HEALTH PHYSICS SOCIETY

64th Annual Meeting
Hilton Orlando • Orlando, Florida • 7-11 July 2019

PRELIMINARY PROGRAM
THANK YOU TO OUR 2019 HPS SPONSORS

PLATINUM

MIRION TECHNOLOGIES

GOLD

Bionomics

Thermo Fisher Scientific

Oak Ridge, TN

SILVER

C&C Irradiator

FOSSTHERAPY SERVICES, INC.

HI-Q ENVIRONMENTAL PRODUCTS COMPANY, INC.

Air Sampling & Radiation Monitoring Equipment, Systems & Accessories

Nuclear News

Radwaste SOLUTIONS

NUCLEONIX SYSTEMS PVT LTD INDIA

Manufacturers and suppliers of Nuclear Instruments & Systems AN ISO 9001:2015 COMPANY

Bronze

Actinium Pharmaceuticals, Inc.
Key Dates

1 June
Current Events/Works-In-Progress Deadline

5 June
HPS Annual Meeting Pre-registration Deadline

14 June
Hilton Orlando Hotel
Registration Deadline

15-19 July
Professional Enrichment Program
HPS 64th Annual Meeting

14 July
AAHP Courses

16 July
American Board of Health Physics
Written Exam

Registration
Hours and Location
Hilton Orlando, Orlando Foyer

Sunday, 7 July
07:00 – 17:00

Monday, 8 July
08:00 – 16:00

Tuesday, 9 July
08:00 – 16:00

Wednesday, 10 July
08:00 – 16:00

Thursday, 11 July
08:00 – 11:00

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Saturday
Saturday AAHP Courses
will take place in the
Hilton Orlando

Sunday-Thursday
PEPs, CELs, and Sessions
will be at the Hilton Orlando
**Officers**
- President - Nolan Hertel
- President Elect - Eric Goldin
- Past President - Eric Abelquist
- Secretary - Karen Langley
- Secretary Elect - Sander Perle
- Treasurer - Steven King
- Executive Director - Brett Burk

**Board of Directors**
- Kendall Berry
- Jan Braun
- John Cardarelli
- Jason Harris
- Thomas Johnston
- Mike Mahathy
- Tara Medich
- Thomas Morgan
- Jeffrey Whicker

**Local Arrangements Committee**
- Jay Maisler
- Shane DeStefano
- Howard Dickson
- Ray Dielman
- Carolann Innabone
- Kim Kantner
- Craig Kinne
- Annette Maisler
- Kevin McDonough
- Kevin Nelson
- Rodney Nickell
- George Snyder
- Susan Stanford
- Glenn Sturchio
- Kathy Thomas
- Tristan Timm
- Adam Weaver

**Current Events/Works-In-Progress**
The submission form for the Current Events/Works-in-Progress poster session is on the Health Physics Society Website at www.hps.org under the Orlando Annual Meeting section. The deadline for submissions is Friday, 1 June 2019. All presentations will take place as posters on Monday, 8 July, between 13:00 – 15:00. Individuals will be notified of acceptance of their poster submissions by mid-June.

For questions regarding poster submissions, contact HPSProgram@burkinc.com, or Lori Strong at the HPS Secretariat at LStrong@burkinc.com.

**Note For CHPs**
The American Academy of Health Physics has approved the following meeting-related activities for continuing education credits for CHPs:
- Meeting attendance is granted 1 CEC per contact hour, excluding meals and business meetings;
- AAHP 8-hour courses are granted 16 CECs each;
- HPS 2-hour PEP courses are granted 4 CECs each;
- HPS 1-hour CELs are granted 2 CECs each.

**Student Worker Orientation**
Mandatory Meeting for Student Travel Grant Awardees
- Saturday, 7 July, 17:45 – 18:45
  - Clear Lake, Hilton Hotel

**HPS Awards Plenary Breakfast**
Thursday, 11 July, 08:00 – 10:00
- Hilton Orlando, Orange D
Join us Thursday, 11 July, for the HPS Awards Program. We look forward to seeing you by 08:00 for the presentation at the Hilton Orlando. There will be a buffet breakfast provided that begins at 07:30.
6th Annual Quiz Bowl
You and your friends can test your knowledge against other HPS members (members are encouraged to group with students and young professionals). Join in on the fun Sunday, 7 July, 16:00 – 17:00, at the Hilton Orlando in Clear Lake.

Welcome Reception
The Welcome Reception this year will be held on Monday, 8 July from 17:30 – 19:00 in Orlando 1-3. Join fellow attendees for a time to socialize and renew old acquaintances. A cash bar will be available with appetizers.

Exhibits
Free Lunch! Free Lunch! – 12:00, Monday, 8 July and Tuesday, 9 July. All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.
Breaks Monday Afternoon-Wednesday Morning – Featuring morning continental breakfasts and afternoon refreshments such as fruit, ice cream, and cookies. Be sure to stop by and visit with the exhibitors while enjoying your refreshments!

AAHP Exam
Lake Mizell
Monday, 8 July, 12:30 – 18:30

Reception for Women and Minorities in RP
Hilton Orlando, Lake Monroe
Wednesday, 9 July, 13:15 – 14:15

Again this YEAR!
PEP Courses will have presentations posted online for those who have signed up for them prior to the meeting. There will be no hard copy handouts. See page 38 for course information

Things to Remember!
All speakers are required to check in at the Speaker Ready Room in the Hilton Orlando, at least one session prior to their assigned session.
Preregistration Policy: Unless payment accompanies your form, you will NOT be considered preregistered.

HPS Works in Progress Submittal
Click HERE to submit.

Sessions and Course Locations
AAHP Courses on Saturday are at the Hilton Orlando; Sunday PEPs are in the Hilton Orlando; PEPs, CELs, and all sessions Monday through Thursday will take place at the Hilton Orlando.

AAHP Awards Luncheon
Hilton Orlando, Lake Mizell
Tuesday, 9 July • 12:00 – 14:00

HPS Awards Plenary
Join us Thursday, 11 July, for the Awards Program. We look forward to seeing you by 08:00 for the presentation at the Hilton Orlando. There will be a buffet breakfast provided that begins at 07:30. We look forward to seeing you there.

HPS Business Meeting
Hilton Orlando, Orlando IV
Wednesday, 18 July, 17:30 – 18:30

Sign up early for Social Events!
If social events do not meet minimums by the deadline of 5 June, there is a chance that they will be canceled. Don’t get to the meeting and find that the tour or social event you kept meaning to sign up for was cancelled due to lack of reservations.

Meeting Refund Policy
Request for refunds will be honored if received in writing by 5 June. All refunds will be issued AFTER the meeting and will be subject to a 20% processing fee.

NO REFUNDS WILL BE ISSUED AT THE MEETING.
Refunds will not be issued to no-shows.
Welcome

The Florida Chapter of the Health Physics Society welcomes you to the Orlando, “the City Beautiful,” for the 64th Annual Meeting of the HPS. Orlando is the Theme Capital of the World®! The meeting venue is located close to a number of features and events rated highly by tourists; Universal Orlando, Walt Disney World, SeaWorld, iDrive 360, and many more. Other area attractions include the incredible beaches of both the Gulf and Atlantic Coasts – each only an hour’s drive. The Kennedy Space Flight Center is another great place to visit. We encourage you to make this a family vacation as you make your plans to attend this meeting and enjoy the attractions. Visit the link to VisitOrlando at visitorlando.com.

Weather & Local Area

Orlando’s weather in July is hot and humid. The average daytime temperature can reach about 92°F (33°C), while the average low temperature is a pleasant 73°F (23°C). It’s also peak tourist time so it will be very busy with kids as it’s the summer holidays. Don’t forget your umbrella! Summer in Florida is known for the albeit brief, but sometimes daily, afternoon thunderstorm. Of course, the Hilton is well-air conditioned and you don’t have to leave the hotel for the meeting!

To/From Airport, Getting Around Downtown

Orlando International airport is located about 13 miles from the Hilton. Taxi service is available 24/7 and fares cost about $40. Super Shuttle is also available for about $35. Uber and Lyft are alternatives for transportation between the airport and hotel.

Accommodations

**Hilton Orlando**

6001 Destination Parkway, Orlando, FL 32819
Direct Phone 407-313-4300
HPS Rate: $174 per night.

Located right in the heart of “where it’s happening” means we will be close to a huge number of features and events that tourists rate highly. Think Sea World, Universal Orlando, Walt Disney World, iDrive 360, and many more!

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**SAVE THE DATE**

**HPS 53rd Midyear Meeting**
26-29 January 2020 • Bethesda, MD

**HPS 65th Annual Meeting**
4-9 July 2020 • National Harbor, MD
Preliminary Program

TOURS & EVENTS

Monday, 8 July

Open Mike Night
Free
Details are still being worked out on this fun event. Stop back for details.

COMPANION PROGRAM

Information for Registered Companions

 Companion Registration cost is $110 and includes the Welcome Reception, Monday-Thursday breakfast buffet at the Hilton Orlando, and lunch and breaks in the Exhibition Hall. There will not be a separate Hospitality Room, however the Local Arrangements Committee staff in Lake Highland A will be happy to answer your questions or assist in finding the answer.

New this Year!
Children’s Conference Shirts

This year the local arrangements committee is offering conference t-shirts for children. Children’s t-shirts will not be on available for sale onsite, so order shirts for your kids or grandkids when you pre-register for the meeting.

Wednesday, 10 July

Pub Crawl
18:30
Pre-registration $25 (Check)/ $27 (Credit Card)
Onsite $30 (Check)/ $32 (Credit Card)
Commemorative shirt included!
Sign-up early as we have a limited number of shirts.
The Pub Crawl is always a fun-for-all event. The Orlando has great bars and pubs. Come join us as either an active participant or one who just likes great company.

Monday, 8 July

Welcome to Orlando Companion Orientation
Orlando Representative – 09:00 - 10:00, Lake Highland A

The city orientation takes place Monday, 8 July from 09:00 to 10:00 at Pocket Lake. A representative from Orlando will be on hand to describe some of the many opportunities, provide maps, and answer questions.

Monday, 8 July

Welcome Reception
17:30 – 19:00, Orlando 1-3, Hilton Orlando

Come see old friends and make new ones! Enjoy hors d’oeuvres with a cash bar, 17:30 – 19:00.

Monday, 8 July - Thursday, 11 July

Companion Breakfast
06:30 - 10:30, Hilton Orlando, Bistro Restaurant

Companion Registration includes Monday – Thursday breakfast buffet at the Hilton Orlando, 06:30 to 10:30. A delicious buffet awaits you including made-to-order omelets, scrambled eggs, breakfast meats (sausage and bacon), French toast, pancakes, hot oatmeal, assorted pastries, fresh fruits, juice, coffee, and tea.

Registered companions are welcome to come to the lunch and breaks in the Exhibition Hall.
### Saturday, 6 July 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Finance Committee Meeting</td>
<td>08:00 – 12:00</td>
<td>Turkey Lake</td>
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<tr>
<td>ABHP Board Meeting</td>
<td>08:00 – 16:00</td>
<td>Pocket Lake</td>
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<tr>
<td>NRRPT</td>
<td>08:30 – 16:30</td>
<td>Lake Lucerne</td>
</tr>
<tr>
<td>ABHP Part II Panel</td>
<td>08:00 – 17:00</td>
<td>Lake Virginia</td>
</tr>
<tr>
<td>Executive Committee Meeting</td>
<td>12:00 – 16:00</td>
<td>Turkey Lake</td>
</tr>
<tr>
<td>HP Journal Editorial Board</td>
<td>15:00 – 17:00</td>
<td>Lake Florence</td>
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### Sunday, 7 July 2019

<table>
<thead>
<tr>
<th>Event</th>
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<th>Location</th>
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<tbody>
<tr>
<td>ABHP Part II Panel</td>
<td>08:00 – 17:00</td>
<td>Lake Virginia</td>
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<tr>
<td>NRRPT</td>
<td>08:30 – 16:30</td>
<td>Lake Lucerne</td>
</tr>
<tr>
<td>AAHP Executive Committee</td>
<td>08:30 – 17:00</td>
<td>Pocket Lake</td>
</tr>
<tr>
<td>HPS Board of Directors</td>
<td>08:30 – 17:00</td>
<td>Lake Nona A</td>
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<tr>
<td>IRPA Executive Council</td>
<td>09:00 – 17:00</td>
<td>Lake Florence</td>
</tr>
<tr>
<td>Quiz Bowl</td>
<td>16:00 – 17:00</td>
<td>Clear Lake</td>
</tr>
<tr>
<td>Student Mentor Speed Networking</td>
<td>17:00 – 18:30</td>
<td>Lake Highland A</td>
</tr>
<tr>
<td>Accelerator Section Board Meeting</td>
<td>17:30 – 18:30</td>
<td>Lake Lucerne</td>
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### Monday, 8 July 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
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<tbody>
<tr>
<td>Elda Anderson Breakfast</td>
<td>06:45 – 08:00</td>
<td>Pocket Lake</td>
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<tr>
<td>NRRPT</td>
<td>08:30 – 16:30</td>
<td>Lake Lucerne</td>
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<tr>
<td>AAHP Nominating Committee</td>
<td>09:00 – 10:00</td>
<td>Turkey Lake</td>
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<tr>
<td>Companion Orientation</td>
<td>09:00 – 10:00</td>
<td>Lake Highland A</td>
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<tr>
<td>Academic Education Committee</td>
<td>12:00 – 13:30</td>
<td>Spring Lake</td>
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<tr>
<td>IRPA Board Meeting</td>
<td>13:00 – 18:00</td>
<td>Conway Lake</td>
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<tr>
<td>Chapter Council Meeting</td>
<td>13:30 – 14:30</td>
<td>Orlando IV</td>
</tr>
<tr>
<td>NCRP PAC-2</td>
<td>13:30 – 15:00</td>
<td>Lake Down</td>
</tr>
<tr>
<td>US TAG to ISO/TC85 and Subcommittees (NTAG)</td>
<td>14:00 – 17:00</td>
<td>Spring Lake</td>
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<tr>
<td>Section Council Meeting</td>
<td>14:30 – 15:30</td>
<td>Lake Concord</td>
</tr>
<tr>
<td>ANSI N13.8 Radiation Safety in Uranium Mining</td>
<td>15:00 – 16:30</td>
<td>Turkey Lake</td>
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<tr>
<td>Medical Board Meeting</td>
<td>17:00 – 18:00</td>
<td>Clear Lake</td>
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### Tuesday, 9 July 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
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<tbody>
<tr>
<td>Exhibitor Breakfast</td>
<td>08:00 – 09:00</td>
<td>Lake Highland A</td>
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<tr>
<td>N13.11</td>
<td>08:00 – 12:00</td>
<td>Pocket Lake</td>
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<tr>
<td>NRRPT</td>
<td>08:30 – 16:30</td>
<td>Lake Lucerne</td>
</tr>
<tr>
<td>ANSI N13.61</td>
<td>09:00 – 12:00</td>
<td>Clear Lake</td>
</tr>
<tr>
<td>International Collaboration Committee</td>
<td>12:00 – 14:00</td>
<td>Spring Lake</td>
</tr>
<tr>
<td>AEC hosts Program Directors Meeting</td>
<td>13:30 – 14:30</td>
<td>Lake Highland A</td>
</tr>
</tbody>
</table>
Committee Meetings
Meetings take place at the Hilton Orlando

Wednesday, 10 July 2019

President Mtg with BOD Designates
08:00 – 17:00 Pocket Lake

Standards Committee
12:30 – 16:30 Lake Lucerne

Continuing Education Committee
13:00 – 15:00 Clear Lake

Thursday, 11 July 2019

HPS Awards Breakfast
08:00 – 10:00 Orange D

ANSI N13 Revision
09:00 – 16:30 Lake Concord

IRPA Board Meeting
10:00 – 13:00 Lake Hart

Reception for Women and Minorities in RP
13:15 – 14:15 Lake Monroe

Friday, 12 July 2019

ANSI N13 Revision
09:00 – 16:30 TBD

Business Meetings

MONDAY
AIRRS Business Meeting
16:10 – 17:00 Orange B

Medical Business Meeting
16:30 – 17:00 Orange A

Instrumentation Section Business Meeting
16:30 – 17:00 Orange C

TUESDAY
Environmental/Radon Business Meeting
11:05 – 12:00 Orange A

Power Reactor Business Meeting
12:30 – 14:15 Orange C

AAHP Business Meeting
17:00 – 18:00 Orlando IV

NIR Business Meeting
17:00 – 18:00 Orange B

WEDNESDAY
Nanotechnology Business Meeting
11:15 – 12:00 Orange B

Military Business Meeting
11:45 – 12:15 Orange C

HPS Business Meeting
17:30 – 18:30 Orlando IV

THURSDAY
Accelerator Business Meeting
11:30 – 12:15 Orlando IV

Homeland Security Business Meeting
12:00 – 12:30 Orlando V

Women and Minorities in RP Business Meeting
12:15 – 13:15 Lake Down
<table>
<thead>
<tr>
<th>EXHIBITOR LISTING</th>
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<tbody>
<tr>
<td>2019 Annual Meeting - Orlando, Florida</td>
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<tr>
<td>AAHP/ABHP</td>
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<tr>
<td>Army Medical Recruiting ...................................... Booth: 700</td>
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<tr>
<td>Arrow-Tech, Inc. .................................................. Booth: 214</td>
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<tr>
<td>Berthold Technologies ............................................. Booth: 109</td>
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<tr>
<td>Bertin Instruments .................................................. Booth: 115</td>
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<tr>
<td>Best Dosimetry Services .......................................... Booth: 317</td>
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<td>Bionomics ............................................................... Booth: 401</td>
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<td>Bladewerx ............................................................. Booth: 621</td>
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<tr>
<td>C&amp;C Irradiator Service, LLC ................................. Booth: 300</td>
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<tr>
<td>CAEN SyS srl .......................................................... Booth: 405</td>
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<tr>
<td>Chase Environmental Group, Inc. ............................. Booth: 314</td>
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<tr>
<td>CHP Consultants/CHP Dosimetry ............................... Booth: 303</td>
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<tr>
<td>Conference of Radiation Control Program Directors, Inc.</td>
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<tr>
<td>Eckert &amp; Ziegler Isotope Products ........................... Booth: 606</td>
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<tr>
<td>Environmental Instruments Canada Inc. .................... Booth: 423</td>
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<tr>
<td>F&amp;J Specialty Products Inc. ...................................... Booth: 614</td>
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<td>Foss Therapy Services, Inc. ...................................... Booth: 504</td>
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<td>Fuji Electric Co., Ltd .............................................. Booth: 416</td>
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<td>G/O Corp ................................................................. Booth: 515</td>
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<td>Gamma Products, Inc. .............................................. Booth: 409</td>
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<td>Global Nucleons ..................................................... Booth: 215</td>
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<td>H3D, Inc. ................................................................. Booth: 506</td>
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<td>Health Physics Instruments ...................................... Booth: 201</td>
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<td>Hi-Q Environmental Products Co. ............................. Booth: 400</td>
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<td>Hopewell Designs, Inc. ............................................ Booth: 220</td>
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<td>HPS Journal/Newsletter ............................................ Booth: 417</td>
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<td>Illinois Institute of Technology ................................ Booth: 420</td>
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<td>J.L. Shepherd &amp; Associates ...................................... Booth: 516</td>
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<tr>
<td>K&amp;S Associates, Inc. ............................................... Booth: 602</td>
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<td>LabLogic Systems, Inc. ............................................ Booth: 706</td>
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<td>Landauer, Inc./Fluke/RaySafe ................................... Booth: 206</td>
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<td>LND, Inc. ................................................................. Booth: 603</td>
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<td>Ludlum Measurements, Inc. ...................................... Booth: 714</td>
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<td>Mazur Instruments .................................................... Booth: 301</td>
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<td>Mirion Technologies .................................................. Booth: 304</td>
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<td>NNSA Office of Radiological Security ...................... Booth: 321</td>
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<tr>
<td>NRRPT</td>
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<tr>
<td>Nuclear News (ANS) ................................................ Booth: 501</td>
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<td>Nucleonix Systems Pvt. Ltd. ..................................... Booth: 514</td>
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<td>NUVIA Dynamics Inc. .............................................. Booth: 216</td>
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<td>NV5-Dade Moeller ................................................... Booth: 600</td>
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<tr>
<td>Off-Site Source Recovery Program/LANL .................... Booth: 418</td>
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<td>ORTEC .................................................................... Booth: 507</td>
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<td>PerkinElmer ............................................................. Booth: 414</td>
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<td>Perma-Fix Environmental Services, Inc. .................... Booth: 319</td>
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<tr>
<td>Philotechnics, Ltd. ................................................... Booth: 502</td>
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<tr>
<td>Radiation Safety &amp; Control Services Inc (RSCS) .... Booth: 415</td>
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<tr>
<td>Radiation Solutions Inc ............................................ Booth: 402</td>
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<td>S.E. International, Inc. ............................................ Booth: 315</td>
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<td>SafetyStratus .......................................................... Booth: 500</td>
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<td>Spectrum Techniques ............................................... Booth: 508</td>
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<td>Technical Associates/Overhoff Technology ............... Booth: 208</td>
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<td>Thermo Fisher Scientific .......................................... Booth: 200</td>
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<td>Transco Products Inc. .............................................. Booth: 601</td>
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<tr>
<td>Ultra Electronics Energy ........................................... Booth: 403</td>
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<tr>
<td>Versant Medical Physics and Radiation Safety .......... Booth: 307</td>
</tr>
</tbody>
</table>

**Breaks**

Tuesday AM – Wednesday AM

Featuring morning continental breakfasts and afternoon refreshments. Be sure to stop by and visit with the exhibitors while enjoying your refreshments.

