ANS Meetings

International High-Level Radioactive Waste Management Conference

IHLRWM 2019

Official Program

April 14-18, 2019
Knoxville Convention Center
Knoxville, TN

Robust Collaboration on the Safe, Secure, and Sustainable Management of High-Level Radioactive Materials Over Multiple Generations.

ANS | IHLRWM 2019

International High-Level Radioactive Waste Management Conference

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GENERAL MEETING INFORMATION

PLENARY, SPECIAL SESSIONS & EVENTS

IHLRWM 2019 TECHNICAL SESSIONS

ADDITIONAL

Meeting Officials

Robust Collaboration on the Safe, Secure, and Sustainable Management of High-Level Radioactive Materials Over Multiple Generations.

2019 International High-Level Radioactive Waste Management Conference

GENERAL COCHAIR
John Scaglione
(Oak Ridge National Laboratory)

GENERAL COCHAIR
Rob Howard
(Oak Ridge National Laboratory)

TECHNICAL PROGRAM CHAIR
Eric Pierce
(Oak Ridge National Laboratory)

ASSISTANT TECHNICAL PROGRAM COCHAIR
Steve Skutnik
(University of Tennessee)

ASSISTANT TECHNICAL PROGRAM COCHAIR
Mark Nutt
(Pacific Northwest National Laboratory)

ASSISTANT TECHNICAL PROGRAM COCHAIR
Yifeng Wang
(Sandia National Laboratories)

Meeting Officials

ORGANIZING COMMITTEE

Abiodun Adeniyi	ORNL
Tara Pandya Organizing Committee Chair	ORNL
Katherine Royston	ORNL
Padhraic Mulligan	ORNL
Kaushik Banerjee	ORNL
Bruce Bevard	ORNL
Ben Betzler Assistant General Chair	ORNL
Kevin Connolly	ORNL
Riley Cumberland	ORNL
Robby Joseph III	ORNL
Rose Montgomery	ORNL
Nicholas Luciano	ORNL
Stylianos Chatzidakis	ORNL

TECHNICAL PROGRAM COMMITTEE

Hatice Akkurt	EPRI
Jens Birkholzer	LBL
Bob Borrelli	Univ of Idaho
Edgar Buck	PNNL
Stephanie Bruffey	ORNL
Stefano Caruso	Nagra
Cheng Chen	VT
Ray Clark	EPA
Sue Clark	PNNL
Louise J Criscenti	SNL
George Danko,	UNR
Christoph Gastl	BFE
Bora Gencturk	USC
Teklu Hadgu	SNL
Kathryn Huff	Univ of Illinois
Neil Hyatt	Univ of Sheffield
Qinhong (Max) Hu	UTA
Anastasia Ilgen	SNL
James Jerden	ANL
Robby Joseph	ORNL
Elena Kalinina	SNL
Eunja Kim	UNLV
Donghak Kook	KAERI
Erik Kremer	NUMO
Kris Kuhlman	SNL
Patrick Landais	Andra
Edward Matteo	SNL
Sitakanta Mohanty	Palo Alto College/System View International
Rose Montgomery	ORNL
Scott Painter	ORNL
David Pickett	SWRI
Eric M. Pierce	ORNL
Vincenzo Rondinella	EC
Budhi Sagar	Consultant
Marcelo J Sanchez	TAMU
Natalia V Saraeva	ANL
Emily Stein	SNL
WaiChing Sun	Columbia Univ
Stratis Vomvoris	Nagra
Gale Voyles	Flour
Nathalie A. Wall	WSU
Ruth Weiner	AECOM
Janelle Wharry	Univ of Purdue
Yongliang Xiong	SNL
Shulan Xu	Xu Enironmental Consulting AB
Yida Zhang	Univ of Colorado
Liange Zheng	LBL

If you would like to volunteer at IHLRWM, contact Nick Luciano at lucianonp@ornl.gov

Daily Schedule

Sunday, April 14

12:00 – 4:00 pm	Workshops	200 A-E
11:30 am – 5:00 pm	Meeting Registration	Park Concourse
1:00 – 5:00 pm	Technical Tour 1: SNS & Graphite Reactor sites	
6:00 – 9:00 pm	Welcome Reception	The Emporium 100 South Gay Street

Monday, April 15

7:30 am – 5:00 pm	Meeting Registration	Park Concourse
7:30 am – 8:00 am	Breakfast	Park Concourse
8:00 am – 12:00 pm	Opening Plenary	Lecture Hall
10:15 – 10:30 am	Coffee Break	Park Concourse
12:15 – 1:30 pm	Lunch (on own)	Park Concourse
1:30 – 3:35 pm	Technical Sessions	
	• Consent- Versus Science-Based Siting	200A
	• Issues Associated with Direct Disposal of Storage Canisters	200B
2:30 – 2:45 pm	Afternoon Break	Park Concourse

Tuesday, April 16

7:30 am – 5:00 pm	Meeting Registration	Park Concourse
8:30 – 9:00 am	Breakfast	Park Concourse
9:00 – 11:05 am	Technical Sessions	
	• Post Closure Assessment: Definition, Preparation, Documentation of a Safety Case	200A
	• Cask Integrity Analysis and Testing—I	200B
	• Transportation and Storage (Issues with Regional Versus Centralized Storage)—I	200C
	• Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—I	200D
	• Engineered Barrier Performance—I	200E
10:15 – 10:30 am	Coffee Break	Park Concourse
12:00 – 1:30 pm	Lunch (on own)	
1:30 – 3:35 pm	Technical Sessions	
	• Cask Integrity Analysis and Testing—II	200B
	• Transportation and Storage (Issues with Regional Versus Centralized Storage)—II	200C
	• Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—II	200D
	• Engineered Barrier Performance—II	200E
2:30 – 2:45 pm	Afternoon Break	Park Concourse

Daily Schedule

Wednesday, April 17

7:30 am – 5:00 pm	Meeting Registration	Park Concourse
8:30 – 9:00 am	Breakfast	Park Concourse
9:00 – 11:05 am	Technical Sessions	
	• Dry and Wet Storage—I	200B
	• Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—III	200D
	• Waste Form Performance (Used Fuel, HLW Glass, and Ceramics)—I	200E
10:15 – 10:30 am	Coffee Break	Park Concourse
12:00 – 1:30 pm	Lunch (on own)	
1:30 – 3:10 pm	Technical Sessions	
	• High Burn-Up and Mixed Oxide Spent Nuclear Fuel—I	200C
	• Waste Form Performance (Used Fuel, HLW Glass, and Ceramics)—II	200E
2:30 – 2:45 pm	Afternoon Break	Park Concourse
5:00 – 8:00 pm	Closing Banquet	301 ABC

