FRONT LINE OF GLOBAL SECURITY

NUCLEAR DETERRENCE

NAVAL FUEL

NONPROLIFERATION

PanTEX
AMARILLO, TX

Y12
OAK RIDGE, TN

CONSOLIDATED NUCLEAR SECURITY
Welcome to the INMM 60th Annual Meeting in Palm Desert, California USA

WE’RE GLAD YOU’RE HERE!

We hope that the next five days will be rewarding for you professionally and personally. Our daily plenary sessions, from our opening plenary session on Monday morning to the Interactive closing plenary on Thursday afternoon, you will find a variety of presentations in sessions that will inspire your work and expand your knowledge. The Annual Meeting sessions will include multiple panels on a variety of subjects and with an array of expert panelists. In addition, networking opportunities abound. Official events, such as the President’s Reception, the Annual Business Meeting, and informational meetings among attendees in the Exhibit Hall, will help you extend your professional network, as you build stronger connections with colleagues and friends.

Cary Crawford   Susan Pepper
INMM President   INMM Vice President

RESPECTFUL BEHAVIOR POLICY

The Institute of Nuclear Materials Management (INMM) is committed to maintaining an environment of mutual respect for all members, staff and participants at INMM meetings and events. INMM is dedicated to providing a safe, welcoming, and productive experience 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. INMM will not tolerate harassment of or by participants (including INMM volunteers and staff) in any form, including discriminatory harassment or unwelcome physical contact. Participants in INMM activities who violate this principle are subject to disciplinary action up to and including expulsion from events or revocation of membership.

If you have an incident to report while at the Annual Meeting, you may contact INMM Headquarters (inmm@inmm.org), the INMM President, or a member of the Executive Committee at any time, including during and after the event.
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Exhibit Hall Floor Plan

https://www.abstractsonline.com/pp8/#/7866
The U.S. Support Program to IAEA Safeguards and the International Safeguards Project Office encourages U.S. citizens to pursue Cost-Free Expert, Junior Professional Officer and regular positions at the IAEA. Visit us at exhibit booth #9 to learn more about current opportunities and how to join the IAEA’s dynamic, multicultural staff all working together to make the world a safer place.
INSTITUTE OF NUCLEAR MATERIALS MANAGEMENT

INMM Leadership and Annual Meeting Committees

INMM EXECUTIVE COMMITTEE
Cary Crawford, President
Oak Ridge National Laboratory

Susan Pepper, Vice President
Brookhaven National Laboratory

Chris Pickett, Secretary
National Nuclear Security Administration

Robert Curl, Treasurer
Idaho National Laboratory (Retired)

Corey Hinderstein, Immediate Past President
Nuclear Threat Initiative

INMM EXECUTIVE COMMITTEE
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Brookhaven National Laboratory

Chris Pickett, Secretary
National Nuclear Security Administration

Robert Curl, Treasurer
Idaho National Laboratory (Retired)

Corey Hinderstein, Immediate Past President
Nuclear Threat Initiative

INMM MEMBERS AT LARGE
Michael Baker
Los Alamos National Laboratory

Teri Leffer
DOE/NNSA

Irmgard Niemeyer
Forschungszentrum Juelich

Therese Renis
International Atomic Energy Agency

INMM MEMBERS AT LARGE
Michael Baker
Los Alamos National Laboratory

Teri Leffer
DOE/NNSA

Irmgard Niemeyer
Forschungszentrum Juelich

Therese Renis
International Atomic Energy Agency

INMM HEADQUARTERS STAFF
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Alyssa Carroll
Assistant Director of Meetings and Exhibits

Deanna Bright
Director of Membership

Amy Chezem
Director of Editorial Services

Kattie Krewer
Director of Marketing

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Assistant Director of Meetings and Exhibits

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Director of Editorial Services

Kattie Krewer
Director of Marketing

INMM TECHNICAL PROGRAM COMMITTEE
General Chair
Susan Pepper, Vice President
Brookhaven National Laboratory

Teressa McKinney
Technical Program Committee Chair
Oak Ridge National Laboratory

Glenda Ackerman
Pacific Northwest National Laboratory, Retired

James André
Pacific Northwest National Laboratory

Rian Bahran
Los Alamos National Laboratory

Steve Bellamy
Savannah River National Laboratory

Tom Bonner
Oak Ridge National Laboratory, Retired

INMM TECHNICAL PROGRAM COMMITTEE
General Chair
Susan Pepper, Vice President
Brookhaven National Laboratory

Teressa McKinney
Technical Program Committee Chair
Oak Ridge National Laboratory

Glenda Ackerman
Pacific Northwest National Laboratory, Retired

James André
Pacific Northwest National Laboratory

Rian Bahran
Los Alamos National Laboratory

Steve Bellamy
Savannah River National Laboratory

Tom Bonner
Oak Ridge National Laboratory, Retired

OVERSIGHT CHAIRS
Steve Mladineo
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Pacific Northwest National Laboratory

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Savannah River National Laboratory

Brian Boyer
International Atomic Energy Agency

Joyce Connery
Defense Nuclear Facilities Safety Bd.

Jill Cooley
Retired

Ben Cross
NuSynergy Energy, LLC

Arden Dougan
Office of International Nuclear Safeguards, NNSA/DOE

Mona Dreicer
Lawrence Livermore National Laboratory

KC Drypolcher
Los Alamos National Laboratory

Stacey Eaton
Los Alamos National Laboratory

Paul Ebel
BE Inc.

Melissa Einwechter
National Nuclear Security Administration

Jeff England
NAC International

Marianne Fisher
International Atomic Energy Agency

Claudio Gariazzo
Argonne National Laboratory

Zoe Gastelum
Sandia National Laboratories

https://www.abstractsonline.com/pp8/#7866

www.inmm.org/Events/Annual-Meeting #INMM19
60th ANNUAL MEETING

Phil Gibbs
Oak Ridge National Laboratory

Tom Grice
U.S. Nuclear Regulatory Commission

Charlie Harmon
Consultant

Morris Hassler
Y-12 National Security Complex

Corey Hinderstein
Nuclear Threat Initiative

Karen Hogue
CNS Y-12

Willem Janssens
European Commission JRC

Russell Johns
Pacific Northwest National Laboratory

Shirley Johnson
Tucker Creek Consulting

Teri N. Leffer
National Nuclear Security Administration, U.S. Department of Energy

Dennis Mangan
Consultant

Carrie Mathews
Pacific Northwest National Laboratory

Melanie May
U.S. Department of Energy

Steve Mladineo
Pacific Northwest National Laboratory

Karen Miller
Los Alamos National Laboratory

Bruce Moran
Pantex/Y-12 National Security Complex

Sean Morrell
Oak Ridge National Laboratory

Nancy Jo Nicholas
Los Alamos National Laboratory

Susan Pepper
Brookhaven National Laboratory

Tom Pham
U.S. Nuclear Regulatory Commission

Chris Pickett
National Nuclear Security Administration

Joe Rivers
U.S. Nuclear Regulatory Commission

Nina Rosenberg
Los Alamos National Laboratory

Kenneth Sanders
Argonne National Laboratory

Larry Satkowiak
Oak Ridge National Laboratory

Amanda Sayre
Pacific Northwest National Laboratory

Mark Schanfein
Idaho National Laboratory

Manit Shah
Virginia Commonwealth University

Bryceon Shulman
National Nuclear Security Administration

Michelle Silva
Los Alamos National Laboratory

Heidi Smartt
Sandia National Laboratories

Scott Vance
Energy Northwest

Robert Watkins
Savannah River National Laboratory

Ben Watts
Tetra Tech

Michael Whitaker
Oak Ridge National Laboratory

Jessica White-Horton
Oak Ridge National Laboratory

Andy Worrall
Oak Ridge National Laboratory

Louise Worrall
Oak Ridge National Laboratory

Steve Wyrick
Savannah River National Laboratory

REGISTRATION COMMITTEE

Steve Bellamy, Chair
Leigh Gunn, Deputy Chair
Cindy Bellamy
Deborah Holmer
Russ Johns
Vicki Pickett
Lynn Schanfein
Terri Welsh
Michael Whitaker

Morris Hassler,
Exhibits and Sponsorship Chair
Y-12 National Security Complex

Larry Satkowiak,
60th Anniversary Chair
Oak Ridge National Laboratory

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Job Seekers: Connect with employers who are looking for YOUR skills and experience with INMM’s new Career Center.

- Tired of searching through hundreds of random job postings to find your next opportunity? Your search is about to become a whole lot easier with our new Career Center.
- Find targeted opportunities.
- Post your resume anonymously.
- Create job alerts.

EMPLOYERS: Make your Hire. Start at INMM’s new Career Center. The INMM Career Center meets all your recruitment needs.

- Easily POST jobs.
- Search the RESUME BANK – Pay only for resumes of jobseekers interested in your position.
- ACCESS highly-qualified, professional candidates.
- Set-up PRE-SCREEN FILTERS to deliver the best candidates.

INMM MEMBERS: Post jobs at a substantial discount!

Visit the INMM’s Career Center today. https://inmm.careerwebsite.com
INMM Sustaining Members

INMM thanks our Sustaining Members, who contribute to the Institute through their generous financial support. Employees of Sustaining Member organizations qualify for a reduced registration rate for the INMM Annual Meeting. Additional benefits of membership include recognition in INMM publications, on the Institute’s website and during Institute meetings. For more information and to become an INMM Sustaining Member, visit the INMM website.

DIAMOND
Brookhaven National Laboratory
Los Alamos National Laboratory
Oak Ridge National Laboratory
Sandia National Laboratories

SILVER
ARES Security Corporation

BRONZE
ABACC
Australian Safeguards and Nonproliferation Office
Innovative Technology Partnerships LLC
South Carolina Universities Research & Education Foundation
Synergy Solutions Incorporated
Tetra Tech
Wyant Data Systems Inc.

PLATINUM
Idaho National Laboratory
Lawrence Livermore National Laboratory
Y-12 National Security Complex

GOLD
Aquila
International Atomic Energy Agency
Nuclear Threat Initiative
ORTEC
Savannah River National Laboratory
INMM Working Group Meetings

JOINT DESTRUCTIVE ANALYSES AND NONDESTRUCTIVE ASSAY WORKING GROUP
Sunday, July 14, 2019
8:30 am – 9:45 am
Technical Division: Materials Control & Accountability
Working Group Co-Chairs: Susan Smith and Cole Hexel
Mission: To share best experience, promote best measurement practice and be a forum for emerging ideas in the field of non-destructive assay.
Please note: Individual DA and NDA Working Group meetings will immediately follow the conclusion of this joint meeting.

DESTRUCTIVE ANALYSES WORKING GROUP
Sunday, July 14, 2019
10:00 am – 12:00 pm
Technical Division: Materials Control & Accountability
Working Group Chair: Cole Hexel
The Destructive Analyses (DA) Working Group meeting focuses on serving as a forum for the exchange of information, promoting best practices and sharing experiences related to analytical chemistry of nuclear materials. Additionally, the group will discuss standards of interest to the DA community.

NONDESTRUCTIVE ASSAY WORKING GROUP
Sunday, July 14, 2019
10:00 am – 12:00 pm
Technical Division: Materials Control & Accountability
Working Group Chair: Susan Smith
Mission: To share best experience, promote best measurement practice and be a forum for emerging ideas in the field of non-destructive assay.
You are invited to the INMM Nondestructive Assay (NDA) Working Group Meeting preceding the INMM Annual Meeting. The group’s aim is to share best experience, lessons learned, promote best measurement practice and be a forum for emerging ideas in the field of NDA. Join us for lively discussions and informative presentations.

CONTAINMENT AND SURVEILLANCE WORKING GROUP
Sunday, July 14, 2019
10:00 am – 12:00 pm
Technical Division: Materials Control & Accountability
Working Group Chair: Heidi Smartt
Mission: To share best practices and new concepts for implementing containment and surveillance technologies.

OPEN SOURCE AND GEOSPATIAL INFORMATION (OSGI) WORKING GROUP
Sunday, July 14, 2019
10:00 am - 12:00 pm
Joint Meeting with Safeguards Information Management Working Group
Technical Division: International Safeguards
Working Group Co-Chairs: Zoe Gastelum and Yana Feldman
Mission: To promote the use of open-source and geospatial information for addressing some of the most difficult international safeguards and nonproliferation challenges of the day, and to examine the issues, challenges and opportunities of leveraging these expanding information sources and technologies within a safeguards and nonproliferation perspective. This working group shares experiences, expertise and expectations regarding the emerging open source and geospatial information technologies for safeguards and arms control while providing a dedicated forum for the open and free exchange of ideas and concepts in the domain of open-source and geospatial information.
INMM Working Group Meetings

SAFEGUARDS INFORMATION MANAGEMENT (SIM) WORKING GROUP
Sunday, July 14, 2019
10:00 am - 12:00 pm
*Joint meeting with Open Source/Geospatial Information Working Group
Technical Division: International Safeguards
Working Group Chair: Gary Hirsch
The working group on Safeguards Information Management (SIM) will focus on good practices and new concepts and approaches for reporting to the IAEA, with an objective of more efficient and effective international safeguards. Focus will include efforts for reporting such as under Comprehensive Safeguards Agreements, Additional Protocols, and Voluntary Offer Agreements.

TECHNICAL COMMITTEE MEETINGS

ASC INMM N15/5.1 Analytical Chemistry Laboratory Subcommittee
Sunday, July 14, 2019
12:00 pm – 2:00 pm
The INMM ASC N15/5.1 Analytical Chemistry Laboratory Measurement Control Committee will meet to discuss the following items:
• Future work by INMM ASC N15/5.1 Subcommittee (input from members and others).

Chino Srinivasan
INMM ASC N15/5.1 Subcommittee Chair
b.srinivasan@science.doe.gov

Melanie May
INMM ASC N15 Chair
melanie.may@hq.doe.gov

ASC N15 Technical Standards
Tuesday, July 16, 2019
12:00 pm – 2:00 pm
The INMM Accredited Standards Committee (ASC) N15, Methods of Nuclear Material Control, is responsible for developing and maintaining voluntary consensus standards in the fields of nuclear material accounting, control and physical protection. These standards guide the practices of professionals responsible for safeguarding nuclear material within the United States and are referenced in the regulatory documents of both the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. All those interested in the development, review, revision, maintenance and issuance of American National Standards are welcome to attend. We will discuss the status of current writing/revision activities, explore the need for additional standards, and identify actions to be taken on standards over the next several months.

Melanie May
INMM ASC N15 Chair
melanie.may@hq.doe.gov

Lynne Preston
INMM ASC N15 Vice Chair
lynne.preston@hq.doe.gov

Chino Srinivasan
INMM ASC N15 Secretary
b.srinivasan@science.doe.gov

Jackie Shipwash
N15 Board Writing Team Liaison
Jackie.Shipwash@tetratech.com
Technical Division Meetings

FACILITY OPERATIONS
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

The Facility Operations Technical Division continued developing the organization and interest for this Technical Division throughout the past year. The chairs for the subcommittees will again present a briefing and/or discussion about their subcommittees and encourage participation from others with common interests. This year’s focus will be the incorporation of robotics in the operations of nuclear facilities. Annual meeting participants with an interest in fuel cycle and facilities and operations involved with nuclear materials are encouraged to attend this year’s meeting to share best practices and challenges in domestic and international, commercial and government facilities and operations. Invitations will be sent to members soliciting participation for the Technical Division Meeting as well as the annual meeting.

Ben Watts, Chair
Tetra Tech HEI
+1-865-483-7007
ben.watts@tetratech.com

INTERNATIONAL SAFEGUARDS
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

The International Safeguards Division (ISD) meeting will feature a discussion of current topics of interest in international safeguards and recent safeguards developments by participants from around the world. Dr. Stephan Lechner will discuss safeguards applications for commercial technology and Cindy Vestergaard will discuss Safeguards for deep geological repositories. Informal reports will be provided by the international inspectorates: IAEA, Euratom, and ABACC and updates will be provided by other international organizations: ESARDA, APSN, and WINS. The International Safeguards sessions in the annual meeting technical program will be introduced and other upcoming international events will be announced.

Michael Whitaker, Chair
Oak Ridge National Laboratory
+1-865-576-1682
whitakerjm@ornl.gov

MATERIALS CONTROL AND ACCOUNTABILITY
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

The Materials Control and Accountability (MC&A) Technical Division provides interested individuals an opportunity to hear and share updates about MC&A-related issues from a variety of international perspectives. The meeting will also include informal discussions about policies, best practices, measurements, standards, areas for involvement, and the opportunity to provide input to the future direction of the MC&A Technical Division. In addition, there will be two concurrent meetings Sunday morning. The Nondestructive Assay Users Group and the Destructive Assay Users Group will each meet from 10:00 am – 12:00 pm to focus on recent trends and best practices in their respective areas.

Thomas Grice, Chair
U.S. Nuclear Regulatory Commission
+1-404-997-4477
thomas.grice@nrc.gov

Phil Gibbs, Deputy Chair
Oak Ridge National Laboratory
+1-865-574-3848
gibbspw@ornl.gov
NONPROLIFERATION AND ARMS CONTROL
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

The Nonproliferation and Arms Control Technical Division (NAC) will host informal discussions on high-profile issues related to International Partnership for Nuclear Disarmament Verification, Use of Highly Enriched Uranium in Space, Iran, and Negotiating with the DPRK. Join us to engage with technical and policy professionals on this broad range of important topics!

Mona Dreicer, Chair
Lawrence Livermore National Laboratory
+1-925-422-7588
dreicer1@llnl.gov

Nina Rosenberg, Deputy Chair
Los Alamos National Laboratory
+1-505-665-7487
nina@lanl.gov

NUCLEAR SECURITY AND PHYSICAL PROTECTION
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

The planned agenda for the Nuclear Security and Physical Protection Technical Division will cover a wide variety of topics, to include a discussion of the physical and cyber security for advanced reactors and their associated fuel cycle facilities, a presentation on ANSI Standards under the auspices of the INMM, a status update on the World Institute of Nuclear Security (WINS), an overview of the upcoming Workshop on Emerging Issues in Nuclear Security, as well as a discussion of potential topics for a workshop on risk-informing security that will be planned for the first half of 2020.

Joseph Rivers
U.S. Nuclear Regulatory Commission
+1-301-287-3596
Joseph.rivers@nrc.gov

K.J. Maddux, Deputy Chair
IB3 Global Solutions
865-310-8312
kj.maddux@ib3-global.com

PACKAGING, TRANSPORTATION AND DISPOSITION
Sunday, July 14, 2019 • 2:00 pm - 5:00 pm

- Welcome & Introductions – Robert Watkins
- Planning for the INMM 35th Spent Fuel Management Seminar – Bradley Loftin
- Planning for PATRAM 2019 – Robert Watkins
- Technical Program – Doug Ammerman
  - Industry Participation
  - International Participation
  - Sponsorship
  - PATRAM Event Logistics

Jeff England, Chair
NAC International
+1-803-725-4762
jengland@nacintl.com

Robert Watkins, Deputy Chair
Savannah River Nuclear Solutions
+1-803-557-8203
robert.watkins@srnl.doe.gov
Why Publish in The JNMM?
The Journal of Nuclear Materials Management (JNMM) is the only international scholarly journal in the field of nuclear materials management. The JNMM provides a forum for the exchange of ideas and information related to the technical divisions of the Institute. Specific areas of interest include facility operations, international safeguards, materials control and accountability, nonproliferation and arms control, packaging, transportation and disposition, nuclear security and physical protection.

The JNMM is digitally published four times a year by the INMM and covers articles of topical interest as well as:

- Annual meeting highlights, papers and roundtable discussions
- Industry news
- Book reviews

To submit a manuscript, please contact dbright@inmm.org
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- Industry news
- Book reviews

To submit a manuscript, please contact dbright@inmm.org
INMM Workshop on Emerging Issues in Nuclear Security 2019

SAVE THE DATE: August 5-6, 2019

LOCATION: Harvard Kennedy School, Cambridge, MA, USA

PRESENTED BY: The Institute of Nuclear Materials Management and Project on Managing the Atom at the Belfer Center for Science and International Affairs

REGISTRATION FEES:

<table>
<thead>
<tr>
<th>Registration Type</th>
<th>Registration Fee</th>
</tr>
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<tbody>
<tr>
<td>Members:</td>
<td>$350</td>
</tr>
<tr>
<td>Non Members:</td>
<td>$400</td>
</tr>
<tr>
<td>Students:</td>
<td>$75</td>
</tr>
</tbody>
</table>

This workshop will focus on three emerging issues in nuclear security:
- Drones/unmanned aerial vehicles (UAVs)
- Modeling and simulation
- Cyber security

Each of these will be covered on one day of the workshop, with a mix of presentations and panel discussions. It is anticipated that the attendees will include professionals from the government NGOs, academics, commercial nuclear industry, and government laboratories.

Visit http://www.inmm.org for the preliminary agenda, accommodations, and more information.

Develop your career and learn how emerging digital trends can be applied to Nonproliferation and Nuclear Security.

April 22-24 2020 | Lawrence Livermore National Laboratory (LLNL) Livermore, CA

Suitable for all levels of expertise—from students and early career professionals to senior experts—this workshop combines presentations, poster sessions, and technology demonstrations. There will be networking opportunities with emerging technology leaders working in industry, labs, and academia. Optional tours will be available on April 24, 2020.

Registration will open in September 2019, go to www.inmm.org.

Key deadlines:
- Abstract submissions: Feb 1, 2020

Visit www.inmm.org for our call for abstracts.

Sponsorship opportunities available.