**Lunches**

Monday – Tuesday, 12:00

All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.

**Welcome Reception**

Monday, 17:30 – 19:00

Join fellow attendees in the Orlando 1-3 for a time to socialize and renew old acquaintances.
Mentor Shadowing Program

Introducing the Mentor Shadowing Program
(HPS Student Support Committee, HP-Connect)

The Mentor Shadowing Program is an offshoot of the HP-Connect Mentor program aimed at developing face-to-face interaction between Mentors and students/young professionals at the annual HPS meetings. The goals of the Mentor Shadowing program are to facilitate meaningful and constructive discussion, to foster professional relationships between HPS members of various experience levels, and to increase society involvement of younger members by having the student/young professional shadow a Mentor during the meeting (e.g., attending various social events, committee meetings, shared interest professional sessions/presentations, etc.). A questionnaire will be sent to all persons expressing interest in the Mentor Shadowing program so that the HPS Student Support Committee can determine if there are sufficient numbers of potential Mentors and Shadows that have similar interests and goals for a successful trial program.

Additionally, communications between potential Mentors and Shadows may be established before the meeting if desired (but not required). If you wish to be matched and put in contact with a mentor (or student/young professional) before the meeting, please indicate interest in being pre-matched when signing up or contact Dawn Montgomery (damontg@clemson.edu) directly.

At the annual meeting, the program will kick-off with a combined Mentor Speed Networking/Meet & Greet event for interested parties so that mentors and students/young professionals can discuss their interests, goals of the Mentor Shadowing program, and make plans for interactions through the remainder of the week. Other sponsored Mentor Shadowing events may be planned throughout the meeting; these will be available on the final meeting schedule and updated on the HPS Student Support Committee page as they are confirmed.

Mentor and Shadow Expectations

As a Mentor, you should be willing to have a “Shadow” for at least some time of the meeting. For example, you may invite your Shadow to a meal, social event, or exhibit hall lunch; have them go to committee meetings, PEPs, and/or a few presentations with you; introduce them to others who you think may be good professional connections for your Shadow(s). You do not have to have a Shadow for the entire time, the goal is just to establish lines of communication and make meaningful in-person connections that may continue outside of the meetings and/or at future meetings.

As a Shadow, you should be willing to shadow a Mentor for at least some portion of the meeting (see above). You may want to think about what type of questions you would like to ask a Mentor before the meeting and what you would like to get out of the relationship (e.g., academic advice, graduate school options, career options, knowledge on the mentors background/career path/goals, long lasting mentor relationship to continue outside of the meeting). Remember, it is okay if you just want or need some short term or one time advice, but it would be great if you make a real lasting connection too, even if just to recognize a friendly face at future meetings.
# Sunday Professional Enrichment Program (PEP)

All sessions take place in the Hilton Orlando

## SUNDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Session Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 – 10:00</td>
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<tr>
<td>PEP 1-B</td>
<td>Lake Hart</td>
<td>Basic Training for the NRRPT exam – Fundamentals</td>
<td>Tom Voss</td>
</tr>
<tr>
<td>PEP 1-C</td>
<td>Lake Down</td>
<td>Fundamentals of Reproducible Research</td>
<td>Tom LaBone, Nancy Chalmers, Elizabeth Brackett</td>
</tr>
<tr>
<td>PEP 1-D</td>
<td>Lake George</td>
<td>Quick and dirty radiological dose assessment following a rad/nuke emergency</td>
<td>Andy Karam</td>
</tr>
<tr>
<td>PEP 1-E</td>
<td>Lake Highland B</td>
<td>Integration of Health Physics into Emergency Response</td>
<td>Stephen Sugarman</td>
</tr>
<tr>
<td>PEP 1-F</td>
<td>Lake Monroe</td>
<td>Design of MARSSIM and MARSAME Surveys</td>
<td>David Stuenkel</td>
</tr>
<tr>
<td>PEP 1-G</td>
<td>Lake Sheen A</td>
<td>Radiation Protection Consideration during Construction, Commissioning and Production of Mo-99 with a 40 kW 35 MeV Electron Linac</td>
<td>Pradyot Chowdhury</td>
</tr>
<tr>
<td>PEP 1-H</td>
<td>Lake Sheen B</td>
<td>RDD Guidance</td>
<td>Brooke Buddemeier</td>
</tr>
<tr>
<td>PEP 1-I</td>
<td>Spring Lake</td>
<td>The Fallacy of Safe-Siding Radiation Health Risk</td>
<td>Eric Daxon</td>
</tr>
<tr>
<td>10:30 – 12:30</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PEP 2-A</td>
<td>Lake Concord</td>
<td>RESRAD-BIOTA Code for the Evaluation of Radiological Doses to Flora and Fauna</td>
<td>Charley Yu, Sunita Kamboj, Jing-Jy Cheng, David LePoire</td>
</tr>
<tr>
<td>PEP 2-B</td>
<td>Lake Hart</td>
<td>Basic Training for the NRRPT exam – Practical Applications</td>
<td>Tom Voss</td>
</tr>
<tr>
<td>PEP 2-C</td>
<td>Lake Down</td>
<td>Thorium Molten Salt Reactors (TMSR): Key Radiation Protection Challenges</td>
<td>Caspar Sun</td>
</tr>
<tr>
<td>PEP 2-D</td>
<td>Lake George</td>
<td>Practical Computational Modeling for Health Physics (1) – Introduction to Monte Carlo Simulations</td>
<td>Shaheen Dewji</td>
</tr>
<tr>
<td>PEP 2-E</td>
<td>Lake Highland B</td>
<td>Alpha Spectroscopy for the Health Physicist</td>
<td>Craig Maddigan</td>
</tr>
<tr>
<td>PEP 2-F</td>
<td>Lake Monroe</td>
<td>Evaluation of MARSSIM and MARSAME Surveys</td>
<td>David Stuenkel</td>
</tr>
<tr>
<td>PEP 2-G</td>
<td>Lake Sheen A</td>
<td>Dosimetry methods for second cancer risk estimation following radiotherapy</td>
<td>Matthew Mille</td>
</tr>
<tr>
<td>PEP 2-H</td>
<td>Lake Sheen B</td>
<td>Status of ANSI N42 RPI &amp; HSI standards</td>
<td>Morgan Cox</td>
</tr>
<tr>
<td>PEP 2-I</td>
<td>Spring Lake</td>
<td>Evolution of Occupational Radiological Protection</td>
<td>Dunstana Melo</td>
</tr>
</tbody>
</table>
14:00 – 16:00

**PEP 3-A**  
Lake Concord  
What do Industrial HPs work on?  
Linda Bray

**PEP 3-B**  
Lake Hart  
Basic Training for the NRRPT exam – Review of the applicable CFRs  
Tom Voss

**PEP 3-C**  
Lake Down  
What Neurosciences Can Tell Us about Radiation Safety Decisions  
Ray Johnson

**PEP 3-D**  
Lake George  
Practical Computational Modeling for Health Physics (2) - Intermediate Monte Carlo Modeling with Anthropomorphic Phantoms  
Autumn Kalinowski, Shaheen Dewji

**PEP 3-E**  
Lake Highland B  
Gamma Spectroscopy for the Health Physicist  
Craig Maddigan

**PEP 3-F**  
Lake Monroe  
Technical Basis and Operational Experience for Clearance of Personal Property From SLAC Accelerator Facilities  
James Liu, Ryan Ford, Jim Allan, Sayed Rokni

**PEP 3-G**  
Lake Sheen A  
Federal Radiological Response Teams  
Ken Groves

**PEP 3-H**  
Lake Sheen B  
Neutrons: Discovery, Detection, Applications and Health Physics  
Jeff Chapman

**PEP 3-I**  
Spring Lake  
Radiological Safety Challenges Associated with Operating Non-Medical X-Ray Devices  
Carl Tarantino
## MONDAY

### 07:15 – 08:15

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<thead>
<tr>
<th>Session</th>
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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>CEL-1</td>
<td>Orlando V</td>
<td>Why should HPs be interested in Laser Safety Programs?</td>
<td>Linda Bray</td>
</tr>
<tr>
<td>CEL-2</td>
<td>Orlando VI</td>
<td>What Keeps Us from Being Effective Radiation Risk Communicators?</td>
<td>Ray Johnson</td>
</tr>
</tbody>
</table>

### 08:30 – 12:30

**MAM-A**  
*Chair: Nolan Hertel*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>08:30</td>
<td>MAM-A.1</td>
<td>Opening Remarks</td>
<td>Hertel N</td>
</tr>
<tr>
<td>08:40</td>
<td>MAM-A.2</td>
<td>Welcome to Orlando</td>
<td></td>
</tr>
<tr>
<td>09:30</td>
<td>MAM-A.4</td>
<td>Lung Cancer Risk from Radon Exposure among Former Chinese Uranium Miners</td>
<td>Li L</td>
</tr>
<tr>
<td>10:00</td>
<td>MAM-A.5</td>
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</table>

**12:15 – 14:15**

<table>
<thead>
<tr>
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<th>Location</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>PEP M-1</td>
<td>Orlando V</td>
<td>A Radiation Protection Program Logic Model: Inputs, Outcomes and Benchmarking Opportunities and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change</td>
<td>Janet Gutierrez, Robert Emery</td>
</tr>
<tr>
<td>PEP M-2</td>
<td>Orlando VI</td>
<td>CAP88-PC Version 4.1 Update</td>
<td>Brian Littleton, Ray Wood</td>
</tr>
<tr>
<td>PEP M-3</td>
<td>Orange A</td>
<td>Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers</td>
<td>Michael Stabin</td>
</tr>
<tr>
<td>PEP M-4</td>
<td>Orange B</td>
<td>How to Choose the Correct Portable Radiation Detection Instrument for Your Needs</td>
<td>Judson Kenoyer</td>
</tr>
<tr>
<td>PEP M-5</td>
<td>Orange C</td>
<td>Considerations for Implementation of NCRP 179, Guidance for Emergency Response Dosimetry</td>
<td>Adela Salame-Alfie, Jeff Chapman</td>
</tr>
</tbody>
</table>
MONDAY

13:30 – 15:00  Exhibit Hall

P: Poster Session

Radio-biology - Biological Response

P.1  Building a Statistical Index on Nuclear Security Culture Awareness at a University
     Robinson MP, German NJ*, Harris JT
     Purdue University

Risk Assessment

P.2  The Pseudo Pelger-Huet Cell, a Fast and Cheap Potential Biomarker for Radiation Dose: An Overview
     Reti KE, Johnson TE, Hayes JM
     Colorado State University

External Dosimetry

P.3  Research of indications of albedo individual neutron dosimeters in the fields of mixed gamma-neutron radiation of various origin
     Gantsovskiy PP, Tsuyanov AG, Shinkarev SM
     State Research Center - Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

P.4  Evaluation of Individual Extremity Dose Using 3D Scanner and Monte Carlo Simulation
     Kim HS, Kim Y, Ha WH, Park S
     Korea Institute of Radiological and Medical Sciences

P.5  Practical Lessons for Transitioning to a New Dosimetry System
     Baca MA
     Mirion - DSD

P.6  Establishment of Database for Retrospective Dose Estimation in Industrial Radiography Accidents
     Kim Y, Kim HS, Ha WH, Jang S
     Korea Institute of Radiological and Medical Sciences

P.7  Characterization of an Automated, All-Purpose Thermoluminescent Dosimeter Reader with Removable Planchets
     Kuchta JR, Thiesen JH, Trimas DJ, Chung LK, Golduber RM, Kearfott KJ
     University of Michigan

P.8  Preliminary Demonstration of a Method of Temporal Radiation Dosimetry using Passive, Integrating LiF:Mg,Ti Thermoluminescent Dosimeters
     Thiesen JH, Kearfott KJ
     University of Michigan

P.9  The Circle Experiment: Precision and Consistency of Radiation Dose Delivery for a 137Cs Dosimeter Calibration Facility
     Golduber RM, Trimas DJ*, Kuchta JR, Champion RJ, Kearfott KJ
     University of Michigan

P.10 General Purpose Software for Thermoluminescent Dosimeter (TLD) Glow Curve Analysis (GCA)
     Hepker JM, Thiesen JH*, Trimas DJ, Kuchta JR, Kearfott KJ
     University of Michigan

P.11 A Comparison of Age-dependent Organ Depth Distributions: Stylized Versus Voxel Phantom Series
     Griffin K, Dewji SA, Cuthbert T*, Lee C
     National Cancer Institute - National Institutes of Health, Texas A&M University

P.12 Computation of Spontaneous Fission External Dose Coefficients due to Contaminated Environmental Media
     Kistle H, Dewji SA*
     Texas A&M University

P.13 Comparison of Organ and Effective Neutron Dose Coefficients for Reference Phantoms in Articulated and Upright Postures in Cranial and Caudal Irradiation Geometries
     Bales K, Perry A*, Dewji SA
     University of Texas Health Science Center at San Antonio, Texas A&M University

Instrumentation

P.14 Monte Carlo Simulations to Predict the Energy Discrimination Capability of a Novel Beta Particle Detector
     King JW, Marianno CM
     Texas A&M University

P.15 Performance of Different Former Soviet Union Geiger- Müller Tubes with a Computerized Do-It-Yourself Detector
     Dewald RM, Shen BJ, Tuey R*, Miller JM, Chung LK, Kearfott KJ
     University of Michigan

P.16 University of Michigan’s Computerized Do-It-Yourself Geiger-Müller Radiation Detector: Preparing for Outreach Programs
     Tuey R, McClain RM, Miller JM*, Chung LK, Li M, Shen BJ, Dewald RM, Wisusik FF, Suresh VS, Kearfott KJ
     University of Michigan
P.17 Measurements of Air Kerma and Gamma Ray Spectra in a Space-Constrained 137Cs Research Facility  
Champion RJ, Golduber RM, Trimas DJ, Kuchta JR, Chung LK, Kearfott KJ  
University of Michigan

P.18 Dose Calibrator Activity Measurement of Actinium-225 for targeted alpha therapy  
Kim JG, Lee TW, Song KH, Yoo WJ, Kim BS  
Korea Institute of Radiological and Medical Sciences, Korea  
Association for Radiation Application

P.19 World List of Early Nuclear Reactors, Africa and Asia. A Philatelic Look at Health Physics History.  
Johnston TP  
NIST

P.20 World List of Early Nuclear Reactors, Europe. A Philatelic Look at Health Physics History.  
Johnston TP  
NIST

P.21 World List of Early Nuclear Reactors, the Americas and Antarctica. A Philatelic Look at Health Physics History.  
Johnston TP  
NIST

P.22 Development of an Optical Sensor to Measure Opacity Changes in Polyvinyl Toluene Scintillators  
Ordonez EA, Marianno CM, King JW, Suh R  
Texas A&M University

Academic Institutions

P.23 Revision of an Undergraduate Health Physics Program for a New Generation  
Fulmer PC, Jokisch DW  
Francis Marion University

Emergency Response

P.24 Southern Urals Regional Emergency Medical-dosimetry Center. The Experience  
Marov VA  
Southern Urals Biophysics Institute of the FMBA of Russia

P.24.5 A Novel Approach to Tomographic Imaging for Internalized Dose Estimation for At-Risk Members of the Public  
O’Connell C, Foreman C, D’Souza B, Caldwell N, Cuthbert T, Dewji SA  
Texas A&M University

Air & Environmental Monitoring

P.25 The Use of Administrative Monetary Penalties in Nuclear Safety  
Vucicevic J, Waller E  
University of Ontario Institute of Technology

P.26 Status of Zooplankton Communities of Radioactively Contaminated Reservoirs of “MAYAK” Production Association  
Aldibekova AY, Styazhkina EV, Osipov DI  
URCRM, Russia

P.27 Natural Radioactivity Measurement And Dose Assessment Of Excavated Soils and Well Waters Of Southwestern Nigeria  
Oladele BB, Dike CG  
Federal University of Technology Akure, Nigeria

P.28 Modeling of radiocesium urban washoff and fate in wastewater treatment plant  
Ng GM, Higley KA  
Oregon State University

P.29 Development and comparison of plant-specific dosimetric phantoms  
Montgomery DA, Martinez NE  
Clemson University

P.30 Investigation of Variations in Gamma Rays Detected by the EPA Air Monitoring Systems Located in Pennsylvania  
Fallahian N, Zhang D, Ambrose TA*, Simpson DR  
Bloomsburg University

P.31 Low Dose Retrospective Dosimetry on Shelled Aquatic Species  
Hassan A, Waller EJ  
University of Ontario Institute of Technology

P.32 Investigation of the Bioavailability of Radiocesium in the Fukushima Exclusion Zone using a Sequential Extraction Technique  
McNabb IM, Sudowe R  
Colorado State University

P.33 Uncertainty of the results of the radon control in housings. The problem of assessment of the radon concentration and modern control principles  
Tsapalov AA, Kiselev SM*, Marennyy AM, Kovler KL, Kuvshinnikov SI, Kiselev  
Institute of Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements, SRC Burnasvyan Federal Medical Biophysical Center of the FMBA of Russia, Federal State Unitary Enterprise Research and Technical Center of Radiation-Chemical Safety and Hygiene of the FMBA of Russia, National Building Research Institute, Israel Institute of Technology, Federal Service for Surveillance on Consumer Rights Protection and Human Well-Being
MONDAY

P.34 Measurement and Modeling of Radon Kinetics in a Natural Indoor Radon Chamber
Mata LA, Ye YJ, Chung LK*, Maurer TE, Morishita Y, Carmona MA, Shubayr NA, Zhou QZ, Kearfott KJ
University of Michigan, Jazan University

P.35 Evolution of the University of Michigan’s Radiation Weather Station (RWS) System for Research and Public Outreach
Maurer TE, White WJ, Wu X, Kang S, Kearfott KJ
University of Michigan

P.36 Development of Korea’s Radiation Safety Information System: Identifying Challenges and Developing Functions
Kim MK, Kim JJ, Yang JS, Lee JH, Lee KH, Lee BH
Korea Institute of Nuclear Safety

P.37 Numerical simulation of radon concentration distribution in a discovered radon chamber with and without fans
Ye YJ, Mata LA, Zhou QZ, Huang JR, Chung LK, Morishita Y, Carmona MA, Liu W, Kearfott KJ
University of Michigan, University of South China, Japan Atomic Energy Agency