Thursday, April 18

7:30 – 10:00 am	Meeting Registration	Park Concourse
8:00 am	Technical Tour 2: Manufacturing Demonstration Facility (MDF) & HFIR	
8:30 – 9:00 am	Breakfast	Park Concourse
9:00 – 10:40 am	Technical Sessions	
	• Selection Criteria: Deep Borehole, Crystalline Rock, etc.	200A
	• Dry and Wet Storage—II	200B
	• High Burn-up and Mixed Oxide Spent Nuclear Fuel Part—II	200C
	• Biosphere Characteristics and Processes	200E
10:15 – 10:30 am	Coffee Break	Park Concourse
12:00 – 1:30 pm	Lunch (on own)	
1:30 – 5:00 pm	Workshop: PFLOTRAN IHLRWM Short Course	200 A-E
1:30 – 5:00 pm	Tutorial: Automated Assembly-Specific/As-Loaded and Design-Basis Spent Nuclear Fuel and Related Systems Characterizations Using UNF-Standards	
2:30 – 2:45 pm	Afternoon Break	Park Concourse

General Information

MEETING VENUE

The IHLRWM 2019 Conference will be hosted at The Knoxville Convention Center, April 14-18, 2019. The Knoxville Convention Center is located at 701 Henley St, Knoxville, TN 37902. Phone: 865-522-5669 visitknoxville.com

REGISTRATION

Meeting registration is required for all attendees, and speakers. Badges are required for admission to all plenaries, technical sessions and events.

WIFI

Complimentary WiFi is available at the convention center on the "Visit Knoxville" network.

REGISTRATION HOURS

Location: Park Concourse

Sunday, April 14	11:30 am - 5:00 pm
Monday, April 15	7:30 am - 5:00 pm
Tuesday, April 16	7:30 am - 5:00 pm
Wednesday, April 17	7:30 am - 5:00 pm
Thursday, April 18	7:30 am - 10:00 am

NOTICE FOR SPEAKERS:

All Speakers and Session Chairs must check in at the ANS Registration Desk during registration hours.

ATTENDEE MEAL FUNCTIONS

Breakfast and Breaks will be provided to all registered meeting attendees, Monday-Thursday in the Park Concourse.

Opening Reception: Heavy hors d'oeuvres and open bar are included with a full meeting registration. Your badge is required for this event. The reception will be held at The Emporium, 100 S Gay St, Knoxville, which is a 15 minute walk from the Knoxville Convention Center. Tickets for opening reception and closing banquet are available for purchase for guests.

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 ANS contacts for reports at IHLRWM 2019 are the General Co-Chairs John Scaglione and Rob Howard. Mr. Scaglione can be reached at 702-845-4877. Mr. Howard can be reached at 865-281-2925 or you can leave a message at the Registration Desk for one of them to contact you directly.

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

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, APRIL 14

Workshops
Location: 200 A-E **Time:** 12:00 pm – 4:00 pm

Mavric Shipping Cask Analysis Using Origen Source Terms

One of the unique features of the SCALE code system is the flexibility of assembling different SCALE codes or sequences to solve complex problems. Transportation and storage of spent fuel require a computational tool set to characterize both the spent fuel source terms and the doses for containers used to transport or store the fuel. Spent fuel is a complex neutron and photon source that can be well characterized using the ORIGEN code in SCALE. Additionally, ORIGEN can be used to characterize the radioactive sources resulting from activation of non-fissile materials and components in a nuclear reactor, such as the pressure vessel. The variety of source terms generated with ORIGEN can be used for shielding analyses with the MAVRIC sequence. MAVRIC can estimate particle fluxes and dose rates outside of containers, to ensure that the safety requirements for transportation, storage and ultimate disposal of spent fuel or activated materials are met.

This workshop will provide an introduction to ORIGEN and will demonstrate how to use the ORIGAMI tool for quick calculations of spent fuel sources. This will be followed by an introduction to MAVRIC/Monaco and the automated variance reduction techniques CADIS and FW-CADIS. Finally, the sources generated by ORIGAMI will be used as a source in a MAVRIC/Monaco dose analysis outside of a shipping cask. Registered SCALE users are welcome to bring their laptop and follow along.

Cyclus Fuel Cycle Simulator

This tutorial will demonstrate how to use Cyclus to simulate both simple and complex nuclear fuel cycle scenarios. It is appropriate for all levels of expertise, and attendees should bring a laptop if they intend to follow along with the exercises. Cyclus (fuelcycle.org) is the next-generation agent-based nuclear fuel cycle simulator, providing flexibility to users and developers through a dynamic resource exchange solver and plug-in, user-developed agent framework. The goal of Cyclus is to enable a broad spectrum of fuel cycle simulation while providing a low barrier to entry for new users and agent developers. Cyclus engages with potential module developers and encourages them to join a vibrant community in an expanding ecosystem. Users and developers are always welcome and encouraged to use or contribute to the Cyclus project.

Technical Tour 1: SNS & Graphite Reactor sites
Location: SNS & Graphite Reactor sites **Time:** Begins at 1:00 pm **Cost:** $15 per tour

The tour bus will be boarded at the convention center, the exact spot/location will be communicated at the registration table.

The Spallation Neutron Source (SNS) is a one-of-a-kind research facility that provides the most intense pulsed neutron beams in the world for scientific research and industrial development.

Graphite Reactor: The first reactor in the world, built in 9 months, the Graphite Reactor was designated a historic landmark by US DOI in 1966.

Welcome Reception
Location: The Emporium **Time:** 6:00 – 9:00 pm

The reception will be held at The Emporium, 100 S Gay St, Knoxville, TN 37902. The Emporium is a 15 minute walk from the Knoxville Convention Center. Guest tickets are available for purchase at the registration desk.

