. Walters (*Penn State*)

2:10 pm: Geometric Design Space for Sodium Fast Reactors, Ryan Stewart, Todd S. Palmer (*Oregon State*)

2:35 pm: Current Progress on the Design of a Coupled Fast-Thermal Subcritical Assembly, John Pevey, Ondřej Chvála, Sarah Davis, Vladimir Sobes, J. Wes Hines (*ORNL*)

3:00 pm: Loading Pattern Optimization Method Based on Discrete Differential Evolution, Guangyao Sun, Hui Ding, Bin Wu, Lijuan Hao, Pengcheng Long and FDS Team (*Inst. of Nuclear Safety Technology*)

3:25 pm: Homogenization of TRISO Fuel Using Reactivity Equivalent Physical Transformation Method, Mohammad Alrwashdeh, Saeed A. Alamaeri, Ahmed K. Alkaabi, Mohamed Ali (*Khalifa Univ*)

Reactor Analysis Methods—II

Sponsored by RPD

Session Organizer: Pavel Tsvetkov (*Texas A&M*) **Cochairs:** Kang Seog Kim (*ORNL*), Pavel Tsvetkov (*Texas A&M*)

Location: Washington 4 **Time:** 1:15-3:25 pm

1:20 pm: The Roles of Transport Partial Current Information in Two-Level p-CMFD Acceleration in the Whole-Core Transport Calculation, Nam Zin Cho (*KAIST*)

1:45 pm: A Preliminary Application of the GPS Correction to Pin-by-Pin 2-Step PWR Depletion, Hwanyael Yu (*KAIST*), Hae Sun Jeong (*KAERI*), Yonghee Kim (*KAIST*)

2:10 pm: Polaris/PARCS Prediction of Measured Data for TMI Unit 1 Cycles 1 and 2, True Miller (*Purdue*), Andrew Ward (*Univ Michigan*), Yunlin Xu (*Purdue*)

2:35 pm: Improved Discontinuity Factor Modeling for the In-Situ APEC Leakage Correction in Nodal Analysis, Seongdong Jang, Yonghee Kim (*KAIST*)

3:00 pm: Molten Salt Reactor Neutronic and Fuel Cycle Sensitivity and Uncertainty Analysis, J. W. Bae, B. R. Betzler, A. Worrall (*ORNL*)

TECHNICAL SESSION - 3:00 PM

Storm the Hill briefing and Communications Workshop

Sponsored by YMG

Location: Maryland AB **Time:** 3:00-6:00 pm

This session will focus on the briefing for 'Storm the Hill' participants and an advocacy and communication workshops for the Members. The briefing portion is required to participate in the Storm the Hill event on Thursday, November 21st. It will cover the logistics of the event, overview of the federal nuclear matters, and conversation training to help you educate, inform, and advocate for nuclear science, technology, and engineering on the Capitol Hill and elsewhere!

Panelists:

Craig Piercy (*ANS Washington Representative*)

John Starkey (*American Nuclear Society*)

Mimi Limbach (*Potomac Communications Group*)

Eric Meyer (*Generation Atomic*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 3:55 PM

Operations and Power: General—II

Sponsored by OPD

Session Organizer: William Neal Mann (*Univ of Texas, Austin*) **Chair:** James (Vince) V. Gilbert (*Model Performance, LLC*)

Location: Virginia A **Time:** 3:55-5:40 pm

4:00 pm: Dynamic Matrix Control for Thermal Power of Multi-MHTGR, Di Jiang, Zhe Dong (*Tsinghua Univ*)

4:25 pm: Flow Test Plan to Support the Development of Cartridge Loops in the Versatile Test Reactor, Joel McDuffee, David Felde (*ORNL*), Kevan Weaver (*INL*), Mitch Farmer (*ANL*), Piyush Sabharwall (*INL*), Richard Howard, Padhraic Mulligan (*ORNL*)

4:50 pm: Novel Design Integration for Advanced Nuclear Heat-Pipe Systems, Cole Mueller, Pavel Tsvetkov (*Texas A&M*)

5:15 pm: Evaluating the MSRE Sampler-Enricher: A Fresh Perspective, Megan Harkema, Steven Krahn, Paul Marotta (*Vanderbilt*)

Realizing the Benefits of Risk-Informed and Performance-Based Approaches—Panel

Sponsored by NISD

Session Organizer: Robert Youngblood (*INL*) **Chair:** Andrew J. Clark (*ANL*)

Location: Virginia C **Time:** 3:55-6:00 pm

Risk-informed performance-based (RIPB) ideas are widely accepted in principle, but risk-informed approaches have so far realized only part of their full potential, and performance-based approaches are applied even less. In the operating fleet, since licensing was developed based on design-basis accident considerations, RIPB ideas have been applied only perturbatively to justify modifications, rather than starting from scratch. This panel will discuss opportunities for RIPB that exist for new, especially non-LWR plants, beginning with the Licensing Modernization Project, as well as opportunities for application of RIPB approaches in other domains. The expected outcome for the session is to present a persuasive case for RIPB methods directed at safety as well as economic objectives.

Panelists:

Kent Weltar (*NuScale*)

Amir Afzali (*Southern Co.*)

Margaret Harding (*4 Factor Consulting*)

Prasad Kadambi (*Kadambi Eng Consultants*)

Impact of Radiological Sources on Nuclear Nonproliferation

Sponsored by NNPD

Session Organizer: Stephen Mladineo (*PNNL*) **Cochairs:** Jacob Kamen (*Mt. Sinai Hospital*), Stephen V. Mladineo (*PNNL*)

Location: Delaware A **Time:** 3:55-6:30 pm

4:00 pm: Gamma Source Imaging Using Non-Negative Least Squares, Nuraslinda Anuar (*Texas A&M, Univ Tenaga Nasional*), Craig M. Marianno (*Texas A&M*)

4:25 pm: Validating a Protocol for Low Level EPR Dosimetry of Sugar, Fatma Abdelrahman, Robert B. Hayes (*NCSU*)

4:50 pm: Determination of Characteristics in Post Detonation Debris Collection Scenarios Using Modern Urban Materials, Justin Phelps, James E. Baciak (*Univ Florida*)

5:15 pm: University of California's Experience with Gamma-Irradiators, X-Irradiators, and Radiobiology, Keisuke S. Iwamoto (*UCLA*), Carolyn MacKenzie (*U.C., Berkeley*)

5:40 pm: Alternative X-Ray Sources as Substitutes for Radioactive Isotopes in Irradiation Applications, Mark Eaton, Ronald Hellmer, Zhe Su, Shuo Cheng (*Stellarray*)

6:05 pm: Transitioning from Cobalt-60 to X-Ray or E-Beam for Medical Sterilization: Filling Data and Education Gaps, Leonard S. Fifield, Matt Pharr (*PNNL*), David A. Staack (*Texas A&M*), Mark K. Murphy (*PNNL*), Min Huang, Md Kamrul Hasan (*Texas A&M*)

Technical Sessions: Wednesday November 20

WEDNESDAY, NOVEMBER 20
TECHNICAL SESSIONS - 3:55 PM

Safeguards and Material Accountancy Strategies for Molten Salt Systems

Sponsored by FCWMD

Session Organizer and Chair: Steve Skutnik (*U.T., Knoxville*)

Location: Delaware B **Time:** 3:55-5:40 pm

4:00 pm: Development of ORIGEN Reactor Data Libraries for Thermal Molten Salt Reactors, Kyle Anderson, Steven Skutnik (*U.T., Knoxville*)

4:25 pm: Applicability of the (α,n) Source Term as a Viable Safeguards Measurement for Electrochemical Reprocessing, Stephen N. Gilliam, Jamie B. Coble, Steven E. Skutnik (*U.T., Knoxville*)

4:50 pm: Plutonium Diversion Effect on Molten-Salt Reactor Dynamics, Alexander M. Wheeler, Kyle Anderson, Ondrej Chvála, Steven Skutnik (*U.T., Knoxville*)

5:15 pm: Redox Potential Control for the Molten Salt Reactor Concept, Robin V. Roper, Richard Christensen (*Univ Idaho*)

Data, Analysis and Operations in Nuclear Criticality Safety—II

Sponsored NCS

Session Organizer: Theresa Cutler (*LANL*) **Chair:** Lon E. Paulson (*GE Hitachi*)

Location: Hoover **Time:** 3:55-6:05 pm

4:00 pm: Verification of the $^{239}\text{Pu}(\text{NO}_3)_4$ Solution Fissile Concentration Subcritical Limit in ANSI/ANS-8.1-2014, Douglas G. Bowen (*ORNL*), Nicholas W. Brown (*Nuclear Fuel Services*)

4:25 pm: Update on Benchmark Analysis of Component Critical Configurations of KRUSTY, Kristin Smith (*Texas A&M*), Jesson Hutchinson, Theresa Cutler, Rene Sanchez (*LANL*)

4:50 pm: Analytic One-Group S_2 Slab Problem with Isotropic Scattering and Fission Applied to Leakage and Neutron Multiplicity Sensitivity, Jeffrey A. Favorite (*LANL*)

5:15 pm: Differences in the Use of Nuclide χ Vectors Demonstrated with an Analytic k_∞ Problem, Jeffrey A. Favorite (*LANL*)

5:40 pm: K-Infinite Comparison of Uranium Compounds at 5 wt.% U235, Lon E. Paulson (*GE Hitachi*)

Nuclear Data and Uncertainty Quantification

Sponsored by MCD

Session Organizer: Steven Hamilton (*ORNL*) **Chair:** Christopher M. Perfetti (*Univ of New Mexico*)

Location: Coolidge **Time:** 3:55-5:40 pm

4:00 pm: Bengal: A Multigroup Cross Section Processing Code for Large-Scale Calculations, Steven J. Douglass, Nathan A. Gibson (*Naval Nuclear Lab.*)

4:25 pm: A Graph Approach for Radioactive Decay Calculation, Tae-Sic Yoo (*INL*)

4:50 pm: Sensor Error Estimation for Reactor Coolant System with Generalization Error Equations, Nageswara S. V. Rao, Pradeep Ramuhalli, Christopher Greulich, Sacit M. Cetiner (*ORNL*)

5:15 pm: Impact of the Choice of Probability Distribution Laws for Nuclear Data on Depleted Fuel Related Quantities, Sebastien Lahaye (*CEA*), Keisuke Honta (*Hokkaido Univ*), Pierre Bellier, Aime Tsilanizara (*CEA*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 3:55 PM

Nuclear Fuels

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Kallie E. Metzger (*Westinghouse*)

Location: Harding **Time:** 3:55-5:15 pm

4:00 pm: Direct, Uncorrected Analysis of Mixed Oxide Particle by NAUTILUS, David Willingham, Evan Groopman (*U.S. Naval Research Lab*)

4:25 pm: Mid-Irradiation Experiment Examinations of Monolithic U-10Mo Fuel MP-1 Irradiation Tests at the Advanced Test Reactor, Margaret A. Marshall, James Smith, Clark Scott, David Cottle, Casey Jesse (*INL*)

4:50 pm: Development of the Irradiation Plan for the ET-2 and ET-3 Tests to Support Qualification of U-10Mo Fuel for Use in the Advanced Test Reactor, Douglas E. Hardtmayer, Kyle G. Metzroth (*MPR Assoc.*), Matthew Johnson, Eric Woolstenhulme (*INL*)

General Thermal Hydraulics—III

Sponsored by THD

Session Organizer: Shripad Revankar (*Purdue*) **Cochairs:** Si Young Lee (*SRNL*), Jessika V. Rojas (*Virginia Commonwealth Univ*)

Location: Wilson A **Time:** 3:55-6:05 pm

4:00 pm: Surface Characterization of Chromium Coated Zircaloy-4 Accident Tolerant Fuel Cladding Material, Rajnikant Umretiya, Robert Uhorchuk, Santiago Vargas, Carlos E. Castano, Jessika Rojas (*VCU*)

4:25 pm: Influence of Surface Roughness on Wettability of Accident Tolerant Fuels Cladding, Robert Uhorchuk, Rajnikant Umretiya (*VCU*), Mark Anderson, Barret Elward (*U.W., Madison*), Sama Bilbao y Leon (*VCU*), Raul Rebak (*GE*), Jessika Rojas (*VCU*)

4:50 pm: Best Estimate Plus Uncertainty Methods Applied to Hydraulic System Models, Daniel T. Gualandri, Jeffrey W. Lane (*Zachry Nuclear Engineering*)

5:15 pm: Gas Migration Study for Glovebox Accident in a Process Room, Si Y. Lee (*SRNL*)

5:40 pm: Best Estimate Plus Uncertainty Analysis for SBO, J. Ricardo Tavares de Sousa, Aya Diab (*KEPCO*)

Advances in Nuclear Cybersecurity Research and Development—Panel

Sponsored by HFICD

Session Organizer and Chair: Fredrick McCrory (*SNL*)

Location: Wilson B **Time:** 3:55-6:00 pm

Nuclear facilities worldwide are looking towards digital modernization to leverage the associated capabilities and efficiencies. This panel will explore this trend, its opportunities as well as the new cyber attack surface that comes with digital modernization and is increasingly being exploited. Our hope is to discuss the work that is underway now to protect current facilities and improve the inherent vulnerability of nuclear control systems in the future.