P.38 Numerical simulation of radon migration and exhalation rules of loose porous emanation media during measuring the radon exhalation rate
Ye YJ, Mata LA, Zhou QZ, Chen GL, Su H, Chung LK, Morishita Y, Carmona MA, Kearfott KJ
University of Michigan, University of South China, Japan Atomic Energy Agency

P.39 Study of the reliability of soil Rn222 and Rn220 concentrations measured with gas extraction and in-situ diffusion chamber methods
University of Michigan, Japan Atomic Energy Agency

P.40 Evaluation of Radiological Health Hazard Parameters of Selected Fertilizers - A Statistical Approach
Alcorn State University, University of Kentucky

P.41 Assessment of Isotopic Transfer Factors in Sweet Potatoes
Alcorn State University

P.42 Assessment of radionuclide contents in soil samples in the vicinity of a coal fired-power plant in Mississippi
Gella U, Beitollahi M, Billa J, Adzanu S, Adjaye J, Ankrah M
Alcorn State University, University of Utah, University of Kentucky

P.43 Pitchblende. A Philatelic Look at Health Physics History.
Johnston TP
NIST

P.44 Evaluation of Radioactivity Levels in Soilless Growth Media Collected From Agricultural Research Site in Tallahassee, Florida.
Osei GK, Ngatia LW, Abazinge MD, Bolques A, Billa JK
Florida A&M University, Alcorn State University

Department of Energy Facilities

Holloway DA, Beck RL
Idaho National Lab

Dose Reconstruction

P.46 Dosimetric Models of Hematopoietic Sites of Skeleton for Male and Female
Parshkova DA, Shishkina EA, Tolstykh EI, Sharagin PA, Degteva MO, Smith MA
Chelyabinsk State University, URCRM, PNNL

Internal Dosimetry

P.47 Applying of ICP-MS for Individual Dosimetric Control of Plutonium Intake
Ephimov AV, Batalov VR
Southern Urals Biophysics Institute, Southern Urals Biophysics Institute, Russia

P.48 Assessment of Counting Efficiency Depending on the Physical Characteristics of Subject for Whole Body Counting Measurement by Monte Carlo Simulation
Park MS, Ha WH, Park SH, Jin YW
Korea Institute of Radiological and Medical Sciences

P.49 Faster, Sharper, and Open: A New Pipeline for Biota Phantoms
Neville D, Higley KA
Oregon State University

Radiation Effects

P.50 Association of single nucleotide polymorphisms of apoptosis and cell cycle control genes with the risk of malignant neoplasm development in chronically exposed persons
Blinova EA, Ianishevskaya MA*, Akleyev AV
Ural Scientific and Practical Center of Radiation Medicine, Chelyabinsk
P.51  Mayak Worker Families and Offspring Database – Source for studies of hereditary effects of ionizing radiation
Azizova TV, Zhuntova GV, Grigoryeva ES, Denisova AA*
Southern Ural Biophysics Institute

P.52  Analysis of interrelation between lifetime shortening and plutonium-239 in atomic workers
Legkikh IV
Southern Ural Biophysics Institute

P.53  The Study of the Telomere Length in Chronically Exposed People
Krivoshchapova YA
Urals Research Center for Radiation Medicine, Chelyabinsk

P.54  Characterization Of MCP-124 and MCP-150 Metal Alloys for Beam Collimation and Radiation Shielding purposes.
Stinson K, Maqbool M*
University of Alabama at Birmingham

P.55  Estimation of Exposure Dose by Naturally Occurring Radionuclides in Food consumed in Korea
Kim JY, Kim MK
Korea Institute of Nuclear Safety

P.56  Measurement of absorbed dose and radiation quality for low energy Beta Particle Emitters in Micrometric Sites using a Wall-less TEPC
Boyd CO, Waker AJ., Boyd
University of Ontario Institute of Technology

Medical Health Physics

P.57  Internal Exposure Assessment using Biokinetics of the Radionuclides
Lee J, Lee, Jeong
Korea Institute of Nuclear Safety, Korea University

P.58  Reducing Variability of Radiation Dose in Computed Tomography: The New Frontier in Patient Safety
Lockerby S, Lee RK, Sun JY, Soltycki E, Matalon T
Einstein Healthcare Network

P.59  State of Radiation Protection Practice by Radiologic Technologists at Saudi Pediatric Hospitals
Gary MS
Alfaisal University

P.60  Evaluating Dosimetric Changes Caused by Positional Errors of the SAVI Applicator Used for Breast Cancer Treatment
Jammali A, Maqbool M*
Ball State University, University of Alabama at Birmingham

P.61  Four-Dimensional Digital Tomosynthesis Based On Visual Respiratory Guidance
Kim DS, Suh TS*
The Catholic University of Korea

P.62  Validation of Isodose Curves for the Airo Mobile CT
Smiley BR, Kurgatt S, Yoshizumi T
Duke University

P.63  Estimation of Patient Release Exposure Rates for Pediatric Patients Receiving I-131 Therapy
Aziz L, Dewji SA
Texas A&M University

Ethics and Radiation Protection

P.64  Proposal of Technology Trees for insuring the Qualities of Radiation Safety Program in Korea
KAERI, KIRAMS, Han Yang University, PAL, RadCore, KHNP RHI

Military Health Physics

Johnston TP
NIST

Johnston TP
NIST

P.67  Ships and Submarines. A Philatelic Look at Health Physics History.
Johnston TP
NIST
MONDAY

15:00 – 17:30 Orlando IV

MPM-A
Exhibitors of the HPS: A Special Discussion on Products and Services
Chair: Dustin Miller, Jim Menge

15:00 MPM-A.1
Continuous and Unattended Spectroscopic Operation and Analysis with the Mirion Data Analyst
Mirion Technologies (Canberra) Inc

15:15 MPM-A.2
RadSolver - Sensitive Affordable Gamma Imager
Khodyuk I, Fiala J, Motakef S
CapeSym, Inc.

15:30 MPM-A.3
The Use of Smart Scintillation Detectors in Installed and Portable Health Physics Instruments
Asamoto BS, Kocvara S
HI-Q Environmental Products Company, Inc.

15:45 MPM-A.4
Radioactive Standards for Instrument Calibration
Beinlich UF
Eckert & Ziegler Isotope Products

16:00 MPM-A.5
Hidex Scintillation and Gamma Counters
Boodhun AS
LabLogic Systems Inc

16:15 MPM-A.6
3D Gamma Source Mapping and Intervention Analysis
Hilsabeck JR
Transco Products, Inc.

16:30 MPM-A.7
Unmanned Aerial Vehicle Deployed Radiation Measurement System
Kaletsch K
Environmental Instruments Canada Inc.

16:45 MPM-A.8
RN SUITE: a Synthetic Radiological Training Environment
Winsa JH, Rolando JB
Spectral Labs

17:00 MPM-A.9
Odyssey: A Web-Based Modern Management System for Radiation Safety Programs
Ramsay BM, Ramsay IA, Roller DA
Versant Medical Physics

17:15 MPM-A.10
Fuji Electric Innovation in Radiation Detection
Menge JP
SME Associates

17:30 MPM-A.11
Chase Environmental Group - Decommissioning & Brokerage Services
Miller DG
Chase Environmental Group, Inc.

14:30 – 17:00 Orlando V

MPM-B
Board of Director’s Special Session: Changes in Director’s Roles and HPS Strategic Plan
Chair: Tara Medich

14:30 MPM-B.1
Summary of and rationale for governance changes
Abelquist EW
ORAU

14:45 MPM-B.2
Role of Director in Revised HPS Governance Mode
Lewandowski M
3M Corporate

15:00 MPM-B.3
History of HPS strategic planning: Dodd, Simpkins, Lanza
Simpkins AA
NV5

15:15 MPM-B.4
A strategic Board: implementation of HPS strategic planning 2016 to today
Lewandowski M
3M

15:30 MPM-B.5
HPS 2017 Goal Priority A1, Leverage Annual Meeting Resources to Engage Members - Presentations
Mahathy JM
ORAU

15:45 MPM-B.6
HPS 2017 Goal Priority A1, Leverage Annual Meeting Resources to Engage Members – PDS and PEP Talks
Morgan III TL, Mahathy JM
HPS, ORAU

15:45 – 17:00 Exhibit Hall

15:45 – 17:00 Exhibit Hall
16:15 MPM-B.7
HPS 2017 Goal Priority A1, Leverage Annual Meeting Resources to Engage Members – Affiliate Interactions
Perle SC, Mahathy JM
HPS, ORAU

16:30 MPM-B.8
Leading to the Future: Opportunities for Early Career Members

16:45 MPM-B.9
Panel Discussion: Director Experiences with Governance Change and Strategic Planning
Braun JS, Berry K, Mahathy JM*, Whicker JJ
Mayo Clinic, Fox Chase Cancer Center, ORAU, LANL

15:00 – 16:40 Orlando VI

MPM-C
Special Session: Government Relations
Chair: Craig Little

15:00 MPM-C.1
The HPS Government Relations Program: Our Members Voice in Washington
Little CA
HPS

15:20 MPM-C.2
Health Physics Society Government Relation Committee
Ring JP, Elder D, Hiatt JW, Anderson K
Beth Israel Deaconess Medical Center, University of Colorado Hospital, Nuclear Energy Institute, Barnes-Jewish Hospital

15:40 MPM-C.3
NRC/HPS: A Relationship that Informs Radiation Protection
Flannery CM
US NRC

16:00 MPM-C.4
Interactions Between EPA and HPS Strengthen Both Organizations
Wieder JS, Boyd MA, Veal LA
U.S. EPA

16:20 MPM-C.5
HPS Interaction with Congress
Connolly DA
The Connolly Group

15:00 – 17:00 Orange A

MPM-D
Special Session: Medical Health Physics
Chair: Brian Lemieux

15:00 MPM-D.1
Medical Radiation Exposure of Patients in the United States
NCRP, University of New Mexico, Johns Hopkins University School of Medicine, US Food and Drug Administration, American Collage of Radiology, Stanford Children's Hospital, University of Rochester, Penn State University College of Medicine

15:30 MPM-D.2
Past, present and future of patient radiation dose management efforts - has progress been made?
Martel CB
Philips Healthcare

16:00 MPM-D.3
International Atomic Energy Agency’s (IAEA) efforts to improve Radiation Protection and Patient Safety
Gilley D
IAEA

16:30 MPM-D.4
Discussion
Lemieux B
UK HealthCare

14:30 – 17:00 Orange B

MPM-E
Special Session: AIRRS
Chairs: Catherine Ribaudo, Carl Tarantino

14:30 MPM-E.1
Leaking Ni-63 Source from Ionscan Chemical Agent Detectors
Ribaudo CA
National Institutes of Health

14:50 MPM-E.2
Hidex Triple Label Quench Curve - Part II
Ball KF
National Institutes of Health

15:10 MPM-E.3
Transition from Beckman Coulter and Perkin Elmer to the Hidex Counting Equipment
Ball KB
National Institutes of Health
15:30 MPM-E.4
Haute Compliance: A Radiation Safety Management System in Use
Sturchio GM
Mayo Clinic College of Medicine

15:50 MPM-E.5
Decommissioning Lessons Learned for Academic and Research Reactor Institutions
Miller DG
Chase Environmental Group, Inc.

16:10
AIRRS Business Meeting

15:00 – 17:00 Orange C

MPM-F
Emergency Response Part 1
Chairs: Patricia Milligan, Craig Marianno

15:00 MPM-F.1
The Radiological Operations Support Specialist at Cobalt Magnet 19
Irwin WE
Vermont Department of Health

15:15 MPM-F.2
Managing First Responder Dose in Severe Reactor Accidents: The Role for Wearable Selective Shielding
Jaczko G
Senior Nuclear Advisor StemRad, former US NRC Chair

15:30 MPM-F.3
Risk Informing Emergency Preparedness for Small Modular Reactors and other New Technologies
Milligan PA
US NRC

15:45 MPM-F.4
Orphan Source Search and Secure Program: Issues, Achievements, Sustainability
Kahn RA, McRee B, Rolando J, Taplin T
Argonne National Laboratory, Pacific Northwest National Laboratory, Spectral Labs Incorporated, DOE/National Nuclear Security Administration

16:00 MPM-F.5
Passive Neutron Activation Detectors
Exline PR, Hertel NE
Georgia Institute of Technology, US Army

16:15 MPM-F.6
Validation of a Dose Assessment Tool to be Used in Loose Contamination Exercises
Chen ML, Cochran LD, Cook KM, Marianno CM
Texas A&M University

16:30
Instrumentation Section Business Meeting
TUESDAY

07:15 – 08:15

**CEL-3**
Making Your Radiation Safety Message Stick! 35 Years of Powerful Quotes Collected on Sticky Notes
Janet Gutierrez, Robert Emery

**CEL-4**
History and Overview of the Formerly Utilized Sites Remedial Action Program
John Hackett

**CEL-5**
Dosimetry Challenges of New Nuclear Medicine Theranostic Agents
Michael Stabin

08:30 – 11:45

**TAM-A**
AAHP Special Session: Risk Communication in the Context of Low Dose Health Effects
*Chairs: Kathy Pryor, Armin Ansari*

08:30
Introduction

08:45
The Use and Misuse of Effective Dose
Cool DA
ICRP

09:15
Science Is Not Enough
Daxon EG
SINE

09:45
Say What? Patient-Centered Communication on Benefits and Risks
Dauer LT
Memorial Sloan Kettering Cancer Center

10:15
Exhibit Hall
BREAK

10:45
Risk Communication in Emergency Response and Recovery
Wieder JS
U.S Environmental Protection Agency

08:00 – 12:00

**Orlando V**

**TAM-B**
Medical Health Physics Part 1
*Chairs: John Hackett, Joseph Ring*

08:00
Testing the IAEA TRS483 Code of Practice for Small Fields Dosimetry
King Faisal Specialist Hospital and Research Centre
King Faisal Specialist Hospital and Research Centre

08:15
Development of Novel Nano-Fiber Optic Detector Technology for Real-time Detection of Beta Energy in a Pure Beta Emitter (P-32)
Smiley BR, Petry NA, Gunasingha R, Therien M, Yoshizumi T
Duke University

08:30
Dosimetry In Pulsed Radiation Fields – Features And Measurement Data Of An Innovative Active Alarming Personal Dosimeter
Iwatschenko-Borho MA, Trost N
Thermo Fisher Scientific Messtechnik GmbH

08:45
Dose Analysis & Comparison For Landauer Personnel Dosimetry & Philips Dose-Wise Dose Management System
Pringle D, Yates S, Johnson L*
University of Alabama at Birmingham

09:00
Selective-reconstruction Methods and A Microscopic-system Design for Spectral Computed Tomography
Wang Q
University of Massachusetts Lowell

09:15
Dosimetric characterization of a high efficiency gaseous neutron dosemeter consisting of 95 multi-elements
Kim JY
McMaster University

09:30
Exhibit Hall
BREAK
10:00 TAM-B.7
A New Era of Medical Radiation Shielding: Environmentally Friendly Lead-Free Alternate for the Attenuation of X- and Gamma Rays
Fenelon P J, Liverett MD, Konerth SE*
Artemis Shielding LLC, Versant Medical Physics and Radiation Safety

10:15 TAM-B.8
The Radiation Safety Officer as an Advocate for Patient Safety
Morgan TL
Versant Medical Physics

10:30 TAM-B.9
Simplifying the Identification and Management of Radiation Protective Apparel
Ring JP, Jozokos J, Mungia J, Bohn J
Beth Israel Deaconess Medical Center, Tego, Inc

10:45 TAM-B.10
Gradual introduction of the statistical models project (SMp) normal tissue complication probability (NTCP) in radiation protection
Frometa-Castillo T
Oncology Hospital of Santiago de Cuba

11:00 TAM-B.11
131I-Iomab-B Blood Sample Handling and Occupational Radiation Extremity Exposures
Safavi F, Fisher DR*, Konerth S, Liang Q, Reddy V, Berger MS
Actinium Pharmaceuticals, Inc., Versant Medical Physics and Radiation Safety

11:15 TAM-B.12
Evaluating Feline Release Criteria Following Iodine-131 Treatment For Hyperthyroidism
Davila AD, Fletcher JF, Matthews KM, Wang WW
Louisiana State University, Louisiana State University School of Veterinary Medicine, Louisiana State University

11:30 TAM-B.13
Additional Shielding Materials to Pre-existing Shielding in Diagnostic Radiology facilities
Majali M, Al Remeithi A, Abdullah S
Federal Authority for Nuclear Regulation

11:45 TAM-B.14
Health Physics Analysis of Cs-131 Mesh Implants for Colorectal Cancer
Chang LA, Patel P, Alvarez H, Quan EM
Houston Methodist Hospital

08:30 – 11:30 Orlando VI

08:30 TAM-C.1
Radon Recommendations: NCRP vs. ICRP
Harley NH
NYU School of Medicine

08:45 TAM-C.2
Cylindrical Representations of Recycling Biokinetic Models
Strom DJ, Durnit S, Avtandilashvili M, McComish SL, Tabatadze G, Tolmachev SY, Strom
Washington State University, Los Alamos National Laboratory

09:00 TAM-C.3
Macrodistribution of Plutonium among Dosimetric Compartments of the Human Respiratory Tract
Avtandilashvili M, Tolmachev SY
USTUR, Washington State University

09:15 TAM-C.4
Biokinetics of Pu-238 Oxides: Inferences from Bioassay Data
Poudel D, Bertelli L, Klumpp JA, Durnit S, Waters T
Radiation Protection Division, LANL

09:30 Exhibit Hall

10:00 TAM-C.5
Investigation of a Plutonium 238 skin puncture event
Costigan SA
Los Alamos National Laboratory

10:15 TAM-C.6
Application of the Los Alamos Screening Wound Counter to a 238Pu Contaminated Wound
Gadd MS
LANL

10:30 TAM-C.7
Case Study of a Wound Contaminated With 238Pu
Klumpp JA, Bertelli L, Poudel D
Los Alamos National Laboratory

10:45 TAM-C.8
Historical plutonium contaminated wound: progression of the calculated dose during and after chelation treatment
Durnit S, Miller G, Bertelli L, Klumpp JA, Poudel D, Waters T
Los Alamos National Laboratory
11:00 TAM-C.9
Mitigating the Psychological Harm from Actinide Intakes
Klumpp JA, Bertelli L, Hoffman J, Poudel D, Waters T
Los Alamos National Laboratory

11:15 TAM-C.10
A Review of Computational Dosimetry for Intakes of Strontium-90
Jokisch DW
Francis Marion University, Oak Ridge National Laboratory

08:30 – 12:00 Orange A

TAM-D
Special Session: Environmental / Radon Section
Chairs: James Reese, Phil Egidi

08:30 TAM-D.1
Measurements of Alpha and Beta Radiation from Uncontaminated Surfaces of Common Building Materials
Bullock CA, Whicker JJ, Chastenet MJ, Mcnaughton M
Los Alamos National Laboratory

08:55 TAM-D.2
Statistical Analysis for Indistinguishable from Background Unrestricted Release of Property Using Visual Basic
Chastenet M, Bullock C, Whicker JJ
Los Alamos National Lab

09:20 Exhibit Hall
BREAK

09:50 TAM-D.3
Long-Term Assessment of Critical Radionuclides and Associated Environmental Media at the Savannah River Site
Jannik GT, Paller MH, Baker RA, Eddy TP
Savannah River National Laboratory, Savannah River Nuclear Solutions

10:15 TAM-D.4
Uptake of Radionuclides by Plants from Soils at Uranium Mine Impacted Sites
Hargraves JT, Higley KA
Oregon State University

10:40 TAM-D.5
International Radiation Protection and Waste Management Guidance for NORM/TENORM Sites
Egidi P
US EPA

11:05 Environmental/Radon Section Business Meeting

08:20 – 11:50 Orange B

TAM-E
Special Session: Non-Ionizing Radiation (NIR) Section
Chairs: Jerrold Bushberg, Fred McWilliams

08:20 Introduction

08:30 TAM-E.1
Overview of safety standards for non-ionizing electromagnetic fields (0-300 GHz)
Chou CK
IEEE ICES TC95

09:10 TAM-E.2
Transient Thermal Responses of Tissue to Millimeter-wave Pulses
Foster KR, Ziskin MC, Balzano Q
University of Pennsylvania, Temple University Medical School, University of Maryland

09:40 TAM-E.3
Assessing RF Exposure by Analysis: Estimating RF Fields through Calculation
Tell RA
Richard Tell Associates, Inc.