Plenary, Special Sessions & Events

MONDAY, APRIL 15

Opening Plenary
Session Organizers: Kaushik Banerjee *(ORNL)*, John Scaglione *(ORNL)* **Location:** Lecture Hall **Time:** 8:00 am – 12:15 pm

8:00-8.30 am: Welcome, Safety Topic, General Chairs' Messages, John Scaglione *(ORNL)*, Rob Howard *(ORNL)*, Eric Pierce *(ORNL)*

Role of a Permanent Nuclear Waste Management Solution for a Safe, Secure, Competitive, and Clean Nuclear Energy Future
Session Organizers: Kaushik Banerjee *(ORNL)*, John Scaglione *(ORNL)* **Location:** Lecture Hall **Time:** 8:30-10:15 am

Speakers:
Monica C. Regalbuto *(Idaho National Laboratory)*
Rod McCullum *(Senior Director, Decommissioning and Used Fuel, Nuclear Energy Institute (NEI))*
Steven P. Nesbit *(Consultant)*

10:00-10:15 am: Q&A on first topic

10:15-10:30 am: Coffee break

Nuclear Waste Interim Storage Facility and Permanent Repository: An International Perspective for Reaching Consensus Among the Stakeholders
Session Organizers: Kaushik Banerjee *(ORNL)*, John Scaglione *(ORNL)* **Location:** Lecture Hall **Time:** 10:30 am-12:15 pm

Speakers:
Ansi Gerhardsson *(Section Head for Disposal of Radiation Waste, Swedish Radiation Safety Authority (SSM))*
Evaristo J. ("Tito") Bonano, Ph.D. *(Senior Manager for the Nuclear Energy Fuel Cycle Program, Sandia National Laboratories)*
Stratis Vomvoris, Ph. D. *(Director of International Services and Projects Division (ISP), Nagra)*

12:00-12:15 pm: Q&A on second topic

WEDNESDAY, APRIL 17

Closing Banquet
Location: 301 ABC **Time:** 5:00 – 8:00 pm

Speaker: Dr. Steve Stow *(Retired Geoscientist and ORNL Historian)*
Steve Stow graduated from Vanderbilt with a degree in geology; he attended graduate school at Rice University and received M.S. and PhD degrees. He spent three years with CONOCO in Oklahoma working on the geochemistry of phosphate deposits, then joined the Geology Department at the University of Alabama, where he advanced to Full Professor and initiated a research program on the geochemistry of mafic-ultramafic rocks in the southern Piedmont. After 11 years, Steve joined the staff at Oak Ridge National Laboratory, where he initially took a managerial position as part of ORNL's role in identification of a site for disposal of high-level nuclear waste. He then became involved with characterization and monitoring of historic nuclear waste disposal practices at various Oak Ridge facilities, including ORNL, Y-12, and K-25. Steve also assumed management of the Earth and Atmospheric Science Section at ORNL, a group of over 90 earth scientists and engineers. He later took a management role for the "environmental restoration" activities at Oak Ridge, and, after two years, assumed the role as Ethics Officer for ORNL (and Y-12). In 2003, he became Director for the American Museum of Science and Energy (AMSE) in Oak Ridge, a DOE facility managed by ORNL. Steve has been author or co-author on over 60 open literature publications and other scientific reports.

Steve retired in 2006 and is currently active in numerous groups related to Manhattan Project history and other aspects of educational public interaction. He serves as a tour guide for the popular DOE-sponsored "public tour" of the Manhattan Project history and current scientific activities that have evolved from the Manhattan Project. He serves (has served) on boards for AMSE Foundation, Friends of ORNL, the Oak Ridge Retirees Program, the Oak Ridge Historical Society, DOE's Site Specific Advisory Board, the Farragut Museum, the Oak Ridge Center for Oral Histories, and others.

Plenary, Special Sessions & Events

THURSDAY, APRIL 18

Technical Tour 2: Manufacturing Demonstration Facility (MDF) & HFIR

Location: Manufacturing Demonstration Facility (MDF) & HFIR **Time:** Begins at 8:00 am **Cost:** $15 per tour

The tour bus will be boarded at the convention center, the exact spot/location will be communicated at the registration table.

The Manufacturing Demonstration Facility (MDF) is DOE's first such facility established to provide affordable and convenient access to R&D expertise, facilities, and tools to facilitate rapid adoption of advanced manufacturing technologies.

The High Flux Isotope Reactor (HFIR) is the highest flux reactor-based source of neutrons for research in the United States, and it provides one of the highest steady-state neutron fluxes of any research reactor in the world.

Workshop: PFLOTRAN IHLRWM Short Course

Location: 200 A-E **Time:** 1:30 – 5:00 pm

PFLOTRAN is an open source, massively-parallel reactive multiphase flow and transport code being developed by researchers from around the world to simulate problems of varying complexity, from simple 1D transport to large 3D multiphase flow and biogeochemical reaction in heterogeneous porous media. The code is founded upon the parallel PETSc framework and designed to run on computers ranging from laptops to supercomputers. PFLOTRAN is being employed by the US Department of Energy's (DOE) Spent Fuel and Waste Sciences and Technologies (SFWST) Campaign to simulate thermal, hydrologic, and chemical processes associated with deep geologic disposal of radioactive waste. It is an integral component of the DOE's geologic disposal safety assessment (GDSA) framework (pa.sandia.gov). This half-day short course will demonstrate PFLOTRAN capability within the context of radioactive waste management and include presentation of underlying theory, demonstration of simulation execution, and visualization of results. Participants who would like to install a virtual machine for running PFLOTRAN demonstration problems are encouraged to bring a laptop.

Tutorial: Automated Assembly-Specific/As-Loaded and Design-Basis Spent Nuclear Fuel and Related Systems Characterizations Using UNF-Standards

Location: 200 A-E **Time:** 1:30 – 5:00 pm

The Used Nuclear Fuel-Storage, Transportation & Disposal Analysis Resource and Data System (UNF-ST&DARDS) is being developed at Oak Ridge National Laboratory for integrating spent nuclear fuel (SNF) management through its final disposition. UNF-ST&DARDS provides a database for storing and preserving SNF data and streamlines various analyses using the data from the database for time-dependent characterization of SNF and related systems (e.g., dry storage system). When basic information about the SNF and the cask system is provided, the data relationships defined in UNF-ST&DARDS allow inputs to the respective codes (e.g., SCALE) to be built autonomously. This tutorial will include (1) discussions on various data need for realistic SNF characterizations and demonstration of the data import processes in UNF-ST&DARDS, (2) assembly-specific, time-dependent depletion and decay analyses, (3) as-loaded (using actual cask loading maps) criticality and shielding analyses of currently loaded casks for storage, transportation, and disposal (over disposal time periods), (4) discussion of as-loaded analyses to support licensing/certification of dry SNF systems, (5) misload analysis methodology to support as-loaded criticality analysis, and (6) design-basis criticality and shielding analyses using user-defined loading patterns and fuel assembly types.