For more information, email EDT-INMM@llnl.gov.
9th INMM/ESARDA/INMMJ Joint Workshop in Tokyo

The Institute of Nuclear Materials Management (INMM), the European Safeguards Research and Development Association (ESARDA), and the INMM Japan Chapter (INMMJ) are pleased to announce the workshop: Future Challenges for the Enhancement of International Safeguards and Nuclear Security. This is the ninth workshop in the series and the third to be hosted by the INMM Japan Chapter.

SAVE THE DATE: October 7-10, 2019
LOCATION: Tokyo International Exchange Center (TIEC) Plaza HEISEI (3rd & 4th floor), Tokyo Japan

REGISTRATION:

<table>
<thead>
<tr>
<th>Registration Type</th>
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</thead>
<tbody>
<tr>
<td>INMM &amp; ESARDA Members</td>
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<tr>
<td>Sustaining Members</td>
<td>$375</td>
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<tr>
<td>Non-Members</td>
<td>$400</td>
</tr>
<tr>
<td>Students</td>
<td>$50</td>
</tr>
<tr>
<td>Banquet Ticket for Companion</td>
<td>$30 (All Prices are in USD)</td>
</tr>
</tbody>
</table>

Registration fee includes opening plenary session and all technical sessions, welcoming reception, workshop banquet, and coffee break.

Visit http://www.inmm.org for the preliminary agenda, accommodations, and more information.
General Information

FULL REGISTRATION

Participation in the INMM 60th Annual Meeting is limited to registered attendees. Full registration includes:

• Daily Plenary Sessions
• Technical sessions and poster session (Monday – Thursday)
• Technical Division meetings
• Meeting Program
• Access to Annual Meeting Mobile App
• Exhibit Hall access
• President’s Reception
• Daily refreshment breaks
• INMM Annual Business Meeting
• Access to the 60th Annual Meeting Proceedings online

REGISTRATION DESK HOURS — NORTH REGISTRATION

The INMM Registration Desk will be open during the following times:

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday, July 14</td>
<td>12:00 pm – 5:00 pm</td>
</tr>
<tr>
<td>Monday, July 15</td>
<td>6:45 am – 12:00 pm</td>
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<tr>
<td></td>
<td>1:30 pm – 5:00 pm</td>
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<tr>
<td>Tuesday, July 16</td>
<td>6:45 am – 12:00 pm</td>
</tr>
<tr>
<td></td>
<td>1:30 pm – 5:00 pm</td>
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<tr>
<td>Wednesday, July 17</td>
<td>6:45 am – 12:00 pm</td>
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<tr>
<td></td>
<td>1:30 pm – 5:00 pm</td>
</tr>
<tr>
<td>Thursday, July 18</td>
<td>6:45 am – 12:00 pm</td>
</tr>
</tbody>
</table>

BADGE INFORMATION

All attendees must wear their registration badge to participate in the INMM 60th Annual Meeting.

White — Member
Yellow — Nonmember
Ivory — Companion
Peach — Exhibit Hall Access Only

https://www.abstractsonline.com/pp8/#I7866
General Information

**Speaker Ready Room**

**Location:** Directors Suite 4

<table>
<thead>
<tr>
<th>Day</th>
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<td>6:30 am – 11:30 am</td>
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</tbody>
</table>

Speakers and Presenters are required to bring their presentations to the Speaker Ready Room the day before their session.

**Download the Annual Meeting Mobile App!**

1. Download Attendify in the Apple App Store or the Google Play Store
2. In the search bar select "Have an Event Code?"
3. Use Code: INMM60
4. Select Join
5. Create an Account

https://www.abstractsonline.com/pp8/#i/7866

www.inmm.org/Events/Annual-Meeting #INMM19
General Information

**ATTIRE**
The attire for the annual meeting is business casual with the exception of the President’s Reception, Opening Plenary Session and the Closing Plenary Session. Business attire is requested for these functions.

**EXHIBIT INFORMATION**
The INMM 60th Annual Meeting will be highlighted by an exposition featuring displays by leading vendors and technology providers. The exhibit hall is located in the Desert Salon 7. The list of exhibitors begins on page 101.

**NEW IN 2019**

**Unopposed Exhibit Hall Hours**
You no longer need to decide to between attending a session and seeing what our exhibitors have to offer. Relax between sessions with refreshments and take your time moving through the hall.

**Exhibitor Passport Program**
Don’t forget to complete your Exhibit Hall Passport by visiting each exhibit booth to get a stamp or sticker. Entering the completed exhibit passport into the raffle could win you a prize! Participants must be in attendance to win. Prize announcements will take place during the final exhibit hall break on Wednesday morning.

**EXHIBIT HOURS**

<table>
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</thead>
<tbody>
<tr>
<td>Sunday, July 16</td>
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<tr>
<td>Monday, July 15</td>
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<tr>
<td>Tuesday, July 16</td>
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<td></td>
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</tr>
</tbody>
</table>

**MEETING ROOMS**
A floor plan of the meeting facilities is on page 22 of this program.

**MESSAGE CENTER**
INMM will provide a message board for conference attendees located at Registration in the Desert Ballroom Foyer. Messages will be posted by last name. Please remove your messages after you have received them. You may use this to post business and personal messages.
General Information

MEETING EVALUATION
The INMM Technical Program Committee needs your input to improve future INMM Annual Meetings. An electronic evaluation will be made available to you shortly after the meeting. Please complete it.

AD HOC MEETINGS
For your convenience, the Griffin and Directors Suite 7 rooms will be available for attendees to use at the INMM 60th Annual Meeting for ad hoc meetings. The rooms will be available from 8 am – 8 pm on Monday, July 15, through Wednesday, July 17. On Thursday, July 18 we will utilize Directors Suite 3 instead of Directors Suite 7. Both rooms will be available from 8 am – 3 pm on Thursday. The meeting rooms will be set for 20 people (conference style) with perimeter seating. The meeting rooms are available on a first-come, first-served basis. Sign-up sheets will be posted outside of each room. Ad hoc meetings are limited to one hour per meeting.

ANNUAL MEETING PROCEEDINGS
The INMM 60th Annual Meeting Proceedings will be available online. Complimentary online access is provided to full registration attendees and INMM members. Daily registration does not include access to the proceedings. However, online access is available for purchase on the INMM website. For additional information, contact INMM headquarters after the meeting at inmm@inmm.org. Once the proceedings are uploaded, you will be notified with instructions on how to access.

PARKING
Parking is complimentary to INMM Annual Meeting attendees. For those staying at the JW Marriott, please confirm with the front desk upon check-in that your are with INMM and that you will have a vehicle staying on property during your stay. For those not staying at the JW Marriott, you do not need to stop at the front desk or have a parking pass.

Questions? Stop by the Registration Desk for answers.
JW Marriott Desert Springs Floor Plan
Program At A Glance

TECHNICAL DIVISION LEGEND
FO Facility Operations
MC&A Materials Control & Accountability
ET Education & Training
NSPP Nuclear Security and Physical Protection
IS International Safeguards
PT&D Packaging, Transportation & Disposition
NAC Nonproliferation & Arms Control

SUNDAY, JULY 14

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am - 9:45 am</td>
<td>Joint DA/NDA Working Group</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>9:00 am - 11:00 am</td>
<td>Safeguards Applications for Advanced Reactors</td>
<td>Griffin Room</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>Joint Open Source/Geospatial and Safeguards Information Working Group</td>
<td>Santa Rosa Ballroom</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>DA Working Group</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>NDA Working Group</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>Containment and Surveillance Working Group</td>
<td>Directors Suite 3</td>
</tr>
<tr>
<td>11:00 am - 12:00 pm</td>
<td>NAC Subcommittee on Export Controls Working Group</td>
<td>Directors Suite 5</td>
</tr>
<tr>
<td>12:00 pm - 5:00 pm</td>
<td>Registration Open</td>
<td>North Registration</td>
</tr>
<tr>
<td>12:00 pm - 5:00 pm</td>
<td>Speaker Ready Room Open</td>
<td>Directors Suite 4</td>
</tr>
<tr>
<td>2:00 pm - 5:00 pm</td>
<td>Technical Division Meetings</td>
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</tr>
<tr>
<td></td>
<td>International Safeguards</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td></td>
<td>Packaging, Transportation &amp; Disposition</td>
<td>Griffin Room</td>
</tr>
<tr>
<td></td>
<td>Materials Control &amp; Accountability</td>
<td>Santa Rosa Ballroom</td>
</tr>
<tr>
<td></td>
<td>Nuclear Security &amp; Physical Protection</td>
<td>Directors Suite 7</td>
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<tr>
<td></td>
<td>Nonproliferation &amp; Arms Control</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td></td>
<td>Facility Operations</td>
<td>Directors Suite 3</td>
</tr>
<tr>
<td>6:00 pm - 8:30 pm</td>
<td>President’s Exhibit Hall Welcome Reception</td>
<td>Desert Salon 7</td>
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## Program At A Glance

### MONDAY, JULY 15

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<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>6:30 am - 4:30 pm</td>
<td>Speaker Ready Room Open</td>
<td>Directors Suite 4</td>
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<tr>
<td>6:45 am - 12:00 pm</td>
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<td>North Registration</td>
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<tr>
<td>7:00 am - 7:45 am</td>
<td>Speaker Breakfast</td>
<td>Santa Rosa Ballroom</td>
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<tr>
<td>8:00 am - 8:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Griffin Room</td>
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<tr>
<td>8:00 am - 8:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Directors Suite 7</td>
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<td>8:00 am - 9:00 am</td>
<td>Companion Program Welcome Coffee House</td>
<td>Griffin Room</td>
</tr>
<tr>
<td>8:00 am - 8:45 am</td>
<td>Welcome and Awards Ceremony</td>
<td>Desert Salon 8</td>
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<tr>
<td>8:45 am - 10:00 am</td>
<td>Opening Plenary</td>
<td>Desert Salon 8</td>
</tr>
<tr>
<td>10:00 am - 10:45 am</td>
<td>Exhibit Hall/Poster Viewing/Refreshment Break</td>
<td>Desert Salon 7</td>
</tr>
<tr>
<td>10:50 am - 12:30 pm</td>
<td>Concurrent 1 (Technical Session 1)</td>
<td>Desert Salon 8</td>
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<tr>
<td>Session A</td>
<td>IS Panel: Discussion on Strengthening SSACs</td>
<td>Desert Salon 8</td>
</tr>
<tr>
<td>Session B</td>
<td>FO Nuclear Material Recovery for Reuse</td>
<td>Desert Salon 4-6</td>
</tr>
<tr>
<td>Session C</td>
<td>MC&amp;A Neutron Methods I</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>Session D</td>
<td>NAC Export Control</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td>Session E</td>
<td>NAC Neutrons for Nonproliferation</td>
<td>Desert Salon 12-14</td>
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<tr>
<td>Session F</td>
<td>IS Panel: What is in a Blockchain: from Bitcoin to Nuclear Materials Management</td>
<td>Springs Ballroom AB</td>
</tr>
<tr>
<td>Session G</td>
<td>NSPP Policy</td>
<td>Springs Ballroom C</td>
</tr>
<tr>
<td>12:30 pm - 2:00 pm</td>
<td>Lunch on your own</td>
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<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Registration Open</td>
<td>North Registration</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Concurrent 2 (Technical Sessions 2)</td>
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<td>Session A</td>
<td>IS Enhancing IAEA Safeguards</td>
<td>Desert Salon 8</td>
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<td>Session B</td>
<td>IS Best Practices in Safeguards Information Management I</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td>Session C</td>
<td>FO Facility Monitoring</td>
<td>Springs Ballroom AB</td>
</tr>
<tr>
<td>Session D</td>
<td>MC&amp;A Neutron Methods II</td>
<td>Desert Salon 9-11</td>
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<td>Session E</td>
<td>MC&amp;A NBL/Lab Oversight</td>
<td>Desert Salon 12-14</td>
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<tr>
<td>Session F</td>
<td>NAC Neutron Detection Technology</td>
<td>Desert Salon 4-6</td>
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<tr>
<td>Session G</td>
<td>NSPP Culture</td>
<td>Springs Ballroom C</td>
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Program At A Glance

MONDAY, JULY 15 (CONTINUED)

<table>
<thead>
<tr>
<th>Time</th>
<th>Room Assignment</th>
<th>Session A Description</th>
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<tbody>
<tr>
<td>3:40 pm - 4:25 pm</td>
<td>Exhibit Hall/Poster Viewing/Refreshment Break</td>
<td>IS Reflection on Implementing Safeguards</td>
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<tr>
<td>4:30 pm - 5:50 pm</td>
<td>Concurrent 3 (Technical Sessions 3)</td>
<td>Session B Advances in Measurement Systems Desert Salon 9-11</td>
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<tr>
<td>4:30 pm - 5:50 pm</td>
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<td>Session C Proliferation Challenges Desert Salon 4-6</td>
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<tr>
<td>4:30 pm - 5:50 pm</td>
<td>Concurrent 3 (Technical Sessions 3)</td>
<td>Session D Best Practices in Safeguards Information Management II Desert Salon 1-3</td>
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<td>4:30 pm - 5:50 pm</td>
<td>Concurrent 3 (Technical Sessions 3)</td>
<td>Session F Security for Emerging Technologies Desert Salon 12-14</td>
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<tr>
<td>4:30 pm - 5:50 pm</td>
<td>Concurrent 3 (Technical Sessions 3)</td>
<td>Session G Disposition Springs Ballroom AB</td>
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<td>6:00 pm - 7:00 pm</td>
<td>Pacific Northwest Regional and Student Chapters Meeting</td>
<td>Desert Salon 8</td>
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<tr>
<td>6:00 pm - 7:00 pm</td>
<td>Southwest Professional Chapter Meeting</td>
<td>Desert Salon 12-14</td>
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TUESDAY, JULY 16

<table>
<thead>
<tr>
<th>Time</th>
<th>Room Assignment</th>
<th>Session A IS Spent Fuel and Repositories I Desert Salon 8</th>
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<tr>
<td>8:00 am - 8:45 am</td>
<td>Concurrent 4 (Technical Sessions 4)</td>
<td>Session B FO Isotope Production and Recovery Desert Salon 9-11</td>
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<tr>
<td>8:00 am - 8:45 am</td>
<td>Concurrent 4 (Technical Sessions 4)</td>
<td>Session C MC&amp;A Reference Materials and Analytical Methods I Desert Salon 1-3</td>
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<tr>
<td>8:00 am - 8:45 am</td>
<td>Concurrent 4 (Technical Sessions 4)</td>
<td>Session D NAC Panel: Portal Monitoring Desert Salon 4-6</td>
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## Program At A Glance

### TUESDAY, JULY 16 (CONTINUED)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Organizer</th>
<th>Topic</th>
<th>Room Assignment</th>
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<tr>
<td>9:00 am - 11:00am</td>
<td>Session E</td>
<td>NSPP</td>
<td>Panel: Insider Threat Mitigation</td>
<td>Springs Ballroom AB</td>
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<tr>
<td>9:00 am - 11:00am</td>
<td>Session F</td>
<td>E&amp;T</td>
<td>The Importance of Communication</td>
<td>Desert Salon 12-14</td>
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<td>10:15 am - 11:00 am</td>
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<td>Companion Program Living Safari Private Tour with Giraffe Feeding</td>
<td>Offsite</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session A</td>
<td>IS</td>
<td>Spent Fuel and Repositories II</td>
<td>Desert Salon 9-11</td>
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<td>11:00 am - 12:20 pm</td>
<td>Session B</td>
<td>IS</td>
<td>Safeguards Design Considerations and Emerging Ideas</td>
<td>Desert Salon 8</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session C</td>
<td>MC&amp;A</td>
<td>Reference Materials and Analytical Methods II</td>
<td>Desert Salon 1-3</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session D</td>
<td>NAC</td>
<td>Arms Control Verification I</td>
<td>Desert Salon 4-6</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session E</td>
<td>E&amp;T</td>
<td>Panel: Communication</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session F</td>
<td>NSPP</td>
<td>Technical Approaches</td>
<td>Springs Ballroom AB</td>
</tr>
<tr>
<td>12:30 pm - 2:00 pm</td>
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<td>Lunch on your own</td>
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<td>1:30 pm - 5:00 pm</td>
<td>Registration Open</td>
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<td>North Registration</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Session A</td>
<td>IS</td>
<td>Antineutrinos and Research Reactors</td>
<td>Desert 12-14</td>
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<td>2:00 pm - 3:40 pm</td>
<td>Session B</td>
<td>FO</td>
<td>Nuclear Material Storage and Surveillance</td>
<td>Springs Ballroom AB</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Session C</td>
<td>MC&amp;A</td>
<td>Nuclear Standards and Statistical Approaches I</td>
<td>Desert Salon 1-3</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Session D</td>
<td>NAC</td>
<td>International Security Issues I</td>
<td>Desert Salon 4-6</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Session E</td>
<td>PT&amp;D</td>
<td>Design, Analysis, and Packaging</td>
<td>Desert Salon 8</td>
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<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Session F</td>
<td>NSPP</td>
<td>Insider Mitigation</td>
<td>Springs Ballroom C</td>
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<td>2:00 pm - 3:40 pm</td>
<td>Session G</td>
<td>NSPP</td>
<td>Panel: Advanced Nuclear and Engagement with the INMM</td>
<td>Desert Salon 9-11</td>
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### 3:40 pm - 4:25 pm
- Exhibit Hall/Poster Presentations/ Refreshment Break

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Program At A Glance

TUESDAY, JULY 16 (CONTINUED)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session A</th>
<th>Session B</th>
<th>Session C</th>
<th>Session D</th>
<th>Session E</th>
<th>Session F</th>
<th>Session G</th>
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<tbody>
<tr>
<td>4:30 pm - 5:50 pm</td>
<td>IS IS</td>
<td>IS IS</td>
<td>MC&amp;A</td>
<td>NAC</td>
<td>NSPP</td>
<td>NAC</td>
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<td></td>
<td>Implementation of Safeguards at Facilities</td>
<td>Robotics and Unmanned Systems for Safeguards</td>
<td>Nuclear Standards and Statistical Approaches II</td>
<td>Arms Control Verification II</td>
<td>Improved Detection Technology</td>
<td>International Security Issues - South Asia</td>
<td>Panel: Advanced Nuclear and Engagement with the INMM II</td>
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<td>Room Assignment</td>
<td>Desert Salon 8</td>
<td>Desert Salon 12-14</td>
<td>Desert Salon 1-3</td>
<td>Desert Salon 4-6</td>
<td>Springs Ballroom C</td>
<td>Springs Ballroom AB</td>
<td>Desert Salon 9-11</td>
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6:15 pm - 7:15 pm POTAS Coordinator Meeting  Springs Ballroom C

6:30 pm - 8:00 pm Annual Business Meeting  Desert Salon 8

WEDNESDAY, JULY 17

6:30 am - 4:30 pm Speaker Ready Room Open  Directors Suite 4

6:45 am - 12:00 pm Registration Open  North Registration

7:00 am - 7:45 am Speaker Breakfast  Santa Rosa Ballroom

8:00 am - 8:00 pm Ad-Hoc Committee Room  Griffin Room

8:00 am - 9:00 am Companion Morning Meet Up  Concierge Desk

8:00 am - 8:45 am Morning Plenary  Desert Salon 8
## Program At A Glance

### WEDNESDAY, JULY 17 (CONTINUED)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tr>
<td><strong>8:50 am - 10:10 am</strong></td>
<td><strong>Concurrent 8 (Technical Sessions 8)</strong></td>
<td>Desert Salon 8</td>
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<tr>
<td>8:50 am - 10:10 am</td>
<td>Session A: MC&amp;A/ NAC - Data Science for Nonproliferation I (Joint Session)</td>
<td>Desert Salon 8</td>
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<tr>
<td>8:50 am - 10:10 am</td>
<td>Session B: MC&amp;A - Correlated Fission Physics, Transport and Applications IA</td>
<td>Desert Salon 9-11</td>
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<tr>
<td>8:50 am - 10:10 am</td>
<td>Session C: NAC - Panel: PU History I</td>
<td>Desert Salon 4-6</td>
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<tr>
<td>8:50 am - 10:10 am</td>
<td>Session D: IS - Information Collection &amp; Analysis for Safeguards &amp; Proliferation Detection I</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td><strong>10:15 am - 11:00 am</strong></td>
<td>Exhibit Hall/Poster Award/Prize Drawing/Refreshment Break</td>
<td>Desert Salon 7</td>
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<tr>
<td><strong>11:00 am - 12:20 pm</strong></td>
<td><strong>Concurrent 9 (Technical Sessions 9)</strong></td>
<td>Desert Salon 8</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session A: MC&amp;A/ NAC - Data Science for Nonproliferation II (Joint Session)</td>
<td>Desert Salon 8</td>
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<td>11:00 am - 12:20 pm</td>
<td>Session B: MC&amp;A - Correlated Fission Physics, Transport and Applications IB</td>
<td>Desert Salon 9-11</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session C: NAC - Panel: PU History II</td>
<td>Desert Salon 4-6</td>
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<tr>
<td>11:00 am - 12:20 pm</td>
<td>Session D: IS - Information Collection &amp; Analysis for Safeguards &amp; Proliferation Detection II</td>
<td>Desert Salon 1-3</td>
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<tr>
<td><strong>12:30 pm - 2:00 pm</strong></td>
<td>Lunch on your own</td>
<td></td>
</tr>
<tr>
<td><strong>1:30 pm - 5:00 pm</strong></td>
<td>Registration Open</td>
<td>North Registration</td>
</tr>
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# Program At A Glance