10:10 Exhibit Hall
BREAK

10:50 TAM-E.4
RF FIELD MEASUREMENTS: Overview of Instruments and Techniques
Haes DL
Consultant

11:20 TAM-E.5
RF Safety Programs: The What, Why, When and Where
Tell RA, Haes DL*
Richard Tell Associates

Do you have a job opportunity? Are you looking for an HP to fill a position?
Email your job description and HPS will post it at the meeting. Send a pdf or Word document to Tammy Liberati at reception@burkinc.com.
TUESDAY

08:30 – 14:15 Orange C

TAM-F
Special Session: Translational Approaches to Improve Health Effects Knowledge in Support of Radiation Protection Guidance
Chairs: Isaf Al-Nabulsi, Daniela Stricklin

08:30 TAM-F.1
The Framework for an Adverse Outcome Pathway for Radiation Carcinogenesis
Stricklin DL
DOE

08:00 TAM-F.2
Review of Modern Molecular and Cellular Low Dose Radiation Literature Reveals Need for Paradigm Shifts in Radiation Biology
Tharmalingam S, Sreetharan S, Brooks AL, Boreham DR
Northern Ontario School of Medicine, McMaster University, Washington State University

09:30 TAM-F.3
Exploring the Adverse Outcome Pathway Framework in Radiation Risk Assessment: A Case Example of Radon-Induced Lung Carcinogenesis
Chauhan V
Health Canada

10:00 TAM-F.4
Radiation Effects on Neurogenesis: A Mechanistic Modeling Approach
Cacao E, Cucinotta FA
University of Nevada Las Vegas

10:30 Exhibit Hall

12:15 – 14:15 Orlando VI

PEP T-1
HEU to LEU conversion and the Production of Mo-99 without the use of HEU
Lynne Fairobent, Jeff Chapman

PEP T-2
Where Did This Come From? Lessons Learned from High-Routine Bioassay Investigations
Brett Rosenberg

PEP T-3
An Overview and the Lessons Learned from a Response to a Radiological Event Involving Potentially Significant Internal Radiation Doses from Americium-241
Manuel Mejias, Steven Dewey

PEP T-4
Basic Physics for Radiation Detection
Doug Van Cleef

PEP T-5
Considering Uncertainty and Risk in Public Protection Decisions
Lainy Cochran

14:30 – 18:00 Orlando IV

TPM-A
AAHP Special Session: Risk Communication in the Context of Low Dose Health Effects
Chairs: Kathy Pryor, Armin Ansari

14:30 TPM-A.1
Risk Communications in the Context of Low Dose Health Effects: Communicating in the Courtroom
Frazier JR
Consultant

15:00 TPM-A.2
Importance of Audience Research in Communicating Radiological Health Information
Ansari A
Centers for Disease Control and Prevention

15:20 Question & Answer Session

17:00 AAHP Business Meeting
### Preliminary Program

**TUESDAY**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
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<td><strong>14:30 – 17:00</strong></td>
<td><strong>Orlando V</strong></td>
<td><strong>TPM-B</strong> Medical Health Physics Part 2</td>
<td>Chairs: Thomas Morgan, Muhammad Maqbool</td>
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<tr>
<td>14:30</td>
<td>TPM-B.1</td>
<td>The Development, Validation, And Application Of A</td>
<td>Niskanen HK, Caracappa PF, Xu XG</td>
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<td>Monte Carlo-based CBCT Model To Investigate Patient</td>
<td>Rensselaer Polytechnic Institute, Columbia University</td>
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<td>Size Impact On Organ Dose</td>
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<td>14:45</td>
<td>TPM-B.2</td>
<td>Occupational Radiation Exposures to Clinical Staff</td>
<td>Safavi F, Komerth S, Fisher DR, Liang Q, Reddy V, Berger MS</td>
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<td>Working With I-131-Iomab-B</td>
<td>Actinium Pharmaceuticals, Inc., Versant Medical Physics and</td>
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<td>Radiation Safety</td>
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<td>15:00</td>
<td>TPM-B.3</td>
<td>The Adventures of a Health Physicist in Nuclear</td>
<td>Schultz DB</td>
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<td>Medicine as a Patient</td>
<td>United States Military Academy</td>
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<td>15:15</td>
<td>TPM-B.4</td>
<td>Estimation of External Dose Rates to Hotel Workers</td>
<td>Foreman C, Dewji SA</td>
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<td>from I-131 Patients</td>
<td>Texas A&amp;M University</td>
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<td>Exhibit Hall</td>
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<td>16:00</td>
<td>TPM-B.5</td>
<td>Radioactive Decedants - What are the Risks?</td>
<td>Miller MA, Sturchio GM</td>
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<td>Cleveland Clinic, Mayo Clinic</td>
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<td>16:15</td>
<td>TPM-B.6</td>
<td>Functions of the Nuclear Regulatory Commission</td>
<td>Sheetz MA, Holiday S</td>
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<td>Advisory Committee on the Medical Uses of Isotopes</td>
<td>University of Pittsburgh, US Nuclear Regulatory Commission</td>
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<td>16:30</td>
<td>TPM-B.7</td>
<td>Functions of the Nuclear Regulatory Commission</td>
<td>Holiday S, Sheetz MA</td>
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<td>Advisory Committee on the Medical Uses of Isotopes</td>
<td>US Nuclear Regulatory Commission, University of Pittsburgh</td>
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<td><strong>14:30 – 15:30</strong></td>
<td><strong>Orlando VI</strong></td>
<td><strong>TPM-C1</strong> Risk Assessment</td>
<td>Chair: Wayne Gaul</td>
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<td>14:30</td>
<td>TPM-C1.1</td>
<td>A methodology for investigating the impact of</td>
<td>Werneth CM, Slaba TC, Blattinig SR, Huff JL, Norman RB</td>
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<td>biological countermeasures on the risk of exposure</td>
<td>NASA, Wyle Laboratories, Inc.</td>
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<td>TPM-C1.2</td>
<td>US EPA Superfund model for assessing radon and</td>
<td>Walker SA</td>
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<td>15:00</td>
<td>TPM-C1.3</td>
<td>US EPA Superfund assessing risks and doses of</td>
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<td>homegrown food at contaminated sites</td>
<td>US Environmental Protection Agency</td>
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<td>16:00</td>
<td>TPM-C1.4</td>
<td>Minimum Provable Risk Considering the Variation in</td>
<td>Sasaki M, Ogino H, Hattori T</td>
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<td>Background Risk</td>
<td>Central Research Institute of Electric Power Industry</td>
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<td>16:00 – 17:15</td>
<td><strong>Orlando VI</strong></td>
<td><strong>TPM-C2</strong> Radiobiology - Biological Response</td>
<td>Chairs: Ronald Goans, Lisa Manglass</td>
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<td>16:00</td>
<td>TPM-C2.1</td>
<td>The Neutrophil-Lymphocyte Ratio as a Triage Tool –</td>
<td>Goans RE</td>
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<td>The REAC/TS Accident Registry Experience</td>
<td>MJW Corporation</td>
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</table>
16:15  TPM-C2.2  
Uptake of 239Pu in Common Environmental Bacteria Evaluated for Transcriptional Changes as a Result of Low-Dose Radiological Exposures  
Manglass LM, Wintenberg M, Blenner M, Martinez N  
Clemson University

16:30  TPM-C2.3  
The Pseudo Pelger-Huet Anomaly as a Potential Biodosimeter for Chronic Low Dose Radiation Exposures of Japanese Wild Boar  
Hayes JM, Iddins C, Thomas TE, Goans R, Hayes  
Colorado State University, Oak Ridge Associated Universities

16:45  TPM-C2.4  
Detection of Early Radiation Damage to the Eye-Lens of Rainbow Trout  
Kocemba M, Waker AJ  
University of Ontario Institute of Technology

17:00  TPM-C2.5  
Comparative Analysis of The Effect of Low Doses of Radiation on Human Mesenchymal Stem Cells.  
Usupzhanova DY, Astreina TA, Nikiina VA, Suchkova YB, Kobzeva IV, Brunchukov VA, Brumberg VA, Nugs VI, Ospov AN, Samoylov AS  
State Research Center - Burnasyan Federal Medical Biophysical Center FMBA of Russia

14:30 – 17:15 Orange A  
TPM-D  
Special Session - Rad NESHAPS  
Chairs: Matthew Barnett, Dave Fuehne

14:30  TPM-D.1  
U.S. Environmental Protection Agency Update on the Radionuclide NESHAPs  
Walsh JP  
U.S. EPA

14:45  TPM-D.2  
U.S. Environmental Protection Agency Update on Compliance Codes  
Littleton BK, Wood R, Stuenkel D  
U.S. EPA, Trinity Engineering Associates

15:00  TPM-D.3  
Resuspension and Redistribution of Plutonium and Americium in the WIPP Environment  
Ward AL, Thakur P  
US Department of Energy, Carlsbad Environmental Monitoring and Research Center

15:15  Exhibit Hall  
BREAK

15:45  TPM-D.4  
On Sampling The Background Indoor Particulate Resuspension Factor  
Marshall SA, Medich DC, Potter C  
Worcester Polytechnic Institute, Sandia National Laboratories

16:00  TPM-D.5  
DOE Subpart H Report  
Snyder SF, Fovret D  
Pacific Northwest National Laboratory, Department of Energy

16:15  Rad NESHAPS Roundtable Q&A

14:30 – 18:00 Orange B  
TPM-E  
Special Session: Non-Ionizing Radiation (NIR) Section  
Chairs: Jerrold Bushberg, Fred McWilliams

14:30  TPM-E.1  
Communicating the Science and Risk of Emerging Technologies in a Sea of Intuitive Toxicology and Cognitive Bias  
Bushberg JT  
NCRP

15:15  TPM-E.2  
NIR Distinguished Service Award

15:25  TPM-E.3  
Panel Discussion

16:05  TPM-E.4  
Commercial Wireless Towers on Campus  
Jo MC, Woolf SA  
University of Nevada, Reno

16:30  TPM-E.5  
Health Physics considerations for fielding of the Army Solid State Active Denial Technology  
Marcy BS, Mikulski HT, Frey JJ, Lamoreaux RW  
U.S. Army

17:00  TPM-E.6  
NIR Business Meeting
TPM-F

Academic Institutions

Chairs: Subashri Kurgatt, Philip Fulmer

14:30

TPM-F.1
Managing Safe Use of Lasers at a Academic and Medical Institution
Kurgatt S, Reiman R, Tsorve I
Duke University Health Systems

14:45

TPM-F.2
Response to a Spill Involving Lutetium-177 in a Radiation Use Facility
Robinson J, Hamideh AM, Wang WH
Louisiana State University

15:00

TPM-F.3
A Mixed Methods Approach for Improving the Radiation Safety Climate at Princeton University
Root CM, DeVol T, Sinclair R, Martinez N
Princeton University, Clemson University

15:15

TPM-F.4
Doing More with Less: Increasing Health Physics Capabilities in a Resource-Limited Environment
Nagata JS
U.S. Environmental Protection Agency

15:30

Exhibit Hall

BREAK

16:00

TPM-F.5
Radiation Safety Challenges Using High Activity Radioactive Sources In An Open Configuration On A Military Base
Grimm SL
Georgia Institute of Technology

16:15

TPM-F.6
Guide to an effective database transfer
Kennedy MJ
University of Pittsburgh

16:30

TPM-F.7
Use of the UMass Lowell Research Reactor for the Production of Stable and Radioactive Gold Nanoparticles
Alshahrani AM, Abdulrhman M, Tries MA, Konomi KK
WEDNESDAY

06:55 – 07:55

CEL-6
Science Is Not Enough
Eric Daxon

CEL-7
How do we know they’re good? Design and Administration of a Bioassay Oversight Program
Brett Rosenberg

08:10 – 12:00

WAM-A
Special Session: Chelation
Chairs: Luiz Bertelli, Raymond Guilmette

08:10
Introduction and Announcements

08:15
Dosimetry of a Wound Contaminated with 238Pu During and After Medical Intervention
Klumpp JA, Bertelli L, Poudel D, Dumit S
Los Alamos National Laboratory

08:45
Early Wound Assessment: The Derived Reference Level (DRL)
Sugarman SL
Summit Exercises and Training

09:15
Chelation Therapy at the Savannah River Site 1986-2006: A Personal Recollection
LaBone TL
MJW Companies

09:45
Health Physics and Medical Management of a Pu-238 Contaminated Wound
Findley WM
MJW Corporation, formerly Savannah River Site

10:15
BREAK

10:45
Chelation Modeling: the use of ad hoc models and approaches to overcome a dose assessment challenge
Dumit S, Bertelli L, Klumpp JA, Poudel D, Waters T
Los Alamos National Laboratory

11:00
Efficacy of DTPA Chelation of Actinides – The REAC/TS Experience
Toohey RE, Goans RE, Davis J, Iddins CJ
M. Chew Associates, MJW Corporation, ORAU-REAC/TS

11:15
DTPA efficacy after wound contamination with Am: comparison of various administration protocols
Van der Meeren A, Lamart S, Griffiths NM
CEA

11:30
New decorporation strategies for reducing risk from intakes of lanthanides and actinides
Abergel RJ, Rees JA, An DD
University of California Berkeley, Lawrence Berkeley National Laboratory

11:45
Recent Research On Improved Chelating Agents For Decoration Radionuclides
Guilmette RA
Ray Guilmette & Associates

08:10 – 12:30

WAM-B
Special Session: ICRP/IRPA - Tolerance and Reasonableness
Chairs: Theirry Schneider, Nichole Martinez

08:10
Introduction

08:15
About the tolerability of radiological risk
Lochard J
Nagasaki University

08:45
Where do we go from here on the quest for reasonableness?
Cool DA
ICRP
WEDNESDAY

09:15
IRPA/SFRP workshops on the practical implementation of the ALARA principle
Lecomte JF, Schneider T, Schieber C, Jean-François S, Billarand Y
Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Centre d’Etude pour l’Evaluation de la Protection dans le Domaine Nucléaire (CEPN), Canadian Radiation Protection Association (CRPA)

09:45
Practicality, Common Sense and Value for Society
Coates R
International Radiation Protection Association

10:15
BREAK

10:45
Thoughts on Tolerability/Reasonableness from NCRP
Held KD
NCRP

11:15
A Dilettante Looks at ICRP Publication 138
Hertel N
Georgia Techrol

11:45
What is reasonable radiation protection for non-human biota?
Martinez NE, Van Bladel L
Clemson University, Federal Agency for Nuclear Control

12:05
Open Discussion

12:15
Panel Discussion

08:30 – 11:45 Orlando VI

WAM-C
Special Session Homeland Security Part 1
Chairs: Brooke Buddemeier, Shraddha Rane

08:30
Introduction

08:45
FEMA CBRN RadResponder Network; Transforming Radiological Emergency Response
Leek A, Semanick J, Buddemeier BR, Palmer B, Powers M
Iowa Department of Public Health, Connecticut Department of Energy and Environmental Protection, Lawrence Livermore National Laboratory, Chainbrige Technologies

09:00
Update on the Removal of Risk from Dirty Bomb
Kamen J, Hsu W
Mount Sinai Hospital

09:15
Threat and Hazard Identification and Risk Assessment/ Stakeholder Preparedness Review (THIRA/SPR) for Technical Audiences
Howe MF, Hollingsworth H, Yoo B
FEMA/DHS

09:30
Benchmarking Utility for Performance Evaluations of Radionuclide Identification Algorithms
University of New Mexico, Lawrence Livermore National Laboratory

10:00
The ROSS Position Task Book, FEMA 509 Typing and OneResponder
Irwin WE
Vermont Department of Health

10:30
Can the Roadmap for ROSS Ready Use a Higher Education Expressway?
Higley KA
Oregon State University

11:00
Routine Alarm Performance Testing And Quantitative Multi Energy Calibration Of A Spectroscopic Radiation Pager Using Test Adapters Containing Less Than 10 nCi Of Natural Radioactivity
Iwatschenko-Borho MA
Thermo Fisher Scientific Messtechnik GmbH

11:15
Testing of Transuranic Activity Estimation in the iSolo® Radon Rejection Algorithm
Cope SJ, Hayes RB
North Carolina State University
11:30 WAM-C.10
Nuclear and Radiological Emergency Preparedness and Natural Disasters
Waller EJ, Lafortune JF
UOIT, ISR

10:45 WAM-D.8
Development of a Silicon-Plastic Scintillator Coincidence Beta-ray Spectrometer
Omar-Nazir L, Byun SH
McMaster University

11:00 WAM-D.9
Adding the ability to quantify activity to a Radionuclide Identification Device
Sullivan DF, Persson H, Phillips K, Spruytte J, Oginni B
Mirion Technologies

11:15 WAM-D.10
Introducing the R programming package, “radsafer”
Hogue MG
SRNS

11:30 WAM-D.11
Novel, Low-Cost, Light-Weight, High Efficiency (H* Capable) Neutron Detection-Dosimetry
Taleyarkhan RP, Archambault B, Sansone A, Grimes T, Hagen A
Purdue University, Pacific Northwest National Laboratory

08:30 – 11:45
Orange A
WAM-D Instrumentation
Chairs: Frazier Bronson, Tom Voss

08:30 WAM-D.1
Liquid Scintillation Counter And Wipe Efficiency For Alpha-Emitting Nuclides
Squillante JJ
Oregon State University

08:45 WAM-D.2
Radio Frequency Immunity Testing of Two Ion Chamber Instruments
Collins SL
Ludlum Measurements, Inc.

09:00 WAM-D.3
SrI2 Scintillator: Low Energy Performance and Applications
Bronson FL
Mirion Technologies - Canberra

09:15 WAM-D.4
Challenges In Monitoring For Transuranics
Voss JT
Voss Associates

10:00 WAM-D.5
Real-time Dosimetry of I-131 Using Nano fiber-Optic Detection Technology
Raudabaugh JM, Smiley BR, Petry NA, Therien M, Gunasingha R, Yoshizumi T
Duke University, Duke University

10:15 WAM-D.6
Countering Detector Sensitivity Changes when Calibrating Neutron Survey Instruments and Reference Fields
Piper RK
Pacific Northwest National Laboratory

10:30 WAM-D.7
Understanding the Radiation Soaking Effect in Neutron Survey Meters
Mozhayev AIf, Piper RK
Pacific Northwest National Laboratory

08:15 – 12:00
Orange B
WAM-E Special Session: Aerosols and Nanotechnology
Chairs: Jeff Whicker, Mark Hoover

08:15 WAM-E.1
Aerosol Science Advances and Challenges in Radiation Protection: Thirty Years of Experience and Insights from the Air Monitoring Users Group
Hoover MD, Whicker JJ, Hayes RB, Maiello ML, Jenkins P, Cox M
Mark D Hoover LLC, Los Alamos National Laboratory, North Carolina State University, New York City Department of Health, Bowser-Morner, Inc.