Panelists:

Jim Beardsley (*NRC*)

Nathan Faith (*Exelon*)

Craig Primer (*INL*)

Mike Rowland (*SNL*)

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WEDNESDAY, NOVEMBER 20

TECHNICAL SESSIONS - 3:55 PM

Plutonium Handbook—II—Panel

Sponsored by MSTD

Session Organizer and Chair: Robert Hanrahan (NNSA)

Location: Wilson C Time: 3:55-6:00 pm

Alloyed Plutonium: Thermodynamics and Application to Transformations, Aurelien P. P. Perron, Patrice E. A. Turchi (LLNL)

Thermophysical Properties of Plutonium Metal and Its Alloys, Franz Freibert, Sarah C. Hernandez, Albert Migliori (LANL)

Overview of Plutonium Aging in the New Pu Handbook, Patrick G. Allen (LLNL)

Experimental Thermal Hydraulics—IV

Sponsored by THD

Session Organizer: Yassin Hassan (Texas A&M) Cochairs: Subash L. Shama (Univ of Massachusetts Lowell), Rodolfo Vaghetto (Texas A&M)

Location: Balcony B Time: 3:55-5:15 pm

4:00 pm: Wavelet Transform Analysis of Flow Field in a Helically Coiled Steam Generator Geometry, Saya Lee, Yassin A. Hassan (Texas A&M)

4:25 pm: Response Time of Thermowells for Corrosive, High-Temperature Experiments, Denise Chavez, Ojasvin Arora, David Holler, Rodolfo Vaghetto, Yassin Hassan (Texas A&M)

4:50 pm: Development of a Liquid Sodium Thermal Hydraulic Facility, Matthew Weathered, Tyler Sumner, Christopher Grandy (ANL)

Reactor Physics Design, Validation and Operational Experience

Sponsored by RPD

Session Organizer and Chair: Pavel Tsvetkov (Texas A&M)

Location: Washington 5 Time: 3:55-6:05 pm

4:00 pm: The 2019 Edition of the IRPhEP Handbook, John D. Bess (INL), Tatiana Ivanova, Ian Hill (OECD), Lori Scott (INL)

4:25 pm: Convolutional Neural Network for 2-D Assembly-Wise Pin Power Peaking Factor Prediction in PWRs, Lee Jinyoung, Nam Younduk (KEPCO)

4:50 pm: Pin-Wise Convolutional Neural Network for MOC 3D Pin Power Prediction, Younduk Nam, Jin Young Lee (KEPCO)

5:15 pm: Design Study on Fast Reactor with Low-Enriched Uranium Modeling Fuel at Kyoto University Critical Assembly, Kyoseong Song, Sanghoon Jang (Seoul National Univ), Cheol Ho Pyeon, Masao Yamanaka (Kyoto Univ), Hyung Jin Shim (Seoul National Univ)

5:40 pm: Effect of Doping Fuel with Beryllium on Accumulated Radiation Damage in a Breed-and-Burn Reactor, Kazuki Kuwagaki (U.C., Berkeley, Tokyo Inst. Technol.), Christopher Thomas Keckler, Massimiliano Fratoni (U.C., Berkeley)

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WEDNESDAY, NOVEMBER 20
TECHNICAL SESSIONS - 3:55 PM

Nuclear Data for Advanced Reactor Applications—II

Sponsored by RPD

Session Organizer: Bradley Rearden (*ORNL*) **Cochairs:** Vladimir Sobes (*ORNL*), Bradley Rearden (*ORNL*)

Location: Washington 4 **Time:** 3:55-5:40 pm

4:00 pm: ENDF/B-VIII.0 Augmented Covariance Data: The First Iteration, Vladimir Sobes, William J. Marshall, Doro Wiarda, Friederike Bostelmann, Andrew Holcomb, Bradley T. Rearden (*ORNL*)

4:25 pm: Impact of the ENDF/B-VIII.0 Library on Advanced Reactor Simulations, Friederike Bostelmann, Andrew M. Holcomb, William J. Marshall, Vladimir Sobes, Bradley T. Rearden (*ORNL*)

4:50 pm: Sensitivity Analysis and Uncertainty Quantification of FFTF Cycle 8C Using the NEAMS Workbench, I. T. Usman (*ANL, Univ Witwatersrand*), P. Lartaud, N. E. Stauff (*ANL*)

5:15 pm: Progress on the Development of Thermal Scattering Covariance Formats and Processing Tools, Aaron G. Tumalak, Hansol Park (*Univ Michigan*), Vladimir Sobes (*ORNL*), Won Sik Yang, Brian C. Kiedrowski (*Univ Michigan*)

[ANS Nuclear Grand Challenge] Advanced Material Testing Using Accelerators—Panel

Sponsored by AAD

Session Organizer and Chair: Reginald Ronningen (*Michigan State*)

Location: Maryland C **Time:** 3:55-6:00 pm

This panel will address one of the ANS nuclear grand challenges: accelerate development and qualification of advanced materials. Accelerator beam irradiations have proven to be an extremely useful tool to enhance the understanding of radiation damage in materials for nuclear applications. Radiation damage induced by accelerator beams in studies of structural and component materials for use in accelerator facilities, nuclear fusion, nuclear reactors, nuclear fuel, and radioactive material storage, etc., causes high displacement damage rates that can significantly modify material properties. High damage rates therefore accelerate the research on material response under radiation conditions. The relationship between these high damage rates and performance under actual conditions will be discussed. Panelists will highlight recent advancements in material property changes by accelerator beam-induced radiation damage and the characterization of these changes.

Panelists:

Peter Hosemann (*Univ of California, Berkeley*)

Lin Shao (*Texas A&M*)

George Jiao (*Univ of Michigan*)

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THURSDAY, NOVEMBER 21

TECHNICAL SESSIONS - 8:00 AM

Operations and Power: General—III

Sponsored by OPD

Session Organizer: Piyush Sabharwall (*INL*) **Chair:** Neal Mann (*Univ of Texas*)

Location: Virginia A **Time:** 8:00-8:55 am

8:05 am: Assessing Risk Recognition and Decision-Making (RRDM), Michael Peckham, Dennis Hansen (*Marathon Consulting*)

8:30 am: Integrating LWR with High Renewable Generation—Stochastic Control Based on Langevin Model, M. Ross, A. Gairola, H. Bindra (*Kansas State*)

Radiation Detection and Imaging—I

Sponsored by IRD

Session Organizer: Igor Jovanovic (*Univ Michigan*) **Chair:** Lei Raymond Cao (*Ohio State*)

Location: Virginia B **Time:** 8:00-10:10 am

8:05 am: Detection Methodology of Position-Dependent Neutron Energy Using a Threshold Detector Array, Jiseok Kim (*KAERI, Hanyang Univ*), Han Rim Lee (*KAERI*), Yongkyun Kim (*Hanyang Univ*)

8:30 am: Design and Optimization of a Pinhole Collimator for a High Resolution Emission Gamma Ray Tomography System, Seth Kilby, Joseph Graham (*Missouri Univ Sci. & Technol.*)

8:55 am: Investigation of FPGA Based Real Time Processing in Neutron Imaging, A. Datta, A. Kurtz, B. A. Fallin, A. I. Hawari (*NCSU*)

9:20 am: Modeling and Analysis of an X-Ray Imaging Facility at the Colorado School of Mines, Russell Jarmer, Jameson Hetrick, Jesus Mendoza, Jeffrey C. King (*CSM*)

9:45 am: Development of an Imaging Method for Bulk Scintillator Materials, D. Trimas, M. Burger, K. Ogren, I. Jovanovic (*Univ Michigan*)

Cutting Edge Techniques in Education, Training and Distance Education—II

Sponsored by ETWDD

Session Organizer: Lisa Marshall (*NCSU*) **Chair:** Andrew E. Thomas (*INL*)

Location: Virginia C **Time:** 8:00-10:10 am

8:05 am: A Critique of Literature on Transgender Inclusion in Engineering Education and Practice, Emory Colvin, Todd S. Palmer (*Oregon State*)

8:30 am: The NuScale Ambassador Program: Training Employees to Engage with the Public, Lenka Kollar (*NuScale*)

8:55 am: Recognizing and Arresting Declining Performance (Indicative of Column 4 Performance), Gary R. Cavanaugh, Bruce W. O'Brien (*Marathon Consulting*)

9:20 am: Hammer: An Educational and Research Platform for Neutral Particle Transport Code Development, Evan S. Gonzalez, Aaron G. Tumalak, Kyle A. Beyer, Eric J. Pearson, Matan G. Gottesman, Arav K. Agarwal, Darian J. Fortner, Frank A. Angers, Divans Beqi, Lauren Green, Braden J. Saltus, Brian C. Kiedrowski (*Univ Michigan*)

9:45 am: A Picture is Worth a Thousand Words and an Experiment is Worth Fifty Slides: Development of Experiments in Health Physics to Reinforce Basic Radiation Protection Concepts, Sheldon Landsberger, Tracy Tipping, Lawrence Hall, William Charlton (*U.T., Austin*)

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THURSDAY, NOVEMBER 21
TECHNICAL SESSIONS - 8:00 AM

Non-Reactor Nuclear Facility Consensus Standards—Roundtable

Sponsored by NISD

Session Organizer and Chair: Charles Martin (*Longenecker & Associates*)

Location: Delaware A **Time:** 8:00-10:10 am

This session is a roundtable discussion regarding emergent topics in consensus standards related to nonreactor nuclear facility safety. Of interest is emerging, current or potential issues related to implementation of existing standards, recent changes to the standards and associated impacts, suggested improvements modifications to current standards, and new standards actions needed.

Fuel Cycle and Waste Management: General—I

Sponsored by FCWMD

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

Location: Delaware B **Time:** 8:00-9:20 am

8:05 am: Reclassification of High-Level Waste Under Existing Standards, Jonathan F. Wing (*U.T., Knoxville*)

8:30 am: Evaluation of an Integrated Iodine Scrubber and Polishing Bed System, R. T. Jubin, S. H. Bruffey, J. A. Jordan (*ORNL*)

8:55 am: Preparation and Characterization of Epoxy Solidification, Seonggon Ryu, Misuk Jang, Seoung Rae Kim (*NESS Co. LTD.*)

Data, Analysis and Operations in Nuclear Criticality Safety—III

Sponsored by NCS D

Session Organizer: Theresa Cutler (*LANL*) **Chair:** Katherin I. Goluoglu (*C. S. Engineering, Inc.*)

Location: Hoover **Time:** 8:00-9:45 am

8:05 am: Effect of k_{eff} Varying Reflection on the Estimated Minimum Critical Mass of Moderated ^{235}U , E. M. Saylor (*ORNL*)

8:30 am: Proposed Plutonium-Nickel Critical Experiment, T. Cutler, N. Thompson, A. McSpaden, J. Hutchinson (*LANL*)

8:55 am: Sensitivity/Uncertainty Comparison Study: Oak Ridge National Laboratory Results, E. M. Saylor, W. J. Marshall (*ORNL*)

9:20 am: Bias Between ENDF/B-VIII and ENDF/B-VII.1 for LEU Pin Array Systems, W. J. Marshall (*ORNL*)

Fuel and Materials for Molten Salt Reactors and Aging of Materials

Sponsored by MST D

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Jake R. Quincey (*Univ of Wisconsin, Madison*)

Location: Coolidge **Time:** 8:00-10:35 am

8:05 am: Fission Product Measurement and Off-Gas Scrubbing for Molten Salt Reactors, J. McFarlane, G. Del Cul, D. B. Ezell, K. Myhre (*ORNL*), S. A. Bryan, H. M. Felmy, A. Lines, B. J. Riley (*PNNL*)

8:30 am: Capturing Chemical Dynamics at the Buried Electrode-Electrolyte Interface by In Situ Imaging Mass Spectrometry, Xiao-Ying Yu, Edgar Buck (*PNNL*)

8:55 am: Characterization of Nuclear Graphite for Molten Salt Reactors (MSR), Nidia C Gallego, Cristian Contescu, Tim Burchell, James Keiser, Stephen Raiman (*ORNL*), Karol Putyera (*Eurofins*), Lou Qualls (*ORNL*)

9:20 am: Study on Irradiation Hardening of RPV Steel Based on Modified Crystal Plastic Finite Element Model, Xiaotong Wang (*Reactor Sys. Des. Technol. Lab*), Weihua Yao (*Nuclear Power Inst. China*), Ying Luo, Yuanyuan Dong (*Reactor Sys. Des. Technol. Lab*)