The tutorial/demonstration is open to all registered meeting attendees who signed up at the time of registration. Laptops are not required, but participants with valid licenses for UNF-ST&DARDS and SCALE 6.2.2/SCALE 6.2.3 installed on their computer (windows machine) can follow the demonstrations hands-on.

MONDAY, APRIL 15
TECHNICAL SESSIONS - 1:30 PM

Coffee breaks in the Park Concourse during all afternoon sessions from 2:30-2:45 am

Consent-Versus Science-Based Siting
Session Organizer: Charles Bryan *(SNL)* **Cochairs:** Charles Bryan *(SNL)*, Patrick Landais *(Andra)*
Location: 200A **Time:** 1:30-3:10 pm

1:30 pm: How the Social Sciences Help Nuclear Projects Gain Regulatory Approvals and Project Success, Danya Braun *(Hardy Stevenson and Assoc Ltd.)*

1:55 pm: Two Roads in a Yellow Wood: Consent or Science-Based Siting, Mark Callis Sanders *(Sanders Eng.)*, Charlotta E. Sanders *(UNLV)*

2:20 pm: Nuclear Waste Facility Siting: Learning from Success and Failure, James A. Hamilton, Mary Woollen, Dan Ma *(Deep Isolation)*

2:45 pm: Study of Regulatory Requirements Related to Site Feature Survey for High-Level Radioactive Waste Repository in S. Korea, Hun Cha, Hyundong Woo, Sunjong Park, Seung Gyu Hyun *(KINS)*

Issues Associated with Direct Disposal of Storage Canisters
Session Organizer: Kaushik Banerjee *(ORNL)* **Cochairs:** Kaushik Banerjee *(ORNL)*, Tim Gunter*(DOE)*
Location: 200B **Time:** 1:30-3:35 pm

1:30 pm: Fissile Mass and Concentration Criteria for Criticality in Geologic Media Near Bedded Salt Repository, Rob P. Rechard, Lawrence C. Sanchez *(SNL)*, Patrick J. McDaniel, Jacob Hunt, Gabriella Broadous *(Univ of New Mexico)*

1:55 pm: Dual-Purpose Canister Filling Simulation and Validation: Part I—Simulations, Emilian Popov, Kaushik Banerjee *(ORNL)*

2:20 pm: Neutron Absorber Considerations for the DOE Standardized Canister, Gordon Petersen, Brett Carlsen, Josh Jarrell *(INL)*

2:45 pm: Dual-Purpose Canister Filling Simulation and Validation: Part II—Validation, Nesrin O. Cetiner, Eliott J. Fountain, Venugopal K. Varma, Kaushik Banerjee *(ORNL)*

3:10 pm: Dose to Cementitious Material for Moderator Exclusion in a Spent Nuclear Fuel Canister During a Repository Timeframe, Georgeta Radulescu, Kaushik Banerjee *(ORNL)*

Technical Sessions: Tuesday April 16

TUESDAY, APRIL 16
TECHNICAL SESSIONS - 9:00 AM

Coffee breaks in the Park Concourse during all morning sessions from 10:15-10:30 am

Post Closure Assessment: Definition, Preparation, Documentation of a Safety Case
Session Organizer: Anastasia Ilgen *(SNL)* **Cochairs:** Erik Kremer *(NWMO)*, Budhi Sagar *(SBC Global)*
Location: 200A **Time:** 9:00-11:05 am

9:00 am: Roles of the NUMO Safety Case in the Stepwise Siting Process, T. Fujiyama, H. Umeki *(NUMO)*

9:25 am: A Systematic Radionuclide Migration Parameter Setting Approach for Potential Siting Environments in Japan, Takafumi Hamamoto, Keisuke Ishida, Sanae Shibutani, Kiyoshi Fujisaki *(NUMO)*, Yukio Tachi *(JAEA)*, Katsuhiko Ishiguro *(NUMO)*, Ian McKinley *(McKinley Consulting)*

9:50 am: NUMO Safety Case: Results in Perspective, S. Nishikawa, T. Fujiyama *(NUMO)*, I. G. McKinley *(McKinley Consulting)*, S. M. L. Hardie *(CSD Eng)*, H. Umeki *(NUMO)*

10:15 am: Advanced KM: Sine Qua Non for Holistic Management of Radioactive Waste, H. Umeki, T. Fujiyama, S. Nishikawa *(NUMO)*, I. G. McKinley *(McKinley Consulting)*

10:40 am: Re-Evaluation of U.S. DOE R&D Efforts for Generic Deep Geologic Repositories—Roadmap Update, S. D. Sevougian, G. E. Hammond, P. E. Mariner, R. J. MacKinnon, P. N. Swift *(SNL)*, R. D. Rogers, D. C. Dobson *(Nuclear & Regulatory Support Services, LLC)*, M. C. Tynan *(DOE)*

Cask Integrity Analysis and Testing—I
Cochairs: Bora Gencturk *(USC)*, Ruth Weiner *(AECOM)*
Location: 200B **Time:** 9:00-10:40 am

9:00 am: Multi Hazard Assessment of Free Standing Concrete Dry Storage Systems, Mohammad Hanifehzadeh, Bora Gencturk *(Univ of Southern California)*

9:25 am: Robust High-Fidelity Computational Model for Vibration Health Monitoring Toward Spent Fuel Integrity Assessment, Olivier Ezvan, Xiaoshu Zeng, Roger Ghanem, Bora Gencturk *(Univ of Southern California)*

9:50 am: Analysis of RAM Packages Drop Testing Under Kinematic Aspects, André Musolff, Thomas Quercetti, Karsten Mueller, Matthias Bartholmai *(BAM)*

10:15 am: Package Testing of a Dual Purpose Cask for SNF From German Research Reactors, Thomas Quercetti, Robert Scheidemann, Steffen Komann, Viktor Ballheimer, Frank Wille *(BAM)*

Transportation and Storage (Issues with Regional Versus Centralized Storage)—I
Session Organizer: Rose Montgomery *(ORNL)* **Cochairs:** Rose Montgomery *(ORNL)*, Elana Kalinina *(SNL)*
Location: 200C **Time:** 9:00-10:40 am

9:00 am: Evaluations of Removing Spent Nuclear Fuel from Shutdown Nuclear Power Plant Sites in the U.S., Steven J. Maheras *(PNNL)*, Ralph E. Best *(Independent Consultant)*, Erica E. Bickford *(DOE)*, Lawrence M. Massaro *(Federal Railroad Administration)*, Matthew R. Feldman *(ORNL)*