09:15 WAM-E.2
Nanotechnology and Radiation Protection: HPS Nanotechnology Committee Activities and Opportunities
Hoover MD, Marceau-Day L, Cash LJ, Davis J, Hay T, Holiday S, Whicker JJ
Mark D Hoover LLC, LSU Scientist Emerita, Los Alamos National Laboratory, Oak Ridge Associated Universities, Washington State Department of Health, Nuclear Regulatory Commission

10:15 WAM-E.3
Measuring Air Sampler Filter Material For Pressure Drop, Aerosol Collection Efficiency, Alpha Spectrum Resolution And Radon Progeny Collection LAUR-19-21686
Moore ME, Tao Y, McLean TD, Voss JT, Stephens JA, Simpson CT
Los Alamos National Laboratory, Pacific Northwest National Laboratory
10:35  WAM-E.4  
Health Physics Society rules governing formation of a proposed new Aerosols/Emerging Technologies Section  
Whicker JJ, Hoover MD, Whicker  
Los Alamos National Laboratory, Mark Hoover LLC  

11:15  Nanotechnology Business Meeting  

08:30 – 12:15  Orange C  
WAM-F  
Special Session: Military Health Physics  
Chair: Col. John Cuellar  

08:30  WAM-F.1  
The History of Department of Defense’s Nuclear Test Personnel Review  
Blake PK  
DTRA  

08:45  WAM-F.2  
Modernizing the Nuclear Test Personnel Review Database and Work Flow Elements  
Alleman LA  
DoD  

09:15  WAM-F.3  
Neutron Spectra and Energy Deposition in a Computational Phantom  
Prins RD  

10:15  WAM-F.4  
Applying the ALARA Principles to Maneuvering in a Fallout Environment  
Dant JT  

10:45  WAM-F.5  
Mainland Japan Ship and Shore Medical Clinic Radiation Health Program Standardization  
Caudill JS, Sowers DA  
NAVHOSP YOKO, NAVSEA DET RASO  

11:15  WAM-F.6  
Developing a Unified Radon Policy for the US Air Force  
Hale AC, Rademacher SE  
United States Air Force  

12:15 – 14:15  
PEP W-1  
NDA Systems used for the qualification of TRU waste to WIPP  
Jeff Chapman  

PEP W-2  
Fluoroscopic System Evaluation and Radiation Safety Considerations  
Cari Borrás  

PEP W-3  
A Health Physics Perspective on Prevention Through Design - Modernization of a World-Class Radiation Physics Facility  
Manuel Mejias  

14:15 – 17:15  Orlando IV  
WPM-A  
Special Session: Social and Ethical Values in Radiation Protection  
Chairs: Nichole Martinez, Kendall Berry  

14:15  WPM-A.1  
Introduction  

14:20  WPM-A.1  
Applying the Cultural Tool-Kit Perspective to Foster Inclusive Interactions  
Koontz AJ  
University of Central Florida  

15:00  WPM-A.2  
Accommodating Personnel with Disabilities – What does Accessibility Really Mean?  
Manglass LM  
Clemson University  

15:15  WPM-A.3  
The Mentor–Apprentice Relationship: A Closer Look of Intergenerational Interactions in the Workplace  
Trimas DJ, Martinez NE  
University of Michigan, Clemson University  

11:15  Military Business Meeting  

14:15  Military Business Meeting
15:30
The Hidden Keys to a Successful Radiation Protection Culture
Lee MB
Los Alamos National Laboratory

16:00
Fostering Empathy Through Shared Experiences
Berry KE, Root CM
Fox Chase Cancer Center, Princeton University

16:15
Alignment of the Definition of Health Physics and Job Description of a Health Physicist: Resetting the Mortar in the Foundation to Evolve a Stronger Organization.
Sowers DA
NAVSEA DET RASO

16:30
The HPS Student Support Committee: Current Initiatives
Montgomery DA, Condon CA, Poudel D, Kuchta J
Clemson University, Oregon State University, Los Alamos National Laboratory, University of Michigan

16:45
Getting Involved in the Health Physics Society – Straightforward and Rewarding
Simpkins AA, Simpkins
NV5/Dade Moeller

16:30
The Hidden Keys to a Successful Radiation Protection Culture
Lee MB
Los Alamos National Laboratory

15:05
Risk communication and public understanding about radiation: some lessons from nuclear accidents
Lochard JA, Takamura NO
Nagasaki University

15:30
Connecting science and life with trust
Ando R
Ethos in Fukushima

16:00
Fostering Empathy Through Shared Experiences
Berry KE, Root CM
Fox Chase Cancer Center, Princeton University

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16:45
Getting Involved in the Health Physics Society – Straightforward and Rewarding
Simpkins AA, Simpkins
NV5/Dade Moeller

17:00
The NCRP: Why You Need to Know About This Organization?
Lanza JJ
Florida Department of Health

14:15 – 17:10 Orlando V

14:15
ICRP’s Role in Engaging with the Public
Clement CH
International Commission on Radiological Protection

14:40
Current issues and thoughts for RP professionals regarding Public Understanding on radiation and risk
Yoshida HI
International Radiation Protection Association

14:30
A Simulation Tool for Optimizing Community Reception Center Operations
Finklea LF
Centers for Disease Control and Prevention

14:45
Efficient Contamination Screening at Community Reception Centers in Response to a Radiological Dispersal Event
DHS National Urban Security Technology Laboratory, Fire Department of the City of New York

14:30 – 16:00 Orlando VI

WPM-B
Special Session - International Collaboration Committee
Chairs: Alexander Brandl, Nichole Martinez

WPM-B.1
ICRP’s Role in Engaging with the Public
Clement CH
International Commission on Radiological Protection

WPM-B.2
Current issues and thoughts for RP professionals regarding Public Understanding on radiation and risk
Yoshida HI
International Radiation Protection Association

WPM-B.3
Risk communication and public understanding about radiation: some lessons from nuclear accidents
Lochard JA, Takamura NO
Nagasaki University

WPM-B.4
Connecting science and life with trust
Ando R
Ethos in Fukushima

WPM-B.5
Moving from Lecturing on Data to Communicating Content
Brandl AL, Tschurlovits MA
Colorado State University, Vienna University of Technology

WPM-B.6
By Any Other Name: Is “Risk Communication” What We Mean?
Martinez NE
Clemson University

WPM-B.7
The Role of the International Atomic Energy Agency in Communication of Radiation Safety Principles in Other than Emergency Situations
Dojcanova L, Pinak M
International Atomic Energy Agency
15:00  WPM-C.3  Cesium Irradiators - Replacement and Removal: Lessons Learned
Rasmituth J
Emory University

15:15  WPM-C.4  Radiological Dispersal Device Simulations Help Responders Save Lives
Chen RW, Buddemeier BR*
Lawrence Livermore National Laboratory

15:30  WPM-C.5  Assessing RadTriage Colorimetric Dosimeter Response to Low-Dose Gamma-Ray Exposure
Rand LE
Georgetown University

16:30  WPM-D.6  Dose Rate Simulations of Uranium Ore Samples in the Grand Canyon Museum Collection
Samuels CE, Inman JW, Hertel NE
Georgia Institute of Technology

14:30 – 16:30 Orange A

14:30 – 16:30 Orange B

WPM-E1  Environmental Monitoring
Chairs: Tim Jannik, Paul Charp

14:30  WPM-E1.1  The Creation of a Moose Voxel Model: Part I - Segmentation
Graham HR, Waller EJ
University of Ontario Institute of Technology

14:45  WPM-E1.2  The radiation dose response of Zebra Mussels (Dreissena polymorpha) from the Great Lakes
Tzivaki M, Waller EJ
University of Ontario Institute of Technology

15:00  WPM-E1.3  Environmental Thermoluminescent Dosimetry Program of Nevada National Security Site
Liu NA, Warren W, Xianan R

15:15  WPM-E1.4  Effective environmental Half Life of 134Cs and 137Cs in Fukushima Prefecture When Compared to Theoretical Decay Models
Hayes JM, Johnson TE, Anderson D, Nanba K
Colorado State University, Fukushima University

15:30  WPM-E1.5  Public health evaluation of radiologic contamination in St. Louis – Coldwater Creek
Dyken JJ, Evans E, Trubiano A, Charp PA*
ATSDR, CDC
16:15 – 17:15 Orange B

WPM-E2
Air Monitoring
Chairs: Matthew Barnett, Dave Fuehne

16:15 WPM-E2.1
Visualization Of Radioiodine Distribution In Silver Zeolite Cartridges With Gamma-Ray Imaging
DiMarco DJ, Matthews KL, Wang WH
Louisiana State University

16:30 WPM-E2.2
Operational Health Physics Challenges: From Discovery to Recovery of a Leaking Transuranic Glovebox at Idaho National Laboratory’s Materials and Fuels Complex
Idaho National Laboratory

16:45 WPM-E2.3
Military and American National Standards Institute Testing of a Tritium In Air Monitor
Ramey AJ
Ludlum Measurements Inc.

17:00 WPM-E2.4
Investigation of the Airborne Release Fraction During Rapid Oxidation of Depleted Uranium Metal
Bragg PB
Idaho National Laboratory
HPS Awards Plenary Breakfast
08:00 – 10:00, Orange D
Join us for the Awards Program at the Hilton Orlando. There will be a buffet breakfast provided that begins at 07:30. We look forward to seeing you by 08:00 for the presentation.

08:45 – 09:45

CEL-8
The Importance of the Measurand in Health Physics
Daniel Strom

CEL-9
Radiation Exposure to Terrestrial Organisms and Organisms in Space from Supernovae and Gamma Ray Burst?
P. Andrew Karam

10:00 – 12:15

THAM-A
Accelerator Health Physics
Chairs: Stefania Trovati, Marcia Maria Campos Torres

10:00
Radiation Safety Systems for the LCLS-II project at SLAC: use of beam loss monitors to supplement shielding
Rokni SH
SLAC National Accelerator Laboratory

10:15
Review of RAM Experiments a Graded Approach on Radiological Controls
Torres MC
SLAC

10:30
Radiation Shielding Design of a Cryo-Module Test Facility
Trovati S, Leitner MS, Ge L
SLAC

10:45
Developing Compact Deuterium-Deuterium (DD) Generator Based In Vivo Neutron Activation Analysis (IVNAA) as a New Method for Measuring Sodium (Na) in Bone and Soft Tissue
Coyne MC, Lobene AJ, Weaver CM, Nie LH
Purdue University

11:00
Characterization of Measured Activity and Collection Efficiency of Tritium Smears
Stavola AJ, Hartberger AM
Thomas Jefferson National Accelerator Facility

11:15
Implementation of ALARA Practices for Accelerator Maintenance Work in High Radiation Areas
Overbay LA, Duran MA
Los Alamos National Laboratory

11:30
Accelerator Business Meeting

11:00 – 12:30

THAM-B
Special Session Homeland Security Part 2
Chairs: Brooke Buddemeier, Shraddha Rane

10:00
RadResponder Network - A Quick Walkthrough With The Newest Updates
Chen G, Palmer B*
EPA, Chainbridge Tech, Inc

10:15
Myths about Protective Action Guides (PAGs)
Decair S, Ralston L, Nagata J, Wieder JS*, Matakas L, Buddemeier BR
U.S. Environmental Protection Agency, Lawrence Livermore National Laboratory

10:30
Risk based decision-making during a radiation incident
Leek AE
Iowa Department of Public Health

10:45
A Communication Tool for Use in Nuclear/Radiological Emergencies – Development and Testing
Ansari A, Salame-Alfie A
Centers for Disease Control and Prevention

11:00
Implementation Guidance for Emergency Response Dosimetry
Salame-Alfie A, Musolino SV
Centers for Disease Control and Prevention, Brookhaven National Laboratory
THURSDAY

11:15  THAM-B.6
The Use of PET/CT to Evaluate Internal and External Contamination on a Canine Exposed to a Contaminated Environment
Marianno CM, Cook KM
Texas A&M University

11:30  THAM-B.7
Streamlining Public Health Planning for Radiation Emergencies: A Tool to Transform Point of Dispensing Plans into Community Reception Center Plans
Finklea LR, Cathcart L, Flanagan E
Centers for Disease Control and Prevention

12:00  Homeland Security Business Meeting

10:00 – 12:00  Orlando VI

THAM-C
Dose Reconstruction and Radiation Effects
Chairs: Wesley Bolch, Joseph Shonka

10:00  THAM-C.1
The First Dirty Bomb, Trinity
Shonka JJ
SRA

10:15  THAM-C.2
Dosimetric impact of a new computational voxel phantom series for the Japanese atomic bomb survivors: children and adults
National Cancer Institute, University of Florida, Radiation Effects Research Foundation, Japan Atomic Energy Agency, Georgia Institute of Technology

10:30  THAM-C.3
Dosimetric Impact of a New Computational Voxel Phantom Series for the Japanese Atomic Bomb Survivors: Pregnant Females
UF, NCI, RERF, JAER, Georgia Tech

10:45  THAM-C.4
Uncertainty of dose factors for bone marrow dosimetry of bone-seeking Sr-90 and Sr-89
Shishkina E, Volchkova A, Sharagin P, Smith M, Degteva M, Napier B
Urals Research Center for Radiation Medicine, URCRM, Pacific Northwest National Laboratory

11:00  THAM-C.5
Estimation of Lifetime Doses to the Public Living Close to NPPs Using Electron Paramagnetic Resonance (EPR) Measurements on Extracted Tooth Enamel
Ghimire L, Waller E
University of Ontario Institute of Technology

11:15  THAM-C.6
Health Effects from Exposure to Thorium
Keith LS, Ingerman L, Wohlers DW, Brooks MD, Charp PA
ATSDR, SRC

11:30  THAM-C.7
Limitations of Cause of Death Data Among Autopsied Population in the United States Transuranium and Uranium Registries
McComish SL, Zhou J, Martinez FT, Tolmachev SY
Washington State University, U.S. Department of Energy

11:45  THAM-C.8
Case Studies in Brain Dosimetry for Internally Deposited Radionuclides
Tolmachev SY, Leggett RW, Avtandilashvili M, Boice, Jr JD
US Transuranium and Uranium Registries, Washington State University, Oak Ridge National Laboratory, National Council on Radiation Protection and Measurements

10:00 – 11:15  Orange A

THAM-D
Contemporary Health Physics Topics
Chairs: Jeffrey Lively, Wayne Gaul

10:00  THAM-D.1
A Conceptual Approach to the Remediation of Wide-Area Radioactive Contamination
Chen SY
Illinois Inst. of Technology

10:15  THAM-D.2
Scanning Spectroscopy v. Randomized Discrete Soil Samples – A Case Study In Surface Soil Characterization Data Quality
Lively JW, Posner RG, Jones AR
Wood E&IS

10:30  THAM-D.3
Lessons Learned from the Development of a Web-Based System for Managing Gamma Scan Data
Witmer M, Brown M, Mason T, Hackett J
Jacobs

10:45  THAM-D.4
IPCM12 Radon Enhancements
Lamb SD
Thermo Fisher Scientific
11:00  THAM-D.6
Discussions on Radiation Protection Design under Accident Condition of China PWR
Wang XX, You W, Mi AJ, Mao YW
China Nuclear Power Engineering Co. Ltd

14:00 – 16:00  Lake Hart
THPM-A
IRPA Workshop on Public Understanding
Chair: Roger Coates

IRPA is preparing a guidance document to assist our members, both radiation protection societies and individual professionals, to become more comfortable, confident and better equipped in the science and art of communicating with the public on radiation and risk. The objective of the workshop is to review the latest draft of the guidance document and to seek suggestions for improvement. Attendance at the workshop is by invitation, but any interested person should request an invitation by emailing coates@irpa.net
Radiation Risk Assessment is a full-day advanced course that focuses on specific technical and regulatory issues that Remedial Project Managers (RPMs) and On-Scene Coordinators (OSCs) address when managing Superfund sites that have a risk assessment conducted for radioactive contaminants. By taking the course, participants achieve the following objectives:

• Learn a step-by-step approach to the Superfund remedial program’s risk assessment process for radioactive contamination.
• Explore methods for conducting site-specific risk assessments.
• Discover practical recommendations for improving the radiation risk assessments conducted at your site.
• Master information about radiation risk assessment process.

The instructional methodology for this course includes lectures and demonstrations of using EPA’s risk and dose assessment calculators developed by the Superfund remedial program. The target audience for this course is RPMs, OSCs, risk assessors and others that want to obtain a working knowledge on conducting Superfund radiation risk assessments.

Targeted topics include:

• Updates on ROSS National Qualification System typing, the ROSS position task book and OneResponder for qualifying ROSS;
• A review of ROSS experiences in exercises around the nation;
• Demonstration of emergency responder training videos depicting the ten tactics of the Department of Homeland Security (DHS) National Urban Security and Technology Laboratory (NUSTL) Radiological Dispersal Device (RDD) Response Guidance which can be used in training by ROSS;
• Ten-point monitoring, RDD and shape file overlays for situational awareness in RadResponder;
• Experiential learning using the ROSS Toolkit on RadResponder to generate briefing products for perimeters & zones, worker safety, shelter & evacuation, population monitoring and recovery;
• Introduction to the ROSS Emergency Operations Center Job Aid.

A word about the ROSS Toolkit: It is a web-based collection of national and international guidance organized for quick reference by a ROSS or other radiation professional to quickly guide recommendations or decisions for radiation control perimeters, radiation dose decision points, personnel contamination screening levels, shelter and evacuation guidance, as well as provides fact sheets and other resources for nuclear power plant, RDD and nuclear detonation emergencies. Instructors will demonstrate how to access the ROSS Toolkit through RadResponder and review the structure of the various guidance topics within the Toolkit. Students will be provided an assignment requiring review of guidance in the Toolkit, and they will present a briefing on their recommendations based on the Toolkit guidance.
The Professional Enrichment Program (PEP) provides a continuing education opportunity for those attending the Health Physics Society Annual Meeting. The two hours allotted each course ensure that the subjects can be discussed in greater depth than is possible in the shorter programs offered elsewhere in the meeting.

On Sunday, 7 July, a series of 27 courses will be offered between 08:00 – 16:00.

In addition to the above-mentioned sessions for Sunday, 15 PEP lectures are scheduled on Monday-Wednesday, 12:15 – 14:15. Registration for each two-hour course is $99 and is limited to 60 attendees on a first-come, first-served basis. Those whose registrations are received before the preregistration deadline will be sent confirmation of their PEP course registration.

Students with a current ID card will be admitted free of charge to any sessions which still have space available after the waiting list has been admitted. Student admission will be on a first-come, first-served basis and will only begin 15 minutes after the start of the session to allow for completion of ticket processing.

Please Note!!

Please be on time for your sessions. The lecturer will begin promptly at the scheduled time. Please allow time for check-in. The HPS reserves the right to schedule a substitute speaker or cancel a session in case the scheduled speaker is unavailable.

Attendees not present at the starting time of the session cannot be guaranteed a space, as empty spaces will be filled from the wait list at that time. Spaces left after the wait list has been admitted may be filled with students. If your duties at the meeting cause you to be late for your lecture (e.g., chairing a session), contact the PEP registration desk so that your name can be placed on the waiver list and your space held.

Refund Policy

Requests for PEP refunds will be honored if received in writing by 5 June. All refunds will be issued AFTER the meeting. Exceptions will be handled on a case-by-case basis.

ONCE AGAIN

The Professional Enrichment Program (PEP) handouts for the Annual Meeting will not be available in hard copy. For those who preregister, you will be provided with an access code for downloading the handouts approximately two weeks prior to the meeting. For those who register for courses on-site, you will be provided the code when you register.

Please note, not all instructors provide downloadable information.
Katharine McLellan
Lake Concord

DOE-STD-1153-2019, A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota was published earlier this year at DOE and is on the DOE Technical Standards Website. The revised standard has been reduced to one volume and updated to add new radionuclides, updated parameters, and enhanced methods, models, guidance and case studies to support DOE’s characterization of radiation doses to aquatic and terrestrial biota within a graded approach that meet the requirements set forth in DOE O 458.1, Radiation Protection of the Public and the Environment. This PEP will focus on the changes made to the standard for use in DOE’s continued mission for protection of the public and the environment. This lecture will be followed by a PEP on RESRAD BIOTA, a computer code developed to assist users implementing DOE’s graded approach methodology in this standard.