9:45 am: Evaluation Methods of Fatigue in Nuclear Power Design, Donghui Wang, Qingna Zeng (*Nuclear Power Inst. China*)

10:10 am: Alkali-Silica Reaction Detection Utilizing Linear and Nonlinear Resonance Frequency Shift Techniques, Clayton Malone, Hongbin Sun, Jiong Hu, Jinying Zhu (*Univ Nebraska*)

THURSDAY, NOVEMBER 21

TECHNICAL SESSIONS - 8:00 AM

Accident Tolerant Fuels—I

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (*PNNL*) **Chair:** Troy Munro (*Brigham Young Univ*)

Location: Harding **Time:** 8:00-9:45 am

8:05 am: Measuring Heterogeneity of SiC_f/SiC Tubular Composites, James Nance, Hemanth T. Nagaraju, Ghatu Subhash, Bhavani Sankar, Raphael Haftka (*Univ Florida*)

8:30 am: The Effect of Calculating the Micromechanical Stresses in Braided Composite Tubes by a Flat RVE, Hemanth T. Nagaraju, James R. Nance, Bhavani Sankar, Ghatu Subhash, Raphael Haftka (*Univ Florida*)

8:55 am: SiGATM Bowing Due to Thermally-Dependent Irradiation-Induced Swelling, J. L. Kosmatka, J. Stone, G. M. Jacobsen, J. Gazza, C. P. Deck (*General Atomics*)

9:20 am: Modeling of SiC Cladding Bowing Behavior with Consideration of Spacer Grids, Wei Li (*MIT, China*), Koroush Shirvan (*MIT*)

General Thermal Hydraulics—IV

Sponsored by THD

Session Organizer: Wade Marcum (*Oregon State*) **Cochairs:** Philippe M. Bardet (*George Washington Univ*), Ling Zou (*INL*)

Location: Wilson A **Time:** 8:00-10:35 am

8:05 am: Modeling and Simulations of HTGR During Pressurized Conduction Cooldown Transients Using SAM Code, Prasad Vegendla, Rui Hu, Ling Zou (*ANL*)

8:30 am: A Thermal-Mechanical Properties View of Impacts of Heater Materials on Critical Heat Flux, Mingfu He, Soon K. Lee, Amir Ali, Minghui Chen (*Univ New Mexico*)

8:55 am: Verification of Lateral Conduction in Fuel Plates in PLTEMP/ANL Code, M. Kalimullah, A. P. Olson, S. H. Pham, J. R. Licht (*ANL*)

9:20 am: Assessment of Operator Action for SBO, J. Ricardo Tavares de Sousa, Aya Diab (*KEPCO*)

9:45 am: Acoustic Performance of Fluid-Filled Pipe with Periodic Helmholtz Resonator Considering Lateral Wall Elasticity, Qingna Zeng, Donghui Wang, Fenggang Zang, Yixiong Zhang (*Nuclear Power Inst. China*)

10:10 am: Importance of PIRT to the Safety of Heat Pipe Based Micro Nuclear Reactor, Jun Liao, Richard F. Wright (*Westinghouse*)

General Topics in Human Factors, Instrumentation and Control—II

Sponsored by HFICD

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

Location: Wilson B **Time:** 8:00-9:45 am

8:05 am: Pressure Sensing Line Blockage and Degradation in Nuclear Power Plants, Greg W. Morton, Brent D. Shumaker, Dan E. McCarter, H. M. Hashemian (*Analysis and Measurement Services Corp.*)

8:30 am: Adapting Approximate Entropy as a Health Indicator for Rotating Machinery in Nuclear Power Plants, Cody M. Walker, Jamie B. Coble (*U.T., Knoxville*)

8:55 am: Investigating Sensor Location Effect on the Accuracy of Cross Correlation Flow Estimation with Coolant Injection Using CFD Simulations, Xiong Gao, J. Wesley Hines, Jamie B. Coble (*U.T., Knoxville*), L. B. Carasik (*Virginia Commonwealth Univ*)

9:20 am: Radiation Dose Correlation Analysis of Distributed Measurements Using Fiber Optic Intrinsic Sensors, Charles Stratton, Pavel Tsvetkov (*Texas A&M*)

Technical
Sessions:
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THURSDAY, NOVEMBER 21

TECHNICAL SESSIONS - 8:00 AM

General Topics in Decommissioning—II

Sponsored by DESD

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

Location: Wilson C Time: 8:00-9:20 am

8:05 am: Equilibrium Calculations for HyBRID Decontamination Systems, Byung-Chul Lee (*Hannam Univ*), Jei-Kwon Moon, Seon Byeong Kim (*KAERI*)

8:30 am: Blending Simulation of On-Site Waste Treatment for Kori-1 Bioshield Decommissioning Concrete, Eui Taek Lee, David S. Kessel, Chang-Lak Kim (*KEPCO*)

8:55 am: Equilibrium Calculations in HyBRID Decontamination of Nickel Ferrite and Chromite, Jei-Kwon Moon (*KAERI*), Byung-Chul Lee (*Hannam Univ*), Seon-Byung Kim (*KAERI*)

Accelerator Applications: General

Sponsored by AAD

Session Organizer and Chair: Peter Hosemann (*U.C., Berkeley*)

Location: Washington 5 Time: 8:00-10:10 am

8:05 am: Recent Progress on the Phoenix Accelerator-Based Intense Fusion Neutron Source, Ross Radel, Tye Gribb, Arne Kobernik, Chris Seyfert, Logan Campbell, Preston Barrows (*Phoenix LLC*)

8:30 am: Development of a Non-Destructive Structural Health Monitor for Accelerator Components, G. L. Solbrekken (*Univ Missouri*), N. Gazis (*European Spallation Source*), G. Manoharan (*Univ Missouri*)

8:55 am: Simulations of Vertical GaN Diode Performance Under Electron Beam Radiation Exposures, Matthew J. Jasica, William R. Wampler, Barney L. Doyle, Greg W. Pickrell, William Cowan, Albert Colon, Michael Van Heukelom, Caleb E. Glaser (*Sandia*)

9:20 am: Molybdenum-99 Production via Fissile Solution Reactor and Electron Beam Accelerator, Kelley Verner (*LANL, Univ Idaho*), Seung Jun Kim (*LANL*)

9:45 am: Nonproliferation Features of the Mu*STAR Subcritical Molten-Salt Accelerator-Driven Reactor, Mary Anne Cummings, Rolland P. Johnson, Thomas J. Roberts (*Muons Inc.*)

Reactor Physics: General—III

Sponsored by RPD

Session Organizer: Pavel Tsvetkov (*Texas A&M*) Cochairs: Abdalla About Jaoude (*INL*), Zeyun Wu (*Virginia Commonwealth Univ*)

Location: Washington 4 Time: 8:00-10:10 am

8:05 am: Unstructured Mesh Unification for MCNP6.2 and PROTEUS in NEAMS Workbench, Peter J. Kowal, Kurt A. Dominesey, Mathieu N. Dupont, Jonathan A. Eugenio, Wei Ji (*RPI*)

8:30 am: FAST (Floating Absorber for Safety at Transient) for the Improved Safety of Metallic-Fuel-Loaded Sodium-Cooled Fast Reactors, Chihyung Kim, Yonghee Kim (*KAI/ST*)

8:55 am: Use of MCNP Surface Source Cards for Isotope Production Optimization, Emory Colvin (*Center for Space Nuclear Research*), Todd S. Palmer (*Oregon State*)

9:20 am: Stationarity Diagnostics for Monte Carlo Problems that Utilize Source Acceleration Schemes, Shikhar Kumar, Benoit Forget, Kord Smith (*MIT*)

9:45 am: Characterization, Operation, and Modeling of the MIT Graphite Exponential Pile, Sara Hauptman, Jarod Wilson, Kaichao Sun, Kord Smith, Benoit Forget (*MIT*)

Technical Sessions: Thursday November 21

THURSDAY, NOVEMBER 21

TECHNICAL SESSIONS - 10:25 AM

Radiation Detection and Imaging—II

Sponsored by IRD

Session Organizer: Kenan Unlu (*Penn State*) **Chair:** Igor Jovanovic (*Univ of Michigan*)

Location: Virginia A **Time:** 10:25 am-12:35 pm

10:30 am: Active Interrogation Using AmBe Directional Source and PGNA, Kyle M. Paaren, Seth M. Kilby, Hyoung K. Lee (*Missouri Univ Sci. & Technol.*)

10:55 am: Simulation Study of Alpha-Neutron Reactions from AmBe Directional Source, Kyle M. Paaren, Hyoung K. Lee (*Missouri Univ Sci. & Technol.*)

11:20 am: The UNM Fission Spectrometer for Individual Fission Fragment Identification from ^{239}Pu and ^{235}U with Correlated A, Z, E, and Fission Tagged Gamma-Ray Data, Adam Hecht, Phoenix Baldez, Mark Wetzel (*Univ New Mexico*)

11:45 am: Transient Flux Neutron Activation Detector, William G. Culbreth (*Univ Nevada*)

12:10 pm: A Data Driven Methodology for Estimation of Background Spectrum Utilizing Paired Machine Learning Tools, Miltiadis Alamaniotis (*U.T., San Antonio*)

Biology and Medicine Division: General

Sponsored by BMD

Session Organizer: Stephen LaMont (*LANL*) **Chair:** Samuel E. Glover (*NIOSH*)

Location: Virginia B **Time:** 10:25-11:20 am

10:30 am: One-Way Coupled Tumor Response Model for Combined-Hyperthermia-Radiotherapy Treatment with Anisotropic Scattering, Japan K. Patel, John J. Kuczek, Richard Vasques (*Ohio State*)

10:55 am: Integrating Backscatter X-Ray Imaging with Super-Resolution Imaging Algorithms for Plant Phenotyping, Jyothier Kumar Nimmagadda, Shuang Cui, Jose F. Ruiz-Munoz, Alina Zare, James E. Baciak (*Univ Florida*)

Advances in Remote Inspection System Design

Sponsored by RRSD

Session Organizer: Mitch Pryor (*U.T., Austin*) **Chair:** Leonel E. Lagos (*FIU*)

Location: Washington 5 **Time:** 10:40 am-12:25 pm

10:45 am: Development of Wall Climbing Equipment for Dry Cask Storage System Inspection, Daewon Kim, Kyoungyong Noh, Kyoungwon Yoon, Misuk Jang, Seoung Rae Kim (*Nuclear Engineering Service & Solution*)

11:10 am: Design of Controllable Magnetic Wheel for Dry Cask Storage System Inspection Robot, Myounggyu D. Noh, Eusang Kwon, So Hee Park, Young-Woo Park

11:35 am: Safety and Safeguards by Design: Design of a Fuel Handling Device for Open-Pool Research Reactors, Bahram Nassersharif, Jonathan DeAlmeida, Seth Mace, Alex Harrington, Evan Ambrose (*Univ Rhode Island*), Cameron Goodwin (*Rhode Island Atomic Energy Commission*),Carolynn P. Scherer (*LANL*)

12:00 pm: Autonomous Radiation Mapping and Quantification Using an Unmanned Ground Vehicle, Anthony Abrahao (*Florida International Univ*), Timothy Aucott (*SRNL*), Abdulmueen Alrashide, Joel Adams, Sebastian Zanlongo, Dwayne McDaniel, Leonel Lagos (*Florida International Univ*)

Technical
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THURSDAY, NOVEMBER 21
TECHNICAL SESSIONS - 10:25 AM

Emerging International Topics in Nuclear Installations Safety

Sponsored by NISD

Session Organizer and Chair: Andrew Clark (SNL)

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

10:30 am: Discussion on Challenges for New Regulatory Oversight Program for Nuclear Facilities in Japan, Hiroko Kondo (*Univ Tokyo*)

10:55 am: Development of Methodology for Spent Fuel Pool Risk Assessment in Korea, Kyungmin Kang, Hyowon Kim, Kuyoung Jung (*KINS*)

11:20 am: Off-Site Consequence Analysis for Multi-Unit Considering Inter-Unit Dependency, YongJin Lee, Dohyoung Kim, Kuyoung Jung (*KINS*)

11:45 am: Identification of Multi-Unit Initiating Events Using Operating Experience in Korea, Kihan Jeon, Seungwoo Lee, Ar Ryum Kim, Hyowon Kim, Dongju Jang, Dohyoung Kim (*KINS*)

Fuel Cycle and Waste Management: General—II

Sponsored by FCWMD

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

Location: Delaware B **Time:** 10:25 am-12:35 pm

10:30 am: Parametric Optimization of TRU Destruction Rates in HTR Cores Using Genetic Algorithms and Regression Methods, Takanori Kajihara, Pavel V. Tsvetkov (*Texas A&M*)

10:55 am: BWR Fuel Bundle Optimization Based on Three-Dimensional Fuel Rods, Brian Andersen (*NCSU*), David Kropaczek (*ORNL*), Jason Hou (*NCSU*)

11:20 am: Neural Network Approach to Model Mixed Oxide Fuel Cycles in Cyclus, a Nuclear Fuel Cycle Simulator, J. W. Bae, B. R. Betzler, A. Worrall (*ORNL*)

11:45 am: IAEA Project on Research Reactor Spent Fuel Management Options, Frances M. Marshall (*IAEA*)

12:10 pm: An In-Line Neutron Coincidence Counter for Plutonium Mass Quantification, Cole Thompson (*U.T., Austin, LANL*), Brian O'Neil (*LANL*), William S. Charlton (*U.T., Austin, LANL*)

Technical
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Rapid Turnaround, Competitive Pricing,
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Knoxville Radiological Lab.