## WEDNESDAY, JULY 17 (CONTINUED)

### 2:00 pm - 3:20 pm

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<th>Session</th>
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<tr>
<td>Session A</td>
<td>MC&amp;A/ NAC Data Fusion and Monitoring for Nonproliferation I (Joint Session) Desert Salon 1-3</td>
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<tr>
<td>Session B</td>
<td>IS Implementation Experience Desert Salon 4-6</td>
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<tr>
<td>Session C</td>
<td>MC&amp;A Correlated Fission Physics, Transport and Applications 2A Desert Salon 9-11</td>
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<tr>
<td>Session D</td>
<td>NSPP Panel: Cyber Security Desert Salon 12-14</td>
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<tr>
<td>Session E</td>
<td>NSPP Panel: MNSR Project in Nigeria Springs Ballroom AB</td>
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### 3:20 pm - 3:40 pm

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<tr>
<td>Session A</td>
<td>MC&amp;A/ NAC Data Fusion and Monitoring for Nonproliferation II (Joint Session) Desert Salon 1-3</td>
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<tr>
<td>Session B</td>
<td>NAC Proliferation Resistance Desert Salon 4-6</td>
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<tr>
<td>Session C</td>
<td>IS Gamma Spectroscopy: Algorithm Springs Ballroom AB</td>
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<tr>
<td>Session D</td>
<td>E&amp;T Panel: Virtual Reality Desert Salon 8</td>
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<td>Session E</td>
<td>MC&amp;A Correlated Fission Physics, Transport and Applications 2B Desert Salon 9-11</td>
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<tr>
<td>Session F</td>
<td>MC&amp;A Panel: International Target Values Desert Salon 12-14</td>
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<td>NSPP Radioactive Materials Security Springs Ballroom C</td>
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### 3:40 pm - 5:00 pm

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<td>Session A</td>
<td>MC&amp;A/ NAC Data Fusion and Monitoring for Nonproliferation II (Joint Session) Desert Salon 1-3</td>
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<tr>
<td>Session B</td>
<td>NAC Proliferation Resistance Desert Salon 4-6</td>
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<tr>
<td>Session C</td>
<td>IS Gamma Spectroscopy: Algorithm Springs Ballroom AB</td>
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<tr>
<td>Session D</td>
<td>E&amp;T Panel: Virtual Reality Desert Salon 8</td>
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<tr>
<td>Session E</td>
<td>MC&amp;A Correlated Fission Physics, Transport and Applications 2B Desert Salon 9-11</td>
</tr>
<tr>
<td>Session F</td>
<td>MC&amp;A Panel: International Target Values Desert Salon 12-14</td>
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<td>Session G</td>
<td>NSPP Radioactive Materials Security Springs Ballroom C</td>
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</tbody>
</table>

### 5:00 pm –8:00 pm

<table>
<thead>
<tr>
<th>Session A</th>
<th>Concurrent 10 (Technical Sessions 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session A</td>
<td>MC&amp;A/ NAC Data Fusion and Monitoring for Nonproliferation II (Joint Session) Desert Salon 1-3</td>
</tr>
<tr>
<td>Session B</td>
<td>NAC Proliferation Resistance Desert Salon 4-6</td>
</tr>
<tr>
<td>Session C</td>
<td>IS Gamma Spectroscopy: Algorithm Springs Ballroom AB</td>
</tr>
<tr>
<td>Session D</td>
<td>E&amp;T Panel: Virtual Reality Desert Salon 8</td>
</tr>
<tr>
<td>Session E</td>
<td>MC&amp;A Correlated Fission Physics, Transport and Applications 2B Desert Salon 9-11</td>
</tr>
<tr>
<td>Session F</td>
<td>MC&amp;A Panel: International Target Values Desert Salon 12-14</td>
</tr>
<tr>
<td>Session G</td>
<td>NSPP Radioactive Materials Security Springs Ballroom C</td>
</tr>
</tbody>
</table>

### THURSDAY, JULY 18

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 am - 11:30 am</td>
<td>Speaker Ready Room Open Directors Suite 4</td>
</tr>
<tr>
<td>6:45 am - 12:00 pm</td>
<td>Registration Open North Registration</td>
</tr>
<tr>
<td>7:00 am - 7:45 am</td>
<td>Speaker Breakfast Santa Rosa Ballroom</td>
</tr>
<tr>
<td>8:00 am - 3:00 pm</td>
<td>Ad-Hoc Committee Room Griffin Room</td>
</tr>
<tr>
<td>8:00 am - 3:00 pm</td>
<td>Ad Hoc Committee Room Directors Suite 3</td>
</tr>
</tbody>
</table>

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## Program At A Glance

### THURSDAY, JULY 18 (CONTINUED)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am - 9:00 am</td>
<td>Companion Program Morning Meet-Up</td>
<td>Concierge Desk</td>
</tr>
<tr>
<td>8:00 am - 10:00 am</td>
<td>Concurrent 12 (Technical Sessions 12)</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>Session A</td>
<td>FO International Nuclear Materials Topics</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td>Session B</td>
<td>MC&amp;A Neutron Rodeo: A Multi-lab Assessment of Alternative NDA Methods for Fresh Fuel Assemblies</td>
<td>Desert Salon 8</td>
</tr>
<tr>
<td>Session C</td>
<td>MC&amp;A/NAC Nuclear Data for Nonproliferation (Joint Session)</td>
<td>Desert Salon 8</td>
</tr>
<tr>
<td>Session D</td>
<td>NAC/NSPP International Security Issues II (Joint Session)</td>
<td>Desert Salon 4-6</td>
</tr>
<tr>
<td>Session E</td>
<td>IS Gamma Spectroscopy: Hardware</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td>Session F</td>
<td>E&amp;T International Collaborations &amp; Lessons Learned</td>
<td>Springs Ballroom AB</td>
</tr>
<tr>
<td>Session G</td>
<td>NSPP New Technologies</td>
<td>Springs Ballroom C</td>
</tr>
<tr>
<td>10:00 am - 10:30 am</td>
<td>Refreshment Break</td>
<td>Desert Ballroom Foyer</td>
</tr>
<tr>
<td>10:30 am - 12:30 pm</td>
<td>Concurrent 13 (Technical Sessions 13)</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td>Session A</td>
<td>IS UF6 &amp; Enrichment Plants</td>
<td>Desert Salon 1-3</td>
</tr>
<tr>
<td>Session B</td>
<td>MC&amp;A Forensics / Destructive Analysis</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>Session C</td>
<td>NAC Panel: Verification</td>
<td>Desert Salon 4-6</td>
</tr>
<tr>
<td>Session D</td>
<td>E&amp;T Looking to the Future: Innovative Tools and Methods for Engagement</td>
<td>Springs Ballroom AB</td>
</tr>
<tr>
<td>Session E</td>
<td>NSPP Nuclear Power Plants/Sabotage</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td>12:30 pm - 2:00 pm</td>
<td>Lunch on your own</td>
<td></td>
</tr>
<tr>
<td>12:30 pm - 2:00 pm</td>
<td>Student Paper Competition Wrap-Up Meeting</td>
<td>Directors Suite 3</td>
</tr>
<tr>
<td>1:00 pm - 2:00 pm</td>
<td>Companion Program - Farewell Ice Cream Social</td>
<td>Griffin</td>
</tr>
<tr>
<td>2:00 pm - 4:00 pm</td>
<td>Closing Plenary Session</td>
<td>Desert Salon 8</td>
</tr>
</tbody>
</table>

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## Full Program Schedule

**TECHNICAL DIVISION LEGEND**

<table>
<thead>
<tr>
<th>FO</th>
<th>Facility Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC&amp;A</td>
<td>Materials Control &amp; Accountability</td>
</tr>
<tr>
<td>ET</td>
<td>Education &amp; Training</td>
</tr>
<tr>
<td>NSPP</td>
<td>Nuclear Security and Physical Protection</td>
</tr>
<tr>
<td>IS</td>
<td>International Safeguards</td>
</tr>
<tr>
<td>PT</td>
<td>Packaging, Transportation &amp; Disposition</td>
</tr>
<tr>
<td>NAC</td>
<td>Nonproliferation &amp; Arms Control</td>
</tr>
</tbody>
</table>

### SUNDAY, JULY 14, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am - 9:45 am</td>
<td>Joint DA/NDA Working Group</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>9:00 am - 11:00 am</td>
<td>Safeguards Applications for Advanced Reactors</td>
<td>Director's Suite 7</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>Joint Meeting Open Source Geospatial and Safeguards Information Management (SIM) Working Groups</td>
<td>Santa Rosa Ballroom</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>DA Working Group</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>NDA Working Group</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>Containment and Surveillance Working Group</td>
<td>Directors Suite 3</td>
</tr>
<tr>
<td>11:00 am - 12:00 pm</td>
<td>NAC Subcommittee on Export Controls Working Group</td>
<td>Directors Suite 5</td>
</tr>
<tr>
<td>12:00 pm - 5:00 pm</td>
<td>Registration Open</td>
<td>North Registration</td>
</tr>
<tr>
<td>12:00 pm - 5:00 pm</td>
<td>Speaker Ready Room Open</td>
<td>Directors Suite 4</td>
</tr>
<tr>
<td>1:00 pm - 2:00 pm</td>
<td>Student Paper Competition Kick-Off</td>
<td>Director's Suite 7</td>
</tr>
<tr>
<td>2:00 pm - 5:00 pm</td>
<td><strong>Technical Division Meetings</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>International Safeguards</td>
<td>Desert Salon 12-14</td>
</tr>
<tr>
<td></td>
<td>Packaging, Transportation &amp; Disposition</td>
<td>Griffin Room</td>
</tr>
<tr>
<td></td>
<td>Materials Control &amp; Accountability</td>
<td>Santa Rosa Ballroom</td>
</tr>
<tr>
<td></td>
<td>Nuclear Security &amp; Physical Protection</td>
<td>Directors Suite 7</td>
</tr>
<tr>
<td></td>
<td>Nonproliferation &amp; Arms Control</td>
<td>Desert Salon 9-11</td>
</tr>
<tr>
<td></td>
<td>Facility Operations</td>
<td>Directors Suite 3</td>
</tr>
<tr>
<td>6:00 pm - 8:30 pm</td>
<td><strong>President's Exhibit Hall Welcome Reception</strong></td>
<td>Desert Salon 7</td>
</tr>
<tr>
<td>6:30 am - 5:00 pm</td>
<td>Speaker Ready Room Open</td>
<td>Directors Suite 4</td>
</tr>
</tbody>
</table>

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# Full Program Schedule

**MONDAY, JULY 15, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:45 am - 12:00 pm</td>
<td>Registration Open</td>
<td>North Registration</td>
</tr>
<tr>
<td>7:00 am - 7:45 am</td>
<td>Speaker Breakfast</td>
<td>Santa Rosa Ballroom</td>
</tr>
<tr>
<td>9:00 am - 8:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Griffin Room</td>
</tr>
<tr>
<td>8:00 am - 8:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Directors Suite 7</td>
</tr>
<tr>
<td>8:00 am - 9:00 am</td>
<td>Companion Welcome Coffee House</td>
<td>Griffin Room</td>
</tr>
<tr>
<td>8:00 am - 8:30 am</td>
<td><strong>Welcome and Awards Ceremony</strong></td>
<td>Desert Salon 8</td>
</tr>
</tbody>
</table>

**Welcome and Awards Ceremony**

Cary Crawford, INMM President

**Opening Plenary**

The Opening Plenary Session features two distinguished speakers who will offer their perspectives on a topic of their choice. Their prepared remarks will be followed by a question and answer session from the audience.

**Tammy Taylor**, Director of the International Data Centre (IDC) Division of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)

**Therese Renis**, Director of Division of Concepts and Planning in the Department of Safeguards of the International Atomic Energy Agency (IAEA)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am - 10:45 am</td>
<td>Exhibit Hall/Poster Viewing/Refreshment Break</td>
<td>Desert Salon 7</td>
</tr>
</tbody>
</table>
## Full Program Schedule

**MONDAY, JULY 15, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Concurrent 1 (Technical Session 1)</th>
</tr>
</thead>
</table>
| 10:50 am - 12:30 pm | Panel Discussion on Strengthening SSACs  
**Chair:** Haroldo Barroso  
**Co-Chair:** Laura Holgate |

**10:50 am - 12:30 pm**

The role of the State or regional system of accounting for and control of nuclear material (SSAC) is an important component of the safeguards system, as foreseen in safeguards agreements. Key themes that will be addressed are:

- The importance of the legal framework in the State and updating it when necessary to adapt to changes
- Resource and budget implications for the SSAC and how to plan adequately for changes
- Training and maintaining capability of staff in the SSAC
- Challenges faced in developing IT systems for reporting
- The role of a management system to control and direct the processes of the SSAC
- The role of partnership to assist States that are developing their SSAC

The expected outcome of the session will be the sharing of practical examples of how States have dealt with the challenges identified, what worked and didn’t work. Session participants will go away with tangible ideas for improving their own SSACs.

| Session B | FO | Nuclear Material Recovery for Reuse  
**Chair:** Leigh Gunn |
|-----------|----|----------------------------------------------------------------------------------|
| 10:50 am - 11:10 am | 116 - Recovery of Rare Actinides from Oak Ridge National Laboratory Legacy Nuclear Materials  
**Bradley Patton**, Tina Matta, Sharon Robinson.  
Oak Ridge National Laboratory, Oak Ridge, TN, USA. |
| 11:10 am - 11:30 am | 325 - SRNL Recent Progress in Recovery of Plutonium-244 and Heavy Actinides from Mark-18A Targets  
**William F. Swift.**  
Savannah River National Laboratory, Aiken, SC, USA. |
MONDAY, JULY 15, 2019

11:30 am - 11:50 am  
178 - Status of Surplus HEU Disposition in the U.S.  
Charles W. Irons.  
Consolidated Nuclear Security, LLC, Oak Ridge, TN, USA.

11:50 am - 12:10 pm  
271 - Spent Nuclear Fuel Disposition at the Savannah River Site  
Virginia E. Magoulas.  
Savannah River National Laboratory, Aiken, SC, USA.

Session C  MC&A    Neutron Methods I  Desert Salon 9-11
Chair: Shikha Prasad  
Co-Chair: Angela Di Fulvio

10:50 am - 11:10 am  
166 - Simulation of Concept for Compact Single Volume Neutron Scatter Camera for Nuclear Safeguard Applications  
Taylor J. Harvey, Andreas Enqvist.  
University of Florida, Gainesville, FL, USA.

11:10 am - 11:30 am  
187 - Neutron Multiplicities of Cosmogenic Muon Interactions in High Z Materials  
Lisa M. Nguyen, Scott Kiff, Peter Marleau.  
1University of California Berkeley, Berkeley, CA, USA, 2Sandia National Laboratories, Livermore, CA, USA.

11:30 am - 11:50 am  
167 - Extension of the Böhnel model of multiplicity counting to include space- and angular dependence  
Imre Pázsit, Lénárd Pál, Andreas Enqvist.  
1Chalmers University of Technology, Goteborg, Sweden, 2Hungarian Academy of Sciences, Centre for Energy Research, Budapest, Hungary, 3University of Florida, Gainesville, FL, USA.

11:50 am - 12:10 pm  
197 - Multiplicity Counting for Thermal Neutrons from Fission Chamber Currents with Multi-point Time Distributions  
Lajos Nagy, Imre Pázsit, Lénárd Pál.  
1Budapest University of Technology and Economics, Budapest, Hungary, 2Chalmers University of Technology, Goteborg, Sweden, 3Hungarian Academy of Sciences, Centre for Energy Research, Budapest, Hungary.

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12:10 pm - 12:30 pm  152 - Enhancements to the Unattended Dual Current Monitor (UDCM) and Unattended Multiplicity Shift Register (UMSR) Prior to Commercialization
Matthew R. Newell, David C. Jones, Keith Morgan, Paul Graham, Metodi Iliev, Kiril Ianakiev. LANL, Los Alamos, NM, USA.

10:50 am - 12:30 pm

Session D  NAC  Export Control  Desert Salon 1-3
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Chair: Chris Beedle</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:50 am - 11:10 am</td>
<td>1191 - INMM NAC Subcommittee on Export Controls</td>
<td>Meli Swanson1, Amanda Sayre2. 1Sandia National Laboratories, Albuquerque, NM, USA, 2Pacific Northwest National Laboratory, Seattle, WA, USA.</td>
<td></td>
</tr>
<tr>
<td>11:10 am - 11:30 am</td>
<td>331 - Export Compliance and Supply Chain Security Challenges at an NNSA Laboratory</td>
<td>Karla Niemi. Los Alamos National Laboratory, Los Alamos, NM, USA.</td>
<td></td>
</tr>
<tr>
<td>11:30 am - 11:50 am</td>
<td>121 - Role of Nonproliferation at the NRC</td>
<td>Lauren M. Mayros. U.S. Nuclear Regulatory Commission, N. Bethesda, MD, USA.</td>
<td></td>
</tr>
<tr>
<td>11:50 am - 12:10 pm</td>
<td>176 - Public Involvement in Exports/Imports of Nuclear Material</td>
<td>Gary Langlie. U.S. Nuclear Regulatory Commission, N. Bethesda, MD, USA.</td>
<td></td>
</tr>
<tr>
<td>12:10 pm - 12:30 pm</td>
<td>126 - U.S. Policy and Implications on Nuclear Material and Component Exports</td>
<td>Peter J. Habighorst. U.S. Nuclear Regulatory Commission, N. Bethesda, MD, USA.</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
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<tr>
<th>Session E</th>
<th>NAC</th>
<th>Neutrons for Nonproliferation Chair: Chris Pickett Co-Chair: Vladimir Mozin</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:50 am - 11:10 am</td>
<td>215 - Simulation and Optimization of a Neutron Scatter Imager Based on Silicon Photomultipliers and Signal Multiplexing&lt;br&gt;Marc A. Wonders, Marek Flaska. Pennsylvania State University, University Park, PA, USA.</td>
<td></td>
</tr>
<tr>
<td>11:10 am - 11:30 am</td>
<td>221 - Low-Statistics Imaging of Weapons-Grade Plutonium using a Handheld Neutron Scatter Camera&lt;br&gt;William Steinberger, Marc Ruch, Nathan Giha, Angela Di-Fulvio, Shaun Clarke, Sara Pozzi. University of Michigan, Ann Arbor, MI, USA.</td>
<td></td>
</tr>
<tr>
<td>11:30 am - 11:50 am</td>
<td>315 - Experimental Validation of a Moderated Collimator for Zero-Knowledge Isotopic Discrimination&lt;br&gt;Mike Hepler¹, Alex Glaser¹, Robert J. Goldston², Francesco d’Errico³.&lt;br&gt;¹Princeton University, Princeton, NJ, USA, ²Princeton Plasma Physics Laboratory, Princeton, NJ, USA, ³Yale School of Medicine, New Haven, CT, USA.</td>
<td></td>
</tr>
<tr>
<td>11:50 am - 12:10 pm</td>
<td>387 - Optimization of a CONFIDANTE System&lt;br&gt;Rebecca Krentz-Wee¹, Peter Marleau².&lt;br&gt;¹University of California, Berkeley, Berkeley, CA, USA, ²Sandia National Labs, Livermore, CA, USA.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Session F</th>
<th>IS</th>
<th>Panel: What’s in a Blockchain: from Bitcoin to Nuclear Materials Management Chair: Cindy Vestergaard Co-Chair: Jay Disser</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:50 am - 12:30 pm</td>
<td></td>
<td>Bitcoin has been a much hyped and disruptive technology in the financial sector. However, the underlying technology, is moving beyond digital currencies. Distributed ledger technology (DLT) can provide parties in a network a consistent and immutable history of transactions for a range of fields from diamond trade to supply chain integrity. Can this technology be leveraged in the nuclear materials management field? This panel will explore key questions and considerations in applying DLT to nuclear supply chain and safeguards information management.</td>
</tr>
</tbody>
</table>

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**MONDAY, JULY 15, 2019**

| Session G | NSPP | Policy Chair: Dick Donovan  
Co-Chair: Daniel Johnson |
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<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Springs Ballroom C</strong></td>
</tr>
<tr>
<td><strong>10:50 am - 11:10 am</strong></td>
<td>131 - U.S. Department of Energy Development of Unacceptable Radiological Consequence Thresholds for Nuclear and Radiological Materials under the 2016 Design Basis Threat Policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joseph Sandoval(^1), Samuel Callahan(^2), Melanie May(^2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(^1)Sandia National Laboratories, Belen, NM, USA, (^2)US Department of Energy, Germantown, MD, USA.</td>
</tr>
<tr>
<td><strong>11:10 am - 11:30 am</strong></td>
<td>219 - Update on the Decline of the NRC’s Security Inspection Program</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Edwin Lyman.</td>
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<td></td>
<td>Union of Concerned Scientists, Washington, DC, USA.</td>
</tr>
<tr>
<td><strong>11:30 am - 11:50 am</strong></td>
<td>334 - Future Technical and Policy Challenges in Nuclear Security and Physical Protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marc A. Wonders, Matthew Durbin, Joshua R. Gallagher, Chad A. Lani, Azaree T. Lintereur.</td>
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<tr>
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<td></td>
<td>Pennsylvania State University, University Park, PA, USA.</td>
</tr>
<tr>
<td><strong>12:30 - 2:00 pm</strong></td>
<td>Lunch on your own</td>
<td></td>
</tr>
</tbody>
</table>
| **1:30 pm - 5:00 pm** | Registration Open  
**North Registration** |

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## Full Program Schedule

**MONDAY, JULY 15, 2019**

### Concurrent 2 (Technical Sessions 2)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>IS</th>
<th>Room Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm - 3:40 pm</td>
<td>Enhancing IAEA Safeguards Effectiveness at the State Level</td>
<td>Desert Salon 8</td>
<td></td>
</tr>
<tr>
<td>Session A</td>
<td>Chair: Julie Oddou Co-Chair: Carrie Mathews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00 pm - 2:20 pm</td>
<td>1412 - Performance Targets for Safeguards Effectiveness at the State Level</td>
<td>Desert Salon 8</td>
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</tr>
<tr>
<td></td>
<td>Mark Goodman¹, Dunbar Lockwood², J. Stephen Adams¹.</td>
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</tr>
<tr>
<td></td>
<td>¹U.S. Department of State, Washington, DC, USA. ²U.S. Department of Energy/National Nuclear Security Administration, Washington, DC, USA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:20 pm - 2:40 pm</td>
<td>189 - Monitoring of Performance to Improve Effectiveness of IAEA Safeguards</td>
<td>Desert Salon 8</td>
<td></td>
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<tr>
<td></td>
<td>Y-12 Nuclear Security Complex, Oak Ridge, TN, USA.</td>
<td></td>
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</tr>
<tr>
<td>2:40 pm - 3:00 pm</td>
<td>109 - Human Performance Testing on Observation Capture Methods for International Nuclear Safeguards Inspections: Transferring Knowledge from the Field to Headquarters and Back</td>
<td>Desert Salon 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zoe Gastelum, Laura Matzen, Mallory Stites, Heidi Smartt.</td>
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<td></td>
<td>Sandia National Laboratories, Albuquerque, NM, USA.</td>
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<tr>
<td>3:00 pm - 3:20 pm</td>
<td>232 - Implementation of Safeguards at the State level - Developments Based on Recent Experience</td>
<td>Desert Salon 1-3</td>
<td></td>
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<tr>
<td></td>
<td>Massimo Aparo, Therese Renis.</td>
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<td></td>
<td>International Atomic Energy Agency, Vienna, Austria.</td>
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### Best Practices in Safeguards - Information Management I

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<td>2:00 pm - 2:20 pm</td>
<td>Testing and Evaluation of the IAEA Safeguards State Declaration Portal (SDP) by the US Nuclear Materials Management and Safeguards System (NMMSS)</td>
<td>Desert Salon 1-3</td>
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<tr>
<td></td>
<td>Peter Dessaules², Richard Meehan¹, Mirabelle Shoemaker³, Ali Tabatabai³.</td>
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Full Program Schedule

MONDAY, JULY 15, 2019

2:20 pm - 2:40 pm  
241 - Intuitive, Secure SSAC with Language Capability
Sam L. Brown.
NAC International Inc, Norcross, GA, USA.