PEP 1-B  Basic Training for the NRRPT exam – Fundamentals
Tom Voss
Lake Hart

This class presents the fundamentals of radiation – Sources of Radiation, Biological Effects, Mathematics, Chemistry, Physics, and Units and Terminology. The techniques and requirements of emergency preparedness, prescribed dosimetry, and contamination control are explored. Radiation interactions, radiation effects, radiation shielding, and radiation measurement techniques are described. The derivation and history of units are discussed. The relationships between various units are explored. Calculations of units and conversion of units are stated. Basic radiation rules and laws are interpreted. The primary reference materials are taken from Glenn Knoll “Radiation Detection and Measurement”, James Turner “Atoms, Radiation, and Radiation Protection”, and the wide experience of the instructor. The instructor began his career in radiation in 1967, working at a commercial nuclear power plant (then under AEC rules). The instructor’s experience covers working with the AEC, NRC, DOE, US Military, Research, and the commercial world. He participates in the reviews and development of US and International standards for radiation instruments and measurements.

PEP 1-C  Fundamentals of Reproducible Research
Tom LaBone, Nancy Chalmers, Elizabeth Brackett
Lake Down

Here we will define research to be the process where we:

• Ask a question.
• Acquire data that we hope is capable of answering the question.
• Analyze the data.
• Draw conclusions from the analysis that are generally applicable to similar situations and data not yet observed.

Research can be high-stakes, a clinical trial for a new cancer treatment for example. Or, it can be fairly mundane, like trying to decide if your GM counter is operating properly. The gold standard for demonstrating that the conclusions you reached at the end of your research are valid is replication.

Research is replicated when another person independently acquires another dataset, reanalyzes it, and arrives at more or less the same conclusions. Replication is not always feasible because it can be expensive, time consuming, unethical, or impossible. A lesser standard is reproduction.

Research is reproduced when another person can recreate all the numbers and graphs in your report given your data, code, and associated documentation. There is a bit of a crisis in modern research because an uncomfortable amount of published research can’t be replicated or reproduced. Failure to replicate someone’s work is called science. Failure to reproduce someone’s work is actually more troubling because at first glance one might think this should be easy to do. But, at a personal level, who has not experienced the situation where a plot in a report can’t be reproduced by the author (much less someone else) at a later date? One can’t help but to be suspicious of any research that can’t be reproduced.

The idea of reproducible research centers around configuring the workflow in your research so as to make it possible for someone else to readily reproduce all the numerical results and graphs in your report, starting with the original data and documentation on how you manipulated this data.

Today we are going to discuss details of reproducible research, including

• asking a good question,
• acquiring adequate data,
• cleaning data,
• using appropriate analytical methods, and
• reaching conclusions that are based on the data and analysis.

To a large extent the software tools you use for these activities has a huge impact on the effort involved with creating reproducible research and hence on the chances of your work being reproducible. The ubiquitous Microsoft Word/Excel
applications do not easily lend themselves to the production of reproducible research, but there are other software packages that do. We will review some freely available applications like the statistical programming language R, the word-processing/typesetting software Lyx, and version control software Git that make this task easier. The goal of this software review is not necessarily to convert you to using these tools, but to illustrate what you should be trying to do with Microsoft Word/Excel if you use them to do your research.

PEP 1-D Quick and dirty radiological dose assessment following a rad/nuke emergency
Andy Karam
Lake George

I recently published a paper in HPJ describing a methodology that will make it possible for lightly-trained personnel (e.g. my father) to quickly establish whether or not a person requires the administration of decorporation agents, should be sent home, or requires more study. This PEP would describe the development of this methodology, how it is intended to be used in an actual emergency (at a Community Reception Center, for example), and will include a few examples showing how it would work in real life. There might even be some class participation at a mock dose assessment desk.

PEP 1-E Integration of Health Physics into Emergency Response
Stephen Sugarman
Lake Highland B

In the event of a radiation incident it is essential that the radiological situation is properly, yet rapidly, assessed so that a proper response can be planned. Various techniques can be employed to help gather the necessary information needed. There are many groups of responders that need to be considered such as law enforcement, EMS, fire, and healthcare providers. Most, if not all, of these groups have relatively little understanding of the realistic hazards associated with radiation. It is not always necessary to incorporate wholesale changes to the way things may usually be done in the absence of radioactive materials. For instance, law enforcement officers routinely incorporate stand-off distances when approaching a suspect or other dangerous situation. Firefighters are familiar with the use of protective clothing and respiratory protection. EMS and healthcare providers routinely incorporate contamination control practices – universal precautions and proper patient handling techniques – into their everyday jobs. Coupled with a good event history and other data, health physicists can help to develop a strategy for safely and effectively responding to a radiological event. Support duties can also include assessment of dose responders or patients and assistance with communication issues affecting incident response, medical care, or with external entities such as regulators and the media. As time goes on and more information, such as bioassay or biological dosimetry data, plume data, and other additional data is received the health physicist will be called upon to interpret that data and communicate its meaning to the decision-makers and otherwise advise incident command. It is, therefore, essential that health physicists are able to seamlessly integrate themselves into the response environment and effectively communicate their findings to a wide variety of people.

PEP 1-F Design of MARSSIM and MARSAME Surveys
David Stuenkel
Lake Monroe

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides guidance on how to demonstrate that a site complies with applicable radiation dose- or risk-based release criteria. In a similar way, the Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) manual, a supplement to MARSSIM, provides guidance on how determine proper disposition of materials and equipment. While both MARSSIM and MARSAME provide comprehensive guidance, the focus of both is on the design and evaluation of final surveys, known as final status surveys in MARSSIM and disposition surveys in MARSAME. This presentation will discuss the design of final status surveys and disposition surveys. For MARSSIM surveys, this will include determination of the number of sample or measurement locations required, the calculation of minimum detectable concentrations during scanning, adjustment to the number of sample or measurement locations required, and the selection of sample or measurement locations. For MARSAME surveys, this will include the calculation of minimum quantifiable concentrations and the development of an operational decision rule. Illustrative examples will be used to demonstrate these concepts.
Our experience during construction, commissioning, and production of \( ^{99}\text{Mo} \) with a high power linac (40 kW, 35 MeV Electrons) will be shared. The electrons bombarded on a heavy metal converter generate Bremsstrahlung photons that undergo photonuclear reaction \( ^{99}\text{Mo}(\gamma,n)^{98}\text{Mo} \) with a Mo Target placed in the forward direction. Gamma spectroscopy detected 46Sc as an activated product from Ti. Converters and targets are water cooled, and the radiation protection due to Bremsstrahlung and neutrons are achieved using iron, lead, polyethylene, concrete and earth as shielding materials. Monte Carlo simulations are performed with FLUKA to generate the dose profiles for the electron, gamma and neutron.

We have explored the possibility of using a high power linac (40 kW and 35 MeV Electrons) to produce medical isotopes such as \( ^{99}\text{Mo} \), as a cost-effective alternative method. The electrons bombarded on a Tantalum heavy metal converter generates Bremsstrahlung photons that undergo photonuclear reaction \( ^{99}\text{Mo}(\gamma,n)^{98}\text{Mo} \) with an enriched Mo target placed in the forward direction. The high intensity Bremsstrahlung and neutrons generated require significant shielding. The dose rate calculated for Bremsstrahlung from a thick Tantalum converter in the forward direction is \( 4 \times 10^3 \) Sv/h at one meter, and in the perpendicular direction \( 2 \times 10^3 \) Sv/h at one meter. By assuming that the 35 MeV, 40 kW electron beam is stopped entirely on a thick target, the neutron yield would be about \( 5 \times 10^{13} \) n/s. To keep the dose rate in the public occupied areas ALARA, the number of tenth value layer of shielding required in the perpendicular direction are 8.3 for Bremsstrahlung and 6 for the neutrons, respectively. The shielding is achieved by using the following materials: Iron, Lead, Polyethylene, Concrete and Earth.

The cooling water at the converter and target as well as the room air will be activated, and may produce ozone and hydrogen. The expected radioactive gases produced in air are \( ^{15}\text{O}, ^{14}\text{N} \), and \( ^{40}\text{Ar} \), and in water are \( ^{15}\text{O}, ^{14}\text{C}, ^{7}\text{Be}, \) and \( ^{3}\text{H} \) (tritium). Adequate precautions are taken to mitigate these hazards. The tritium generated in the cooling water for the converter and target after 58.5 kW-hour of Linac operation was found to be only 2.5 Bq/L. Similarly, there was no Be-7 in the converter and target cooling water, nor any ozone production in the room air could be observed during the early phase of commissioning. However, we have experienced an elevated level of radiation from the converter and target holder’s material - titanium that has undergone nuclear reaction \( ^{48}\text{Ti}(\gamma,pn)^{46}\text{Sc} \) generating Sc-46, which emits two cascading gamma photons \( \sim 1 \) MeV detected by gamma spectroscopy, with a longer half-life of 83.8 days. The Ti was replaced by Zr and Cu at the converter and target holders, respectively. Monte Carlo simulations were performed with FLUKA to calculate the dose at the converter, target, beam dump and shielding structures, as well as independent dose profiles for the electron, gamma and neutron.

We have commissioned and produced Medical Isotope with a linac (40 kW and 35 MeV Electrons) where the electrons bombarded on a heavy metal converter generating Bremsstrahlung photons that undergo \( ^{99}\text{Mo}(\gamma,n)^{98}\text{Mo} \) photonuclear reaction. Issues of providing adequate radiation shielding and containment of the hazards due to activated products will be presented. Monte Carlo simulations were performed with FLUKA to generate the dose profiles of electron, gamma and neutron.

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**PEP 1-H  RDD Guidance**

**Brooke Buddemeier**

**Lake Sheen B**

Great strides have been made in the past few years to improve our response preparedness capabilities, including the release of updated guidance on response to RDDs; animations that visualize the RDD Response Tactics, H&S Officer guidance for responder support to nuclear detonations, an NCRP report on responder dosimetry, a new PAG Manual, FEMA’s RadResponder platform for collecting, sharing, and using radiological data, the development of a FEMA Radiological Operations Support Specialist (ROSS) position (including new tools, Job Aids, and training to support the ROSS), operational support tools early phase hazard area assessments, and lots of great new communication tools to help inform the public, responders, and decision makers on the best way to reduce the consequences of radiological and nuclear incidents.

This session will review all of these new tools and capabilities, and how health physicists can access them to support radiological and nuclear response training and preparedness efforts.

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**PEP 1-I  The Fallacy of Safe-Siding Radiation Health Risk**

**Eric Daxon**

**Spring Lake**

Health physicists live in two worlds – the regulatory world and the health risk world. At the beginning of our profession in the 1950’s, these worlds were appropriately merged in that the known health risks of radiation were used to develop a radiation safety system commensurate with that health risk belief. At this point in time, dire genetic effects were thought to be the primary health risk from radiation exposure. This led to a fear-based ethos that permeated the profession, the regulatory system and was subsequently communicated to the public at
large. The discovery of the multiple DNA repair mechanisms and the wealth of subsequent data showed these initial health risk estimates to be inaccurate. The health risk aspects of health physics evolved accordingly but the regulatory and emergency response worlds did not. The continuance of the initial regulatory framework has fostered the continuance of this fear-based ethos in the profession and in the public at large. The intent of this paper is to outline the evolution of these two systems, to provide recommendations for bringing congruence and to outline the major roadblocks to the needed changes. Specific objectives include: · Identify the origins of the culture of safe-siding risks. · Describe the impacts of safe-siding radiation health risk assessments/dose assessments on individuals and populations. · Present methodologies that can provide bests estimates of total health risk and communicate those risks.

Sunday 10:30 – 12:30

PEP 2-A RESRAD-BIOTA Code for the Evaluation of Radiological Doses to Flora and Fauna
Charley Yu, Sunita Kamboj, Jing-Jy Cheng, David LePoire
Lake Concord

RESRAD-BIOTA is part of the RESRAD Family of Codes developed by Argonne National Laboratory. It is designed for demonstrating compliance with the dose rate criteria set in Department of Energy (DOE) Order 458.1 and implements the graded approach methodology described in DOE Standard DOE-STD-1153-2019. The development of RESRAD-BIOTA was sponsored by DOE, with support from US Nuclear Regulatory Commission and the US Environmental Protection Agency. The RESRAD-BIOTA code provides a complete spectrum of biota dose evaluation capabilities, ranging from generic screening to comprehensive receptor-specific dose estimation. The implementation of the DOE graded approach methodology in the RESRAD-BIOTA code will be demonstrated with examples. The advanced analysis capabilities in RESRAD-BIOTA code, including geometry-based dose coefficients, organism wizard, food chain model, and sensitivity and probabilistic analysis, etc., will be discussed.

PEP 2-B Basic Training for the NRRPT exam – Practical Applications
Tom Voss
Lake Hart

This class presents the practical applications of the use of radiation detection instruments and radiation protection. ALARA techniques will be discussed in depth. The primary reference materials are taken from Dan Gollnick “Basic Radiation Protection Technology” and Glenn Knoll “Radiation Detection and Measurement”. Radiation instrumentation calibration techniques will be presented. Radiation survey techniques will be explored. The types of radiation detectors and the capabilities and limitations are described. Ion chamber, gas filled detectors, gas flow detectors, scintillators, dual scintillators, sandwich detectors, proportional, and other detectors are explored. The six region curve for gas filled detectors is explored in depth. The connection between radiation instrument calibration and radiation instrument usage will be discussed. The limitations and interferences for various detector types will be explored in detail. Remember; almost every type of radiation detector responds to almost every type of radiation!

PEP 2-C Thorium Molten Salt Reactors (TMSR): Key Radiation Protection Challenges
Casper Sun
Lake Down

Join this lecture for an overview of thorium molten salt reactors (TMSR) and their radiation safety requirements. In recent years, the potential of TMSR has captivated the attention of our nuclear energy industry. Key benefits include fuel flexibility—the ability to burn spent fuels, thorium, and unwanted plutonium—as well as reduced risk, both during normal reactor operations and in case of emergency. As Richard Martine noted in MIT Technology Review (2016), “cheaper and cleaner nuclear plants could finally become a reality…the technology was invented more than 50 years ago”.

Overall, TMSR is a very promising option for nuclear energy, but there’s work to be done. We’ll review the top radiation protection considerations around TMSR today, including neutron radiation protection, fuel loading management and chemical separation, and controlling neutron flux in the core. Lastly, you’ll get a quick look at things to come: robotic radiation workers operating advanced nuclear reactors.
PEP 2-D  Practical Computational Modeling for Health Physics (1) – Introduction to Monte Carlo Simulations  
Shaheen Dewji  
Lake George  
Radiation transport codes are used in a breadth of application scopes in health physics, including estimating doses due to radiation exposures, characterizing radiation fields from sources, and conducting shielding calculations. In this introductory course, we will review the fundamentals of radiation interactions with matter and construct simple problems defining simulation geometries, materials, sources, and tallies. The objectives of this course are to: (1) provide participants with a background in Monte Carlo radiation transport code development; (2) provide a fundamental understanding of radiation interactions with matter; (3) help participants create and visualize a basic input file for Monte Carlo simulation; and (4) conduct and analyze the simulation data to interpret meaningful results.

Participants are responsible for obtaining their own license for MCNP® from RSICC at rsicc.ornl.gov. Participants are strongly encouraged to bring their own computers to the course with MCNP® installed.

PEP 2-E  Alpha Spectroscopy for the Health Physicist  
Craig Maddigan  
Lake Highland B  
This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis for the Health Physicist. The course includes a review of the nature and origins of alpha-particle emitting radioactivity, basic physics of alpha particle interaction with matter, considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data.

PEP 2-F  Evaluation of MARSSIM and MARSAME Surveys  
David Stuenkel  
Lake Monroe  
The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides guidance on how to demonstrate that a site complies with applicable radiation dose- or risk-based release criteria. In a similar way, the Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) manual, a supplement to MARSSIM, provides guidance on how determine proper disposition of materials and equipment. While both MARSSIM and MARSAME and provide comprehensive guidance, the focus of both is on the design and evaluation of final surveys, known as final status surveys in MARSSIM and disposition surveys in MARSAME. This presentation will discuss the evaluation of these surveys. For final status surveys in MARSSIM, this will include preliminary data review, performance of statistical tests and performance of the elevated measurement comparison. For disposition surveys in MARSAME, this will include preliminary data review, evaluation of the measurement uncertainty, and comparison to an upper confidence limit. Illustrative examples will be used to demonstrate these concepts.

PEP 2-G  Dosimetry methods for second cancer risk estimation following radiotherapy  
Matthew Mille  
Lake Sheen A  
Advanced imaging methods combined with modern linear accelerator technologies have made it possible to deliver radiation precisely to the targeted tissue. Nonetheless, even the most careful treatment planning still results in unavoidable dose to nearby normal tissues. The impact of this unintended dose on patient long-term health is of increasing concern as survival rates improve. Radiotherapy is known to be an important contributor to second primary cancers and cardiovascular disease which may occur many years after treatment. Furthermore, the efficacy of emerging treatments such as proton and heavy ion therapies have yet to be evaluated through long-term epidemiological follow-up. Improved knowledge on the relationship between organ dose and late health effects is critical for the optimization of treatments and the development of preventative measures for mitigating toxicity, thereby improving quality of life of future survivors. Consequently, the Radiation Epidemiology Branch (REB) of the National Cancer Institute, Division of Cancer Epidemiology and Genetics has initiated or is participating in a number of epidemiologic studies of radiotherapy patients. Radiation exposure assessment is a critical component of these efforts but poses significant challenge in the context of epidemiological studies which typically involve a large number of patients who were treated many years in the past, for whom anatomical images may be inaccessible, and for whom only limited radiotherapy plan information may be known. To overcome these issues the REB is developing a novel radiotherapy dosimetry system entitled NCIRT which combines computational phantoms, accelerated Monte Carlo simulation, and the NIH High-Performance Computing cluster to provide organ dose estimates. This talk will describe the multi-institutional effort to develop, validate, and ultimately apply the NCIRT method to branch and extramural epidemiologic studies or clinical trials.
This summary covers the current status of American National Standards Institute (ANSI) N42 standards for health physics instrumentation in two sections:

This section includes the discussion of some seventeen ANSI N42 standards for Radiation Protection Instrumentation (RPI) in effect, being revised or being combined, including those for performance & testing requirements for portable radiation detectors, in ANSI N42.17A for normal environmental conditions and in ANSI N42.17C for extreme environmental conditions, being combined; and now published ANSI N42.323A/B, for calibration of portable instruments over the entire range of concern, i.e., in the normal range and for near background measurements; performance criteria for alarming personnel monitors in ANSI N42.20; replaced airborne radioactivity monitors in ANSI N42.30 for tritium, ANSI N42.17B for workplace airborne monitoring, ANSI N42.18 for airborne effluent on-site monitoring, and ANSI N323C for test and calibration of airborne radioactive monitoring; instrument communication protocols in ANSI N42.36; in-plant plutonium monitoring in ANSI N317 is being revised; reactor emergency monitoring in ANSI N320 is being revised; quartz and carbon fiber personnel dosimeters in ANSI N322; installed radiation detectors in ANSI N323D needs to be updated and revised; ANSI N42.26 for personnel warning devices; radon progeny monitoring in ANSI N42.50 in development; and radon gas monitoring published in ANSI N42.51 by ARRP.

The newly published ANSI N42.54 standard combines the salient materials for airborne radioactivity monitoring from ANSI N42.17B, ANSI N42.18 (airborne only), ANSI 323C and ANSI N42.30, with the comprehensive title of "Instrumentation and systems for monitoring airborne radioactivity".

This section includes the discussion of twenty ANSI N42 standards recently developed, being developed, or being revised and updated for Homeland Security.