THURSDAY, NOVEMBER 21
TECHNICAL SESSIONS - 10:25 AM

Data, Analysis and Operations in Nuclear Criticality Safety—IV

Sponsored by NCS

Session Organizer: Theresa Cutler (LANL) **Chair:** William J. Zywiec (George Washington Univ)

Location: Hoover **Time:** 10:25-11:45 am

10:30 am: A Graded Approach to the Selection of Minimum Subcritical Margin, Joseph Christensen (SHINE Medical Technol.)

10:55 am: Subcriticality Measurement Using Feynman- α Analysis with a Fully Random Sampling and Second-Order Filtering Technique for AGN-201K, Sungho Moon, Jong Hoon Kim, Myung Hyun Kim, Ser Gi Hong (Kyung Hee Univ)

11:20 am: Determination of Bounding Axial Burnup Profiles for Criticality Analysis with Burnup Credit for Spent Fuels Discharged from OPR-1000, Dong Jin Kim, Kyu Jung Choi, Ser Gi Hong (Kyung Hee Univ)

Fusion Energy Applications

Sponsored by FED

Session Organizer: Arnold Lumsdaine (ORNL) **Chair:** Leigh Winfrey (Penn State)

Location: Coolidge **Time:** 10:40-11:30 am

10:45 am: Flibe Fusion Blankets and Flibe Fluoride-Salt-Cooled High-Temperature Reactors: Opportunities for Synergistic Development Strategies, Charles Forsberg, Emilio Baglietto, Matteo Bucci, Ronald G. Ballinger (MIT)

11:10 am: Nanoscale Feature Implications on Electron Emission and Gas Breakdown, Amanda M. Loveless, Adam M. Darr, Russell S. Brayfield II, Jacqueline R. Malayter, Sarah A. Lang, Allen L. Garner (Purdue)

Technical
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- Portable Precision Machine Tools
- Mechanized Welding Systems
- Code Welding
- On-Site Construction Services
- Special Engineering & Custom Mfg.
- Equipment Rentals

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THURSDAY, NOVEMBER 21
TECHNICAL SESSIONS - 10:25 AM

Accident Tolerant Fuels—II

Sponsored by MSTD

Session Organizer: Kenneth Geelhood (PNNL) **Chair:** Troy Munro (Brigham Young Univ)

Location: Harding **Time:** 10:25-11:45 am

10:30 am: Fabrication of Fully Ceramic Microencapsulated Compacts for Miniature Fuel Specimen Irradiation, Rachel L. Seibert, Joseph R. Burns, James O. Kiggans, Kurt A. Terrani (ORNL)

10:55 am: Aging Effect of Chromium Coated Zircaloy-4 Accident Tolerant Fuel Cladding Material, Rajnikant Umretiya, Santiago Vargas, Robert Uhorchuk, Carlos E. Castano, Jessica Rojas (VCU)

11:20 am: DFT + U Study of Electronic and Lattice Thermal Conductivity of the Hypostoichiometric UO_2 , T. P. Kaloni, N. Onder (CNL), J. Pencer (CNL, McMaster Univ), E. Torres (CNL)

Computational Thermal Hydraulics—IV

Sponsored by THD

Session Organizer: Lane Carasik (Virginia Commonwealth) **Cochairs:** Subash Sharma (Univ of Massachusetts), Dillon R. Shaver (ANL)

Location: Wilson A **Time:** 10:40-12:00 pm

10:45 am: One-Way Coupled Simulation of Twisted-Tube Bundle Flow-Induced Vibration, Landon Brockmeyer (ANL), Jerome Solberg (LLNL), Dillon Shaver (ANL), Elia Merzari (ANL)

11:10 am: Reduced-Order Modeling of Fluid Flows in Closed-Loop Systems, Péter German, Mauricio E. Tano, Jean C. Ragusa (Texas A&M), Carlo Fiorina (Ecole Polytechnique Federale de Lausanne)

11:35 am: Modelling of Fuel Assembly Under Dynamic Solicitation, Guillaume Ricciardi (CEA)

General Topics in Human Factors, Instrumentation and Control—III

Sponsored by HFICD

Session Organizer: Jamie Coble (U.T., Knoxville) **Chair:** Fan Zhang (U.T., Knoxville)

Location: Wilson B **Time:** 10:25-11:45 am

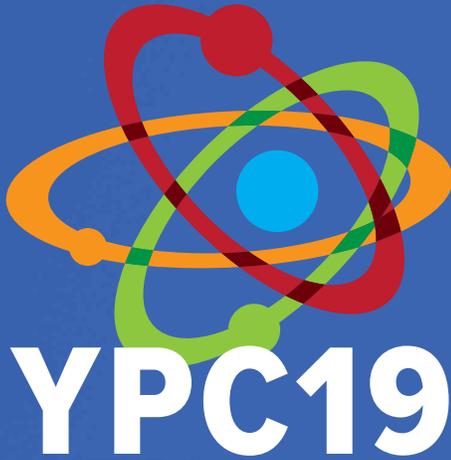
10:30 am: Scalable Multi-Agent Adaptive Resolution Tools for Collaborative Outage Management, Anirudh More, Nathan Lau (Virginia Tech), Shilo Anders (Vanderbilt)

10:55 am: An Intelligent Operator Support System for Early State Emergency Operations in Nuclear Power Plants, Jung Sung Kang, Jeeyea Ahn, Seung Jun Lee (UNIST)

11:20 am: Bench-Scale Demonstration of a Capacitive Sensor for In-Pile Materials Monitoring, Tyler Naughton (U.T., Knoxville), Christian Petrie (ORNL), Jamie Coble (U.T., Knoxville)

Technical
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The advertisement features the WSC logo at the top with the tagline 'Innovative Simulation Solutions' and the website 'www.ws-corp.com'. Below this, the text 'Nuclear Training and Engineering Simulation' is displayed in a large, bold font. To the right, a laptop is shown displaying a complex simulation interface. At the bottom, a photograph of a control room with multiple monitors is visible. Overlaid on the bottom right is the Keysoft VAVE logo, which includes the text 'Unlock the Power of Simulation' and the Keysoft VAVE logo itself.



Young Professionals Congress 2019

Saturday, November 16
Marriott Wardman Park
Washington, D.C.

Organized by the ANS Young Members Group

Join young nuclear professionals from around the country for this amazing one-day event.

- Focuses on current technical, policy and economic issues
- Strategies for engaging policymakers, customers, and community members
- Workshops for strengthening your own leadership qualities
- Networking with fellow young members, experts and leaders
- Keynote speaker Candace Bertotti on “Crucial Conversations in the Workplace”
- Friday night social hosted by NAYGN and Saturday night social following YPC

Register today at answinter.org

Registration as part of the Winter Meeting is only \$5.
Registration fees for YPC only are \$40 for ANS members
and \$80 for nonmembers.

For more information contact:

Matthew Jasica, *General Co-Chair*
m.jasica1@gmail.com

Catherine Prat, *General Co-Chair*
pratcm@westinghouse.com

Harsh Desai, *ANS YMG Chair*
harsh.s.desai@outlook.com



American Nuclear Society
Young Members Group

Embedded Topical Meeting

Embedded Topical Meeting: Young Professionals Congress 2019



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Alyse Huffman
*ANS
Congressional
Fellow*



**TECHNICAL
PROGRAM
COCHAIR**
Nicolas Stauff
*Argonne National
Laboratory*

Young Professionals Congress Schedule at a Glance

Saturday, November 16

7:30-8:15 am	YPC Check-in	Virginia Foyer
8:15-8:30 am	Opening Remarks: Why are we here?	Maryland ABC
8:30-9:30 am	YPC19 Plenary: Voices Matter	Maryland ABC
9:30-10:30 am	YPC19 Plenary: Understanding Nuclear in Energy Markets	Maryland ABC
10:30-10:45 am	Break	Maryland Foyer
10:45-11:45 am	YPC19 Plenary: Nuclear of the Future: Domestic and International Customers	Maryland ABC
11:45 am-12:45 pm	YPC19 Keynote: Crucial Conversations	Maryland ABC
12:45-1:45 pm	Division Luncheon	Maryland ABC
1:45-2:45 pm	Technical Sessions Track 1	
	• Leadership: Developing Your Leadership Presence–Panel	Virginia A
	• Communication: Mastering Crucial Conversations at Work	Virginia B
	• Innovating Nuclear: Big Data, Machine Learning, Artificial Intelligence–Panel	Virginia C
2:45-3:45 pm	Technical Sessions Track 2	
	• Advocating to Policymakers: Delivering Your Message Credibly–Panel	Virginia A
	• Innovating Nuclear: Additive Manufacturing–Panel	Virginia B
	• Career Development: Exploring Careers in Advanced Nuclear–Panel	Virginia C
3:45-4:00 pm	Break	Maryland Foyer
4:00-5:00 pm	Technical Sessions Track 3	
	• Leadership: Failing Forward–Panel	Virginia A
	• Career Development: Planning Career Transitions While Managing Work-Life Balance–Panel	Virginia B
	• Career Development: The Power of Habit–Panel	Virginia C
5:00-5:15 pm	Why Professional Organizations Matter to Young Professionals?—NAYGN	Maryland ABC
5:15-5:30 pm	Future of ANS Depends on YMG—ANS President	Maryland ABC
5:30-5:45 pm	Closing Remarks –YMG Chair / YPC Chair	Maryland ABC
6:00-9:00 pm	YPC Social	Macintyre's Pub 2621 Connecticut Ave NW, Washington DC 20008

SATURDAY, NOVEMBER 16

PLENARY SESSIONS - 8:30 AM-12:45 PM

YPC19 Plenary: “Nuclear Voices Matter”

Session Chair: Harsh S. Desai (*NEI*)

Location: Maryland ABC **Time:** 8:30-9:30 am

Each of us has a story behind why we are in the nuclear industry. But are you good at telling it? We all recognize that a clean, reliable, and resilient electric grid of the future will have to include nuclear power, but not all of our stakeholders know that. Distinguished panelists each will tell a story of how advocacy, community engagement, education, policy making, and technology all intersect. The panel will discuss how you too can convey the “nuclear” message. Young professionals of the nuclear industry will have to be the nuclear voices of the future.

Moderator: Harsh S. Desai (*Chair – ANS Young Members Group and Nuclear Energy Institute*)

Speakers: Rita Baranwal (*Assistant Secretary of Nuclear Energy at the U.S. DOE*)
Maria Korsnick (*President and CEO, Nuclear Energy Institute*)
Marilyn Kray (*President – American Nuclear Society and Vice President – Exelon Nuclear*)
Allison Wall (*Elementary School Teacher, Prince Georges County Schools*)

YPC19 Plenary: Understanding Nuclear in Energy Markets

Session Chair: Patrick Snouffer (*Bechtel Power*)

Location: Maryland ABC **Time:** 9:30-10:30 am

In order to keep the current fleet operating and to successfully bring the next generation of plants online, nuclear power will have to be economical. This session will delve into current energy market structures, construction costs of advanced reactors, and how nuclear can thrive in future markets.

Moderator: Patrick Snouffer (*Bechtel Power*)

Speakers: Muhammad Fahmy (*Bechtel Power*)
Valerie Teeter (*Exelon Corporation*)
Patrick White (*Massachusetts Institute of Technology*)

YPC19 Plenary: Nuclear of the Future: Domestic and International Customers

Session Cochairs: Luca Capriotti (*INL*), Fidelma Di Lemma (*INL*)

Location: Maryland ABC **Time:** 10:45-11:45 am

This session will discuss the future of U.S. nuclear energy industry focusing on new opportunities domestically and globally. Game-changer technologies (e.g., SMRS, microreactors) will be presented together with their application to new potential markets. The session will highlight the many benefits of nuclear as low-carbon energy source and as viable solution for energy security and prosperity for new upcoming countries.