2:40 pm - 3:00 pm  
148 - Bringing IAEA Safeguards in the United States
into the 21st Century
David H. Hanks, Eduardo Sastre-Fuente.
US Nuclear Regulatory Commission, Washington, DC,
USA.

3:00 pm - 3:20 pm  
218 - Analysis of Shared Use Equipment for
Safeguards
Robert J. Finch, Michael C. Hamel, Heidi A. Smartt,
Natacha L. Peter-Stein.
Sandia National Laboratories, Albuquerque, NM, USA.

Session C  FO  Facility Monitoring  Springs Ballroom A
Chair: Leonard Manzanares

2:00 pm - 2:20 pm  
177 - Initial Assessment of Infrasound Signatures Tied
to Nuclear Facility Operations
David Chichester¹, Edna Cardenas¹, Karina Asmar²,
Anthony Christe², Milton Garces², Scott Watson¹, Thomas
Holschuh¹, Monica Maceira³.
¹Idaho National Laboratory, Idaho Falls, ID, USA,
²University of Hawai‘i, Manoa, HI, USA,
³Oak Ridge National Laboratory, Oak Ridge, TN, USA.

2:20 pm - 2:40 pm  
211 - Novel Low-Cost Approach for Acquiring High
Resolution High-Speed Data
Grady R. Wetherington, Jr.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

2:40 pm - 3:00 pm  
1405 - Comprehensive Monitoring of Reactor Opera-
tions with Fiber Optics
Will Ray, Matt Poska, Camila Ramirez.
Oak Ridge National Lab, Oak Ridge, TN, USA.
3:00 pm - 3:20 pm  
330 - Surveillance of SNM Containers Using Mobile Robotics  
Cheryl Brabec¹, David Grow², Cristy Abeyta¹, Sarah Pevey¹.  
¹Los Alamos National Laboratory, Los Alamos, NM, USA, ²New Mexico Institute of Mining and Technology, Socorro, NM, USA, ³NA-532, National Nuclear Security Administration, Germantown, MD, USA.

2:00 pm - 3:40 pm

Session D  
Neutron Methods II  
Chair: Shikha Prasad  
Co-Chair: Angela L. Lousteau

2:00 pm - 2:20 pm  
284 - VERYFUEL, A LIQUID SCINTILLATOR-BASED FAST NEUTRON COUNTER FOR FRESH NUCLEAR FUEL MEASUREMENTS  
Matteo Corbo¹, Francesco Pepe¹, Giovanni Cerretani¹, Massimo Morichi¹, Claudio Raffo¹, Mikhail Mayorov², Jonathan Beaumont², Tae Hoon Lee³.  
¹CAEN SpA, Viareggio, Italy, ²International Atomic Energy Agency, Vienna, Austria.

2:40 pm - 3:00 pm  
243 - Neural Network-Based Algorithm for Fast Neutron Detection in a Pulsed High-Photon Field  
Christopher A. Meert, Kyle E. Laferty, Abbas J. Jinia, Yueying Li, Cameron A. Miller, Hun Seok Kim, Shaun D. Clarke, David D. Wentzloff, Sara A. Pozzi.  
University of Michigan, Ann Arbor, MI, USA.

3:00 pm - 3:20 pm  
359 - A central limit approximation for dead time corrections in high rate measurements  
Chen Dubi¹, Rami Atar².  
¹Nuclear Research Center of the Negev, Beer Sheva, Israel, ²Technion, Haifa, Israel.

3:20 pm - 3:40 pm  
1411 - Genetic Algorithm for Spectrum Reconstruction of Neutron Sources  
Ian W. Halvic, Shikha Prasad.  
Texas A&M University, College Station, TX, USA.
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Session E  MC&A  NBL/Lab Oversight
Chair: Lynne Preston  Co-Chair: Stephan Richter

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<td>2:00 pm - 2:20 pm</td>
<td>154</td>
<td>NBL Program Office: 2018 Proficiency Testing Program</td>
<td>B SRINIVASAN¹, Alma Stiffin¹, William Guthrie², Hung-Kung Liu².</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>¹U.S. Department of Energy, Lemont, IL, USA, ²National Institute of Standards and Technology, Gaithersburg, MD, USA.</td>
</tr>
<tr>
<td>2:20 pm - 2:40 pm</td>
<td>173</td>
<td>Proficiency testing program to support nuclear material measurements and accountancy in Brazilian and Argentinian Laboratories at ABACC</td>
<td>Fabio Dias¹, Sonia Fernández Moreno¹, Luis Carlos R. Machado da Silva¹, Marcos Moreira¹, Anibal Bonino¹, B. Srinivasan².</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>¹ABACC, Rio de Janeiro, Brazil, ²NBL Program Office, Lemont, IL, USA.</td>
</tr>
<tr>
<td>2:40 pm - 3:00 pm</td>
<td>261</td>
<td>Effective use of Inspection samples as Intercomparison samples for the quality control in Safeguards analysis in Japan</td>
<td>Mika Sumi¹, Hiro Okazaki¹, Masashi Kayano¹, Kazutomi Matsuyama¹, Toru Suzuki¹, Erwin Kuhn².</td>
</tr>
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<td></td>
<td>¹Japan Atomic Energy Agency, Ibaraki, Japan, ²-, Vienna, Austria.</td>
</tr>
<tr>
<td>3:00 pm - 3:20 pm</td>
<td>321</td>
<td>Establishing a High-Precision Titration Laboratory at Oak Ridge National Laboratory to Support the NBL Program Office's Mission</td>
<td>Benjamin D. Roach¹, Kayron Rogers¹, Joseph Giaquinto¹, Ralph Ilgner¹, Cole Hexel¹, Haley Hesse¹, Anna Voeks², Nancy Hui², Alma Stiffin², Peter Mason².</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>¹Oak Ridge National Laboratory, Oak Ridge, TN, USA, ²NBL Program Office, Argonne, IL, USA.</td>
</tr>
<tr>
<td>3:20 pm - 3:40 pm</td>
<td>1420</td>
<td>Activities and Future Plans for the NBL Program Office</td>
<td>Peter Mason.</td>
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<td>US Department of Energy, Lemont, IL, USA.</td>
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<th>Session F</th>
<th>NAC</th>
<th>Neutron Detection Technology</th>
<th>Chair: Stefan Nonneman</th>
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<td>2:00 pm - 2:20 pm</td>
<td>184</td>
<td>Gamma-Ray and Fast-Neutron Rossi-alpha Measurements of Special Nuclear Material with Organic Scintillators</td>
<td>Michael Hua, John-Tyler Iacovetta, Shaun Clarke, Sara Pozzi. University of Michigan, Ann Arbor, MI, USA.</td>
<td></td>
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<tr>
<td>2:40 pm - 3:00 pm</td>
<td>329</td>
<td>A New Spin on Bubble Counting in Superheated Emulsion Neutron Detectors</td>
<td>Mike Hepler¹, Robert J. Goldston², Alexander Glaser¹, Joshua E.G. Peek³. ¹Princeton University, Princeton, NJ, USA, ²Princeton Plasma Physics Laboratory, Princeton, NJ, USA, ³Space Telescope Science Institute, Baltimore, MD, USA.</td>
<td></td>
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<tr>
<td>3:00 pm - 3:20 pm</td>
<td>312</td>
<td>Mechanical Design and Fabrication of Compact, Portable Nuclear Particle Detectors</td>
<td>Andrew Druetzler¹, Ryan Dorrill¹, Nathan Kaneshige¹, John G. Learned¹, Kurtis Nishimura¹, Avon Whitworth¹, Aline Galindo-Tellez¹, Kevin Keefe¹, Devin Schoen¹, Roger Diamond¹, Roy Tom¹, Melinda Sweany², Erik Brubaker². ¹University of Hawaii, Honolulu, HI, USA, ²Sandia National Laboratories, Livermore, CA, USA.</td>
<td></td>
</tr>
<tr>
<td>3:20 pm - 3:40 pm</td>
<td>254</td>
<td>The Single Volume Scatter Camera Project</td>
<td>Melinda Sweany, on behalf of the SVSC Collaboration. Sandia National Laboratories, Livermore, CA, USA.</td>
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| Session G | NSPP | Culture | Chair: Daniel Johnson  
| Co-Chair: David Diec | Springs Ballroom C |
|---|---|---|---|
| **2:00 pm - 2:20 pm** | 222 - Challenges of Integrated International Nuclear Security and Safety Culture Programs  
Paul Ebel\(^1\), Terry Kuykendall\(^2\).  
\(^1\)BE Inc., Aiken, SC, USA, \(^2\)Evolve Engineering & Analysis, LLC, Fort Walton Beach, FL, USA. | **222** | **222** |
| **2:20 pm - 2:40 pm** | 193 - Socio-Technical Interactions: A New Paradigm for Nuclear Security  
Adam D. Williams.  
Sandia National Laboratories, Albuquerque, NM, USA. | **193** | **193** |
| **2:40 pm - 3:00 pm** | 208 - Leading Indicators for Security Organizations  
Richard L. Donovan.  
U. S. Department of Energy, GTN Building, Washington, DC, USA. | **208** | **208** |
| **3:00 pm - 3:20 pm** | 322 - Exploring Security Culture and Leadership Governance for Radiological Material  
Trinh Le, Maria Lovely Umayam.  
Stimson Center, Washington, DC, USA. | **322** | **322** |
| **3:20 pm - 3:40 pm** | 225 - Specifics of formation of safety culture in the sociotechnical system of a nuclear facility  
Taisia Piskureva.  
Research Institute of Scientific Instruments, Lytkarino, Moscow region, Russian Federation. | **225** | **225** |
| **3:40 pm - 4:25 pm** | Exhibit Hall/Poster Viewing/Refreshment Break | Desert Salon 7 | Desert Salon 7 |

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<td>4:30 pm - 5:50 pm</td>
<td>Concurrent 3 (Technical Sessions 3)</td>
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<td><strong>Reflection on Implementing Safeguards</strong></td>
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<td><strong>Chair:</strong> Therese Renis</td>
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<td><strong>Co-Chair:</strong> Malinda Devaney</td>
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| 4:30 pm - 4:50 pm | **138 - Sixty Years On, Time for Reflection on IAEA Safeguards?**  
                             **James A. Larrimore.**  
                             Former IAEA Senior Staff and Consultant to the Department of Safeguards, IAEA, Del Mar, CA, USA. |
| 4:50 pm - 5:10 pm | **265 - Safeguards in France: 60 Years of History & Recent Developments**  
                             **Julie ODDOU, François Bonino.**  
                             Comité Technique Euratom, Gif-sur-Yvette, France. |
| 5:10 pm - 5:30 pm | **266 - 30-year Cooperation Between US-Japan in Area of Nuclear Nonproliferation and Nuclear Security**  
                             **Hirofumi Tomikawa¹, Yoko Kawakubo¹, Naoko Noro¹, Masato Hori¹, Yosuke Naoi¹, Kathryn Glynn², Brian Abeyta², Deborah Dale³, Michael Browne³, Adrienne LaFleur³, Howard Menlove³, Kevin Veal².**  
                             ¹Japan Atomic Energy Agency, Tokai-mura, Japan, ²Department of Energy, Washington, DC, USA, ³Los Alamos National Laboratory, Los Alamos, NM, USA. |
| 5:30 pm - 5:50 pm | **123 - Reminiscences**  
                             **Dr. T. Douglas Reilly**  
                             Retired, White Rock, NM, USA |
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<th>MC&amp;A</th>
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**MONDAY, JULY 15, 2019**

**Room Assignment**

**Session B**  
**MC&A**  
**Advances in Measurement Systems**

**Chair:** Susan Smith  
**Co-Chair:** Azaree Lintereur

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<tr>
<td>4:30 pm</td>
<td>182 - Plutonium and Uranium Assay in Spent Fuel</td>
<td>Yongdeok Lee. Korea Atomic Energy Research Institute, Daejon, Republic of Korea</td>
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<td>5:10 pm</td>
<td>390 - Source Term Quantification Using 3DCZT</td>
<td>Willy Kaye, Brian Kitchen. H3D, Inc., Ann Arbor, MI, USA.</td>
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<td>5:30 pm</td>
<td>160 - Uncertainty identification in mass estimation applications with imaging detectors</td>
<td>Jeff Preston. CNS, LLC, Oak Ridge, TN, USA.</td>
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**Session C**  
**NAC**  
**Proliferation Challenges**

**Chair:** Mark Goodman  
**Co-Chair:** Jonathan Essner

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<td>4:30 pm</td>
<td>142 - Neutrino detectors for cooperative threat reduction in North Korea</td>
<td>Rachel Carr. MIT, Cambridge, MA, USA.</td>
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<td>4:50 pm</td>
<td>250 - Analytical Methods in Safeguards for Nuclear Nonproliferation and Complete, Verifiable, Irreversible Denuclearization (CVID) of North Korea</td>
<td>Junghyun Bae, Robert S. Bean. Purdue University, West Lafayette, IN, USA.</td>
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<td>5:10 pm</td>
<td>124 - An Estimate of North Korean HEU Stockpile for the given Natural Uranium Reserve and Enrichment Capacities</td>
<td>Sherzod R. Kurbanbekov. Texas A&amp;M University, College Station, TX, USA.</td>
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5:30 pm - 5:50 pm

119 - Investigating Iran’s Nuclear Latency Subject to the Status of the Joint Comprehensive Plan of Action

Kavita Rathore, Jeremy Osborn, Matthew Fuhrmann, Sunil S. Chirayath.
Texas A&M University, College Station, TX, USA.

4:30 pm - 5:50 pm

Session D  IS  Best Practices in Safeguards Information Management II  Desert Salon 1-3

Chair: Gary Hirsch  
Co-Chair: Lucie Millot

4 PRESENTATIONS

4:30 pm - 4:50 pm

345 - Management of Foreign Obligated Nuclear Material in the United States

Peter Dessaules\textsuperscript{1}, Richard Meehan\textsuperscript{1}, Ali Tabatabai\textsuperscript{2}.
\textsuperscript{1}U.S. Department of Energy/NNSA, Washington, DC, USA, \textsuperscript{2}Link Technologies, Inc., Germantown, MD, USA.

4:50 pm - 5:10 pm

146 - Effective Capacity-Building Development based on Good Practices from the Additional Protocol Implementation

Perpetua I. Rodriguez.
Japan Atomic Energy Agency, Ibaraki, Japan.

5:10 pm - 5:30 pm

1409 - Using the Additional Protocol Reporting System as an Information Management Tool

Oak Ridge National Laboratory, Oak Ridge, TN, USA.

5:30 pm - 5:50 pm

313 - The NMMSS Evolving Role In Enhancing International Nuclear Security

Peter Dessaules\textsuperscript{1}, Richard Meehan\textsuperscript{1}, Ali Tabatabai\textsuperscript{2}.
\textsuperscript{1}U.S. Department of Energy/NNSA, Washington, DC, USA, \textsuperscript{2}Link Technologies, Inc., Germantown, MD, USA.
### Full Program Schedule

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<td><strong>Chair:</strong> Steven Horowitz</td>
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<td><strong>Co-Chair:</strong> Rebecca Stone</td>
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#### 4:30 pm - 4:50 pm
195 - **Security, Safety, and Safeguards (3S) Risk Analysis for Small Modular Reactors**  
Adam D. Williams, Brian Cohn, Doug Osborn. Sandia National Laboratories, Albuquerque, NM, USA.

#### 4:50 pm - 5:10 pm
263 - **A Bayesian Network Based Security Assessment Methodology for SMR Physical Protection Design**  
Andhika Y. Prawira, Man-Sung Yim. Nuclear and Quantum Engineering, KAIST, Daejeon, Republic of Korea

#### 5:10 pm - 5:30 pm
213 - **Nuclear and Aviation Security - what can we learn from each other?**  
Roger Howsley, Daniel Johnson. World Institute for Nuclear Security, Vienna, Austria.

#### 5:30 pm - 5:50 pm
203 - **Predicting how emerging nuclear energy countries will manage radioactive waste and implications for likely scenarios**  
Lindsay Rand. University of Maryland, Washington, DC, USA.
## Full Program Schedule

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|           |     | **Chair:** Robert Watkins  
|           |     | **Co-Chair:** Commie Byrum                                                                   |                     |
| 4:30 pm - 4:50 pm | 128 - The U.S. Nuclear Waste Impasse: Legal and Policy Updates  
| 4:50 pm - 5:10 pm | 144 - Technical Strategic Plan 2018 for Decommissioning of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc.  
|           |     | **Toshiaki Kogai.** Nuclear Damage Compensation and Decommissioning Facilitation Corporation, Tokyo, Japan. |                     |
| 5:10 pm - 5:30 pm | 283 - Deep Geological Disposal of Nuclear waste in Jordan preferred sites  
| 5:30 pm - 5:50 pm | 352 - Deep Isolation: Innovative Technology For The Storage And Disposal Of High Level Waste And Spent Nuclear Fuel  
|           |     | **Rodney Baltzer.** Deep Isolation, Berkeley, CA, USA.                                      |                     |
| 6:00 pm - 7:00 pm | Pacific Northwest Regional and Student Chapters Meeting                                      | Springs Ballroom C  |
| 6:00 pm - 7:00 pm | Southwest Professional Chapter Meeting                                                       | Griffin             |

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6:30 am - 4:30 pm  Speaker Ready Room Open  Directors Suite 4

6:45 am - 5:30 pm  Registration Open  North Registration

7:00 am - 7:45 am  Speaker Breakfast  Santa Rosa Ballroom

8:00 am - 8:00 pm  Ad-Hoc Committee Room  Griffin Room

8:00 am - 8:00 pm  Ad-Hoc Committee Room  Directors Suite 7

8:00 am - 9:00 am  Companion Morning Meet Up  Concierge Desk

8:00 am - 8:45 am  Morning Plenary

Stephan Lechner

Dr. Stephan Lechner, based in Luxembourg, is Director of Euratom Safeguards and co-ordinator for cyber security policy in the Directorate General for Energy of the European Commission. Before this appointment to this position in July 2016, he was Director of the Institute for the Protection and the Security of the Citizen at the European Commission’s Joint Research Centre in Italy for more than eight years. Before joining the European Commission in 2007, he was International Department Head and Senior Manager at Siemens Corporate Technology in Munich. Between 1989 and 2007, Dr. Lechner spent more than 18 years in the hi-tech sector of private industries where he held various management positions both in operations and in industry research. Dr. Lechner holds a degree in mathematics and computer sciences from Giessen University, Germany, and a doctoral degree in cryptography from Linz University, Austria. Dr. Lechner is certified information systems security professional (CISSP) according to international standards.

8:50 am - 10:10 am  Concurrent 4 (Technical Sessions 4)

Session A  IS  Spent Fuel and Repositories I  Desert Salon 8

Chair: James Rubenstone
Co-Chair: Elina Martikka

8:50 am - 9:10 am  287 - Back-end to the Future: Safeguards Considerations for Multinational Geological Repositories
Cindy Vestergaard, James Casterton. Stimson Center, Washington DC, USA.

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9:10 am - 9:30 am
206 - Simulation study of an alternative setup for nuclear safeguards measurements of spent fuel assemblies
Débora M. Trombetta¹, Bo Cederwall¹, Kåre Axell².
¹KTH - Royal Institute of Technology, Stockholm, Sweden, ²SSM - Swedish Radiation Safety Authority, Stockholm, Sweden.