Instrumentation (HSI), including those for performance criteria for personal radiation detectors in ANSI N42.32 that has been revised; portable radiation detectors in ANSI N42.33 in revision; portable detection and identification of radionuclides in ANSI N42.34; all types of portal radiation monitors in ANSI N42.35; for training requirements for homeland security personnel in ANSI N42.37 revised and published in 2017; spectroscopy-based portal monitors in ANSI N42.38 in revision; performance criteria for neutron detectors in ANSI N42.39, needing attention; neutron detectors for detection of contraband in ANSI N42.40, not addressed; active interrogation systems in ANSI N42.41; data formatting in ANSI N42.42, revised and updated; mobile portal monitors in ANSI N42.43; checkpoint calibration of image-screening systems in ANSI N42.44; criteria for evaluating x-ray computer tomography security screening in ANSI N42.45; performance of imaging x-ray and gamma ray systems for cargo and vehicles in ANSI N42.46; measuring the imaging performance of x-ray and gamma ray systems for security screening of humans in ANSI N42.47; spectroscopic personal detectors in ANSI N42.48; personal emergency radiation detectors (PERDs) in ANSI N42.49A for alarming radiation detectors and in ANSI N42.49B for non-alarming radiation detectors; backpack-based radiation detection systems used for Homeland Security in ANSI N42.53; portable contamination detectors for emergency response in ANSI N42.58 needing some attention; and ANSI N42.60 training for radiological/nuclear initial detection response, being developed.

Occupational radiation exposure occurs in the workplace due to exposure to sealed radiation sources (generally known external exposure) and/or exposure to unsealed radiation sources (generally known as internal exposure), that involves incorporation of radionuclides by inhalation, ingestion or skin absorption. The International Commission on Radiological Protection (ICRP) provides an appropriate standard of protection for man without unduly limiting the beneficial practices giving rise to radiation exposure. The aim of the radiological protection is to prevent detrimental deterministic effects and to limit the probability of stochastic effects to levels deemed to be acceptable.

The first radiological protection recommendations were published in 1958: ICRP Publication 1, which was based on the concept of critical organs, the tissues and organs of concern were gonads, red bone marrow and lens of the eyes. In 1977, the ICRP Publication 26 replaced the previous 1958 recommendations with important updates. In this new Publication, ICRP recommends a system of dose limitations. Based on this new system, these recommendations were completely revised and again issued in 1991 as Publication 60, the dose limits were reviewed based on findings of epidemiological studies, radiation quantities were updated, and physiologically based biokinetic models were adopted as well. Most recently, the ICRP recommendations were again updated and published in 2007, with further guidance and clarifications in ICRP Publication 103.

The objective of this course is to educate and inform health physicist and students about the latest concepts of radiological protection.
protection and the favourable changes and improvements over the 60 years. We will discuss the evolution of dosimetry methodologies, dose limits, occupational monitoring programs as well as a comparison the doses calculated using the different ICRP recommendations.

**Sunday 14:00 – 16:00**

**PEP 3-A**  What do Industrial HPs work on?  
*Linda Bray*  
*Lake Concord*

In the 1980’s there was a great focus on nuclear power and many HPs were invested in that area of expertise. The jobs were plentiful and well paying. Then came the down turn for nuclear power and most HPs went into the medical or government side of health physics where there were still a lot of opportunities and good salaries. However, that is not the end of the story. There are really a great deal of opportunities for HPs to provide safety services in the industrial or manufacturing world as well. This course discusses the types of industries and work scopes where HPs are still needed and will continue to be needed in the near future.

**PEP 3-B**  Basic Training for the NRRPT exam – Review of the applicable CFRs  
*Tom Voss*  
*Lake Hart*

This class presents the interpretation of the CFRs applicable to radiation protection. The class concentration is on 10CFR19, 10CFR20, 10CFR30, 10CFR34, 10CFR35, 10CFR835, 29CFR1910, 49CFR100–199, and Regulations and Guides. The CFRs are the federal laws that govern our work with radiation. An in-depth knowledge and understanding of those CFRs is vital to the radiation professional. Reguides, Nuregs, Info Notices, and additional sources of guidance are explored. The history of guides and regulations is explained. The effect that US and International Standards and radiological organizations have on the CFRs is examined. The instructor began his career in radiation instrumentation in 1967, working at a commercial nuclear power plant (then under AEC rules). His experience covers working with the AEC, NRC, DOE, US Military, Research, and the commercial world. Part three of three.

**PEP 3-C**  What Neurosciences Can Tell Us about Radiation Safety Decisions  
*Ray Johnson*  
*Lake Down*

The past 15 years have seen tremendous growth in in the fields of neuroscience and neurobiology that have resulted in many new insights on how our minds acquire information, how we process that information, and how we make decisions. Interpersonal neurobiology shows how the structure and function of the mind and brain are shaped by experiences, especially those involving emotional factors. Perhaps there is no greater emotional factor in our lives than the motivation for survival. We are also social creatures with brains and minds that are part of larger organisms called families, communities, and cultures. There is not only safety in numbers but we share the fundamental human experience of inhabiting an incomprehensible and often frightening universe. Given our dependence on groups for our very survival, we have evolved elaborate neural networks for interacting with others. The fundamental behavioral tendency of all organisms is to approach what is life sustaining and avoid that which is dangerous. The success of rapid and accurate approach/avoidance decisions determines whether we live long enough to reproduce or not. During stressful situations, such as deciding on the risks of radiation, much of the brain’s functioning is based upon primitive fight-or-flight mechanisms as opposed to conscious and compassionate decision making.

Although we are born with certain survival instincts, for example, infants are automatically startled by loud noises, other survival instincts are acquired from modeling of our parents. If a parent is fearful of spiders, the child may also be fearful. If parents are fearful of radiation, the children may inherit those fears. As these children become adults they may respond with aversion to radiation automatically without knowing why. The big question today is whether those automatic responses can be changed by our interventions? While the simple answer to this question is YES, there are many factors that go into decisions for radiation safety, only part of which are the ingrained biases from our early lives. During our lifetimes, our subconscious minds continuously store knowledge, impressions, and feelings as we assess the outer world for signs of danger. Because we cannot experience radiation by any of our five senses we have to rely on what the community tells us. The media has done a good job of creating a general mindset against radiation by the frequent use of the words “Deadly Radiation.” For many people those words are sufficient for decisions to avoid radiation exposure at all costs. Since radiation fears are largely automatic, it may not be helpful to tell people, “You do not have to be afraid.” While these words are intended to be helpful and allay fears they may be heard by a frightened person as if we are telling them, “Your feelings are wrong and it’s not OK to be fearful of radiation.” Anxiety is
contagious and it activates fear and alarm circuitry through the amygdala that spreads throughout our body. Conscious processing may become inhibited by the amygdala, making us have a difficult time being rational, logical, and in control of our emotions when making decisions for radiation safety.

PEP 3-D  Practical Computational Modeling for Health Physics (2) - Intermediate Monte Carlo Modeling with Anthropomorphic Phantoms
Autumn Kalinowski, Shaheen Dewji
Lake George

Computational phantoms can be employed to estimate or reconstruct organ and effective doses due to external and internal radiation exposures. In this course, we will build upon principles for those familiar with MCNP basics and apply computational modeling skills for internal and external radiation sources in reference male and female adult phantoms. Demonstrations of computing organ doses and effective doses will be conducted.

The objectives of this course are to: (1) review the history and capabilities of computational phantoms; (2) explore using the reference adult computational phantoms in dose estimation; (3) conduct rudimentary real-life problems and applications; and (4) provide in-person resources and support to navigate specific user needs. Participants should obtain a copy of the PIMAL (Phantom with Moving Arms and Legs) from the U. S. Nuclear Regulatory Commission Radiation Protection Computer Code Analysis and Maintenance Program website (www.usnrc-ramp.com). Participants are responsible for obtaining their own license for MCNP® from RSICC at rsicc.ornl.gov. Participants are strongly encouraged to bring their own computers to the course with MCNP® and PIMAL installed.

PEP 3-E  Gamma Spectroscopy for the Health Physicist
Craig Maddigan
Lake Highland B

This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis for the Health Physicist. The course includes a review of the nature and origins of gamma emitting radioactivity, basic physics of gamma interaction with matter, consequences of gamma interactions on gamma spectra, gamma spectroscopy system components and calibrations, gamma spectroscopy analysis methods, and interpretation of gamma spectroscopy data.

PEP 3-F  Technical Basis and Operational Experience for Clearance of Personal Property From SLAC Accelerator Facilities
James Liu, Ryan Ford, Jim Allan, Sayed Rokni
Lake Monroe

At high energy particle accelerators, induced radioactivity in accelerator components or materials can occur as a direct or indirect consequence to exposure to the particle beam and/or the secondary radiation particles due to beam losses. Management of the potentially activated materials is an important part of the radiation protection program. This presentation addresses the release of the materials from radiological control (i.e., clearance of personal property) in accelerator facilities to meet the DOE Order 458.1 requirements. SLAC, a high-energy electron accelerator facility, has successfully release metals for recycle in the past few years. The SLAC material clearance program with its technical bases are consistent with the DOE Technical Standard DOE-STD-6004-2016 on “Clearance and Release of Personal Property from Accelerator Facilities”.

The technical bases that support the clearance of metals (e.g., aluminum, iron, steel, copper, and lead) associated operational experience at SLAC will be presented. The emphasis of the technical basis is placed on the volumetric radioactivity aspects, instead of surface contamination, due to potential activation at high-energy accelerator facilities and the more challenging measurement methods for volumetric radioactivity. The technical basis includes process knowledge (e.g., characteristics of induced radioactivity, proxy radionuclides versus the hard-to-measure radionuclides, and surface maximum activity), measurement protocols (including quantification of detection capability), and a release criterion based on that the release measurements are indistinguishable from background (IFB).

SLAC has developed and implemented a material management and release program for the material clearance and metal recycling. The program includes the establishment of radiation detection instrumentation and measurement methods to meet the ANSI N13.12 screening level requirements for clearance of accelerator materials. These instruments include portable instruments with sufficient detection capability for survey on material surfaces, field gamma spectrometer for confirmatory measurements, and a portal gate monitor. The discussion will also include best practices for instrument set-up, field measurements, documentation and record management, and communication with stakeholders. A summary of recycling progress, as well as lessons learned and mitigation of safety hazards, at SLAC will be provided.
PEP 3-G  Federal Radiological Response Teams
Ken Groves
Lake Sheen A

This Presentation will offer a review of both Federal and State (Federally-Funded) Radiological/Nuclear Emergency Response Teams/Assets. It should be noted that FIRST AND FOREMOST—ALL EMERGENCIES ARE LOCAL (AND AT BEST REGIONAL). The response times for both Federal and State resources are not fixed; so it is imperative that local jurisdictions have planned for the first 24+ hours without outside support. It is critical that “regional” plans be in place, documented, trained and exercised if your response is to be effective! Integration of the Federal and State assets will be important in achieving a successful response during the early and intermediate phases of the radiological/nuclear emergency.

PEP 3-H  Neutrons: Discovery, Detection, Applications and Health Physics
Jeff Chapman
Lake Sheen B

This session will present the interesting and somewhat contradictory circumstances that lead to the discovery of the neutron, in 1932, by James Chadwick. With its discovery, the physics community—primarily lead by Fermi—studied the experimental behavior of neutron capture, and ultimately fission, induced by thermal neutron capture. Later, the determination of neutron multiplicity was sought, and with almost complete surprise the average number of neutrons per fission was measured at greater than 2, sufficient to sustain a neutron chain reactor. Applications of the neutron will be discussed, as well as some of the more interesting health physics issues that arise in the detection and interpretation of dose resulting from neutron exposure.

PEP 3-I  Radiological Safety Challenges Associated with Operating Non-Medical X-Ray Devices
Carl Tarantino
Spring Lake

A wide spectrum of non-medical x-ray units are used in a myriad of research, university, government, and private company environments. The large number and variety of these units used in the field present unique radiological safety challenges to the operator and organization responsible for ensuring applicable federal, state, and local requirements are met. While providing information on the different types of non-medical x-ray devices and their uses, this CEL will review the governing requirements for the safe use, operation, and inspection of these units. Revisions of regulations, staff changes, training, manufacturer certifications, procedures, equipment mods/ upgrades and repairs will be discussed as potential contributions to radiological safety concerns, including overexposure incidents. Differences in compliance requirements based on the type of non-medical x-ray generating devices, how they are being used, and whether the unit is classified as permanent or temporary, will be addressed. In addition to regulatory controls, the latest NCRP recommendations for the safe use of non-medical x-ray units in educational institutions will be shared.

PEP M-1  A Radiation Protection Program Logic Model: Inputs, Outcomes and Benchmarking Opportunities and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change
Janet Gutierrez, Robert Emery
Orlando V

Part A. Successful radiation protection programs function largely in the realm of prevention, thus making it difficult to explain to upper management and others the amount of resources needed to “make nothing happen”. One possible solution to this conundrum resides in the filed of public health where logic models are often used to assess program “inputs” and program “outcomes”. This session will examine radiation protection programs from the perspective of a public health logic model and serve as the basis for a discussion about what sorts of valid benchmarking might be accomplished within the radiation safety profession.

Part B. The University of Texas School of Public Health recently conducted a straw poll of approximately fifty very experienced health & safety professionals and the results were astonishing: 80% had reported to the person they current report to for a period of less than 5 years, and 25% for a period of less than 1 year! These striking results underscore the old adage that “change is constant”. But adapting to change is not something that is traditionally addressed in academic health & safety programs. Interestingly, although change is indeed constant, the underlying data that drives radiation safety programs doesn’t change. What does change is the framing of the delivery of this important information to ensure continued program support. This presentation will discuss the dilemma of constant change and provide some tips on the personal management of change and will present options to consider for communicating essential information to the ever-changing environment.
PEP M-2  CAP88-PC Version 4.1 Update
Brian Littleton, Ray Wood
Orlando VI
The EPA is preparing a new release of the CAP88-PC model, version 4.1. This new release updates the existing version 4.1 with new data and includes some small modifications to the user environment. This course will help users of the CAP88-PC model to understand the changes in the new version relative to previous versions, describe the bases for the model, and instruct users on proper use of the model for regulatory compliance. The course will include descriptive presentations about the model along with demonstrations on using CAP88-PC version 4.1 for specific types of scenarios. Additional information on future update paths and regulatory approaches will also be presented.

PEP M-3  Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers
Michael Stabin
Orange A
Internal dose calculations for nuclear medicine applications or for protection of radiation workers are based on the same fundamental concepts and units. The various systems developed to provide a basis for the needed calculations (e.g. ICRP 30/60/103, MIRD, RADAR) use equations that appear to be different, but are in fact identical when carefully studied. The RADAR method harmonized the defining equations and units employed to provide quantitative analysis for these two general problem areas. This program will show, from a theoretical standpoint, how all of these systems are identical in concept, and will then show, using practical examples, how each is applied to solve different problems. For nuclear medicine, an overview will be given of the current state of the art and promise for future improvements to provide more patient specificity in calculations and better ability to predict biological effects from calculated doses. For occupational applications of internal dosimetry, an overview will be given of currently applicable models and methods for bioassay analysis and dose assessment, showing several practical examples.

PEP M-4  How to Choose the Correct Portable Radiation Detection Instrument for Your Needs
Judson Kenoyer
Orange B
Over the past 5 years, the presenter has had many, many discussions with radiation-protection peers and students of Radiation Safety Officer classes with regard to the factors that go into the decision on how to choose the correct portable radiation detection instruments for specific needs. Most of those needs fall into two categories – exposure rate measurements or contamination (activity) measurements. During this PEP session, we will discuss basic principles of radiation detection (mainly for gas ionization and scintillation detectors), several different types of instruments (ion chambers, gas proportional counters, GM, NaI, plastic scintillators), and factors that can affect instrument readings (temperature, ambient pressure, humidity, type of window and thickness, background, radiation absorption, calibration conditions, energy dependence, geometry, and speed of movement). By comparing the specific needs to be met, the characteristics of the radiation being measured (or what is known or unknown about the radiation field) and the features of different portable radiation detection instruments, one can follow a fairly straightforward path to determine the types of instruments that can meet your needs and also establish a prioritization of choices within the types of instruments that will give you the best results for your situation.

PEP M-5  Considerations for Implementation of NCRP 179, Guidance for Emergency Response Dosimetry
Adela Salame-Alfie, Jeff Chapman
Orange C
National Council on Radiation Protection and Measurements (NCRP) Report No. 179, Guidance for Emergency Response Dosimetry, complements three previous NCRP publications that provide advice on planning responses to radiological or nuclear terrorism incidents.” In an effort to implement the guidance from NCRP 179, an inter-agency steering committee, between FEMA, NNSA, EPA, OSHA, HHS has been established to guide the decision-making process in how dosimetry for first responders to a radiological or nuclear incident is managed, when in fact the responders are absent external dosimetry. This PEP/CEL course will review the key issues to be addressed, and proposed methodologies for assigning and controlling dose to first responders who are not necessarily trained in radiation protection and who are not assigned external dosimetry.
With minimal dosimetry resources, how do responders make decisions to control the total dose and associated risk? • How are doses assigned to responders when not every responder is issued a dosimeter before exposure occurs? • What is the regulatory framework for responders who are not trained as radiation workers?

**Tuesday 12:15 – 14:15**

**PEP T-1** HEU to LEU conversion and the Production of Mo-99 without the use of HEU  
*Lynne Fairobent, Jeff Chapman*  
*Orlando VI*

The National Academy of Sciences issued its first report on conversion of research reactor fuel and targets from HEU to LEU in 2009, as a result of a mandate for the National Research Council study from Section 630 of the Energy Policy Act of 2005 (Public Law 109-58). Section 630 directed the Secretary of Energy to enter into an arrangement with the National Academy of Sciences for a study on the elimination of highly enriched uranium (HEU) from reactor fuel, reactor targets, and medical isotope production facilities. At that time Lynne was working for ACR and Jeff was working this very conversion problem at the SAFARI-1 reactor in South Africa. Since that time, which really started in as early as 2006, the Department of Energy has made considerable progress in assisting with the conversion of several reactors around the world, and began an effort to produce Mo-99 domestically. This PEP session will provide the historical framework as well as problems and issues encountered along the way, in producing this vital medical isotope, which accounts for more than 40,000 medical procedures a day in the United States.

**PEP T-2** Where Did This Come From? Lessons Learned from High-Routine Bioassay Investigations  
*Brett Rosenberg*  
*Orange B*

This PEP class provides actual case studies of high routine bioassay measurements addressing the investigation process, resolution, and lessons learned from each. The considerations made during these investigations could be of benefit to other sites that run internal dosimetry programs. High routine bioassay results can come from several sources, including false positive results, laboratory errors, interference from non-occupational sources, and previous occupational intakes, as well as new intakes. It is incumbent upon the site performing a high bioassay result investigation to thoroughly address all possibilities before classifying a high routine as a new intake. The presenter has encountered all of the foregoing issues in the course of investigating high routine bioassay measurements at the US Department of Energy Hanford Site. The important lessons learned include, 1) have good measurement verification protocols, 2) confirm intakes by more than one bioassay measurement, 3) conduct interviews with workers concerning their specific circumstances and recollections, 4) have good retrievable site records for work history reviews, 5) exercise good professional judgment in putting the pieces together to form a conclusion, and 6) clearly communicate the conclusions to the worker, the employer, and the regulatory agency.

**PEP T-3** An overview and the lessons learned from a response to a radiological event involving potentially significant internal radiation doses from Americium-241  
*Manuel Mejias, Steven Dewey*  
*Orlando IV*

As a Radiation Safety Officer (RSO) or health physicist, there are numerous technical, regulatory, and political challenges involved in managing a NRC reportable event that involves internal contamination potentially exceeding occupational dose limits. The health physics personnel involved with the response and incident investigation will have to address bioassays, radiological surveys, remediation activities, reports to the NRC, advising senior management, handling of public affairs inquiries, and many other activities. This program will discuss the events from the initial discovery of the contamination to the closure of an NRC reactionary inspection. The discussion will include valuable lessons learned concerning the adequacy of hazards assessment for radioactive materials not in use, the proper use and selection of detection equipment, the collection and interpretation of bioassay data, communicating with medical staff, laboratory decontamination, incident reporting and investigation, interactions with NRC personnel and senior leadership, communicating with potentially exposed personnel and preventive measures implemented to prevent recurrence of the event.