Co-Moderator: Luca Capriotti and Fidelma Di Lemma (*Idaho National Laboratory*)

Speakers: Claudio Filippone (*HolosGen*)
Sama Bilbao Y Leon (*OECD – Nuclear Energy Agency*)
Paul Murphy (*Murphy Energy and Infrastructure Consulting*)

YPC19 Keynote: Crucial Conversations

Session Chair: Alyse Huffman (*ANS Congressional Fellow*)

Location: Maryland ABC **Time:** 11:45 am-12:45 pm

Motivational speaker Ms. Candace Bertotti will set the stage for developing effective leadership skills in the workplace, focusing on handling high-stakes, emotional conversations to empower your and your team.

Speaker: Candace Bertotti (*VitalSmarts*)

TECHNICAL SESSIONS - 1:45-2:45 PM

Leadership: Developing Your Leadership Presence–Panel

Session Chair: Kelsey Amundson

Location: Virginia A **Time:** 1:45-2:45 pm

As a young professional it may be difficult to be seen as a leader within your organization. However, there are many ways to gain leadership responsibility in an organization, whether you are a manager, project lead, or a staff member. In this session the panelists will discuss strategies that have worked (or failed) in helping them become recognized as a leader in their respective organizations and the nuclear industry.

Panelists: Lenka Kollar (*NuScale*)
Sam Brinton (*Deep Isolation*)
Rian Bahran (*Argonne National Laboratory*)

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SATURDAY, NOVEMBER 16
TECHNICAL SESSIONS - 1:45-2:45 PM

Communication: Mastering Crucial Conversations at Work

Session Chair: Alyse Huffman (*ANS Congressional Fellow*)

Location: Virginia B **Time:** 1:45-2:45 pm

When the stakes are high and opinions differ, some people ramrod their ideas while others retreat to silence. But in most organizations there is a small minority, usually about ten percent, who are able to speak up and be heard when others have shut down. These people speak truth to power, and it gains them enormous respect from both their peers and their managers. For the last 30 years we've studied the skills these natural leaders use in high-stakes, emotional conversations. In this session we'll demonstrate these skills and show you how to use them to get the best out of people when the stakes are high and emotions are strong.

Panelist: Candace Bertotti (*VitalSmarts*)

Innovating Nuclear: Big Data, Machine Learning, Artificial Intelligence–Panel

Session Organizer: Nicolas Stauff (*Argonne National Laboratory*)

Location: Virginia C **Time:** 1:45-2:45 pm

Artificial Intelligence, Big Data, Machine Learning – they are influencing the world and our daily life. Could they help us advance the nuclear industry as well? In this session, computer scientists and nuclear engineers will discuss promises and current applications of these technologies and how they are improving the nuclear industry.

Moderator: Katy Huff (*University of Illinois – Urbana-Champaign*)

Panelists: Prasanna Balaprakash (*Argonne National Laboratory*)
Haoyu Wang (*Argonne National Laboratory*)

TECHNICAL SESSIONS - 2:45-3:45 PM

Advocating to Policymakers: Delivering Your Message Credibly–Panel

Session Chair: Harsh Desai (*NEI*)

Location: Virginia A **Time:** 2:45-3:45 pm

Delivering your message credibly to policymakers: Policymakers thrive on simple and short explanations. Add that with a short attention span, and we have a challenging scenario to convey a message. The conclusion is clear: politicians are no technocrats. So how do we effectively communicate with them? This engaging session will discuss the need for public policy engagement on nuclear science, engineering, and technology issues and how you can be an effective advocate for the industry. We will also discuss career development opportunities to enhance your advocacy skills.

Moderator: Randy Reames (*Potomac Communications Group*)

Panelists: Jeremy Harrell (*ClearPath*)
John Kotek (*Nuclear Energy Institute*)
Katie Mummah (*University of Wisconsin*)
John Starkey (*American Nuclear Society*)

Innovating Nuclear: Additive Manufacturing–Panel

Session Organizer: Nicolas Stauff (*Argonne National Laboratory*)

Location: Virginia B **Time:** 2:45-3:45 pm

Advanced manufacturing technologies developed in recent years are posed to fundamentally alter the way in which components are designed and manufactured and have seen growing interest from the nuclear industry. In this session, you will learn about advanced manufacturing and example of applications in the nuclear industry.

Moderator: Ben Betzler (*Oak Ridge National Laboratory*)

Panelists: Meimei Li (*Argonne National Laboratory*)
Phillip C. Chesser (*Oak Ridge National Laboratory*)

Career Development: Exploring Careers in Advanced Nuclear–Panel

Session Chair: Dan Carleton (*Terrestrial Energy USA*)

Location: Virginia C **Time:** 2:45-3:45 pm

The purpose of this session is to provide attendees multiple perspectives on what it means to pursue a career in advanced nuclear. The panelists for this session will comprise of members from industry who work for a company in an advanced nuclear field. After providing a brief background on themselves and the companies they work for, the panelists will be asked to give advice to the attendees on what they can expect in pursuing a career in advanced nuclear. The key items discussed will include, 1) what does it mean to pursue a career in advanced nuclear?, 2) what are the unique challenges one can expect?, 3) how to go about meeting these challenges, and 4) general advice on how to achieve success in the advanced nuclear field.

Panelists: Jaime Sumpter (*NuScale*)
Eric Van Abel (*SHINE*)
Matthew Denman (*Kairos Power*)

SATURDAY, NOVEMBER 16

TECHNICAL SESSIONS - 4:00-5:00 PM

Leadership: Failing Forward—Panel

Session Chair: Matt Jasica (*Sandia National Laboratory*)

Location: Virginia A **Time:** 4:00-5:00 pm

It's been said that failure is the greatest teacher. Maybe a meeting didn't go as planned with a customer and business was lost. Perhaps I made a wrong decision and my team is losing confidence in me as a leader. Or, the project demands were changed on us at the last minute and we were unable to deliver the new demands. At the same time, these experiences are also learning experiences that we use can to shape ourselves as leaders. Speakers will share their experiences with overcoming failures, and then participants will break out into small groups to workshop how they can turn their own experiences into opportunities to grow as leaders.

Panelists: Ross Radel (*Phoenix*)
Shaheen Dewji (*Texas A&M University*)
Mark Quesenberry (*Dominion Energy*)

Career Development: Planning Career Transitions While Managing Work-Life Balance— Panel

Session Chair: Tim Crook (*MCR Performance Solutions*)

Location: Virginia B **Time:** 4:00-5:00 pm

Historically, driven young professionals have been asked or expected to sacrifice their personal life and goals in pursuit of career advancement. In contrast, our generation values work-life balance to a greater degree than pure advancement, and many companies see a competitive advantage in hiring and productivity by offering their employees more personal time or similar benefits. Additionally, younger generations tend to prefer working for companies with missions that more closely align with their personal values. Regardless of what is offered, many are finding fulfillment in challenging careers and rich personal lives. Rather than attempting to determine what an optimum work-life balance looks like, we hope the panelists' experiences will elucidate approaches to juggling responsibilities, maximizing impact, and feeling fulfilled however you choose to spend your time.

Panelists: Lane Carasik (*Virginia Commonwealth University*)
Suzy Hobbs-Baker (*University of Michigan*)
Catherine Prat (*Westinghouse*)

Career Development: The Power of Habit—Panel

Session Chair: Alyse Huffman (*ANS Congressional Fellow*)

Location: Virginia C **Time:** 4:00-5:00 pm

At its core, *The Power of Habit* contains an exhilarating argument: The key to exercising regularly, losing weight, raising exceptional children, becoming more productive, building revolutionary companies and social movements, and achieving success is understanding how habits work. Habits aren't destiny. By harnessing this new science, we can transform our businesses, our communities, and our lives.

Panelist: Candace Bertotti (*VitalSmarts*)

Why Professional Organizations Matter to Young Professionals?—NAYGN

Session Chair: Courtney Tampas (*Dominion Generation*)

Location: Maryland ABC **Time:** 5:00-5:15 pm

Future of ANS Depends on YMG—ANS President

Session Chair: Catherine Prat (*Westinghouse*)

Location: Maryland ABC **Time:** 5:15-5:30 pm

Speaker: Marilyn Kray (*ANS President*)

Closing Remarks—YMG Chair / YPC Chair

Session Chair: Matt Jasica (*Sandia National Laboratory*)

Location: Maryland ABC **Time:** 5:30-5:45 pm

YPC Social

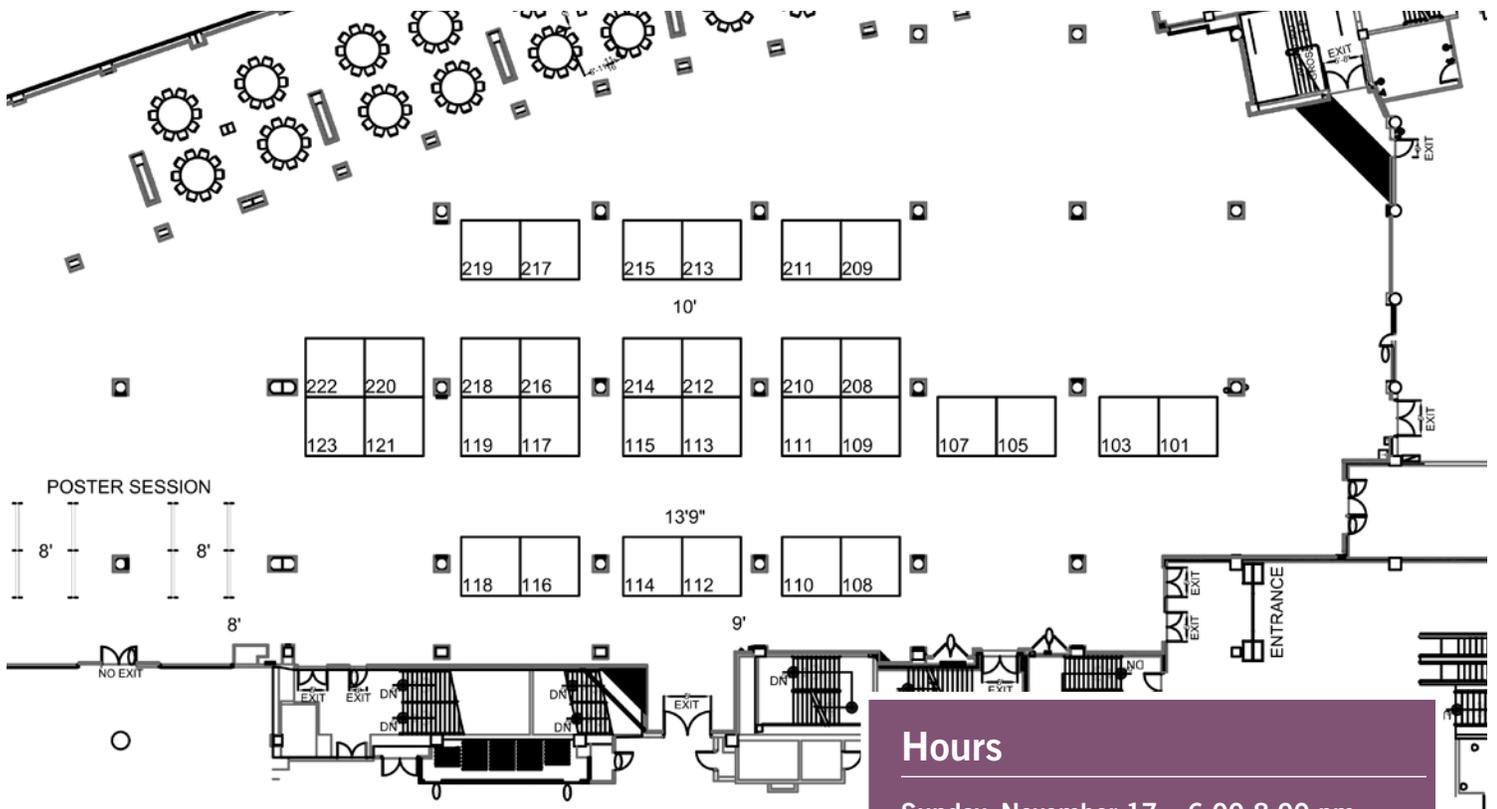
Location: Macintyre's Pub (2621 Connecticut Ave NW, Washington DC 20008) **Time:** 6:00-9:00PM

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Exhibitor Listing

American Nuclear Society	Booths 208, 210 and 212	Los Alamos National Laboratory	Booth 114
Argonne National Laboratory	Booths 101 and 103	Nuclear Energy University Program (NEUP)	Booth 113
BWX Technologies, Inc.	Booth 105	Nuclear In My Backyard Program Exhibit	Booth 214
Canadian Nuclear Laboratories	Booth 215	Nuclear Science User Facilities (NSUF)	Booth 116
Centroid Lab	Booth 211	NuScale Power	Booth 107
Consortium for Nonproliferation Enabling Capabilities (CNEC)	Booth 216	Nutherm International, Inc.	Booth 209
Curtiss-Wright	Booth 213	Oak Ridge National Laboratory	Booth 108
Gateway for Accelerated Innovation in Nuclear . .	Booth 118	OTEK Corporation	Booth 123
HolosGen LLC	Booth 220	Pacific Northwest National Laboratory	Booth 217
Idaho National Laboratory	Booth 109	Paragon	Booth 112
Institute of Nuclear Energy Safety Technology, CAS	Booth 115	Power System Sentinel Technologies, LLC	Booth 219
International Safeguards Project Office / IAEA . .	Booth 117	SHINE	Booth 218
Ken & Mary Alice Lindquist Department of Nuclear Engineering (Penn State)	Booth 121	Taylor & Francis	Booth 111
		Texas A&M University Nuclear Engineering	Booth 110
		WSC, Inc.	Booth 119

Exhibit Hall Floor Plan



Hours

Sunday, November 17	6:00-8:00 pm
Monday, November 18	7:30 am-4:00 pm
Tuesday, November 19	7:30 am-1:30 pm

Exhibitor & Expo Info

American Nuclear Society

LaGrange Park, IL (Booths 208, 210 and 212)

Argonne National Laboratory

Lemont, IL (Booths 101 and 103)

Argonne National Laboratory continues to advance the science and technology foundations of safe, secure, and sustainable nuclear energy systems. Stop by the Argonne booth to learn more and register to win a piece of history – a block of CP-1 graphite! www.ne.anl.gov.