9:25 am: Building Public Understanding of Operations and Safety of SNF Transport by Rail in the U.S., Erica Bickford *(DOE)*, Mark Abkowitz *(Vanderbilt Univ)*, Elizabeth Helvey, Lauren Rodman *(North Wind Infrastructure and Technology)*

9:50 am: Trends in Dry Storage Cask Loading at Operating Reactor Sites, Riley Cumberland *(ORNL)*, Maia Tooley *(Smith College)*

10:15 am: Railcar Dynamics Model of the ENSA/DOE Multimodal Transportation Campaign Rail Conveyance System, Kevin Kadooka, Pavlo Ivanusa, Nicholas Klymyshyn *(PNNL)*, William Shust *(Objective Engineers, Inc.)*, Casey Spitz *(PNNL)*

TUESDAY, APRIL 16
TECHNICAL SESSIONS - 9:00 AM

Coffee breaks in the Park Concourse during all morning sessions from 10:15-10:30 am

Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—I
Session Organizer: Emily R. Stein *(SNL)* **Cochairs:** Emily R. Stein *(SNL)*, Teklu Hadgu *(SNL)*
Location: 200D **Time:** 9:00-10:40 am

9:00 am: Kalman Calibration Approach to Assess Hydraulic Impact Induced by the Construction and the Operation of the Planned IHLRW Repository—Cigeo (France), Hakim Benabderrahmane *(ANDRA)*, Dan Thuy Lam, Jaouher Kerrou *(Univ of Neuchâtel)*, Laurent Tacher *(EPFL - LMS)*, Pierre Perrochet *(Univ of Neuchâtel)*

9:25 am: Determination of Factors Influencing Radionuclide Transport in Fractured Crystalline Rock, Teklu Hadgu, Elena Kalinina, Yifeng Wang *(SNL)*

9:50 am: Impact of Interim Storage on Repository Design Options, Milos Atz, Massimiliano Fratoni *(Univ of California, Berkeley)*

10:15 am: Lessons Learned from THMC Modeling of an In Situ Test for Engineered Barrier System, Liange Zheng, Hao Xu, Jonny Rutqvist, Jens Birkholzer *(LBNL)*

Engineered Barrier Performance—I
Session Organizer: Qinhong Hu *(Univ of Texas at Arlington)* **Cochairs:** Qinhong Hu *(Univ of Texas at Arlington)*, Liange Zheng *(LBL)*
Location: 200E **Time:** 9:00-11:05 am

9:00 am: Saponites as New Generation Engineered Buffer Materials for Harsh Environments, Yongliang Xiong, Yifeng Wang *(SNL)*

9:25 am: Canister Integrity Issues in the Licensing of a KBS-3 Repository in Sweden, Allan Hedin, Christina Lilja, A. Johannes Johansson *(SKB)*

9:50 am: Sensitivity Analysis in Repository Performance Assessment: Findings from an International Exercise, Dirk-Alexander Becker *(GRS)*

10:15 am: Corrosion Resistant Alloy Canisters for Nuclear Waste Disposal in Horizontal Drillholes, Joe H. Payer *(Univ of Akron)*, Stefan Finsterle *(Finsterle GeoConsulting)*, John A. Apps *(Consultant)*, Richard A. Muller *(Deep Isolation)*

10:40 am: Long-Term Behavior of Bentonite Buffer in a Repository with a Chemo-Mechanical Approach, H. Xu, L. Zheng, J. Rutqvist, J. T. Birkholzer *(LBNL)*

TECHNICAL SESSIONS - 1:30 PM

Afternoon breaks in the Park Concourse during all sessions from 2:30-2:45 pm

Cask Integrity Analysis and Testing—II
Session Organizer: Janelle Wharry *(Purdue Univ)* **Cochairs:** Janelle Wharry *(Purdue Univ)*, Marcelo Sanchez *(TAMU)*
Location: 200B **Time:** 1:30-3:10 pm

1:30 pm: The Shock and Vibration Environment for Used Nuclear Fuel Transportation Modeling, Pavlo Ivanusa, Nicholas Klymyshyn, Kevin Kadooka, Casey Spitz *(PNNL)*

1:55 pm: Characterization of Through-Wall Aerosol Transmission for SCC-Like Geometries, Samuel G. Durbin, Eric R. Lindgren, Ramon J. M. Pulido *(SNL)*

2:20 pm: Probabilistic Investigations on Pinching Failure of PWR SNF Rods Considering Hydride-Related Cladding Embrittlement, E. Eidelpes, L. F. Ibarra *(Univ of Utah)*, R. A. Medina *(Univ of New Hampshire)*

2:45 pm: Neutron Residual Stress Mapping of Repaired Spent Nuclear Fuel Welded Stainless-Steel Canisters, Stylianos Chatzidakis, Wei Tang, Jian Chen, Roger Miller, Andrew Payzant, Jeffrey Bunn, Jy-An Wang *(ORNL)*

Technical Sessions: Tuesday April 16

TUESDAY, APRIL 16
TECHNICAL SESSIONS - 1:30 PM

Afternoon breaks in the Park Concourse during all sessions from 2:30-2:45 pm

Transportation and Storage (Issues with Regional Versus Centralized Storage)—II
Session Organizer: Robby Joseph III *(ORNL)* **Cochairs:** Robby Joseph III *(ORNL)*, Neil Hyatt *(The Univ of Sheffield)*
Location: 200C **Time:** 1:30-2:45 pm

1:30 pm: Analyzing the Impact of Buffer Material on Shock and Vibration in Used Nuclear Fuel Transportation, Casey Spitz, Nicholas Klymyshyn, Pavlo Ivanusa, Kevin Kadooka *(PNNL)*

1:55 pm: Commercial SNF Pickup Queue Under the Standard Contact and Analysis of Hypothetical Alternate Acceptance Strategies, R. A. Joseph III, R. M. Cumberland, R. L. Howard *(ORNL)*, J. J. Jarrell *(INL)*, E. A. Kalinina *(SNL)*

2:20 pm: Modeling Shock and Vibration of Used Nuclear Fuel Rods During Normal Conditions of Transportation, Nicholas Klymyshyn, Pavlo Ivanusa, Kevin Kadooka, Casey Spitz (PNNL)

Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—II
Session Organizer: Scott L. Painter *(ORNL)* **Cochairs:** Scott Painter *(ORNL)* Bob Borelli *(Univ of Idaho)*
Location: 200D **Time:** 1:30-2:45 pm

1:30 pm: Quantifying Matrix Diffusion in Low-Permeable Geological Media, Qinhong Hu *(Univ of Texas at Arlington)*

1:55 pm: Benchmarking and QA Testing PFLOTRAN, Tara LaForce, Jennifer M. Frederick, Glenn E. Hammond, Emily R. Stein, Paul E. Mariner *(SNL)*

2:20 pm: High Fidelity Surrogate Modeling of Fuel Dissolution for Probabilistic Assessment of Repository Performance, Paul E. Mariner, Laura P. Swiler, D. Thomas Seidl, Bert J. Debusschere, Jonathan Vo, Jennifer M. Frederick *(SNL)*, James L. Jerden *(ANL)*

Engineered Barrier Performance—II
Session Organizer: Jens Thomas Birkholzer *(LBNL)* **Cochairs:** Jens Birkholzer *(LBNL)* Edward Matteo *(SNL)*
Location: 200E **Time:** 1:30-4:05 pm

1:30 pm: Engineered Barrier Material Interactions at Elevated Temperatures: Bentonite-Metal Interactions Under Elevated Temperature Conditions, Carlos Jové Colón *(SNL)*, Florie A. Caporuscio, Kirsten B. Sauer *(LANL)*, Michael C. Cheshire *(ORNL)*

1:55 pm: A Low-Cost, High-Performance Anionic Getter Material with Applications for Engineered Barrier Systems, Jessica Kruichak, Nelson Bell, Edward N. Matteo, Yifeng Wang *(SNL)*

2:20 pm: Analysis of Radioactive Materials in Liquid Using in Situ SEM and ToF-SIMS, Xiao-Ying Yu, Jenn Yao, Zihua Zhu, Edgar Buck *(PNNL)*

2:45 pm: Corrosion of Copper in Repository-Like Field Tests: Compilation and Analysis of Data, A. Johannes Johansson, Christina Lilja, Allan Hedin *(SKB)*

3:10 pm: Grimsel Test Site—Experimental Program 2019-2023: On-Going and New Experiments, S. Vomvoris, I. Blechschmidt *(Nagra)*

3:35 pm: Uranyl Oxalate Species in Natural Environments: Stability Constants for Aqueous and Solid Uranyl Oxalate Complexes, Yongliang Xiong, Yifeng Wang *(SNL)*

WEDNESDAY, APRIL 17
TECHNICAL SESSIONS - 9:00 AM

Coffee breaks in the Park Concourse during all morning sessions from 10:15-10:30 am

Dry and Wet Storage—I
Session Organizer: Natalia Saraeva *(ANL)* **Cochairs:** Natalia Saraeva *(ANL)*, Patrick Landais *(Andra)*
Location: 200B **Time:** 9:00-11:05 am

9:00 am: Zircaloy-4 Cladding Degradation Tests Under Simulated Dry Storage Conditions —Creep and Delayed Hydride Cracking, Jong-Dae Hong, Euijung Kim, Sung Geun Kim, Yong-Sik Yang, Donghak Kook *(KAERI)*

9:25 am: Detailed Radiation Dose Rate Evaluations of Commercial Spent Nuclear Fuel Canisters, Georgeta Radulescu, Kaushik Banerjee *(ORNL)*

9:50 am: Overview of EPRI Research on Evaluation of Long Term Performance of Neutron Absorber Material Performance in Spent Fuel Pools, Hatice Akkurt *(EPRI)*

10:15 am: Fission Gas Composition, Rod Internal Pressure, Rod Free Volume of High Burnup Pressurized Water Reactor Fuel Rods, R. A. Montgomery, R. N. Morris, R. H. Ilgner, J. M. Giaquinto, J. M. Scaglione, B. B. Bevard *(ORNL)*

10:40 am: Performance Characteristics of High Burnup ZIRLO Cladding Fuel Rods, Guirong Pan *(Westinghouse)*, Rosemary Montgomery *(ORNL)*, David B. Mitchell *(Westinghouse)*

Modeling Near-Field and Far-Field Processes: (Hydrologic, Chemical, Thermal, and Mechanical Processes)—III
Session Organizer: Stratis Vomvoris (Nagra) **Cochairs:** Stratis Vomvoris *(Nagra)*, Sitakanta Mohanty *(System-View International, LLC)*
Location: 200D **Time:** 9:00-11:30 am

9:00 am: Increasing the Realism in Solute Transport Modelling, Björn Gylling *(Gylling GeoSolutions)*, Bill Lanyon *(Fracture Systems Ltd.)*, Josep Soler *(IDAEA-CSIC)*, Kersti Nilsson *(Geosigma AB)*, Martin Löfgren *(Niressa AB)*, Paolo Trinchero *(Amphos 21)*, Jan-Olof Selroos *(SKB)*, Antti Poteri, Lasse Koskinen *(Posiva Oy)*

9:25 am: Numerical Evaluation of Thermal Effects from Nuclear Waste Disposed in Horizontal Drillholes, S. Finsterle *(Finsterle GeoConsulting)*, Richard A. Muller, Rod Baltzer *(Deep Isolation)*, Joe Payer *(Univ of Akron)*, James W. Rector *(Univ of California)*

9:50 am: Collaborative Testing and Modelling of Engineered Barrier System Performance: Task 8 of SKB Task Force, Björn Gylling *(Gylling GeoSolutions)*, Bill Lanyon *(Fracture Systems Ltd)*, Stefan Finsterle *(Finsterle GeoConsulting)*

10:15 am: Permeability Estimation for an Assembly of Ellipsoids with Size Distribution, Sitakanta Mohanty *(System-View International, LLC)*, Razvan Nes *(Consultant)*

10:40 am: Methods of Sensitivity Analysis in Geologic Disposal Safety Assessment (GDSA) Framework, Emily R. Stein, Laura P. Swiler, S. David Sevougian *(SNL)*

11:05 am: Site Characterisation and Synthesis into SDMs for NUMO Safety Case, Kunio Ota, Hiromitsu Saegusa, Hirofumi Kondo, Junichi Goto, Takanori Kunimaru, Saori Yamada *(NUMO)*

Technical Sessions: Wednesday April 17

WEDNESDAY, APRIL 17

TECHNICAL SESSIONS - 9:00 AM

Coffee breaks in the Park Concourse during all morning sessions from 10:15-10:30 am