9:30 am - 9:50 am
356 - Application of γ-γ Coincidence Measurement of $^{134}\text{Cs}$ and $^{154}\text{Eu}$ to Verify Burnup and Cooling Time for TRIGA Reactor Used Fuels at the University of Texas Nuclear Engineering Teaching Laboratory
Jay P. Joshi, William S. Charlton.
The University of Texas at Austin, Austin, TX, USA.

9:50 am - 10:10 am
163 - Combined PGET and PNAR System for Spent Fuel Verification
Tapani P. Honkamaa, Topi Tupasela, Mikael Moring.
STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland.

Session B

Isotope Production and Recovery
Desert Salon 9-11
Chair: Jeff Allender
Co-Chair: Jeffrey Johnson

8:50 am - 9:10 am
115 - Need for Minor Actinides Production
Sharon Robinson, Bradley Patton.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

9:10 am - 9:30 am
114 - Minor Actinide Production at Oak Ridge National Laboratory
Bradley Patton, Sharon Robinson.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

9:30 am - 9:50 am
1432 - Inspired Innovation: Modifying Existing Technological Solutions for Mark-18A Processing
Catherine M. Mussi¹, William F. Swift¹, Sarah Pevey², Bradley Loftin¹, Alan S. Busby¹.
¹Savannah River National Laboratory, Aiken, SC, USA, ²National Nuclear Security Administration, Washington, DC, USA.
### Full Program Schedule

**TUESDAY, JULY 16, 2019**

| 9:50 am - 10:10 am | 324 - Glenn Seaborg’s Legacy: Rare Isotope Recovery from Irradiated Targets  
William F. Swift, Jeffrey S. Allender.  
Savannah River National Laboratory, Aiken, SC, USA. |

| 8:50 am - 10:10 am |  
**Session C**  
**MC&A Reference Materials and Analytical Methods I**  
**Chair:** Tom Pham  
**Co-Chair:** Scott Stewart |

Stephan Richter, Carmel Hennessy, Ulf Jacobsson, Renata Bujak, Celia Venchiarutti, Jan Truyens, Yetunde Aregbe.  
JRC-G.2, Geel, Belgium. |

| 9:10 am - 9:30 am | 113 - Certification of a Uranium Micro-particle Reference Material and Results of the NUSIMEP-9 Inter-Laboratory Comparison on Uranium Isotope Amount Ratios and Mass in Uranium Micro-Particles  
Stephan Richter, Celia Venchiarutti, Jan Truyens, Ronald Middendorp, Yetunde Aregbe.  
JRC, Geel, Belgium. |

| 9:30 am - 9:50 am | 299 - U.S. - China Collaborations on Nuclear Reference Materials  
Joe M. Giaquinto¹, Michael Brisson², Kayron Rogers¹, Pete Mason³, Brent McGinnis⁴, Mark Croce⁵, Jacob Stinnett⁶, Zhaohui Wu⁷, Zhimin Yang⁸.  
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA, ²Savannah River National Laboratory, Aiken, SC, USA, ³NBL Program Office, Argonne, IL, USA, ⁴Innovative Solutions Unlimited, LLC, Piketon, OH, USA, ⁵Los Alamos National Laboratory, Los Alamos, NM, USA, ⁶State Nuclear Security Technology Center, Beijing, China. |

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9:50 am - 10:10 am  290 - When are differences between standards significant? A case study using plutonium and uranium isotopic standards from New Brunswick Laboratory
Kattathu J. Mathew, Chelsea Ottenfeld, Russ Keller, Steven Levesque, James Fulwyler, Angela Lawver. Los Alamos National Lab, Los Alamos, NM, USA.

Session D  NAC  Panel: Portal Monitoring  Desert Salon 4-6
Chair: Alicia Swift

8:50 am - 10:10 am  Findings from the Portal Monitor for Authentication and Certification (PMAC) Project
The US and UK governments have collaborated on the Portal Monitor for Authentication and Certification project, which set out to develop portal monitors for arms control monitoring scenarios. Various aspects of the project relevant to the nonproliferation, arms control, and security communities, including the portal monitor design, development of associated use procedures, exercise findings, and recommendations for future work will be discussed.

Session E  NSPP  Panel: Insider Threat Mitigation  Springs Ballroom AB
Chair: Patrick Lynch

8:50 am - 10:10 am  Insider Threat Mitigation Panel Discussion
In March, 2019, an international symposium was conducted in Brussels, Belgium consisting of several leading experts in the nuclear security industry relative to the Insider Threat topic. Interactive video vignettes were presented to this international audience to help guide the discussion around challenges and approaches to mitigation of the insider threat. While such interactive vignettes prove to highlight disparate thinking around the challenge and helps provide insights into future direction, more dialogue is necessary to continue to promote best practices in this field. This panel is intended to provide a follow-on forum to discuss good practices in Insider Threat Mitigation as well as potential gaps, challenges, or opportunities to strengthen these programs. The panel will consist of leading US and International experts in the field as well as the opportunity to interact with session attendees.
# Full Program Schedule

**TUESDAY, JULY 16, 2019**

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<th>E&amp;T</th>
<th>The Importance of Communication Chair: Martin Schoonen Co-Chair: Katherine Bachner</th>
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<tr>
<td>8:50 am - 9:10 am</td>
<td>333 - The Influence of Language on Nuclear Security Education and Training: An Exploratory Study Zenobia S. Homan, Şebnem Udum. ¹King’s College London, London, United Kingdom, ²Hacettepe University, Ankara, Turkey.</td>
<td></td>
</tr>
<tr>
<td>9:50 am - 10:10 am</td>
<td>239 - Communicating what INMM does: The INMM Communicator’s Challenges and Successes James J. Disser, Katherine Bachner, Susan Pepper, Zoe Gastelum. ¹Idaho National Laboratory, Idaho Falls, ID, USA, ²Brookhaven National Laboratory, Upton, NY, USA, ³Sandia National Laboratories, Albuquerque, NM, USA.</td>
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9:00 am - 11:00am  Companion Program Living Safari Private Tour Offsite with Giraffe Feeding

10:15 am - 11:00 am  Exhibit Hall / Poster Presentations / Refreshment Break

11:00 am - 12:20 pm  Concurrent 5 (Technical Sessions 5)

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<th>Session A</th>
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<th>Spent Fuel and Repositories II Chair: James Rubenstone Co-Chair: Tapani Honkamaa</th>
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11:20 am - 11:40 am  257 - Imaging Spent Nuclear Fuel with Muon Tomography
                       Konstantin N. Borozdin.
                       Decision Sciences, Sandia Park, NM, USA.

11:40 am - 12:00 pm  275 - Evolving Technologies for Future Deep Geological Repositories: A Closer Look
                       Trinh Le.
                       Stimson Center, Washington, DC, USA.

12:20 pm - 12:40 pm  308 - Safeguards for Deep Geological Repositories
                       Jessica L. White-Horton.
                       Oak Ridge National Laboratory, Oak Ridge, TN, USA.

Session B  IS  Safeguards Design Considerations and Emerging Ideas
Chair: Therese Renis  Co-Chair: Masao Senaki

11:00 am - 11:20 am  214 - Enhancing Research Reactor Safeguards Through the Use of Mailbox Declarations
                       Allyn K. Milojevich1, Sean Martinson2, Craig Marianno2,
                       Sunil Chirayath3, John Creasy1.
                       1Y-12 National Security Complex, Oak Ridge, TN, USA,
                       2Center for Nuclear Security Science and Policy Initiative,
                       Texas A&M University, College Station, TX, USA.

11:20 am - 11:40 am  1414 - Mailbox approaches for research reactors safeguards
                       Mark W. Goodman1, Dunbar Lockwood2, J. Stephen Adams1.
                       1U.S. Department of State, Washington, DC, USA,
                       2U.S. Department of Energy/National Nuclear Security Administration, Washington, DC, USA.

11:40 am - 12:00 pm  361 - Molten Salt Reactor Safeguards: The Necessity of Advanced Modeling and Simulation to Inform on
                       Fundamental Signatures
                       Andy Worrall.
                       Oak Ridge National Laboratory, Oak Ridge, TN, USA.

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12:00 pm - 12:20 pm  357 - International versus Domestic Safeguards Considerations for the Design of Advanced Reactors Donald Kovacic.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

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<td>11:00 am - 11:20 am</td>
<td>229 - Implementation of Faraday cup amplifiers with $10^{13}$ Ohm resistors for TIMS measurements at JRC-G.2 in Geel</td>
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<td></td>
<td></td>
<td>Stephan Richter.</td>
<td>JRC, Geel, Belgium.</td>
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<tr>
<td>11:20 am - 11:40 am</td>
<td>228 - Standardization of Nuclear Mass Spectrometry and Nuclear Material Sampling Methods with ASTM-International</td>
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<tr>
<td></td>
<td></td>
<td>Stephan Richter.</td>
<td>JRC, Geel, Belgium.</td>
</tr>
<tr>
<td>11:40 am - 12:00 pm</td>
<td>252 - Practical Microcalorimeter Spectrometers Mark Croce¹, Katrina Koehler¹, Michael Yoho¹, Scott Garner¹, Shannon Kossmann¹, Michael Rabin¹, Daniel Becker², John Mates², Johnathon Gard², Douglas Bennett¹, Joel Ullom³.</td>
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<td></td>
<td></td>
<td>¹Los Alamos National Laboratory, Los Alamos, NM, USA, ²University of Colorado, Boulder, CO, USA, ³National Institute of Standards and Technology, Boulder, CO, USA.</td>
<td></td>
</tr>
<tr>
<td>12:00 pm - 12:20 pm</td>
<td>303 - Validation of Non-Standard Analytical methods Used in Nuclear Material Measurement for Safeguards Purposes Sylvain Morel, Karin Casteleyn, Ana-Maria Sánchez Hernández, Evelyn Zuleger, Klaus Lützenkirchen, Sebastien Mialle.</td>
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<td></td>
<td></td>
<td>European Commission - Joint Research Centre, Karlsruhe, Germany.</td>
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11:00 am - 12:20 pm

**Session D**

**NAC**

**Arms Control Verification 1**

**Chair:** Jacob Benz  
**Co-Chair:** Debbie Dale

**Desert Salon 4-6**

11:00 am - 11:20 am

135 - Nuclear Archaeology for Nonproliferation, Disarmament and Transparency  
**Malte Göttzsche.**  
RWTH Aachen University, Aachen, Germany.

11:20 am - 11:40 am

264 - Verifying the non-nuclear nature of objects without revealing sensitive information  
**Ryan Snyder,** Pavel Podvig.  
United Nations Institute for Disarmament Research, Geneva, Switzerland.

11:40 am - 12:00 pm

277 - The Seismoacoustic Detection Of Operational Events Around A Small Nuclear Reactor: A Power Spectral Density Approach  
**Omar Marcillo**\(^1\), Chenging Chai\(^2\), Maceira Monica\(^2\).  
\(^1\)Los Alamos National Laboratory, Los Alamos, NM, USA, \(^2\)Oak Ridge National Laboratory, Oak Ridge, TN, USA.

12:00 pm - 12:20 pm

136 - An Integrated Approach to Nuclear Archaeology  
**Malte Göttzsche**\(^1\), Antonio Figueroa\(^1\), Martin Frank\(^2\).  
\(^1\)RWTH Aachen University, Aachen, Germany, \(^2\)Karlsruhe Institute of Technology, Karlsruhe, Germany.

**Session E**

**E&T**

**Communication Panel**

**Chair:** Martin Schoonen  
**Co-Chair:** Katherine Bachner

**Desert Salon 12-14**

11:00 am - 12:20 pm

Panelists: Karen McNulty Walsh, Zoe Gastelum, Elina Martikka, Suzy Hobbs Baker  
Communication is important in every field and communicating science presents its own challenges. This session will bring together speakers from a variety of fields who are responsible for or coach others in communicating technical information with the public, peers, government representatives, and elected officials.
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<td><strong>Co-Chair:</strong> Marc Wonders</td>
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<td>11:00 am - 11:20 am</td>
<td>186 - D3S - results of qualification measurements of a wearable RIID for homeland security</td>
<td>Springs Ballroom AB</td>
<td>60th ANNUAL MEETING Final Program</td>
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<td><strong>Monika Risse,</strong> M. Charlotte Bornhoeft, Jeannette Glabian, Theo Koeble. Fraunhofer INT, Euskirchen, Germany.</td>
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<tr>
<td>11:20 am - 11:40 am</td>
<td>220 - Short Pulse Active Interrogation System to find Fissile Materials</td>
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<td>60th ANNUAL MEETING Final Program</td>
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<td></td>
<td></td>
<td><strong>Mark Derzon(^1), Lorenzo Gutierrez(^1), Markku Koskelo(^2), Aaron Powledge(^3).</strong></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1(^1)Sandia National Laboratory, Albuquerque, NM, USA, 2(^2)Aquila, Inc., Albuquerque, NM, USA.</td>
<td></td>
</tr>
<tr>
<td>11:40 am - 12:00 pm</td>
<td>291 - A Novel Portable Device For Gamma and Neutron Spectroscopy with Special Nuclear Material Identification</td>
<td>Springs Ballroom AB</td>
<td>60th ANNUAL MEETING Final Program</td>
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<td></td>
<td><strong>Giacomo Mangiagalli(^1), Matteo Corbo(^1), Massimo Morichi(^1), Luca Stevanato(^2), Isacco Bonesso(^2).</strong></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1(^1)CAEN SyS Srl, Viareggio, Italy, 2(^2)Padua University, Padua, Italy.</td>
<td></td>
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<tr>
<td>12:00 pm - 12:20 pm</td>
<td>141 - Comparison of energy response function of stilbene, BC501 and EJ309 neutron gamma detection system.</td>
<td>Springs Ballroom AB</td>
<td>60th ANNUAL MEETING Final Program</td>
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<td></td>
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<td><strong>Annesha Karmakar(^1), Aditya H. Kelkar(^2), Laxmidhar Behera(^1).</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1(^1)Indian Institute of Technology, Kanpur, Kanpur, India, 2(^2)Indian Institute of Technology, Kanpur, India.</td>
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### 12:30 pm - 2:00 pm

**Lunch on your own**
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<td><strong>Chair:</strong></td>
<td><strong>Fabio Dias</strong></td>
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<th>2:00 pm - 2:20 pm</th>
<th>240 - Aboveground Reactor Antineutrino Detection with the PROSPECT Experiment</th>
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<tbody>
<tr>
<td></td>
<td>Nathaniel Bowden. Lawrence Livermore National Laboratory, Livermore, CA, USA.</td>
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<tr>
<th>2:20 pm - 2:40 pm</th>
<th>317 - Antineutrino-Based Reactor Power Monitoring Instrumentation: A Case Study of the Versatile Test Reactor at Idaho National Laboratory</th>
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<tr>
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<td>Bryce R. Littlejohn. Illinois Institute of Technology, Chicago, IL, USA.</td>
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<tr>
<th>2:40 pm - 3:00 pm</th>
<th>396 - Nuclear Reactor Antineutrinos, Hard to Detect, but with a Traceable Lineage.</th>
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<td>Alejandro Sonzogni, Elizabeth McCutchan. National Nuclear Data Center, Upton, NY, USA.</td>
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<tr>
<th>3:00 pm - 3:20 pm</th>
<th>1439 - Far-Field Monitoring of Reactor Antineutrinos for Nonproliferation</th>
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<td>Viacheslav Li. Lawrence Livermore National Laboratory, Livermore, CA, USA.</td>
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<th>2:00 pm - 2:20 pm</th>
<th>237 - NBL Program Office CRM Distribution Center at Y-12 Ensuring a Sustainable Supply of Certified Reference Materials</th>
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<td></td>
<td>Lloyd J. Jollay, Todd Hawk, Mary Tucker-Watson, Peter Mason. Y-12 National Security Complex, Oak Ridge, TN, USA, NBL Program Office, Chicago, IL, USA.</td>
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**Session B**

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<th><strong>Nuclear Material Storage and Surveillance</strong></th>
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<td><strong>Chair:</strong></td>
<td><strong>Ron Milligan</strong></td>
<td><strong>Co-Chair:</strong></td>
<td><strong>Bill Swift</strong></td>
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ROOM ASSIGNMENT

2:20 pm - 2:40 pm  319 - Flexible Storage Packaging for Archive and Forensics Items
David T. Herman, Jeffrey S. Allender, William F. Bates. Savannah River National Laboratory, Aiken, SC, USA.

2:40 pm - 3:00 pm  164 - Safeguards & Security Approach for Increasing Storage of Special Nuclear Material at a Nuclear Research Facility While Reducing Protective Force Requirements

3:00 pm - 3:20 pm  251 - Feasibility of Robot-Based Surveillance of Nuclear Materials Containers
David Grow¹, Cheryl Brabec², Cristy Abeyta³, Sarah Pevey⁴. ¹New Mexico Tech, Socorro, NM, USA, ²Los Alamos National Lab, Los Alamos, NM, USA, ³Los Alamos National Lab, Los Alamos, NM, USA, ⁴Department of Energy - NGFP, Richland, WA, USA.

3:20 pm - 3:40 pm  400 - Updating Materials Management Methods Using a Discrete Event Simulation

Session C  MC&A  Nuclear Standards and Statistical Approaches I  Desert Salon 1-3
Chair: Andreas Enqvist  Co-Chair: David Tomar

2:00 pm - 2:20 pm  314 - INMM Accredited Standards Committee N15 - Activities, 2013 - 2019
Lynne D. Preston¹, Melanie P. May¹, B. Chino Srinivasan², Jacqueline L. Shipwash³. ¹U.S. Department of Energy, Washington, DC, USA, ²NBL Program Office, Lemont, IL, USA, ³Tetra Tech CES HEI, Oak Ridge, TN, USA.

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<td>2:20 pm - 2:40 pm</td>
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<td>ASTM International and ISO Standards for Analyses Supporting Nuclear Materials Control and Accountancy</td>
<td>Michael Brisson, Savannah River National Laboratory, Aiken, SC, USA.</td>
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<td>2:40 pm - 3:00 pm</td>
<td>348</td>
<td>Methods for Monitoring a Chloride Volatility Process for Treating Nuclear Materials</td>
<td>Parker K. Okabe, Michael Simpson, University of Utah, Salt Lake City, UT, USA.</td>
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<td>3:00 pm - 3:20 pm</td>
<td>305</td>
<td>Resolution of an Inventory Difference Loss Trend Caused by Holdup Non-Destructive Assay</td>
<td>Jeffrey B. Coleman, Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC, USA.</td>
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2:00 pm - 3:40 pm

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<td>2:00 pm - 2:20 pm</td>
<td>111</td>
<td>Calling Putin’s Bluff (Or Not?) An Assessment of Russian Attachment to the INF Treaty and Its Implications</td>
<td>Jared Rowe, Christopher Jones, Halvor Undem, Middlebury Institute of International Studies, Monterey, CA, USA, University of Washington, Seattle, WA, USA.</td>
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<td>2:20 pm - 2:40 pm</td>
<td>1427</td>
<td>Failure of the INF Treaty: Analysis and Implications</td>
<td>Autumn Redd, Shawn Bray, Nicholas Schweikhard, Jakob Lengacher, Devin Mowrer, Middlebury Institute of International Studies, Monterey, CA, USA.</td>
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<td>2:40 pm - 3:00 pm</td>
<td>293</td>
<td>Nuclear Energy Cooperation as a Means to Achieving Nuclear Nonproliferation: A Case Study of U.S.-ROK Nuclear Energy Cooperation</td>
<td>Jonas Siegel, University of Maryland, College Park, MD, USA.</td>
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3:00 pm - 3:20 pm  304 - Nonproliferation in the New Space Age: Where do We Stand?
   Paul W. Stockett, Robert S. Bean.
   Purdue University, West Lafayette, IN, USA.

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2:00 pm - 2:20 pm  134 - Experimental Evaluation of Vacuum Drying for Removing Residual Water in Canister of Spent Nuclear Fuel Dry Storage System
   Kyoung-sik Bang.
   Korea Atomic Energy Research Institute, Daejeon, Republic of Korea.

2:20 pm - 2:40 pm  147 - OPTIMUS Packaging Solutions for ILW and TRU
   Steve Sisley, Jeff England.
   NAC International, Norcross, GA, USA.

2:40 pm - 3:00 pm  183 - Recent Updates on the Application of Non-Destructive Testing to Assess Corrosion Damage in SAVY containers
   Rajendra U. Vaidya.
   Los Alamos National Laboratory, Los Alamos, NM, USA.

3:00 pm - 3:20 pm  332 - Critical Safety of Confinement Containers Subject to Worst Case Seismic and Fire Scenario
   Wesley Cook, David Grow, Jamie Kimberley.
   New Mexico Institute of Mining and Technology, Socorro, NM, USA.

3:20 pm - 3:40 pm  369 - A Distributed Ledger Technology (DLT) Approach to Monitoring UF₆ Cylinders: Lessons Learned from TradeLens
   Paige Gasser.
   Lawrence Livermore National Laboratory, Livermore, CA, USA.
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<td>Co-Chair: Nick Roth</td>
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### 2:00 pm - 2:20 pm

**1430 - International Symposium on Insider Threat Mitigation: Engaging the International Community**  
Constance McAninch, **Amanda Pourciau**.  
NNSA, Washington, DC, USA.

### 2:20 pm - 2:40 pm

**393 - Defining Metrics for Measuring the Insider Threat**  
**Shannon N. Abbott**, Adam D. Williams.  
Sandia National Laboratories, Albuquerque, NM, USA.