BWX Technologies, Inc.

Lynchburg, VA (Booth 105)

Headquartered in Lynchburg, Va., BWX Technologies, Inc. (NYSE:BWXT) is a leading supplier of nuclear components and fuel to the U.S. government; provides technical and management services to support the U.S. government in the operation of complex facilities and environmental remediation activities; and supplies precision manufactured components, services and fuel for the commercial nuclear power industry. With approximately 6,350 employees, BWXT has 11 major operating sites in the U.S. and Canada. In addition, BWXT joint ventures provide management and operations at more than a dozen U.S. Department of Energy and NASA facilities.

Canadian Nuclear Laboratories

Ontario, Canada (Booth 215)

Canadian Nuclear Laboratories (CNL) is Canada's premier nuclear science and technology laboratory, dedicated to developing peaceful and innovative applications from nuclear technology through its expertise in physics, metallurgy, chemistry, biology, and engineering. We address global issues across the nuclear lifecycle and develop novel medical isotopes and devices.

Centroid Lab

Mar Vista, CA (Booth 211)

CENTROID LAB is an independent engineering services and solutions company established in 2015, who solve wide-ranging industry specific problems that involve dynamic simulations, computational fluid dynamics and analysis, 3D modeling and visualization. Headquartered in California USA, with offices in Japan, India and UK, CENTROID LAB has close alliances and partnerships with leading research and industry patrons, such as the Idaho National Laboratory (INL), National Renewable Energy Laboratory (NREL), and Electric Power Research Institute (EPRI).

Consortium for Nonproliferation Enabling Capabilities (CNEC)

Raleigh, NC (Booth 216)

The Consortium for Nonproliferation Enabling Capabilities (CNEC) aims to create a preeminent research & education hub dedicated to the development of enabling technologies and technical talent for meeting the present and future grand challenges of nuclear nonproliferation.

Curtiss-Wright

Idaho Falls, ID (Booth 213)

Scientech, a product and service brand of Curtiss-Wright Nuclear, provides NRC certified digital safety systems, plant process computers, digital controls and annunciator systems; thermal performance software; regulatory information databases and services; nozzle dams and installation services; reactor and steam generator specialized tooling; under-vessel BWR services and equipment; inventory database services (RAPID, OIRD) and supply chain analytics; repair, refurbish and reverse engineered I&C services; security and access authorization software; and mobile technology applications.

Gateway for Accelerated Innovation in Nuclear

Idaho Falls, ID (Booth 118)

GAIN's mission is to provide the nuclear energy industry with access to the technical, regulatory, and financial support necessary to move new or advanced nuclear technologies toward commercialization in an accelerated and cost-effective fashion. Through private-public partnerships, GAIN connects nuclear innovators to DOE national laboratory capabilities and RD&D programs.

HolosGen LLC

Manassas Park, VA (Booth 220)

HolosGen LLC is a technology development firm focused on mobile, rapidly deployable nuclear generators with scalable power rating (3–81MWe), optimized to closely match application-specific electricity demand and process heat requirements. Viability of its HOLOS™ gas-cooled reactor concept is being demonstrated under the DOE's APRA-E MEINTER program. Visit www.holosgen.com.

Idaho National Laboratory

Idaho Falls, ID (Booth 109)

Idaho National Laboratory (INL) is the nation's nuclear energy laboratory and home of the National Reactor Innovation Center. INL's researchers work with unparalleled irradiation and post-irradiation examination, fuel fabrication, materials testing and demonstration facilities to develop better fuels and materials for the current fleet and for advanced nuclear reactor designs.

Exhibitor & Expo Info

Institute of Nuclear Energy Safety Technology, CAS Hefei, China (Booth 115)

FDS Team (the team for Frontier Development of Science), founded in 1986, has been devoting to the R&D of advanced nuclear energy systems and safety technology. As a cooperative, interdisciplinary research team, it takes the Institute of Nuclear Energy Safety Technology (INEST), CAS as the core, companies as the technology industrialization platform and has extensive cooperation worldwide.

International Safeguards Project Office / IAEA Upton, NY (Booth 117)

The International Atomic Energy Agency (IAEA) is the world's center for cooperation in the nuclear field and promotes the safe, secure and peaceful use of nuclear technologies. The United States Support Program to the IAEA encourages U.S. citizens to seek opportunities to work at the IAEA's headquarters in Vienna, Austria.

Ken & Mary Alice Lindquist Department of Nuclear Engineering (Penn State) University Park, PA (Booth 121)

The newly created Ken and Mary Alice Lindquist Department of Nuclear Engineering at Penn State, builds on a long tradition of nuclear engineering. Our program was founded in 1959, four years after the establishment of the Breazeale Nuclear Reactor on campus. We are the largest Undergraduate Program in the United States, having single handedly produced over 12% of all B.S. degrees in Nuclear Engineering over the last 5 years. We have a vibrant Graduate Program, performing research in reactor physics, thermal hydraulics, materials and nuclear security. We also have a very active online M.E.ng in Nuclear Engineering program, which has graduated over 180 students over the last 15 years. To learn more about how we're inspiring change and impacting tomorrow, visit www.nuce.psu.edu.

Los Alamos National Laboratory Los Alamos, NM (Booth 114)

Los Alamos National Laboratory is a multi-disciplinary institution with over 10,000 employees located in Northern New Mexico. The Laboratory's mission is to solve national security challenges through scientific excellence. We have world-class capabilities in nuclear disciplines including theory, simulation, and experiments and are currently seeking qualified students, postdocs, and staff.

Nuclear Energy University Program (NEUP) Idaho Falls, ID (Booth 113)

The Department of Energy's Office of Nuclear Energy (DOE-NE) created the Nuclear Energy University Program (NEUP) in 2009 to consolidate university support under one program. NEUP plays a key role in helping DOE-NE accomplish its mission of leading the nation's investment in the development and exploration of advanced nuclear science and technology by funding nuclear energy research at U.S. colleges and universities and providing student education support.

Nuclear In My Backyard Program Exhibit (Booth 214)

OPD offers ANS members the opportunity to apply for funds to support a new ANS product, program or other activity to help the Society develop professional skills and knowledge, advance nuclear science & technology, meet the needs of utility and supplier members, and engage the public/policymakers. Members are encouraged to be creative and think outside the box. All ideas considered. Exhibit information will be on display describing the scope and accomplishments of grants completed in 2018-2019. Those interested in discussing new grant ideas will be able to do so. Application information at <http://opd.ans.org/nimby/>.

Nuclear Science User Facilities (NSUF) Idaho Falls, ID (Booth 116)

The Nuclear Science User Facilities (NSUF) offers unparalleled research opportunities for nuclear energy researchers via 21 partner institutions. Users are provided access (at no cost to the researcher) to world-class nuclear research facilities, technical expertise from experienced scientists and engineers, and assistance with experiment design, assembly, safety analysis and examination. Access is awarded through a competitive peer-reviewed process, and NSUF research supports Department of Energy-Office of Nuclear Energy missions.

NuScale Power Portland, OR (Booth 107)

NuScale's innovative thinking led the development of an Integral Pressurized Water Reactor (IPWR). The reactor, steam generator, pressurizer, and containment are integrated into a single module. The NuScale Power Module™ is only 60MWe (gross), and a plant can be designed to accommodate growing electrical demand by simply adding additional modules as the need arises.

Exhibitor & Expo Info

NuTherm International, Inc.

Mt. Vernon, IL (Booth 209)

NuTherm is an innovative company committed to delivering world class solutions to the commercial nuclear power industry and the Department of Energy that meet the demands of the 21st century while providing unprecedented levels of service. NuTherm maintains a Quality Assurance Program to support its products and services. The NuTherm Quality Assurance Program meets the requirement of 10 CFR 50 Appendix B, 10 CFR Part 21, NQA-1 and ANSI/ASME Standard N45.2.

Oak Ridge National Laboratory

Oak Ridge, TN (Booth 108)

Oak Ridge National Laboratory (ORNL) is a multi-program science and technology laboratory managed for the U.S. Department of Energy by UT-Battelle, LLC. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. www.ornl.gov

OTEK Corporation

Tucson, AZ (Booth 123)

OTeK designs and manufactures meters for the nuclear industry and maintains a NQA-1 program that conforms to the requirements of 10CFR50 Appendix B and 10CFR21. We can provide both Commercial Grade Meters as well as CLASS 1E basic components. Custom designs are also welcome.

Pacific Northwest National Laboratory

Richland, WA (Booth 217)

Pacific Northwest National Laboratory draws on signature capabilities in chemistry, Earth sciences, and data analytics to advance scientific discovery and create solutions to the nation's toughest challenges in energy resiliency and national security. Founded in 1965, PNNL is operated by Battelle for the U.S. Department of Energy. www.pnnl.gov

Paragon

Oak Ridge, TN (Booth 112)

Paragon has provided an unmatched commitment to the nuclear industry's most difficult challenges with customized solutions. Dedicated to quality, safety and reliability, Paragon prides itself on delivering premium products and services including I&C Repair, Reverse Engineered Products, Solving Obsolescence, Commercial Grade Dedication / Qualification, Just-in-time Inventory, Emergency Support and Innovative Supply Chain Solutions.

SHINE

Janesville, WI (Booth 218)

Founded in 2010, SHINE is a development-stage company working to become a manufacturer of radioisotopes for nuclear medicine. The SHINE system uses a patented, proprietary manufacturing process that offers major advantages over existing and proposed production technologies. It does not require a nuclear reactor, uses less electricity, generates less waste and is compatible with the nation's existing supply chain for Mo-99.

Power System Sentinel Technologies, LLC

Warrior, AL (Booth 219)

POWER SYSTEM SENTINEL TECHNOLOGIES, LLC (PSStech) is an engineering services and manufacturing company whose senior technical staff has more than 100 years combined knowledge in design, protection, and analysis of electric power systems. PSStech was founded to provide nuclear generating stations with a novel approach to protecting transformers against open phase conditions.

Taylor & Francis

Philadelphia, PA (Booth 111)

Taylor & Francis partners with world-class authors, from leading scientists and researchers, to scholars and professionals operating at the top of their fields. Together, we publish in all areas of the Humanities, Social Sciences, Behavioural Sciences, Science, Technology and Medicine sectors. We are one of the world's leading publishers of scholarly journals, books, eBooks, text books and reference works.

Texas A&M University Nuclear Engineering

College Station, TX (Booth 110)

The Department of Nuclear Engineering at Texas A&M is the largest and one of the most diverse programs in the nation, with a long history of outstanding undergraduate and graduate education, strong research at the graduate level, and an unsurpassed commitment to professional and public service.

WSC, Inc.

Frederick, MD (Booth 119)

WSC, Inc. is a global simulation technology company that deploys its proprietary 3KEYSOFTWARE® Simulation Technology for nuclear training simulators and to support engineering design and commissioning of new and upgraded plants Worldwide. WSC leads the industry with web based training simulators accessible at any time or place via the internet or intranet delivery.