Waste Form Performance (Used Fuel, HLW Glass, and Ceramics)—I

Session Organizer: Edgar Buck *(PNNL)* **Cochairs:** Edgar Buck *(PNNL)*, Eunja Kim *(UNLV)*
Location: 200E **Time:** 9:00-10:40 am

9:00 am: Effect of Calcination Temperature on Microphase Structure in Simulated High-Level Waste Calcine, Yoichi Endo, Akihiro Suzuki *(Nippon Nuclear Fuel Development Co.,Ltd.)*

9:25 am: Nonlinear Dynamics of Aqueous Dissolution of Silicate Materials, Yifeng Wang *(SNL)*

9:50 am: Investigating Conditions for Manufacturing Uniform Simulated High-Level Waste Granules Using Batch Type Rotary Kiln, Akihiro Suzuki, Yoichi Endo, Fumiki Mizusako, Atsushi Ouchi, Kenichi Matsushima *(Nippon Nuclear Fuel Development Co., Ltd.)*

10:15 am: Performance Assessment Model for Degradation of TRistructural-ISOtropic (TRISO) Coated Particle Spent Fuel, David Sassani, Fred Gelbard *(SNL)*

TECHNICAL SESSIONS - 1:30 PM

Afternoon breaks in the Park Concourse during all sessions from 2:30-2:45 pm

High Burn-Up and Mixed Oxide Spent Nuclear Fuel—I

Session Organizer: Donghak Kook *(KAERI)* **Cochairs:** Donghak Kook *(KAERI)* Bob Borelli *(Univ of Idaho)*
Location: 200C **Time:** 1:30-2:45 pm

1:30 pm: Numerical Simulation of Spent Fuel Segments Under Transport Loads, Konrad Linnemann, Viktor Ballheimer, Jens Sterthaus Annette Rolle, Frank Wille *(BAM)*, Efstathios Vlassopoulos *(EPFL)*, Dimitrios Papaioannou *(EC-JRC)*

1:55 pm: Spent Nuclear Fuel Integrity R&D Work for Dry Storage in Korea, Donghak Kook, Jae-ho Yang, Yang-hyun Koo, *(KAERI)*

2:20 pm: Analysis of Mechanical Integrity of Low Burnup Nuclear Fuel Assembly, Jae Yong Kim, KyungHo Yoon, SungUk Lee, HongRyoul Oh, DongHak Kook *(KAERI)*

Waste Form Performance (Used Fuel, HLW Glass, and Ceramics)—II

Session Organizer: Eric M. Pierce *(ORNL)* **Cochairs:** Eric M. Pierce *(ORNL)*, Kathryn Huff *(Univ of Illinois)*
Location: 200E **Time:** 1:30-3:10 pm

1:30 pm: Potential Use of Novel Zr-P-W Wasteforms for Radionuclide Waste Streams, Charles Bryan, Margaret Gordon, Philippe Weck, Jeffery Greathouse *(SNL)*, Eunja Kim *(UNLV)*, Clay Payne *(SNL)*

1:55 pm: Synthesis and Processing of Meta-Stable Negative Thermal Expansion Materials, Zirconium Tungstate and Zirconium Phosphotungstate (ZrW_2O_8 and $ZRWP_2O_{12}$), Margaret E. Gordon, Jeffrey A. Greathouse, Phillippe E. Weck *(SNL)*, Eunja Kim *(UNLV)*, Charles R. Bryan *(SNL)*

2:20 pm: Combined Computational and Experimental Study of Zirconium Tungstate, E. Kim *(UNLV)*, M. E. Gordon, P. F. Weck, J. A. Greathouse, S. P. Meserole, M. Rodriguez, C. Payne, C. R. Bryan *(SNL)*

2:45 pm: Structural Properties of Crystalline and Amorphous Zirconium Tungstate from Classical Molecular Dynamics Simulations, Jeffery A. Greathouse, Philippe F. Weck, Margaret E. Gordon *(SNL)*, Eunja Kim *(UNLV)*, Charles R. Bryan *(SNL)*

THURSDAY, APRIL 18
TECHNICAL SESSIONS - 9:00 AM

Coffee breaks in the Park Concourse during all morning sessions from 10:15-10:30 am

Selection Criteria: Deep Borehole, Crystalline Rock, etc.
Session Organizer: Yongliang Xiong *(SNL)* **Cochairs:** Yongliang Xiong *(SNL)*, Ray Clark *(EPA)*
Location: 200A **Time:** 9:00-10:15 am

9:00 am: Crystalline Rocks are Better Repository Hostrocks than Current Hydrogeological Interpretation Suggests, John H. Black *(In Site Hydro)*

9:25 am: Pore Structure, Fluid Flow and Radionuclide Transport in Geological Barrier Materials, Qinhong Hu *(Univ of Texas at Arlington)*

9:50 am: Deep Isolation: Innovative Technology for the Storage and Disposal of Spent Nuclear Fuel and Other High-Level Waste, Rodney (Rod) A. Baltzer *(Deep Isolation)*

Dry and Wet Storage—II
Session Organizer: Hatice Akkurt *(EPRI)* **Cochairs:** Hatice Akkurt *(EPRI)*, George Danko *(UNR)*
Location: 200B **Time:** 9:00-10:15 am

9:00 am: A Plan to Prepare DOE-Managed Spent Fuel for Long-Term Storage, Transportation and Disposal, Josh J. Jarrell, Brett W. Carlsen, Gordon M. Petersen, Colleen V. Shelton-Davis, Philip L. Winston *(INL)*

9:25 am: Stability of Sea-Salt Deliquescent Brines on Heated Surfaces of SNF Dry Storage Canisters, Charles Bryan, Eric Schindelholz, Andrew Knight, Jason Taylor, Remi Dingreville *(SNL)*

9:50 am: Analysis of Gas Samples Collected from the DOE High Burn-Up Demonstration Cask, Charles Bryan, Russell Jarek, Christopher Flores, Elliott Leonard *(SNL)*

High Burn-up and Mixed Oxide Spent Nuclear Fuel Part—II
Session Organizer: Vincenzo Rondinella *(EC)* **Cochairs:** Vincenzo Rondinella *(EC)*, Stefano Caruso *(Nagra)*
Location: 200C **Time:** 9:00-9:50 am

9:00 am: Long Term Mechanical Integrity Studies and Release From Spent Fuel Rods Failure, V. V. Rondinella, D. Papaioannou, R. Nasyrow, L. Fongaro, O. Dieste Blanco, T. A. G. Wiss *(EC-JRC)*