### 2:40 pm - 3:00 pm

**224 - Nuclear Facility Access Control Based on Biosignals to Prevent a Potential Insider Threat**  
Jung Hwan Kim, Chul Min Kim.  
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea.

### 3:00 pm - 3:20 pm

**180 - Preliminary Results from a Comparative Analysis of Counterintelligence and Insider Threat in Nuclear Facilities**  
**Noelle Camp**, Adam Williams.  
Sandia National Laboratories, Albuquerque, NM, USA.
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<td>Chair: Jacqueline Kempfer Co-Chair: Laura Holgate</td>
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#### 2:00 pm - 3:20 pm

**Advanced Nuclear and Engagement with the INMM**

This panel will bring representatives from the advanced reactor developer community together with safeguards and security technical experts. The panel will provide a forum for representatives from four different advanced nuclear companies to discuss their reactor designs and the status of their projects.

**Panelists:**
- Per Peterson, Chief Nuclear Officer
  Kairos Power
- Pete Pappano, Vice President Fuel Development
  X-Energy
- Robin Rickman, Vice President Business Development
  Terrestrial Energy
- Alex Renner, Director of Licensing
  Oklo

#### 3:40 pm - 4:25 pm

**Exhibit Hall/Poster Presentations/ Refreshment Break**

Join us for a slice of cake to Celebrate the 60th Anniversary of the INMM!

#### 4:30 pm - 5:50 pm

**Concurrent 7 (Technical Sessions 7)**

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<td></td>
<td>Chair: Na-Young Lee Co-Chair: Stephan Lechner</td>
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#### 4:30 pm - 4:50 pm

**1426 - Application of Safeguards-by-Design in the Indonesian 10-MWt RDE Experimental Power Reactor**

Arief S. Adhi.

BATAN (National Nuclear Energy Agency of the Republic of Indonesia), Tangerang Selatan, Indonesia.

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4:50 pm - 5:10 pm
190 - Experience in Safeguards Implementation at the Restart of a Refurbished CANDU Type Reactor in Argentina
Fabio Dias¹, Luis Carlos R. Machado da Silva¹, Sonia Fernández Moreno¹, Leonardo A. Pardo², Gustavo D. Diaz², Luis Giordano², Marcelo Rojo².
¹Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), Rio de Janeiro, Brazil,
²Nuclear Regulatory Authority (ARN), Buenos Aires, Argentina.

5:10 pm - 5:30 pm
353 - Current Efforts on Inspection Activities at Rokkasho Reprocessing Plant (RRP)
Yoshihiko Noguchi, Masahito Mori, Tsuyoshi Sampei.

5:30 pm - 5:50 pm
246 - Unattended Safeguards Systems for the Plutonium Fuel Production Facility (PFPF) in Japan.
Howard O. Menlove.
Los Alamos National Laboratory, Los Alamos, NM, USA.

Session B IS Robotics and Unmanned Systems for Safeguards Desert Salon 12-14
Chair: Irmgard Niemeyer
Co-Chair: Kenneth Sanders

4:30 pm - 4:50 pm
372 - Unmanned Aerial Systems for Safeguards Inspections of Uranium Mines
Alexander Solodov, Daniel Small, Steven Horowitz.
Sandia National Laboratories, Albuquerque, NM, USA.

4:50 pm - 5:10 pm
1433 - Drones, International Safeguards and Emergency Management
L David Lambert.
Gregg Protection Services, Davenport, FL, USA.

5:10 pm - 5:30 pm
1454 - 3D Gamma-ray Mapping From An Unmanned Aerial System For International Nuclear Safeguards
Ryan Pavlovsky, Tenzing Joshi, Josh Cates, Daniel Hellfeld, Brian Quiter, Kai Vetter.
Lawrence Berkeley National Lab, Berkeley, CA, USA.

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<tr>
<td>4:30 pm - 4:50 pm</td>
<td>311 - Simplifying Statistical Error Modeling of Nuclear Material Measurements</td>
<td>Michael L. Shipman. Global Nuclear Fuels - America, Wilmington, NC, USA.</td>
<td></td>
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<tr>
<td>4:50 pm - 5:10 pm</td>
<td>309 - A Review of “A Unified Theory of Measurement Errors and Uncertainties” in the Context of Uncertainty Quantification Used in Nuclear Safeguards</td>
<td>Tom Burr¹, Stephen Croft², Andrea Favalli¹, Daniela Henzlova¹, Thomas Krieger¹, Brian Weaver¹. ¹Los Alamos National Lab, Los Alamos, NM, USA, ²Oak Ridge National Lab, Oak Ridge, TN, USA, ³Forschungszentrum Jülich GmbH, Jülich, Germany.</td>
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<tr>
<td>5:10 pm - 5:30 pm</td>
<td>231 - Optimal Tests for Verification Sampling Plans</td>
<td>Thomas Krieger¹, Rudolf Avenhaus², Tom L. Burr³. ¹Forschungszentrum Jülich GmbH, Jülich, Germany, ²Universität der Bundeswehr München, Neubiberg, Germany, ³Los Alamos National Laboratory, Los Alamos, NM, USA.</td>
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<tr>
<td>5:30 pm - 5:50 pm</td>
<td>259 - Systems Theoretic Process Analysis Tools for Nuclear Materials Safeguards Evaluation</td>
<td>Zachery S. Beauvais¹, William S. Charlton¹, Adam D. Williams². ¹University of Texas at Austin, Austin, TX, USA, ²Sandia National Laboratories, Albuquerque, NM, USA.</td>
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**Full Program Schedule**

**TUESDAY, JULY 16, 2019**

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<td>Chair: Malte Göttche</td>
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<td>Co-Chair: Scott Kiff</td>
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4:30 pm - 4:50 pm

**4:30 pm - 4:50 pm**

165 - Physical Encryption of Sensitive Gamma-Ray Templates  
Michael Hamel.  
Sandia National Laboratories, Albuquerque, NM, USA.

4:50 pm - 5:10 pm

346 - Radioisotope Discrimination Algorithm for Arms Control Verification  
Eduardo Padilla.  
Sandia National Labs, Albuquerque, NM, USA.

5:10 pm - 5:30 pm

382 - Investigating the method of UK - Norway initiative Information Barrier  
Naeem Syed¹, Fabio Zeiser², Styrkaar Hustveit¹, Ole Reistad³, Sunniva Siem⁴.  
¹Norwegian Radiation and Nuclear Safety Authority, Oesteraas, Norway, ²Department of Physics, University of Oslo, Oslo, Norway, ³Institute of Energy Technology, Kjeller, Norway, ⁴Department of Physics, University of Oslo, Oslo, Norway.

5:30 pm - 5:50 pm

258 - Warhead Monitoring by Environmental Activation Products Detection  
Peter Marleau¹, Matthew Shinner².  
¹Sandia National Laboratories, Livermore, CA, USA, ²University of California Berkeley, Berkeley, CA, USA.

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## Full Program Schedule

**TUESDAY, JULY 16, 2019**

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<th>Improved Detection Technology</th>
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<tr>
<td>E</td>
<td>NSPP</td>
<td>Chair: Rebecca Stone Co-Chair: Marc Wonders</td>
<td>Springs Ballroom C</td>
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### 4:30 pm - 4:50 pm

<table>
<thead>
<tr>
<th>Title</th>
<th>Speakers</th>
<th>Institution</th>
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### 4:50 pm - 5:10 pm

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<th>Title</th>
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<th>Institution</th>
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<table>
<thead>
<tr>
<th>Session</th>
<th>NAC</th>
<th>International Security Issues - South Asia</th>
<th>Room Assignment</th>
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<tr>
<td>F</td>
<td>NAC</td>
<td>Chair: Paige Gasser Co-Chair: Alex Bednarek</td>
<td>Springs Ballroom AB</td>
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### 4:30 pm - 4:50 pm

<table>
<thead>
<tr>
<th>Title</th>
<th>Speakers</th>
<th>Institution</th>
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</table>
Session G  NAC  Panel: Advanced Nuclear and Engagement with the INMM Panel Pt. 2  Chair: Jacqueline Kempfer  Co-Chair: Laura Holgate

4:30 pm - 5:50 pm

This panel will bring together leading experts on nuclear security and safeguards with key stakeholders from the advanced reactor community to discuss how companies are already thinking about security-by-design and safeguards-by-design issues, and how the INMM community might play a role in collaborating with developers to implement security and safeguards at the design phase.

Panelists:

Joe Rivers
Senior Level Advisor on Security, Division of Physical and Cyber Security Policy, Office of Nuclear Security and Incident Response, U.S. Nuclear Regulatory Commission, and Chair of the INMM Nuclear Security Technical Division

Michael Whitaker
Group Leader, International Safeguards, Oak Ridge National Lab, and Chair of the INMM Nuclear Safeguards Technical Division

Thomas Grice
Senior Fuel Facility Inspector, U.S. Nuclear Regulatory Commission, Region II, and Chair of the INMM MC&A Technical Division

Corey Hinderstein
Vice President International Fuel Cycle Strategies, Nuclear Threat Initiative, and former President, INMM

Katie Vogler
Senior Advisor for International Nuclear Security, Office of Defense Nuclear Nonproliferation, National Nuclear Security Administration
Full Program Schedule

WEDNESDAY, JULY 17, 2019

6:30 am - 4:30 pm  Speaker Ready Room Open  Directors Suite 4

6:45 am - 5:30 pm  Registration Opens  North Registration

7:00 am - 7:45 am  Speaker Breakfast  Santa Rosa Ballroom

8:00 am - 8:00 pm  Ad-Hoc Committee Room  Griffin Room

8:00 am - 8:00 pm  Ad-hoc Committee Room  Directors Suite 7

8:00 am - 9:00 am  Companion Morning Meet Up  Concierge Desk

8:00 am - 8:45 am  Morning Plenary  Desert Salon 8

**Facilitators:** David Lambert and Susan Pepper

**Topic:** Evolving Cyber Challenges in Modern Industry

Robert Hoffman, Nuclear Cybersecurity Fellow, National & Homeland Security
Idaho National Laboratory

**Topic:** Cybersecurity and National Infrastructure: The Stakes are Rising

Samuel Sanders Visner, Director, National Cybersecurity Federally Funded Research Center, The MITRE Corporation

8:50 am - 10:10 am  Concurrent 8 (Technical Sessions 8)

**Session A  MC&A**  **Data Science for Nonproliferation I**  **Chair:** Colonel Ben Miller  **Co-Chair:** Angela Waterworth  **Desert Salon 8**

8:50 am - 9:10 am  181 - Development of Novel Approaches to Anomaly Detection and Surety for Safeguards Data
Alexander Solodov¹, David Farley², Constantin Brif², Nicholas Pattengale¹.
¹Sandia National Laboratories, Albuquerque, NM, USA, ²Sandia National Laboratories, Livermore, CA, USA.

9:10 am - 9:30 am  323 - Transformative Data Analytics Capabilities for Nuclear Forensics and Safeguards
Ken Dayman¹, Charles Weber¹, Nicholas Luciano¹, Brian Ade¹, Matthew Francis¹, Andrew Nicholson¹, Louise Worral¹, Scott Stewart¹, Mark Adams¹, Adam Drescher².
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA, ²University of Texas at Austin, Austin, TX, USA.

https://www.abstractsonline.com/pp8/#1/7866
9:30 am - 9:50 am  
**212 - Multimodal Data Analytics for Nuclear Facility Monitoring**  
**Christopher L. Stewart**, Bethany L. Goldblum, Yi-Ting Alicia Tsai, Shruthi Chockkalingam, Suchismita Padhy, Austin Wright.  
University of California, Berkeley, Berkeley, CA, USA.

9:50 am - 10:10 am  
**188 - Smart Monitoring of Nuclear Facilities: Implementation Concepts and Development Status**  
Los Alamos National Laboratory, Los Alamos, NM, USA.

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**Correlated Fission Physics, Transport and Applications IA**  
**Chair:** Michael Rising  
**Co-Chair:** Ramona Vogt

**8:50 am - 10:10 am**  
Correlated Fission Physics, Transport and Applications  
This collection of special sessions will consist of several parts, with presentations on recent developments in fission physics theory, new code capabilities, experimental work, and nuclear nonproliferation and safeguards applications of interest under development at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and University of Michigan (UM). Part I consists of A) introduction and motivation of recent research and development efforts, B) correlated fission physics theory and code capabilities in CGMF and FREYA, and C) differential experimental work to support and validate the physics of fission.
Session C NAC Panel: Pu History I Desert Salon 4-6
Chair: Debra Barnett Co-Chair: Skip Kerschner

8:50 am - 10:10 am

Introduction to Plutonium: A Hanford Perspective
Panelists: David E. Meier, Matthew K. Edwards, Lucas E. Sweet

Many national laboratories have a unique heritage related to the Manhattan Project that continues to influence research today. Two back-to-back panel sessions provide a high-level overview to lead participants through Hanford’s legacy to modern-day applications of plutonium science. The panel will focus on the historical perspective, accomplishments and challenges of plutonium processing, post-reactor plutonium reprocessing, and plutonium chemistry and characterization in the context of historic flowsheets.

Panel Session One: Debra Barnett will present Introduction and background - Why Look Back? David E. Meier will present the Historical Perspective of the Herculean Accomplishments and Challenges of the Plutonium Processing.

Session D IS Information Collection & Analysis for Safeguards & Proliferation Detection I Desert Salon 1-3
Chair: Yana Feldman Co-Chair: Joshua Rutkowski

8:50 am - 9:10 am

285 - Geospatial Data Science in Nuclear Safeguards - Extracting Safeguards-relevant Information from Geospatial Big Data
Irmgard Niemeyer. Forschungszentrum Jülich GmbH, Juelich, Germany.

9:10 am - 9:30 am

117 - Detection via Persistence: Leveraging Commercial Imagery from Small Satellites
Heidi A. Smartt1, Dennis Lee1, John Ohlinger2, Allison Puccioni3.
1Sandia National Labs, Albuquerque, NM, USA, 2BlackSky Geospatial Solutions, Herndon, VA, USA, 3Armillary Services, LLC, Oakland, CA, USA.

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**WEDNESDAY, JULY 17, 2019**

### 9:30 am - 9:50 am

**288 - Collection and Evaluation of Open Source Information Relevant to the Additional Protocol**  
Lucie Millot.  
IRSN, Fontenay aux Roses, France.

### 9:50 am - 10:10 am

**289 - Considerations for the Development and Implementation of Crowdsourcing to Support International Nuclear Safeguards Verification Activities**  
Zoe Gastelum¹, Kari Sentz², Steven Horowitz¹, Meili Swanson¹, Cristina Rinaudo².  
¹Sandia National Laboratories, Albuquerque, NM, USA, ²Los Alamos National Laboratory, Los Alamos, NM, USA.

### 8:50 am - 10:10 am

**Session E E&T University Programs to Develop the Next Generation Desert Salon 12-14**

- **Chair:** Commie Byrum  
- **Co-Chair:** Kim Gilligan

#### 8:50 am - 9:10 am

**272 - The MIT Nuclear Weapons Education Project: Raising Awareness in the Next Generation of Leaders**  
Luisa Kenausis.  
The Stanley Foundation, Muscatine, IA, USA.

#### 9:10 am - 9:30 am

**300 - Nuclear Non-proliferation education in the university level - Brazilian perspective case**  
Débora M. Trombetta¹, Renato Tavares², Carlos Eduardo Cabrera³.  
¹KTH - Royal Institute of Technology, Stockholm, Sweden, ²Brazilian National Commission of Nuclear Energy, Rio de Janeiro, Brazil, ³Federal University of Minas Gerais, Rio de Janeiro, Brazil.

#### 9:30 am - 9:50 am

**122 - Nuclear Security Education and Training Capacities Development at the University of Port Harcourt: Outcomes and Prospects**  
Lucky Uyigue, Ayoade Oludayo Kuye.  
University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.

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<td>Chair: Nick Roth</td>
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<td>Co-Chair: Marshall Kohen</td>
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8:50 am - 9:10 am 364 - Best Practices for Sharing Threat Information

Nickolas J. Roth¹, Dmitry Kovchegin².

¹Belfer Center, Cambridge, MA, USA, ²Consultant, Moscow, Russian Federation.

9:10 am - 9:30 am 1401 - Securing the Function - a proposal for identifying, prioritizing, and protecting processes at nuclear power plants

Kim M. Lawson-Jenkins¹, Michael L. Brown¹, Charity Pantalo¹, Brandon T. Gorton², Fleurdeliza de Peralta¹.

¹U.S. Nuclear Regulatory Commission, Rockville, MD, USA, ²Pacific Northwest National Laboratory, Richland, WA, USA.

9:30 am - 9:50 am 194 - Addressing Cyber Hazards in Nuclear Power Plants with STPA-Informed Fault Trees

Adam D. Williams, Andrew Clark.

Sandia National Laboratories, Albuquerque, NM, USA.

9:50 am - 10:10 am 157 - Study on the Safety and Cyber Security Interface during I&C System Life Cycle

Ickhyun Shin.

Korea Institute of Nuclear Nonproliferation And Control, Daejeon, Republic of Korea.

10:15 am - 11:00 am Exhibit Hall/Poster Awards/ Refreshment Break

11:00 am - 12:20 pm Concurrent 9 (Technical Sessions 9)

Session A MC&A and NAC Joint Session

Data Science for Nonproliferation II

Chair: Colonel Ben Miller

Co-Chair: Angela Waterworth

11:00 am - 11:20 am 149 - Unattended Monitoring and Machine Learning for Safeguarding a PUREX Reprocessing Facility

Nathan Shoman, Benjamin Cipiti.

Sandia National Laboratories, Albuquerque, NM, USA.

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11:20 am - 11:40 am  253 - Diversion Detection using Optical Surveillance based on Deep Learning
                     Se-Hwan Park.
                     Korea Atomic Energy Research Institute, Daejeon, Republic of Korea.

11:40 am - 12:00 pm  1435 - Machine Learning to Reinforce IAEA Safeguards Effectiveness Evaluation
                     Duaa Aljilani.

12:00 pm - 12:20 pm  247 - Math Modeling and Classification Techniques for nonproliferation problems
                     Romarie Morales Rosado, Lee Burke, Jereme Haack, Matthew Oster, David Vermillion, Paul Whitney.
                     Pacific Northwest National Laboratory, Richland, WA, USA.

Session B  MC&A  Correlated Fission Physics, Transport and Applications IB  Desert Salon 9-11
Chair: Michael Rising  Co-Chair: Ramona Vogt

11:00 am - 12:20 pm  Correlated Fission Physics, Transport and Applications
This collection of special sessions will consist of several parts, with presentations on recent developments in fission physics theory, new code capabilities, experimental work, and nuclear nonproliferation and safeguards applications of interest under development at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and University of Michigan (UM). Part I consists of A) introduction and motivation of recent research and development efforts, B) correlated fission physics theory and code capabilities in CGMF and FREYA, and C) differential experimental work to support and validate the physics of fission.

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<td>NAC</td>
<td>Pu History II</td>
<td>11:00 am - 12:20 pm</td>
<td>Introduction to Plutonium: A Hanford Perspective</td>
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<td>Chair: Debra Barnett</td>
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<td>Panelists: David E. Meier, Matthew K. Edwards, Lucas E. Sweet</td>
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<td>Co-Chair: Skip Kerschner</td>
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<td>The second panel session will begin with a high-level overview on Hanford’s legacy to modern-day applications of plutonium science. The panel will focus on the historical perspective, accomplishments and challenges of plutonium processing, post-reactor plutonium reprocessing, and plutonium chemistry and characterization in the context of historic flowsheets.</td>
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<td>Panel Session Two: Matthew K. Edwards will provide a Brief Overview of Post-reactor Plutonium Reprocessing followed by Lucas E. Sweet giving an Overview of Plutonium Chemistry and Characterization in the Context of Historic Flowsheets. A wrap-up will follow.</td>
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<td>D</td>
<td>IS</td>
<td>Information Collection &amp; Analysis for Safeguards &amp; Proliferation Detection II</td>
<td>11:00 am - 11:20 am</td>
<td>156 - Natural Uranium Reactor Reference Document to Assist IAEA SEG Assessments</td>
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<td>Mark Schanfein¹, Samuel Bays², Gus Reyes², Amanda Rynes².</td>
<td></td>
<td>¹Idaho National Laboratory, Eastsound, WA, USA, ²Idaho National Laboratory, Idaho Falls, ID, USA.</td>
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<td>11:20 am - 11:40 am</td>
<td>274 - Breakout Time Estimate Comparison Using Centrifuge Performance Maps</td>
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<td>Benjamin R. Thomas, Wisher Paudel, Houston G. Wood. University of Virginia, Charlottesville, VA, USA.</td>
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<td>11:40 am - 12:00 pm</td>
<td>133 - Acquisition Pathway Analysis using Fuel Cycle Simulators</td>
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<td>Kathryn Mummah¹, Rian Bahran², Karen Miller², Paul P.H. Wilson¹.</td>
<td></td>
<td>¹University of Wisconsin-Madison, Madison, WI, USA, ²Los Alamos National Laboratory, Los Alamos, NM, USA.</td>
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<td>Lunch on your own</td>
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<tr>
<td>2:00 pm - 3:20 pm</td>
<td>Concurrent 10 (Technical Sessions 10)</td>
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### Session A

**MC&A and NAC Joint Session**  
**Data Fusion and Monitoring for Nonproliferation I**  
**Chair:** Angela Waterworth  
**Co-Chair:** Colonel Ben Miller

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
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</table>
| 2:00 pm - 2:20 pm | **Integrating Physical and Informational Sensing to Support Nonproliferation Assessments of Nuclear-Related Facilities**  
Zoe Gastelum¹, Aarom Luttman², Bethany Goldblum³, Timothy Shead¹, Christopher Stewart³.  
¹Sandia National Laboratories, Albuquerque, NM, USA,  
²Nevada National Security Site, Las Vegas, NV, USA,  
³University of California - Berkeley, Berkeley, CA, USA. |
| 2:20 pm - 2:40 pm | **Radiation detectors with associated contextual sensors within the Multi-Informatics for Nuclear Operations Scenarios (MINOS) program**  
Dan Archer¹, Andrew Nicholson¹, Michael Willis¹, Ian Aewart², James Ghawaly².  
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA,  
²University of Tennessee, Knoxville, TN, USA. |
| 2:40 pm - 3:00 pm | **Networked Radiation and Contextual Sensor Fusion Around the High Flux Isotope Reactor/Radiochemical Engineering Development Center Facilities**  
Andrew Nicholson.  
Oak Ridge National Laboratory, Oak Ridge, TN, USA. |
| 3:00 pm - 3:20 pm | **Classification of Industrial Facility Power-Levels Using Seismo-Acoustic Signatures**  
Camila A. Ramirez¹, Chengping Chai¹, Monica Maceira¹, Omar Marcillo².  
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA,  
²Los Alamos National Laboratory, Los Alamos, NM, USA. |

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Full Program Schedule
WEDNESDAY, JULY 17, 2019

Session B  | IS | Implementation Experience | Desert Salon 4-6
---|---|---|---

### 2:00 pm - 2:20 pm

**1434 - Outcome and Actions of the 2019 Reflection Group of the European Safeguards Research and Development Association (ESARDA)**

**Chair:** Jeffrey Johnson  
**Co-Chair:** Rob Floyd

Willem A. Janssens¹, Yetunde Aregbe², Francois Bonino³, Pierre Funk⁴, Lars Hildingsson⁵, Peter Jansson⁶, Christos Koutsoyannopoulos⁷, Elina Martikka⁸, Fausto Medici⁹, Irmgard Niemeyer¹⁰, Julie Oddou¹¹, Olli Okko¹², Filippo Sevini¹³, James Tushingham¹⁴, Arpad Vince¹⁵, Arpad Vince¹⁵, Arpad Vince¹⁵.