Committee Meetings

NATIONAL COMMITTEES

Accreditation Polices & Procedures

SUNDAY, 11 AM – 12 PM | PARK 8222

Board of Directors

WEDNESDAY, 4 PM – 6 PM | MARRIOTT SALON 2

ANS Board of Directors

THURSDAY, 7:30 AM – 4:00 PM | MARRIOTT SALON 2

Bylaws & Rules

SUNDAY, 4 PM – 5:30 PM | PARK 8222

Diversity and Inclusion in ANS

MONDAY, 1:30 PM – 3:30 PM | WASHINGTON 2

Finance

TUESDAY, 2 PM – 6 PM | PARK 8222

Honors & Awards

MONDAY, 4 PM – 6 PM | PARK 8209

International

SUNDAY, 11:30 AM – 1:30 PM | MARYLAND AB

Local Section Workshop

SUNDAY, 9:30 AM – 12 PM | VIRGINIA A

Membership Committee

SUNDAY, 11 AM – 12 PM | PARK 8219

National Program

NPC Screening

SUNDAY, 10 AM – 12 PM | HARDING

NPC National Meeting Subcommittee

TUESDAY, 11:30 AM – 1 PM | WASHINGTON 2

NPC Committee Meeting

TUESDAY, 5:30 PM – 7:30 PM | WASHINGTON 2

NEED

MONDAY, 11 AM – 12 PM | PARK 8211

President's Meeting w/Committee & Division Chairs

SUNDAY, 8 AM – 9:30 AM | MARYLAND AB

Professional Divisions Committee Meeting

TUESDAY, 4 PM – 5:30 PM | WASHINGTON 1

Professional Engineering Exam

PEEC Item Writers Workshop

SATURDAY, 5 PM – 10 PM | WILSON C

PEEC Exam Prep Subcommittee

SUNDAY, 10 AM – 11 AM | VIRGINIA C

PEEC Committee Meeting

SUNDAY, 4 PM – 6 PM | VIRGINIA C

Public Policy Committee

WEDNESDAY, 1:00 PM – 3:00 PM | WASHINGTON 1

NATIONAL COMMITTEES

Publications Steering

Meetings, Proceedings & Transactions

SUNDAY, 9 AM – 10 AM | VIRGINIA C

Book Publishing

SUNDAY, 11 AM – 12:30 PM | VIRGINIA C

FS&T Advisory Committee

SUNDAY, 4:30 PM -5:30 PM | PARK 8209

Technical Journals

SUNDAY, 1 PM – 4 PM | VIRGINIA C

Publications Steering Committee

MONDAY, 4:30 PM – 6:30 PM | PARK 8224

Scholarship Policy & Coordination

MONDAY, 12 PM – 1 PM | PARK 8211

Student Sections Committee

Executive

MONDAY, 6 PM – 7 PM | VIRGINIA A

Reports

MONDAY, 7 PM – 8 PM | VIRGINIA A

SPECIAL COMMITTEES

Special Committee on the Congressional Fellow Program

TUESDAY, 3:30 PM – 4:30 PM | WASHINGTON 2

OTHER MEETINGS

Christian Nuclear Fellowship

MONDAY, 7 PM – 8:30 PM | PARK 8211

Christian Nuclear Fellowship Breakfast

WEDNESDAY, 7 AM – 8:30 AM | PARK 8219

International Nuclear Societies Council

WEDNESDAY, 2 PM – 5 PM | PARK 8219

Korea Nuclear Society

MONDAY, 5 PM – 7 PM | WASHINGTON 6

NEDHO

SUNDAY, 4 PM – 6 PM | WASHINGTON 1

Pacific Nuclear Council

SUNDAY, 10 AM – 11 AM; RESUME 2 PM – 3:30 PM | MADISON A

VTR Discussion

THURSDAY, 1 PM – 3 PM | WASHINGTON 6

VTR Division Meeting

WEDNESDAY, 6:30 PM – 8:30 PM | WASHINGTON 2

Committee Meetings

DIVISION COMMITTEES

Accelerator Applications

Executive

MONDAY, 11:30 AM – 1:30 PM | WASHINGTON 1

Aerospace Nuclear Science & Technology

SUNDAY, 12 PM – 1 PM | PARK 8222

Biology & Medicine/Isotopes and Radiation

Program

SUNDAY, 12:30 PM – 2:30 PM | VIRGINIA A

Decommissioning and Environmental Sciences

Program

SUNDAY, 3:30 PM – 4:30 PM | PARK 8219

Executive

SUNDAY, 4:30 PM – 5:30 PM | PARK 8219

Education, Training & Workforce Development

Program

SUNDAY, 10:30 AM – 12 PM | HOOVER

Alpha Nu Sigma National Honor Society

SUNDAY, 1 PM – 2 PM | HOOVER

Executive

SUNDAY, 2 PM – 4 PM | HOOVER

Fuel Cycle & Waste Management

Program

SUNDAY, 12 PM – 1 PM | WASHINGTON 6

Executive

SUNDAY, 1 PM – 2:30 PM | WASHINGTON 6

Fusion Energy

Executive

TUESDAY, 6 PM – 7 PM | PARK 8219

Human Factors, Instrumentation, and Controls

Program

SUNDAY, 11 AM – 12 PM | MADISON B

Executive

SUNDAY, 12 PM – 2:30 PM | MADISON B

Materials Science & Technology

Executive

MONDAY, 6:30 PM – 8:30 PM | PARK 8219

Mathematics & Computation

Program

SUNDAY, 1 PM – 2 PM | PARK 8222

Executive

SUNDAY, 2 PM – 4 PM | PARK 8222

DIVISION COMMITTEES

Nuclear Criticality Safety

Education Meeting

SUNDAY, 1 PM – 2 PM | WASHINGTON 3

Program

SUNDAY, 2 PM – 3 PM | WASHINGTON 3

Executive

SUNDAY, 3 PM – 4:30 PM | WASHINGTON 3

Nuclear Installations Safety

Program

SUNDAY, 4 PM – 6 PM | HOOVER

Executive

MONDAY, 6 PM – 8 PM | PARK 8222

Nuclear Nonproliferation Policy

Program

SUNDAY, 2:30 PM – 3:30 PM | MADISON B

Executive

SUNDAY, 3:30 PM – 4:30 PM | MADISON B

Operations & Power

Executive

SUNDAY, 1 PM – 3 PM | HARDING

Program

SUNDAY, 3 PM – 4 PM | HARDING

Radiation Protection & Shielding

Program

SUNDAY, 1 PM – 2 PM | COOLIDGE

Executive

SUNDAY, 2 PM – 4 PM | COOLIDGE

Reactor Physics

Program

SUNDAY, 2 PM – 4 PM | VIRGINIA B

Executive

SUNDAY, 4 PM – 5:30 PM | VIRGINIA B

Robotics & Remote Systems

Executive

SUNDAY, 12 PM – 4 PM | PARK 8209

Thermal Hydraulics

Program

SUNDAY, 2:30 PM – 4:30 PM | VIRGINIA A

Executive

SUNDAY, 4:30 PM – 6 PM | VIRGINIA A

Young Members Group

Program

MONDAY, 10:45 AM – 11:45 AM | WASHINGTON 2

Executive

MONDAY, 12 PM – 1 PM | WASHINGTON 2

Committee Meetings

STANDARDS COMMITTEES

ANS-3.15, Cybersecurity

SUNDAY, 1 PM – 3 PM | PARK 8224

ANS-6.1.1, Neutron and Photon Fluence-to-Dose Conversion Coefficients

MONDAY, 1 PM – 3 PM | PARK 8209

ANS-8, Fissionable Materials Outside Reactors Subcommittee

SUNDAY, 12 PM – 2 PM | PARK 8219

ANS-8 Standards Forum

WEDNESDAY, 8 AM – 10 AM | VIRGINIA A

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

MONDAY, 8 AM – 10 AM | PARK 8222

ANS-8.10, Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement

MONDAY, 12 PM – 1 PM | PARK 8222

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

TUESDAY, 4 PM – 6 PM | PARK 8211

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

TUESDAY, 3 PM – 5 PM | PARK 8224

ANS 8.3, Criticality Accident Alarm System

MONDAY, 10 AM – 12 PM | PARK 8222

ANS-19, Reactor Physics Subcommittee

MONDAY, 9 AM – 10:30 AM | PARK 8209

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

MONDAY, 8 AM – 9 AM | PARK 8209

ANS-19.3.4, Determination of Thermal Energy Deposition Rates in Nuclear Reactors

MONDAY, 10:30 AM – 12 PM | PARK 8209

Environmental and Siting Consensus Committee (ESCC)

MONDAY, 10 AM – 12 PM | WASHINGTON 6

Fuel, Waste, and Decommissioning Consensus Committee (FWDC)

MONDAY, 10 AM – 12 PM | PARK 8219

Large Light Water Reactor Consensus Committee (LLWRCC)

WEDNESDAY, 9 AM – 12 PM | WASHINGTON 6

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)

MONDAY, 8 AM – 10 AM | WASHINGTON 6

Nuclear Criticality Safety Consensus Committee (NCSCC)

MONDAY, 1:30 PM – 4 PM | WASHINGTON 6

Research and Advanced Reactors Consensus Committee (RARCC)

MONDAY, 1 PM – 3 PM | PARK 8219

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

MONDAY, 3:30 PM – 6 PM | PARK 8219

Safety and Radiological Analyses Consensus Committee (SRACC)

SUNDAY, 3PM – 5 PM | PARK 8211

Standards Board

TUESDAY, 8:30 AM – 5 PM | WASHINGTON 6

Committee/Division/Other Meetings by Day

Saturday, November 16

8:30 am- 4:00 pm	Teachers Workshop	Coolidge
5:00 pm-10:00 pm	PEEC Item Writers Workshop	Wilson C

Sunday, November 17

8:00 am-9:30 am	President's Meeting w/Committee & Division Chairs	Maryland AB
9:00 am-10:00 am	Publications Steering Committee-Meetings, Proceedings & Transactions	Virginia C
10:00 am-11:00 am	Pacific Nuclear Council	Madison A
9:30 am-12:00 pm	Local Section Workshop	Virginia A
10:00 am-11:00 am	Professional Engineering Exam- PEEC Exam Prep Subcommittee	Virginia C
10:00 am-12:00 pm	National Program Committee-NPC Screening	Harding
10:30 am-12:00 pm	Education, Training & Workforce Development Division-Program Committee	Hoover
11:00 am-12:00 pm	Accreditation Policies & Procedures Committee	Park 8222
11:00 am-12:00 pm	Human Factors, Instrumentation & Controls Division-Program Committee	Madison B
11:00 am-12:00 pm	Membership Committee	Park 8219
11:00 am-12:30 pm	Publications Steering Committee-Book Publishing	Virginia C
11:30 am-1:30 pm	International Committee	Maryland AB
12:00 pm-1:00 pm	Fuel Cycle & Waste Management Division-Program Committee	Washington 6
12:00 pm-1:00 pm	Aerospace Nuclear Science & Technology Division	Park 8222
12:00 pm -2:00 pm	ANS 8 Fissionable Materials Outside Reactors Subcommittee	Park 8219
12:00 pm-2:30 pm	Human Factors, Instrumentation & Controls Division-Executive Committee	Madison B
12:00 pm-4:00 pm	Robotics & Remote Systems Division-Executive Committee	Park 8209
12:30 pm-2:30 pm	Biology & Medicine/Isotopes and Radiation Program	Virginia A
1:00 pm-2:00 pm	Education, Training & Workforce Development Division-Alpha Nu Sigma National Honor Society	Hoover
1:00 pm-2:00 pm	First-Time Attendee Orientation	Washington 2
1:00 pm-2:00 pm	Mathematics & Computation Division-Program Committee	Park 8222
1:00 pm-2:00 pm	Nuclear Criticality Safety Division-Education Meeting	Washington 3
1:00 pm-2:00 pm	Radiation Protection & Shielding Division-Program Committee	Coolidge
1:00 pm-2:30 pm	Fuel Cycle & Waste Management Division-Executive Committee	Washington 6
1:00 pm-3:00 pm	ANS-3.15 Cybersecurity	Park 8224
1:00 pm-3:00 pm	Operations & Power Division-Executive Committee	Harding
1:00 pm-4:00 pm	Publications Steering Committee-Technical Journals	Virginia C
2:00 pm-3:30 pm	Pacific Nuclear Council	Madison A
2:00 pm-3:00 pm	Nuclear Criticality Safety Division-Program Committee	Washington 3
2:00 pm-4:00 pm	Education, Training & Workforce Development Division-Executive Committee	Hoover
2:00 pm-4:00 pm	Mathematics & Computation Division-Executive Committee	Park 8222
2:00 pm-4:00 pm	Radiation Protection & Shielding Division-Executive Committee	Coolidge
2:00 pm-4:00 pm	Reactor Physics Division-Program Committee	Virginia B
2:30 pm-3:30 pm	Nuclear Nonproliferation Policy Division-Program Committee	Madison B
2:30 pm-4:30 pm	Thermal Hydraulics Division-Program Committee	Virginia A
3:00 pm-4:00 pm	Operations & Power Division-Program Committee	Harding
3:00 pm-4:30 pm	Nuclear Criticality Safety Division-Executive Committee	Washington 3
3:00 pm-5:00 pm	Safety & Radiological Analyses Consensus Committee (SRACC)	Park 8211
3:30 pm-4:30 pm	Decommissioning and Environmental Sciences Division-Program Committee	Park 8219
3:30 pm-4:30 pm	Nuclear Nonproliferation Policy Division-Executive Committee	Madison B
4:00 pm-5:30 pm	Bylaws & Rules Committee	Park 8222
4:00 pm-5:30 pm	Reactor Physics Division-Executive Committee	Virginia B
4:00 pm-6:00 pm	NEDHO	Washington 1
4:00 pm-6:00 pm	Nuclear Installations Safety Division-Program Committee	Hoover
4:00 pm-6:00 pm	Professional Engineering Exam Committee-Committee Meeting	Virginia C
4:30 pm-5:30 pm	Decommissioning and Environmental Sciences Division-Executive Committee	Park 8219
4:30 pm-5:30 pm	Publications Steering Committee - FS&T Editorial Advisory Committee	Park 8209
4:30 pm-5:30 pm	Publications Steering Committee Nuclear Technology Editorial Advisory Committee	Park 8223
4:30 pm-6:00 pm	Thermal Hydraulics Division-Executive Committee	Virginia A
5:00 pm-6:00 pm	Mentor Meeting	Washington 2