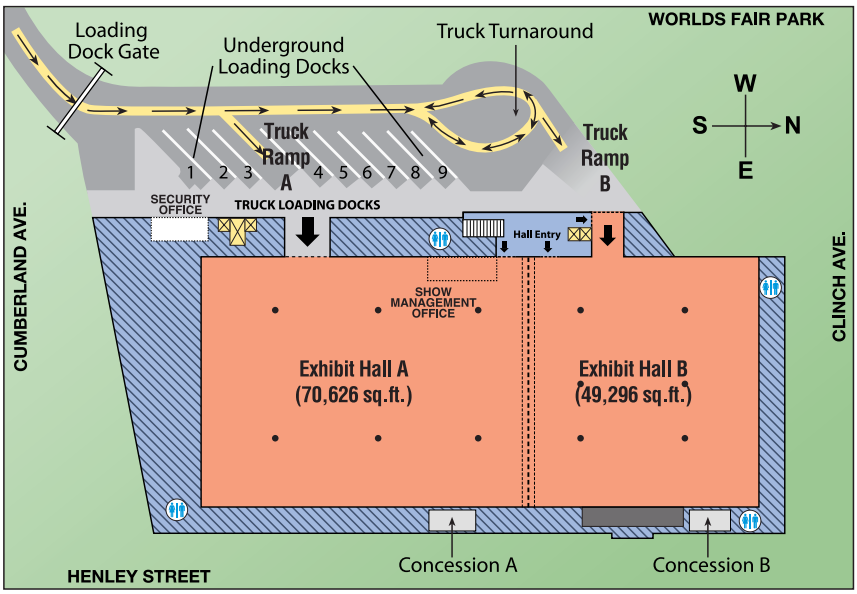
9:25 am: Ductility of High-Exposure ZIRLO™ Cladding Following Drying and Storage, M. C. Billone *(ANL)*

Biosphere Characteristics and Processes
Session Organizer: Shulan Xu *(Xu Enironmental Consulting AB)* **Cochairs:** Shulan Xu *(Xu Environmental Consulting AB)*, Nathalie A. Wall *(WSU)*
Location: 200E **Time:** 9:00-9:50 am

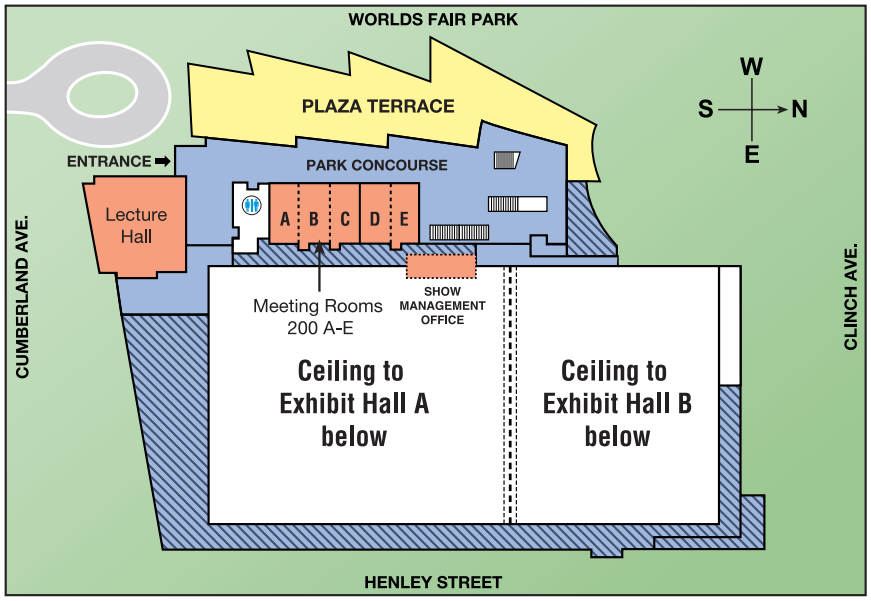
9:00 am: A Simple and Transparent Modelling Approach for Biosphere Assessment in Post-Closure Safety Assessment, Reda Guerfi *(STUK)*, Björn Dverstorp, Maria Nordén *(SSM)*, Ryk Klos *(Aleksandria Sciences Ltd.)*, Shulan Xu *(Xu Enironmental Consulting AB)*

9:25 am: Parameterizing Water Fluxes in the Geosphere-Biosphere Interface Zone: For Use in Biosphere Modelling as Part of the Long-Term Safety Assessment, Anders Wörman, Joakim Rim, Brian Babak Mojarrad *(KTH)*, Shulan Xu *(Xu Environmental Consulting AB)*

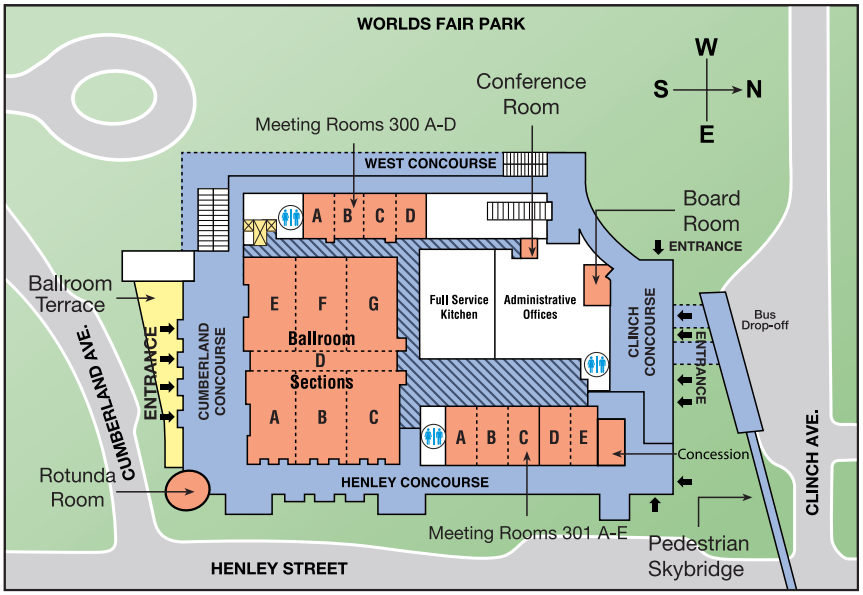
Knoxville Convention Center Floor Plans



First Floor



Second Floor



Third Floor