### 2:20 pm - 2:40 pm

**127 - IAEA Long-term R&D and the role of the MSSP**

Na Young Lee.

Korea Institute of Nuclear Nonproliferation and Control, Daejeon, Republic of Korea.

### 2:40 pm - 3:00 pm

**1419 - Status of Implementation of IAEA Safeguards in the United States**

U.S. Department of State, Washington, DC, USA.

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www.inmm.org/Events/Annual-Meeting #INMM19
### Session C  
**MC&A**  
**Correlated Fission Physics, Transport and Applications 2A**  
*Chair:* Michael Rising  
*Co-Chair:* Ramona Vogt  
**Desert Salon 9-11**

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<th>Time</th>
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<tr>
<td>2:00 pm - 3:20 pm</td>
<td>Correlated Fission Physics, Transport and Applications</td>
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This collection of special sessions will consist of several parts, with presentations on recent developments in fission physics theory, new code capabilities, experimental work, and nuclear nonproliferation and safeguards applications of interest under development at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and University of Michigan (UM). Part II consists of A) MCNP6.2 analog transport input options and outputs, B) DRIFIT detector response functions toolkit capabilities, and C) nuclear nonproliferation applications and experiments.

### Session D  
**NSPP**  
**Panel: Cyber Security**  
*Chair:* Steven Horowitz  
**Desert Salon 12-14**

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<th>Time</th>
<th>Session Title</th>
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<tr>
<td>2:00 pm - 3:20 pm</td>
<td>Panel: Cyber Security</td>
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This panel discussion will continue the discussion of cyber security that begins in the morning with two plenary speakers. Cyber security experts will form the panel and will engage with people in attendance to further our understanding of the emerging field of cyber security.
Full Program Schedule
WEDNESDAY, JULY 17, 2019

Session E NSPP Panel: MNSR Project in Nigeria Chair: Tiffany Blanchard-Case Springs Ballroom AB

2:00 pm - 3:20 pm
The panel focuses on recently completed effort that supports HEU minimization worldwide. In 2018, M3 partnered with Nigeria, China, and the IAEA to complete the conversion of Nigeria’s research reactor from HEU to LEU and fuel repatriation. Nigeria became the 33rd country plus Taiwan to become HEU free. M3 proposes coordinating separate paper topics into one session that cover all aspects of the MNSR project: 1) Conversion of the MNSR reactor; 2) Removal of all HEU from Nigeria to China; and 3) Establishment of the International MNSR Training Center in Ghana.

3:20 pm - 3:40 pm Refreshment Break Desert Ballroom Foyer

3:40 pm - 5:00 pm Concurrent 11 (Technical Sessions 11)

Session A MC&A Data Fusion and Monitoring for Nonproliferation II Chair: Angela Waterworth Co-Chair: Colonel Ben Miller Desert Salon 1-3

3:40 pm - 4:00 pm 342 - Predicting the Power Level of a Nuclear Reactor by Combining Multiple Modalities Garrison S. Flynn, Nidhi K. Parikh, Adin Egid, Emily Casleton.
Los Alamos National Laboratory, Los Alamos, NM, USA.

4:00 pm - 4:20 pm 1408 - Using Quantile Comparisons to Classify Environmental Samples Charles Weber, Kenneth Dayman.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

4:20 pm - 4:40 pm 279 - Cluster Analysis Applied to Synchrotron Radiation-Based Elemental Data ofSwipe Samples Martin A. Schoonen, Biays S. Bowerman, Juergen Thieme.
Brookhaven National Laboratory, Upton, NY, USA.

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www.inmm.org/Events/Annual-Meeting #INMM19
4:40 pm - 5:00 pm 316 - Classifiers for Dissolution Events in Processing Facility Using Effluents Measurements
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

Session B NAC Proliferation Resistance Chair: David Chichester Desert Salon 4-6

3:40 pm - 4:00 pm 1403 - Figure of Merit Analysis of Proliferation Resistant Plutonium and Uranium
Cody Lloyd, Braden Goddard.
Virginia Commonwealth University, Richmond, VA, USA.

4:00 pm - 4:20 pm 233 - Intrinsic Proliferation Resistance in Advance Reactor Fuel
Sumit Bainjwan.
Pandit Deendayal Petroleum University, Gandhinagar, India.

Session C IS Gamma Spectroscopy: Algorithm Springs Ballroom AB Chair: Sara Pozzi

3:40 pm - 4:00 pm 276 - Adding the ability to quantify activity to a Radionuclide Identification Device
David F. Sullivan¹, Henrik Persson¹, Kara Phillips¹, Julien Spruytte², Joshua Handley³.
¹Mirion Technologies, Meriden, CT, USA, ²Mirion Technologies, Lamanon, France, ³Mirion Technologies (Canberra), Meriden, CT, USA.

4:00 pm - 4:20 pm 1431 - Assessment of FRAM Measurement Uncertainties
Jung Rim, Donivan R. Porterfield, Michael D. Yoho.
Los Alamos National Laboratory, Los Alamos, NM, USA.

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4:20 pm - 4:40 pm  1410 - Implementation of an MDA algorithm with Systematic Uncertainties for Non-Destructive Assay  
John M. Kirkpatrick¹, Patricia McClay¹, Ludovic Bourva², Albert Joseph², Patrick Chard², Jas Singh², Gareth White², Colin Wilkins².  
¹Mirion Technologies (Canberra), Inc., Meriden, CT, USA,  
²Mirion Technologies (Canberra), Inc., Warrington, United Kingdom.

4:40 pm - 5:00 pm  1424 - A Self-Irradiation Correction for the Hybrid K-Edge Densitometer  
Robert D. McElroy, Stephen Croft.  
ORNL, Oak Ridge, TN, USA.

5:00 pm - 5:20 pm  307 - Geometry Independent Mass Determination using Gamma-Ray Measurements  
Shivam Singh¹, Shikha Prasad².  
¹Indian Institute of Technology Kanpur, Kanpur, India,  
²Texas A&M University, College Station, TX, USA.

Session D E&T  Panel: Virtual Reality Chair: Larry Satkowiak  Desert Salon 8

3:40 pm - 5:00 pm  Interactive 3D Models and Simulations for Nuclear Security and Nonproliferation Education, Training, and Analysis Panel Discussion  
This panel will discuss current and emerging virtual reality technologies and their applications in international nuclear security and safeguards in the areas of training, simulation, and assessment.

Panelists: Donovan Heimer (LANL), Ryan Knudsen (SNL), Tam Le (SNL), Mariah Pacheco (LANL), David Warner (LANL)

https://www.abstractsonline.com/pp8/#i/7866
3:40 pm - 5:00 pm  
Session E  
Correlated Fission Physics, Transport and Applications 2B  
Chair: Michael Rising  
Co-Chair: Ramona Vogt  
Desert Salon 9-11  

Correlated Fission Physics, Transport and Applications  
This collection of special sessions will consist of several parts, with presentations on recent developments in fission physics theory, new code capabilities, experimental work, and nuclear nonproliferation and safeguards applications of interest under development at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and University of Michigan (UMPart II consists of A) MCNP6.2 analog transport input options and outputs, B) DRIFT detector response functions toolkit capabilities, and C) nuclear nonproliferation applications and experiments.

3:40 pm - 5:00 pm  
Session F  
Panel: International Target Values  
Chair: Steven Balsley  
Co-Chair: Stephen Croft  
Desert Salon 12-14  

International Target Values (ITV) 2020: The Role of Stakeholders  
The objective of nuclear material accountancy (NMA) and its keystone, material balance evaluation (MBE), is to detect and deter diversion by assessing the nuclear material balances established through the State’s systems of accounting for and control of nuclear material (SSAC) against the corresponding uncertainties and by verifying the correctness of the States’ declaration through independent measurements. The effectiveness of NMA thus strongly depends upon the quality of both the facility operator’s declarations and the inspector’s verification measurements. In order to assess and compare the quality of safeguards measurements, a set of uncertainty values for destructive analysis (DA) was proposed by the ESARDA Working Group for Destructive Analyses (WGDA), and the first values were published in 1979. In preparation for the 2020 ITV update, an IAEA-led panel discussion consisting of State and regional authorities, representatives from NFC facility operators, laboratory experts, etc. will set the scene regarding the current application of the ITV, the process to establish them and the role of international partners. Importantly, the panel discussion is intended to solicit ideas and comments from a broader stakeholder audience than that normally involved in the ITV updating process.
## Full Program Schedule
**WEDNESDAY, JULY 17, 2019**

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<th>Radioactive Materials Security</th>
<th>Springs Ballroom C</th>
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<td>Chair: Nancy Jo Nicholas</td>
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<td>Co-Chair: Daniel Johnson</td>
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<tr>
<td>3:40 pm - 4:00 pm</td>
<td>244</td>
<td>Development of Probabilistic Threat Scenarios for Medical Radioactive source security</td>
<td>Springs Ballroom C</td>
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<tr>
<td></td>
<td></td>
<td>Shraddha Rane, Courtney Sheffield, Naomi German, Jason Harris.</td>
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<td>Purdue University, West Lafayette, IN, USA.</td>
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<tr>
<td>4:00 pm - 4:20 pm</td>
<td>118</td>
<td>Risk Analysis for Nuclear and Radioactive Materials Used in Research Institutes</td>
<td>Springs Ballroom C</td>
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<tr>
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<td>Alpana Goel, Kawaipeet Kaira¹, Sunil S.Chirayath².</td>
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<td></td>
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<td>¹AIINST, Amity University, Noida, India, ²Center for Nuclear Security Science &amp; Policy Initiatives, Texas A &amp; M University, College Station, TX, USA.</td>
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<tr>
<td>4:20 pm - 4:40 pm</td>
<td>351</td>
<td>Successful Experience in Migrating from Radioactive Irradiators to X-ray Irradiators for Blood and Medical Research Applications</td>
<td>Springs Ballroom C</td>
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<td></td>
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<td>Jacob Kamen.</td>
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<td>Mount Sinai Medical Center, New York City, NY, USA.</td>
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<tr>
<td>4:40 pm - 5:00 pm</td>
<td>139</td>
<td>Preventing a Dirty Bomb: Case Studies and Lessons Learned</td>
<td>Springs Ballroom C</td>
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<td>Ioanna Iliopulos¹, Christopher Boyd¹, Jessica Bufford².</td>
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<tr>
<td></td>
<td></td>
<td>¹Nuclear Threat Initiative (NTI), Washington, DC, USA, ²Nuclear Threat Initiative, Washington, DC, USA.</td>
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<tr>
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<tr>
<td>5:00 pm - 8:00 pm</td>
<td>Companion Program - Children</td>
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<td>Discovery Museum of the Desert</td>
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<td>5:30 pm - 6:30 pm</td>
<td>Southeast Chapter Meeting</td>
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www.inmm.org/Events/Annual-Meeting

#INMM19
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<td>Speaker Ready Room Open</td>
<td>Directors Suite 4</td>
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<tr>
<td>6:45 am - 12:00 pm</td>
<td>Registration Opens</td>
<td>North Registration</td>
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<tr>
<td>7:00 am - 7:45 am</td>
<td>Speaker Breakfast</td>
<td>Santa Rosa Ballroom</td>
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<td>8:00 am - 2:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Griffin Room</td>
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<tr>
<td>8:00 am - 3:00 pm</td>
<td>Ad-Hoc Committee Room</td>
<td>Directors Suite 3</td>
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<tr>
<td>8:00 am - 10:00 am</td>
<td>Concurrent 12 (Technical Sessions 12)</td>
<td>Desert Salon 9-11</td>
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### Session A FO International Nuclear Materials Topics

**Chair:** Morris Hassler  
**Co-Chair:** Todd Dunivan

**8:00 am - 8:20 am**

**380 - JAEA-SRNL-LANL Technical Exchange on Safe Packaging and Storage of Plutonium Bearing Materials**

¹Savannah River National Laboratory, Aiken, SC, USA, ²Los Alamos National Laboratory, Los Alamos, NM, USA, ³Japan Atomic Energy Agency, Oarai, Japan.

**8:20 am - 8:40 am**

**202 - Seeing past the uncertainties of nuclear energy in South Korea**

*Lindsay E. Rand*, Jonas Siegel.  
University of Maryland., College Park, DC, USA.
# Full Program Schedule

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<th>Neutron Rodeo: A Multi-lab Assessment of Alternative NDA Methods for Fresh Fuel Assemblies</th>
<th>Desert Salon 1-3</th>
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</table>
|           |      | **Chair:** Claudio Andres Gariazzo  
**Co-Chair:** Sara Pozzi | |
| 8:00 am - 8:20 am | 341 | **Optimization and Simulation of the Fast Neutron Passive Collar for Fresh Uranium Fuel Verification**  
Margaret Root, William Geist, Howard Menlove, Anthony Belian.  
Los Alamos National Laboratory, Los Alamos, NM, USA. | |
| 8:20 am - 8:40 am | 1428 | **Effect of the detector type on the performance of a simulated fast-neutron uranium collar for nondestructive assay of fresh fuel assemblies**  
Angela Di Fulvio¹, Tony H. Shin², Shaun D. Clarke², Sara A. Pozzi².  
¹Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA, ²Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, MI, USA. | |
| 8:40 am - 9:00 am | 354 | **Simulations of Measurement of Fresh Fuel with an Organic Glass Scintillator**  
Jeff D. Sanders¹, David Chichester¹, Dongwon Lee¹, Patrick Feng².  
¹Idaho National Laboratory, Idaho Falls, ID, USA, ²Sandia National Laboratories, Albuquerque, NM, USA. | |
| 9:00 am - 9:20 am | 350 | **Characterization of a Stilbene Detector Array for Safeguards.**  
Jerome M. Verbeke, Philip Kerr, Manoj Prasad, Steven Sheets.  
Lawrence Livermore National Laboratory, Livermore, CA, USA. | |
| 9:20 am - 9:40 am | 367 | **Simulation studies on a stilbene-based fast-neutron uranium collar for non-destructive assay of fresh fuel assemblies**  
Tony H. Shin¹, Michael Y. Hua¹, Angela Di Fulvio², Shaun D. Clarke¹, Sara A. Pozzi¹.  
¹University of Michigan, Ann Arbor, MI, USA, ²University of Illinois at Urbana-Champaign, Urbana, IL, USA. | |

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<th>Speaker(s)</th>
<th>Institution(s)</th>
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| 8:00 am - 8:20 am | Session C      | 209 - Summary of the Workshop for Nuclear Data Activities (WANDA)    | Catherine Romano¹, Lee Bernstein².  
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA,  
²Lawrence Berkeley National Laboratory, Berkeley, CA, USA.              |
| 8:20 am - 8:40 am |               | 392 - JAEA Perspective on Cross-cutting Nuclear Data Improvements Required for Safeguards and Nonproliferation | Douglas C. Rodriguez, Fabiana Rossi, Tohn Takahashi, Michio Seya, Mitsuo Koizumi, Osamu Iwamoto, Akito Oizumi, Kenji Nishihara.  
Japan Atomic Energy Agency, Tokaimura, Ibaraki, Japan.                   |
| 8:40 am - 9:00 am |               | 368 - Workshop on Technical and Programmatic Needs for NDA: Summary and Recommendations | Angela L. Lousteau, Cecil Parks, Stephen Croft.  
Oak Ridge National Laboratory, Oak Ridge, TN, USA.                        |
| 9:00 am - 9:20 am |               | 1423 - Total Measurement Uncertainty in Neutron Coincidence Multiplicity Analysis | Robert D. McElroy, Stephen Croft.  
Oak Ridge National Laboratory, Oak Ridge, TN, USA.                        |
| 9:20 am - 9:40 am |               | 1425 - Application of a Coincidence Ring Ratio Moderator Correction to the Assay of $^{235}$U Residues | Robert D. McElroy¹, Angela Lousteau¹, Philemon Magampa², Robert Chauke², Tebogo Leshilo³.  
¹Oak Ridge National Laboratory, Oak Ridge, TN, USA,  
²NECSA, Pretoria, South Africa.                                            |
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<th>Time</th>
<th>Session D</th>
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| **8:00 am - 10:00 am** | **NAC/NSPP Joint Session**  
**International Security Issues 2**  
Chair: Leon Ratz  
Co-Chair: Olga Martin |
| **8:00 am - 8:20 am** | **374 - The first Review Conference of the Amended CPPNM: preparations and possibilities**  
Robert B. Floyd, Stephan Bayer.  
Australian Safeguards and Non-Proliferation Office, Barton, Australia. |
| **8:20 am - 8:40 am** | **399 - Challenges and Solutions in Securing Ukrainian Borders Against Trafficking of Radiological and Nuclear Materials**  
Vadym Ivko¹, Pavel Tishakov², Pavel Lebedev³.  
¹Administration of State Border Guard Service of Ukraine, Kyiv, Ukraine, ²Nordisk Sikkerhet AS, Baerums Verk, Norway, ³Nordisk Sikkerhet AS, Kyiv, Ukraine. |
| **8:40 am - 9:00 am** | **1417 - Radioactive Sources in Contested Spaces: Assessing the Political and Legal Dimensions of International Response to Radioactive Sources in Areas with Weak or Non-Existent Regulatory Controls**  
Leon Ratz¹, Ioanna Iliopoulos¹, Laura Rockwood², Jessica Bufford¹, Caroline Gustavson¹.  
¹Nuclear Threat Initiative, Washington, DC, USA, ²Vienna Center for Disarmament and Non-Proliferation, Vienna, Austria. |
| **9:00 am - 9:20 am** | **366 - What Makes Nuclear Security Cooperation with Russia Work?**  
Nickolas J. Roth¹, Dmitry Kovchegin².  
¹Belfer Center, Cambridge, MA, USA, ²Consultant, Moscow, Russian Federation. |
| **9:20 am - 9:40 am** | **204 - Trending Russian Nuclear Security: What is the Progress since 2014?**  
Dmitry Kovchegin.  
N/A, St. Petersburg, Russian Federation. |