Committee/Division/Other Meetings by Day

Monday, November 18

8:00 am-9:00 am	ANS-19.3, Steady-State Neutronics Methods for Power Reactor Analysis	Park 8209
8:00 am-10:00 am	ANS 8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	Park 8222
8:00 am-10:00 am	Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)	Washington 6
9:00 am-10:30 am	ANS-19, Reactor Physics Subcommittee	Park 8209
10:00 am-12:00 pm	ANS 8.3, Criticality Accident Alarm System	Park 8222
10:00 am-12:00 pm	Environmental and Siting Consensus Committee (ESCC)	Washington 6
10:00 am-12:00 pm	Fuel, Waste, and Decommissioning Consensus Committee (FWDC)	Park 8219
10:30 am-12:00 pm	ANS-19.3.4, Determination of Thermal Energy Deposition Rates in Nuclear Reactors	Park 8209
10:45 am-11:45 am	Young Members Group-Program Committee	Washington 2
11:00 am-12:00 pm	NEED Committee	Park 8211
11:30 am-1:30 pm	Accelerator Applications Division-Executive Committee	Washington 1
12:00 pm-1:00 pm	ANS-8.10, Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	Park 8222
12:00 pm-1:00 pm	Scholarship Policy & Coordination Committee	Park 8211
12:00 pm-1:00 pm	Young Members Group-Executive Committee	Washington 2
1:00 pm -3:00 pm	ANS 6.1.1 Neutron and Photon Fluence-to-Dose Conversion Coefficients	Park 8209
1:00 pm-3:00 pm	Research and Advanced Reactors Consensus Committee (RARCC)	Park 8219
1:30 pm-3:30 pm	Diversity and Inclusion in ANS	Washington 2
1:30 pm-4:00 pm	Nuclear Criticality Safety Consensus Committee (NCSCC)	Washington 6
3:30 pm-6:00 pm	Risk-Informed, Performance-based Principles and Policy Committee (RP3C)	Park 8219
4:00 pm-6:00 pm	Honors & Awards Committee	Park 8209
4:30 pm-6:30 pm	Publications Steering Committee-Publications Steering Committee	Park 8224
5:00 pm-7:00 pm	Korea Nuclear Society	Washington 6
6:00 pm-8:00 pm	Nuclear Installations Safety Division-Executive Committee	Park 8222
6:00 pm-7:00 pm	Student Sections Committee-Executive Committee	Virginia A
6:30 pm-8:30 pm	Materials Science & Technology Division-Executive Committee	Park 8219
7:00 pm-8:00 pm	Student Sections Committee-Report Committee	Virginia A
7:00 pm-8:30 pm	Christian Nuclear Fellowship	Park 8211

Tuesday, November 19

8:30 am-5:00 pm	Standards Board	Washington 6
11:30 am-1:00 pm	National Program Committee-NPC National Meeting Subcommittee	Washington 2
2:00 pm-6:00 pm	Finance Committee	Park 8222
3:00 pm-5:00 pm	ANS-8.28, Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Park 8224
3:30 pm-4:30 pm	Special Committee on the Congressional Fellow Program	Washington 2
4:00 pm-5:30 pm	Professional Divisions Committee-Committee Meeting	Washington 1
4:00 pm-6:00 pm	ANS-8.12, Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors	Park 8211
5:30 pm-7:30 pm	National Program Committee-NPC Committee Meeting	Washington 2
6:00 pm-7:00 pm	Fusion Energy Division-Executive Committee	Park 8219

Wednesday, November 20

8:00 am-10:00 am	ANS-8 Standards Forum	Virginia A
9:00 am-12:00 pm	Large Light Water Reactor Consensus Committee (LLWRCC)	Washington 6
1:00 pm-3:00 pm	Public Policy Committee	Washington 1
2:00 pm-5:00 pm	International Nuclear Societies Council	Park 8219
4:00 pm-6:00 pm	Board of Directors	Marriott Salon 2
6:30 pm-8:30 pm	VTR Division Meeting	Washington 2

Thursday, November 21

7:30 am-4:00 pm	ANS Board of Directors	Marriott Salon 2
1:00 pm-3:00 pm	VTR Discussion	Washington 6



ANS Organization Membership

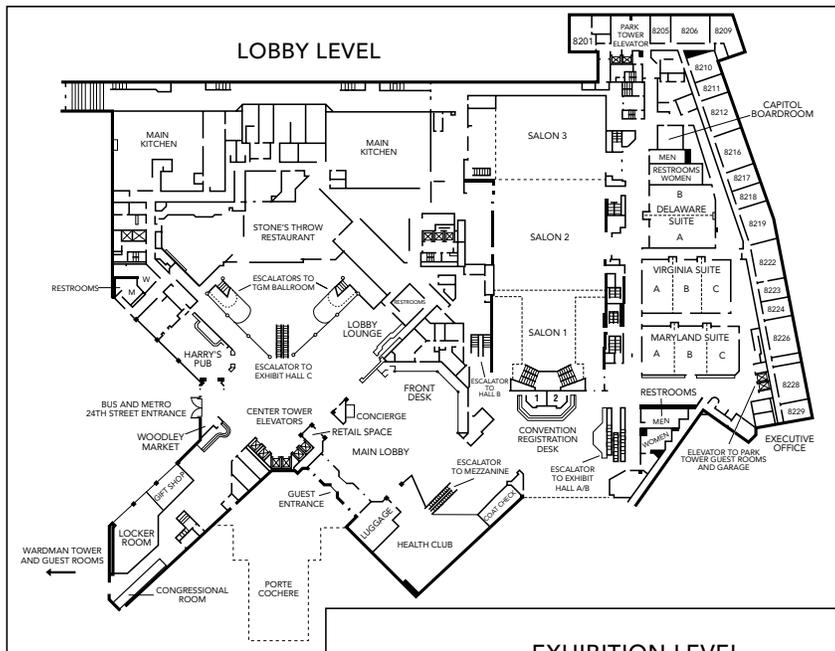
The American Nuclear Society salutes our Organization Members as sharing in our mission to promote nuclear science and technology to benefit humanity.*

AGT Global Logistics	Engineered Solutions, Inc.	NuScale Power
Alphasource Inc.	EXCEL Services Corporation	Nutherm International, Inc.
Ameren Missouri-Callaway Energy Center	Exelon Generation Company	Ontario Power Generation
American Electric Power	F&J Specialty Products Inc.	OTEK Corporation
American Nuclear Insurers	FirstEnergy	Pacific Gas and Electric Company
ARC Energy Services	Framatome Inc.	Power System Sentinel Technologies, LLC
Arizona Public Service Co.	Frham Safety Products, Inc.	Procedure Solutions Management, LLC
AZIsotopes	FuseRing.com	Reef Industries, Inc.
Barnhart Nuclear Services	Hagley Museum & Library	RSCC Nuclear Cable
Bechtel Nuclear, Security & Environmental	Hemato Pte Ltd	S&ME, Inc.
Black & Veatch	Idaho National Laboratory	Sarens USA, Nuclear
Burns & McDonnell	James C. White Company	Sargent & Lundy
BWX Technologies, Inc.	Kinectrics, Inc.	Savannah River National Laboratory
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Dominion Generation	Maxeta Technologies	Thermo Fisher Scientific
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Duke Energy Corporation	Mega-Tech Services, LLC	Tri Tool, Inc.
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Energy Northwest	NRSI-Institute of Nuclear Energy Research	Vistra Energy
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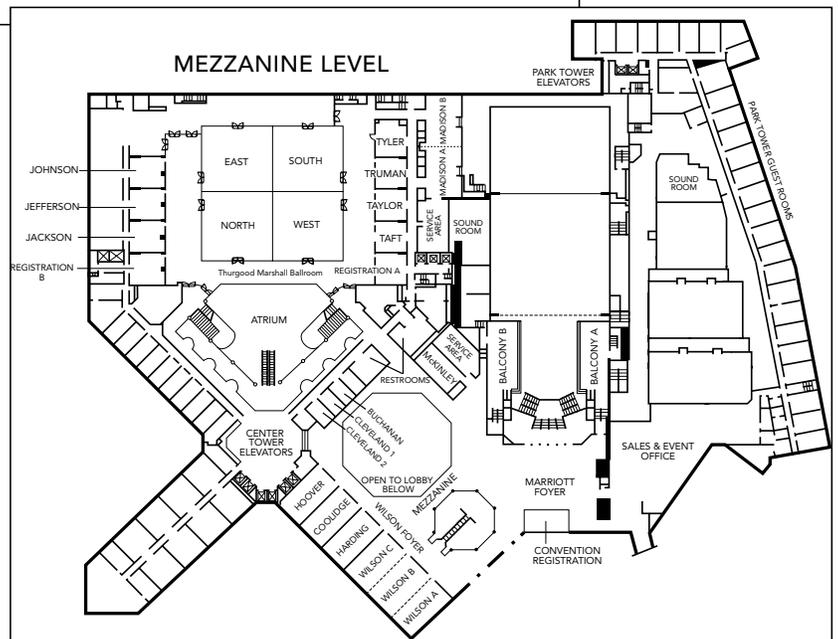
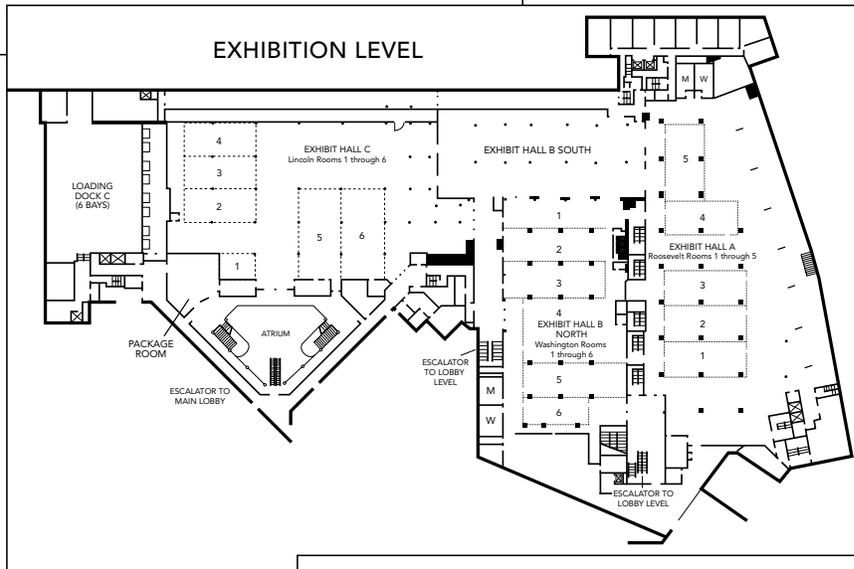
Learn more about Organization Membership and join at ans.org/orgmembers • 800-323-3044 ext 217 • Email: organization@ans.org

*Post-print roster updates at ans.org/orgmembers/memberlist.

Hotel Map



Marriott Wardman Park
 2660 Woodley Road, NW,
 Washington, D.C. 20008-4106



See you at future



ANS Winter Meetings



NOVEMBER 15-19, 2020

Chicago Marriott Downtown, Chicago, IL

OCTOBER 31-NOVEMBER 4, 2021

Marriott Wardman Park, Washington, D.C.

NOVEMBER 13-17, 2022

Hyatt Regency Albuquerque, Albuquerque, NM

NOVEMBER 5-9, 2023

Marriott Wardman Park, Washington, D.C.