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<td><strong>8:00 am - 8:20 am</strong></td>
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<td>280 - Evaluation of a Silicon Photomultiplier Array as a Photomultiplier Tube Replacement</td>
<td>Tapani Honkama, STUK</td>
<td>Desert Salon 12-14</td>
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<td>Jesus Valencia, Michael Hamel, Ben Maestas, Benjamin Godfrey. Sandia National Laboratories, Albuquerque, NM, USA.</td>
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<td><strong>8:20 am - 8:40 am</strong></td>
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<td>381 - Guide for Employing High-Resolution Gamma Spectroscopy for $^{252}$Cf Source Age and Isotopic Composition</td>
<td>Mara M. Watson¹, Ramkumar Venkttaraman², Stephen Croft². ¹Clemson University, Anderson, SC, USA, ²Oak Ridge National Laboratory, Oak Ridge, TN, USA.</td>
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<tr>
<td></td>
<td></td>
<td>8:00 am - 8:20 am 280 - Evaluation of a Silicon Photomultiplier Array as a Photomultiplier Tube Replacement Jesus Valencia, Michael Hamel, Ben Maestas, Benjamin Godfrey. Sandia National Laboratories, Albuquerque, NM, USA.</td>
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<tr>
<td><strong>8:40 am - 9:00 am</strong></td>
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<td>262 - Uranium content and age determination of uranium in gold mine tailing using high resolution gamma spectrometry</td>
<td>Tebogo G. Kupi¹, Manny Mathuthu¹, Marthie Coetzee², Danel VanTonder². ¹North West University, Mafikeng, South Africa, ²North West University, Potchefstroom, South Africa.</td>
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<tr>
<td><strong>9:00 am - 9:20 am</strong></td>
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<td>162 - Delayed Gamma-ray Spectroscopy for Nuclear Material Analysis 1: Progress Toward Developing Practical Nondestructive Assay Technology</td>
<td>Douglas C. Rodriguez¹, Fabiana Rossi¹, Tohn Takahashi¹, Michio Seya¹, Mitsuo Koizumi¹, Kamel Abbas², Jean-Michel Crochemore³, Bent Pedersen², Peter Schillebeeckx³, Cedric Bonaldi², Stephan Oberstedt², Stefan Nonneman². ¹Japan Atomic Energy Agency, Tokaimura, Ibaraki, Japan, ²EC Joint Research Centres, Ispra, Italy, ³EC Joint Research Centres, Geel, Belgium, ⁴AC Joint Research Centre, Ispra, Italy.</td>
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<td><strong>Chair</strong>: Elina Martikka <strong>Co-Chair</strong>: Louise Worrall</td>
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<td>8:20 am - 8:40 am</td>
<td>196 - Partnering between the IAEA Collaboration Center for Human Resource and Nuclear Energy Infrastructure Development &amp; Gulf Nuclear Energy Infrastructure Institute (GNEII)</td>
<td>Saeed Alameri, Adam D. Williams, Ahmed Alkaabi, Alexander Solodov, Philip A. Beeley, Amir H. Mohagheghi, Anthony Hechanova. 1Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates, 2Sandia National Laboratories, Albuquerque, NM, USA, 3Abu Dhabi Polytechnic, Abu Dhabi, United Arab Emirates.</td>
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<tr>
<td>8:40 am - 9:00 am</td>
<td>336 - Progress on the WINS Challenge to Establish Certified Professional Development Programs</td>
<td>Daniel Johnson, Jeffrey Chapman. 1World Institute for Nuclear Security, Vienna, Austria, 2National Nuclear Security Administration, Washington, DC, USA.</td>
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**THURSDAY, JULY 18, 2019**

**Session G**

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<th>Time</th>
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| 8:00 am - 8:20 am | Development of Machine Learning Algorithms for Directional Gamma Ray Detection  
Matthew Durbin, Ryan Sheatsley, Christopher Balbier, Tristan Grieve, Patrick McDaniel, Azaree Lintereur.  
The Pennsylvania State University, State College, PA, USA. | 216 - Development of Machine Learning Algorithms for Directional Gamma Ray Detection  
Matthew Durbin, Ryan Sheatsley, Christopher Balbier, Tristan Grieve, Patrick McDaniel, Azaree Lintereur.  
The Pennsylvania State University, State College, PA, USA. |
| 8:20 am - 8:40 am | Directional Dual-Particle Detection with a Rotating Scatter Mask  
The Air Force Institute of Technology, Wright-Patterson AFB, OH, USA. | 125 - Directional Dual-Particle Detection with a Rotating Scatter Mask  
The Air Force Institute of Technology, Wright-Patterson AFB, OH, USA. |
| 8:40 am - 9:00 am | An Unsupervised Radiation Anomaly Detection Algorithm Using a Deep Neural Autoencoder  
James M. Ghawaly Jr.*, Daniel Archer**, Howard Hall**, Matthew Cook**.  
1University of Tennessee Knoxville, Knoxville, TN, USA,  
2Oak Ridge National Laboratory, Oak Ridge, TN, USA. | 347 - An Unsupervised Radiation Anomaly Detection Algorithm Using a Deep Neural Autoencoder  
James M. Ghawaly Jr.*, Daniel Archer**, Howard Hall**, Matthew Cook**.  
1University of Tennessee Knoxville, Knoxville, TN, USA,  
2Oak Ridge National Laboratory, Oak Ridge, TN, USA. |
| 9:00 am - 9:20 am | Advanced Radiation Imaging Algorithms with Rotating Scatter Masks  
Robert Olesen, Darren Holland, James Bevins.  
The Air Force Institute of Technology, Wright-Patterson AFB, OH, USA. | 169 - Advanced Radiation Imaging Algorithms with Rotating Scatter Masks  
Robert Olesen, Darren Holland, James Bevins.  
The Air Force Institute of Technology, Wright-Patterson AFB, OH, USA. |
| 9:20 am - 9:40 am | Experimental benchmarking of large-scale PVT scintillator Geant4 simulations for performance prediction and design optimisation.  
Joshua H. Smith.  
AWE plc, Reading, United Kingdom. | 397 - Experimental benchmarking of large-scale PVT scintillator Geant4 simulations for performance prediction and design optimisation.  
Joshua H. Smith.  
AWE plc, Reading, United Kingdom. |
| 9:40 am - 10:00 am | Utilising Dynamic Time Warping in the Assessment of Alarms from Radiation Portal Monitors - An Exploratory Study  
Christopher Hobbs, Peter McBurney, Dominic Oliver.  
King’s College London, London, United Kingdom. | 278 - Utilising Dynamic Time Warping in the Assessment of Alarms from Radiation Portal Monitors - An Exploratory Study  
Christopher Hobbs, Peter McBurney, Dominic Oliver.  
King’s College London, London, United Kingdom. |

**10:00 am - 10:30 am**

**Refreshment Break**

**Desert Ballroom Foyer**

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Full Program Schedule
THURSDAY, JULY 18, 2019

10:30 am - 12:30 pm Concurrent 13 (Technical Sessions 13)

Session A IS UF6 & Enrichment Plants Desert Salon 1-3
Chair: Bruce Moran Co-Chair: Sonia Fernandez Moreno

10:30 am - 10:50 am 1407 - Simulation of Undeclared Operations at Gas Centrifuge Enrichment Plants
Charles Weber, Susan Smith. Oak Ridge National Laboratory, Oak Ridge, TN, USA.

10:50 am - 11:10 am 376 - Dittus-Boelter Analysis of the Non-Invasive, Non-Spoofable, UF₆ Thermal Mass-Flow Meter
Soha Aslam¹, Robert J. Goldston¹, Alessandro Cattaneo², Rollin E. Lakis², Deborah Lark².
¹Princeton University, Princeton, NJ, USA, ²Los Alamos National Laboratory, Los Alamos, NM, USA.

11:30 am - 11:50 am 1421 - Noninvasive Mass Flow Meter for UF6 Gas
Deborah Lark, Alessandro Cattaneo, Jacob Riglin, Marwan Mohamed, Robert Goldston, Rollin Lakis, Estevan Trujillo.
Los Alamos National Lab, Los Alamos, NM, USA.

11:50 am - 12:10 pm 1400 - A consensus procedure for sampling gaseous uranium hexafluoride using aluminum oxide pellets
Olivio Pereira de Oliveira Junior.
IPEN-CNEN, Sao Paulo, Brazil.

12:10 pm - 12:30 pm 340 - Gamma Spectrum Variations For Standoff Measurements Of UF₆ Cylinders
Noah J. McFerran¹, Andreas Enqvist¹, Bonnie E. Canion², Simon E. Labov², Benjamin S. McDonald³, Jonathan A. Kulisek³, Jonathan G. Dreyer².
¹University of Florida, Gainesville, FL, USA, ²Lawrence Livermore National Laboratory, Livermore, CA, USA,
³Pacific Northwest National Laboratory, Richland, WA, USA.

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<td>Forensics / Destructive Analysis</td>
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<td>Chair: Michael Bridson</td>
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<td>Co-Chair: Tina Hernandez</td>
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10:30 am - 10:50 am
1418 - Nuclear Forensics Capacity Building at LLNL through Peer-to-Peer Engagements
Ruth Kips, Kerri Treinen, Rachel Lindvall, Marta Bavio, Michael J. Kristo.
1Lawrence Livermore National Laboratory, Livermore, CA, USA, 2National Atomic Energy Commission Argentina, Buenos Aires, Argentina.

10:50 am - 11:10 am
242 - Analysis of U-Co isotope ratios and REE pertains in uranium mine products in South Africa using ICP-Mass Spectrometry
Manny Mathuthu.
North-West University (Mafikeng), Mmabatho, South Africa.

11:10 am - 11:30 am
234 - Characterisation of Safeguarded Nuclear Materials in the Republic of South Africa using Non-Destructive Assay Techniques
1Necsa, Pretoria, South Africa, 2Oak Ridge National Laboratories, Oak Ridge, TN, USA.

11:30 am - 12:10 pm
391 - Absolute Measurement of $^{137}$Cs and $^{134}$Cs/$^{137}$Cs and $^{154}$Eu/$^{137}$Cs Ratios to Verify University of Texas TRIGA Reactor Spent Fuel Burnup
Jay P. Joshi, William Charlton, Alexis Trahan.
1University of Texas at Austin, Austin, TX, USA, 2Los Alamos National Laboratory, Los Alamos, NM, USA.

337 - Evolution of Uranium Monoxide in Laser-Induced Plasma Plume in Oxygen-Rich Environment
Miguel A. Barragan.
North Carolina State University, Raleigh, NC, USA.
Session C  NAC Panel : Verification  Desert Salon 4-6
Chair: Corey Hinderstein  Co-Chair: Rob Floyd

10:30 am - 12:30 pm  The Benefits of Exercising - Using tabletops, simulations and practical experiences to strengthen disarmament verification approaches
The challenges associated with verifying cooperative, multilateral nuclear dismantlement processes are often acknowledged but still not fully understood. While the relationship between design and prototyping is well understood in other area, it is not possible for all countries to “test drive” new instruments or processes in the field for nuclear disarmament verification. This panel will discuss the benefits and lessons learned from a number of international initiatives undertaken to expand the technical and policy community’s understanding of challenges, identify new areas of study, and test conclusions.

Panelists:
Irmgard Niemeyer, Forschungszentrum Jülich, Germany
Styrkaar Hustveit, Norwegian Radiation Protection Authority
Marek A. Sobótka, Polish Permanent Representation to the OSCE
Alicia Swift, CNS/Y-12 National Security Complex, USA
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<td>Chair: Nina Rosenberg</td>
<td>Co-Chair: Willem Janssens</td>
</tr>
<tr>
<td>10:30 am - 10:50 am</td>
<td>394 - Developing Interactive Means to Teach Nuclear 3S Topics</td>
<td>Shannon N. Abbott, Noelle Camp, Matthew Sternat, Jason Bolles. Sandia National Laboratories, Albuquerque, NM, USA.</td>
<td></td>
</tr>
<tr>
<td>11:30 am - 11:50 am</td>
<td>248 - Realistic Nuclear Detection Training In The Field Without Radioactive Sources - The Radiation Field Training Simulator (RaFTS)</td>
<td>Steven Kreek, William Dunlop, Greg White. Lawrence Livermore National Laboratory, Livermore, CA, USA.</td>
<td></td>
</tr>
</tbody>
</table>
# Full Program Schedule

**THURSDAY, JULY 18, 2019**

<table>
<thead>
<tr>
<th>Session E</th>
<th>NSPP</th>
<th>Nuclear Power Plants/ Sabotage</th>
<th>Chair: KJ Maddux</th>
<th>Co-Chair: Ed Lyman</th>
<th>Desert Salon 12-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 am - 12:10 pm</td>
<td>236</td>
<td>Adversary path analysis for hypothetical facility and performance comparison with extended detection probability</td>
<td>Vishal U. Dhakane, Smit S. Shah, Abhishek V. Saxena, Vipin Shukla. Pandit Deendayal Petroleum University, Gandhinagar, India.</td>
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</tr>
<tr>
<td>12:30 pm - 2:00 pm</td>
<td>Lunch on your own</td>
<td>Student Paper Competition Wrap-Up Meeting</td>
<td>Directors Suite 3</td>
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<tr>
<td>1:00 pm - 2:00 pm</td>
<td>Companion Program - Farewell Ice Cream Social</td>
<td>Griffin</td>
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</table>

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2:00 pm - 4:00 pm

Closing Plenary Session

Desert Salon 8

**Topic: GOT INSIDERS in Nuclear Security?**

Please join us for the closing plenary session: An interactive scenario-based discussion on the challenge of mitigating the insider threat. The DOE/NNSA and FANC (Belgium) co-hosted an international symposium in Brussels in March 2019 to raise awareness of the need for insider threat mitigation programs for nuclear security as well as to promote the endorsement of IAEA INFIRC 908. The closing plenary will be a follow-on to some of the interactive break-out sessions held in Brussels and will serve to heighten awareness of challenges posed by organizations implementing insider threat mitigation programs, discuss potential strategies to enhance mitigation techniques, and propose future research and opportunities to advance the state-of-the-art in this mission space. Our closing session will be moderated by Mr. Tomas Bieda, Director of Nuclear Security Policies and Nonproliferation of the Energy Government Secretariat in Argentina. It will also provide opportunities for anonymous interactive polling to garner feedback from the audience on ways to enhance insider threat mitigation programs and generate insights for the development of program improvements.

**Facilitator:**

Tomás Bieda, Undersecretariat of Nuclear Energy from the Secretary of Energy from Argentina

**Panelists:**

Cary Crawford, INMM President, Oak Ridge National Laboratory (ORNL)

Frank Wong, Lawrence Livermore National Laboratory (LLNL)

Christine Noonan, Pacific Northwest Laboratory (PNL)
Poster Hours and Submissions

<table>
<thead>
<tr>
<th>POSTER HOURS</th>
<th>LOCATION: DESERT SALON 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, July 15: 8:00 am – 10:00 am</td>
<td>Poster Set-Up</td>
</tr>
<tr>
<td>Monday, July 15: 10:00 am – 10:45 am</td>
<td>Poster Viewing</td>
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<tr>
<td>Monday, July 15: 3:40 pm - 4:25 pm</td>
<td>Poster Viewing</td>
</tr>
<tr>
<td>Tuesday, July 16: 10:15 am – 11:00 am</td>
<td>Poster Presentations</td>
</tr>
<tr>
<td>Tuesday, July 16: 3:40 pm - 4:25 pm</td>
<td>Poster Presentations</td>
</tr>
<tr>
<td>Wednesday, July 16: 10:15 am - 11:00 am</td>
<td>Last Viewing and Poster Award Presentation</td>
</tr>
</tbody>
</table>

Poster Submissions

**POSTER #1**

Abstract 105 - Regulatory Perspective on Nuclear Cyber Security: The Fundamental Issues

Uchechukwu C. Arinze, Agozie Hyacinth Eneh, Babatope Olumide Longe.

1Nigerian Nuclear Regulatory Authority, Enugu, Nigeria, 2University of Nigeria, Nsukka, Enugu, Nigeria, 3Caleb University, Lagos, Nigeria.

**POSTER #2**

Abstract #129 - Development of Active Neutron NDA System for Radioactive Nuclear Materials

Yosuke Toh, Akira Ohzu, Harufumi Tsuchiya, Kazuyoshi Furutaka, Fumito Kitatani, Masao Komed, Makoto Maeda, Mitsuo Koizumi.

Japan Atomic Energy Agency, Ibaraki, Japan.

**POSTER #3**

Abstract #153 - Safeguards: Exempted Nuclear Materials at KAERI

Inchul Kim.

Korea Atomic Energy Research Institute, Daejeon, Republic of Korea.

**POSTER #4**

Abstract #158 - An Arms Control Primer

Morag K. Smith, Jacob Benz, Deborah Dale, Michele DeCroix, Kristin Hertz, Kelly Jenkins, Peter Marleau.

1Los Alamos National Laboratory, Los Alamos, NM, USA, 2Pacific Northwest National Laboratory, Richland, WA, USA, 3Sandia National Laboratories, Livermore, CA, USA.

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Poster Submissions

**POSTER #5**
Abstract #168 - The Use of Drones in Nuclear Security
Jelena Vucicevic, Ed Waller.
University of Ontario Institute of Technology, Oshawa, ON, Canada.

**POSTER #6**
Abstract #179 - The International Safeguards Working Group on Open Source and Geospatial Information: Overview, Activities, and Future Plans
Zoe Gastelum¹, Yana Feldman².
¹Sandia National Laboratories, Albuquerque, NM, USA, ²Lawrence Livermore National Laboratory, Livermore, CA, USA.

**POSTER #7**
Abstract #185- Advanced Reactor Safeguards Workshop at Texas A&M University
Mario Mendoza, Athena Sagadevan, Jackson Wagner, Sunil Chirayath, Evans Kitcher.
Texas A&M University, College Station, TX, USA.

**POSTER #8**
Abstract #199 - Plutonium Mass Estimation of Pyroprocessed Ingot by Neutron Multiplicity Measurement and Gamma-ray Spectroscopy
Jihye Jeon, Chang Je Park, Geehyun Kim.
Sejong University, Seoul, Republic of Korea.

**POSTER #9**
Abstract #200 - Safeguards System Analysis on the Withdrawal from the NPT
Keonhee Lee, Byung-Wook Lee, Youngwoo Lee, Jae Soo Ryu.
Korea Atomic Energy Research Institute, Daejeon, Republic of Korea.

**POSTER #10**
Abstract #205 - NMCA Hold Points of Americium Oxide Production
Hope Quintana.
Los Alamos National Laboratory, Santa Fe, NM, USA.

**POSTER #11**
Abstract #223 - Misuse of Research Reactors and Technical Parameters for Potential Mailbox Declarations
Sean Martinson¹, Allyn Milojevich², Craig Marianno¹, Sunil Chirayath¹.
¹Texas A&M University, College Station, TX, USA, ²Y-12 Security Complex, Oak Ridge, TN, USA.

**POSTER #12**
Abstract #1455 - Code-to-Code Comparison Between Nuclear Fuel Cycle Modeling Codes For Nonproliferation And Safeguards Applications
J. Daniel Hartman, Lee Burke, Romarie Morales, Paul Whitney, David Vermillion.
Pacific Northwest National Laboratory, Richland, WA, USA.

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Poster Submissions

POSTER #13
Abstract #238 - Training the Next Generation of Experts through the INMM Arms Control, Treaty Verification, and Disarmament (ACTVD) Pilot Mentorship Program
Kelly Jenkins¹, Jacob Benz¹, Michele DeCroix², Morag Smith².
¹Pacific Northwest National Laboratory, Richland, WA, USA, ²Los Alamos National Laboratory, Los Alamos, NM, USA.

POSTER #14
Abstract #255 - Consideration of Administrative Monetary Penalties in Nuclear Security Regulation
Jelena Vucicevic, Ed Waller.
University of Ontario Institute of Technology, Oshawa, ON, Canada.

POSTER #15
Abstract #260 - Introduction of the Internal Compliance Program For Korea Atomic Energy Research Institute Export Control
Hyun Sook Kim¹, In chul Kim², SeongMi Han², ByungDoo Lee², SungHo Lee², HyunJo Kim², JuAng Jung².
¹KAERI, Deajeon, Republic of Korea, ²Korea Atomic Energy Research Institute, Deajeon, Republic of Korea.

POSTER #16
Abstract #310 - Cultivating Future Leaders in Nuclear Science While Transferring Historical and Institutional Knowledge
Debra Barnett, Frances Smith.
Pacific Northwest National Laboratory, Richland, WA, USA.

POSTER #17
Abstract #328 - Hotcell Dissolution Protocol & Apparatus for High Precision Characterization of Irradiated Curium Target Segments
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

POSTER #18
Abstract #343 - Macroencapsulation for Shipping and Dispositioning Mixed Waste
Garrett Moyers.
TetraTech, Oak Ridge, TN, USA.

POSTER #19
Abstract #355 - Development of Equivalent Beam Model for Evaluating SF Integrity During Dry Storage and Transportation
Donghyo Lee, Seongki Lee, Jongsung Yoo.
Kepco Nuclear Fuel, Daejeon, Republic of Korea.
Poster Submissions

POSTER #20
Abstract #383 - Experimental Benchmarking of Large-scale PVT Scintillator Geant4 Simulations for Performance Prediction and Design Optimisation
Joshua H. Smith.
AWE plc, Reading, United Kingdom.

POSTER #21
Abstract #395 - Nuclear Security in the 2016 Olympic Games: The Brazilian Experience
Larissa Paizante Santos da Silva, Valéria Sousa França, Beatriz Machado dos Santos, Jian Su.
Federal University of Rio de Janeiro, Rio de Janeiro, Brazil.

POSTER #22
Abstract #1440/22 - Stand-Off Neutron Detection Monitoring of the Movement of Spent Nuclear Fuel
Bryan van der Ende, Bhaskar Sur.
Canadian Nuclear Laboratories, Chalk River, ON, Canada.

POSTER #23
Abstract #1442 - Development Environment and Future of China’s Nuclear Security Culture
Zhang Jiaqi.
China Institute of Nuclear Information & Economics, Beijing, China.

POSTER #24
Abstract #226 - Integrated Nuclear Renewable Hybrid Energy System Analysis using HOMER
Philseo Kim, Man-Sung Yim.
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea.

POSTER #25
Abstract #1443 - Anti-Tamper Unclonable Asset Tracking to Promote Nuclear Nonproliferation
Juan Lopez.
Oak Ridge National Laboratory, Oak Ridge, TN, USA.

POSTER #26
Abstract #1447 - An Accelerator-Driven System To Burn Spent Fuel For Power Or Plutonium For Tritium
Rolland Johnson¹, J D. Lobo¹, Thomas J. Roberts², Mary Anne C. Cummings², Robert Abrams².
¹Muons, Inc., Newport News, VA, USA, ²Muons, Inc., Batavia, IL, USA.
INMM Exhibitor Directory

Y-12 National Security Complex | Pantex Plant
Booth 21
Morris Hassler
P.O. Box 2009 MS 8112
Oak Ridge, TN 37831
Tel: 865-576-8136
Email: morris.hassler@cns.doe.gov

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Lawerence Livermore National Laboratory
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