**PEP T-4** Basic Physics for Radiation Detection  
*Doug Van Cleef*  
*Lake Hart*

This course presents an overview of the basic physics of radiation detection, from the generation of radiation in the decay process to the interaction with detector materials. We will include discussions on the effects of distance, shielding, sample materials, and detector materials and will include ample time for Q&A to allow attendees to address specific applications. Upon completion of this course, students will have a solid working foundation for understanding the basic
physics of radiation emission and detection.

Who should attend: Experienced technologists who need a review of basic radiation physics, or new technologists seeking a brief and practical introduction to the physics principles involved in radiation detection.

PEP T-5  Considering Uncertainty and Risk in Public Protection Decisions  
*Lainy Cochran*  
Lake Down

Radiological dose projections must be quickly performed following the accidental or intentional release of radiological materials to the environment to enable public protection decisions to be made in a timely manner. The dose projections include uncertainties associated with numerous input variables (e.g., dose coefficients, atmospheric dispersion modeling, etc.). A DOE inter-laboratory effort is developing the methods and tools to assess the overall uncertainty of the dose projections. This presentation will provide an overview of the uncertainty distributions of input variables and the statistical methods used to quantify the overall uncertainty of the dose projections and the supporting data products (e.g., relocation maps). This presentation will focus on how the uncertainty analysis results can be used to help decision makers make informed public protection decisions. Data product contours that indicate areas where public protection actions may be warranted can be customized to consider the risk from low-dose radiation exposures and the risk from evacuating or relocating a population. The presentation will include examples of data products that incorporate uncertainty analysis results in an effort to collect feedback from the radiological emergency response community on whether this information is useful and if so, how it should be used.

**Wednesday 12:15 – 14:15**

PEP W-1  NDA Systems used for the qualification of TRU waste to WIPP  
*Jeff Chapman*  
Orlando IV

NDA Systems used for the qualification of TRU waste to WIPP Jeff Chapman, Oak Ridge National Laboratory This session will present an overview of NonDestructive Assay (NDA) systems currently deployed across the U.S. for the measurement of transuranic waste. Additionally, and where applicable, measurement devices used in the “IAEA community” for the conduct of Material Control and Accountancy will be discussed. Methodology, Instrumentation, and application limitations will be discussed.  

PEP W-2  Fluoroscopic System Evaluation and Radiation Safety Considerations  
*Cari Borrás*  
Orlando VI

Fluoroscopic studies, especially interventional ones, may result in high radiation doses to the patient and to the staff. Radiation protection can be achieved by proper equipment design, availability and selection of imaging protocols specific to the imaging task and the patient body habitus, and optimized operational procedures. While FDA standards address only the manufacturer’s equipment design, some State Radiation Control Regulations and accreditation programs such as those of The Joint Commission (TJC) and the American College of Radiology (ACR), have emphasized the need to manage the radiation risks involved.

This radiation safety course will focus on the state of the art fluoro systems used in diagnostic and interventional procedures, primarily angiography units. Equipment evaluation checks and criteria will be taken from the 2016 “ACR–AAPM Technical Standard for diagnostic medical physics performance monitoring of fluoroscopic equipment”. This document lists the tests to be performed during acceptance testing, for the annual evaluation (required by many State Regulations), and to set up and implement a quality control program. The methodologies involved in the assessment of image quality and radiation dose will be described, highlighting the differences between analog and digital components such as image intensifiers vs flat panel detectors. Dosimetry parameters will be defined, and instrumentation and techniques involved in their measurement will be reviewed. Typical diagnostic reference levels for adults and children will be presented. Examples of staff and patient exposures for selected interventional procedures will be shown. Emphasis will be placed on the estimation of organ doses. DICOM standards such as the Radiation Dose Structured Report (RDSR) and Patient-RSDR will be introduced. Compliance with Federal Regulations and recent TJC fluoroscopy standards, including training requirements, will be discussed. The latter may be challenging in scope, since fluoroscopy is not only performed in radiology departments, but also in cardiology, neurology, surgery, urology, orthopedics, obstetrics and gynecology, gastroenterology, psychiatry and pain management clinics, where the physicians performing the procedures may not have received any formal training in radiation protection.
PEP W-3  A Health Physics Perspective on Prevention Through Design - Modernization of a World-Class Radiation Physics Facility

*Manuel Mejias*

*Orlando A*

This course offers a review of the health physics considerations in the design of new facilities which include radioactive material laboratories, industrial/research x-ray devices, and health physics support areas. The course will include a discussion of hazards elimination and/or mitigation during the design phase of a new facility and the renovation of an existing facility. Topics will include shielding design, travel paths between laboratories, personnel contamination check points, and liquid and gaseous effluent monitoring design. Lessons learned from the Modernization of the Radiation Physics building at NIST will be discussed.

PEP W-4  Radiation in Flight

*Joseph Shonka*

*Lake Hart*

In 2012, measurements of an extreme solar flare that missed earth by 7 days, along with analysis that showed such an event had a 12% probability of occurrence per decade led the US and UK science and technology advisors to recommend a course of action should such an event occur. Unlike the US, carriers in the EU and UK are regulated, and the doses that would have been received exceeded allowable limits. There are no radiation dose limits for US aircrew and passengers. This CEL will summarize the conclusions of those meetings and address both routine and extreme events from radiation that occur in flight. The CEL will also address methods that are being considered to control that radiation routinely and during space weather events. Recent efforts by the ISO to develop standards for measurement of radiation in flight will also be summarized.

PEP W-5  Certification Options for Health Physicists

*Steven King, Andy Miller*

*Lake Down*

There are several certifications that health physicists can earn that would benefit them in their practice. This talk explores the various certifications and gives the HP the online locations and allows exploration and finding relevance for your situation.

We will explore the CHP, NRRPT, MRSO (Magnetic Resonance Safety Officer), CMLSO, ABMP, and ABSNM certifications and educational as well as pertinent experience requirements. Each organization has examinations and fees involved in becoming certified as well as maintenance of certification expectations after you are certified.

We will follow up the talk with a question and answer period.
CEL-1 07:15 – 08:15
Why should HPs be interested in Laser Safety Programs?
Linda Bray
Orlando V

The use of lasers is continuing to expand in medical and industrial applications. Although not ionizing radiation as is typically associated with the primary Health Physics disciplines, it is still radiation and can present some serious safety concerns. More states are becoming aware of those concerns and starting to regulate the use of lasers. HPs are uniquely suited to provide the type of radiation safety and regulatory compliance oversight required in these applications. This course is to provide insight into the types of industries and facilities using lasers, the scope use, and associated laser safety program requirements.

CEL-2 07:15 – 08:15
What Keeps Us from Being Effective Radiation Risk Communicators?
Ray Johnson
Orlando VI

The simple answer to the title question is that we are creatures of habit. As we evolve from infancy and acquire skills such as how to eat, how to put on our clothes, and how to walk, such skills become automatic habits controlled by our subconscious minds and we no longer think about how we learned those skills. How could we function today if all of these natural habits had to be rethought or relearned every day? Actually most of lives are governed by automatic habits that we no longer think about. As infants we begin to develop ways of communicating that most easily meet our needs for survival. As adults, after decades of experience building our communication habits, we do not think about the process of communication any longer. Most of the time our automatic communication processes allow us to interact with others as successful and responsible adults. However, from time to time, we may find that our normal communication style is no longer effective. For example, are we typically well prepared to deal with difficult people that are emotional, fearful, angry, upset, antagonistic, or distrustful? In these situations we may find that our normal communication approaches do not work. While psychologists and neuroscientists know many strategies for dealing with difficult people, for any of us to use those strategies means that we have to change our communication habits. Now here is the challenge. How hard is it to change any habit? Have any of you had success trying to lose weight? How are you doing with your New Year’s resolutions this year? To communicate in more effective ways we must do more than simply learn about new communication strategies. To become proficient with these strategies we will have to practice, practice, and practice. This means making a decision to spend the time and energy for practicing new skills. This may not be easy in our typically busy lives where we already feel over committed. For best results we will not only need significant practice, but also frequent coaching or supervision to help us keep on track. Feedback from ongoing supervision can help us refine our new communication skills. Ideally we will have the opportunity to meet weekly or biweekly with others to share our ongoing practice who will provide positive feedback and encouragement.

CEL-3 06:45 – 07:45
Making Your Radiation Safety Message Stick! 35 Years of Powerful Quotes Collected on Sticky Notes
Mark Hoover
Orlando VI

Successful radiation safety programs function largely in the realm of prevention, so on a good day “nothing happens”. But the value of “making nothing happen” can be a very difficult message to convey, and this often becomes an impediment to our ability to collectively articulate our story and needs to key program stakeholders. After 35 years of practice we have learned that the right quote, when used at the right time, can be a very strategic way of achieving desired decision making. These quotes, captured on hundreds of disorganized sticky notes, have adorned our office bulletin board for almost four decades, and while drawn from many safety specialties, they seem to have an uncanny universal appeal and thus have been compiled into a “top ten” list that will be shared for discussion during this presentation.
CEL-4 06:45 – 07:45
History and Overview of the Formerly Utilized Sites Remedial Action Program
John Hackett
Orlando B

The Formerly Utilized Sites Remedial Action Program (FUSRAP) has a 45-year history of identifying and cleaning up legacy sites from the nation’s initial atomic weapons development during the Manhattan Project and early days of the Atomic Energy Commission. This lecture presents an overview of the work performed by the Manhattan Engineer District as well as the history of FUSRAP from its initial execution by the Department of Energy (DOE), through the transition of FUSRAP execution from DOE to the U.S. Army Corps of Engineers (USACE) following congressional mandate in the late 1990s, to the present-day roles and responsibilities of both agencies in the program. A discussion of the FUSRAP site life cycle and the eligibility process for new sites is also provided. Case studies of several sites (both completed and active) are presented to highlight specific technical and regulatory issues common to FUSRAP sites.

CEL-5 06:45 – 07:45
Dosimetry Challenges of New Nuclear Medicine Theranostic Agents
Michael Stabin
Orlando IV

The term theranostics is defined as the integration of a diagnostic test with a specific therapeutic intervention. The diagnostic test should identify patients who will likely respond to a particular therapy, fail to respond to a given drug or eventually exhibit adverse events. The therapeutic application seeks to treat a specific disease. This session will describe the criteria for selecting good theranostic radiopharmaceuticals, and provide an overview of several useful theranostic agents in use, or under consideration for use, in nuclear medicine therapy, with a focus on the radiation dosimetry aspects.

CEL-6 06:45 – 07:45
Science Is Not Enough
Eric Daxon
Orlando IV

This is not a science presentation. It is a presentation about how science does and how it should interface with politics, the population at large and decision-makers. The genesis of this talk was a question from a four-star general in 1984, “Is it safe?” General Lawson was referring to depleted uranium (DU). I was an Army captain at the time and a newly-minted health physicist. My answer started with, “Sir, there is always a risk of cancer…” That was about as far as I got. At this point, General Lawson made it clear that my answer was “unsatisfactory.”

He asked the question again, “Is it safe?” My second response was more succinct, “Yes sir.” That incident started my quest to find a way to communicate radiation risk in a manner understandable to decision-makers and non-health physicists. Up until the late 1990’s, my answer was the same as everyone else’s answer – leaders and the public needed more training. While working to develop an Army-wide DU training program, I decided to look at the problem from a different perspective.

I assumed that the issue was not with the public but with we health physicists and the process of scientific investigation. This talk was first given to the annual meeting of the American Association of Aerosol Research in October 2001. My work with Gulf War veterans and my experiences both before and after this first talk reinforce the veracity of the concepts presented and the solutions proposed. As mentioned earlier, this is not just a science presentation. It is a presentation that addresses the interactions of science/scientists with the non-science world from a unique, holistic vantage point. Specific objectives:

- Describe the “language” barriers generated by our scientific methodology.
- Demonstrate the ability to translate the language of science into the language of politics and the language of the general population.
- Identify how our current scientific methodology can cause harm.
- Identify the steps you can take to mitigate the harm and the personal toll of taking science into the political sphere.
How do we know they’re good? Design and Administration of a Bioassay Oversight Program

Brett Rosenberg
Orlando VI

Missing an occupational exposure can have dire consequences. It is the bioassay program’s responsibility to ensure quality in its measurements, both direct (in vivo) and indirect (in vitro), regardless of whether the measurements are performed in-house or through an offsite vendor. This presentation addresses how the DOELAP-accredited Hanford Internal Dosimetry Program oversees its direct and indirect bioassay programs. We will discuss some practices that have bolstered the program, allowing it to catch shortfalls that would have resulted in false positives and missed detections. Lessons learned include 1) the consequences of using synthetic versus real excreta samples, 2) the value of blind and double-blind quality control samples, and 3) the statistical power of recounts.

The Importance of the Measurand in Health Physics

Daniel Strom
Orlando IV

When making a measurement for radiation protection or regulatory compliance, what is “the quantity intended to be measured?” That phrase is the definition of “measurand” that appears in the latest version of the International Vocabulary of Metrology (the VIM). For example, one may conduct a counting experiment to determine the amount of activity in a sample or the amount of activity in a lake. These two different measurands come with differing assumptions, although they may be based on the same measurement result. Another example is the distinction between the result of a measurement in counts per second and the measurand in becquerels (or cpm versus dpm). Alas, most US writing, such as ANSI standards, regulations, MARLAP, and MARSSIM, ignores the concept of the measurand, making it very difficult to convey concepts such as minimum detectable amount, a terribly misleading name for the smallest usually detectable measurand (SUDM). The concept of measurand gives clearer meaning to the notions of population parameter (a measurand) and sample parameter (one or more measurement results or inferences based on those results). When the concepts of variability, uncertainty, bias, error and blunder are combined with models used to make inferences about measurands, or probabilistic statements about measurands using Bayes’s theorem, the distinction between measurement results and measurands is key. While the measurand has sometimes been called the “true value,” those words are not adequate in understanding metrology. All health physicists need to be able to state what the measurand is for every measurement result they make or use.

Radiation Exposure to Terrestrial Organisms and Organisms in Space from Supernovae and Gamma Ray Burst?

P. Andrew Karam
Orlando V

There is a great deal of speculation about the possible impact that nearby supernovae and gamma ray bursts might have on life on Earth; at least one credible assertion has been made that a nearby supernova or gamma ray burst might have triggered a mass extinction over 400 million years ago. At the same time, supernovae have gone off so close to Earth that debris has been found in deep-sea sediments – and so recently that it includes live radioactivity in the form of Fe-60 and Pu-244. In this CEL we will discuss the forms of radiation emitted by supernovae and gamma ray bursts and how close one might have to be to cause harm. For good measure, we’ll also talk about how events such as these might affect organisms traveling through space, the subject of a great deal of speculation under the topic of “panspermia.”
### Schedule at-a-Glance

All events at the Hilton Orlando unless otherwise noted.

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<th>Saturday, 6 July</th>
<th>Monday, 8 July</th>
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<td><strong>All AAHP Courses take place at the Hilton Orlando</strong></td>
<td><strong>CEL-1</strong> Why should HPs be interested in Laser Safety Programs? 07:15 – 08:15 Orlando V</td>
<td><strong>CEL-3</strong> Making Your Radiation Safety Message Stick! 35 Years of Powerful Quotes Collected on Sticky Notes 07:15 – 08:15 Orlando VI</td>
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<tr>
<td><strong>AAHP 1</strong> Radiation Risk Assessment 08:00 – 17:00 Clear Lake</td>
<td><strong>CEL-2</strong> What Keeps Us from Being Effective Radiation Risk Communicators? 07:15 – 08:15 Orlando VI</td>
<td><strong>CEL-4</strong> History and Overview of the Formerly Utilized Sites Remedial Action Program 07:15 – 08:15 Orlando B</td>
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<tr>
<td><strong>AAHP 2</strong> 2019 Radiological Operations Support Specialist (ROSS) Continuing Education Training 08:00 – 17:00 Conway Lake</td>
<td><strong>MAM-A</strong> Plenary Session 08:30 – 12:30</td>
<td><strong>CEL-5</strong> Dosimetry Challenges of New Nuclear Medicine Theranostic Agents 07:15 – 08:15 Orlando IV</td>
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<tr>
<td><strong>AAHP 3</strong> Medical Health Physics 08:00 – 17:00 Ruby Lake</td>
<td><strong>PEP Program</strong> 12:15 – 14:15 Orlando V</td>
<td><strong>TAM-A</strong> AAHP Special Session: Risk Communication in the Context of Low Dose Health Effects 08:30 – 11:45 Orlando IV</td>
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<tr>
<td><strong>Student Worker Orientation</strong> 17:45 – 18:45</td>
<td><strong>M-1</strong> A Radiation Protection Program Logic Model: Inputs, Outcomes and Benchmarking Opportunities and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change Orlando VI</td>
<td><strong>TAM-B</strong> Medical Health Physics Part 1 08:00 – 12:00 Orlando V</td>
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<td><strong>M-2</strong> CAPR8-PC Version 4.1 Update Orlando VI</td>
<td><strong>TAM-C</strong> Internal Dosimetry 08:30 – 11:30 Orlando VI</td>
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<td><strong>M-3</strong> Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers Orange A</td>
<td><strong>TAM-D</strong> Special Session: Environmental / Radon Section 08:30 – 12:00 Orange A</td>
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<td></td>
<td><strong>M-4</strong> How to Choose the Correct Portable Radiation Detection Instrument for Your Needs Orange B</td>
<td><strong>TAM-E</strong> Special Session: Non-Ionizing Radiation (NIR) Section 08:20 – 11:50 Orange B</td>
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<td><strong>M-5</strong> Considerations for Implementation of NCRP 179, Guidance for Emergency Response Dosimetry Orange C</td>
<td><strong>TAM-F</strong> Special Session: Translational Approaches to Improve Health Effects Knowledge in Support of Radiation Protection Guidance 08:30 – 14:15 Orange C</td>
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<tr>
<td><strong>Quiz Bowl</strong> 16:00 – 17:00 Clear Lake</td>
<td><strong>AAHP Exam</strong> 12:30 – 18:30 Lake Mizell</td>
<td><strong>AAHP Awards Luncheon</strong> 12:00 – 14:00 Lake Mizell</td>
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<tr>
<td><strong>Student Mentor Speed Networking</strong> 17:00 – 18:30 Lake Highland A</td>
<td><strong>Poster Session</strong> 13:30 – 15:00 Exhibit Hall</td>
<td><strong>Complimentary Lunch</strong> Orlando I-3</td>
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<td><strong>Sunday PEP Locations</strong></td>
<td><strong>MPM-A</strong> Exhibitors of the HPS: A Special Discussion on Products and Services 15:00 – 17:30 Orlando IV</td>
<td><strong>PEP Program</strong> 12:15 – 14:15 Orlando V</td>
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<td><strong>PEP A</strong> = Lake Concord</td>
<td><strong>MPM-B</strong> Board of Director’s Special Session: Changes in Director’s Roles and HPS Strategic Plan 14:30 – 17:00 Orlando V</td>
<td><strong>T-1</strong> HEU to LEU conversion and the Production of Mo-99 without the use of HEU Orlando VI</td>
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<td><strong>PEP B</strong> = Lake Hart</td>
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<td><strong>MPM-D</strong> Special Session: Medical Health Physics 15:00 – 17:00 Orange A</td>
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<td><strong>PEP D</strong> = Lake George</td>
<td><strong>MPM-E</strong> Special Session: AIRRS Assessment 14:30 – 17:00 Orange B</td>
<td><strong>T-4</strong> Basic Physics for Radiation Detection Lake Hart</td>
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<td><strong>PEP E</strong> = Lake Highland B</td>
<td><strong>MPM-F</strong> Emergency Response Part 1 15:00 – 17:00 Orange C</td>
<td><strong>T-5</strong> Considering Uncertainty and Risk in Public Protection Decisions Lake Down</td>
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<td><strong>PEP F</strong> = Lake Monroe</td>
<td><strong>Welcome Reception</strong> 17:30 – 19:00 Orlando 1-3</td>
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<td><strong>TPM-C2</strong> Radiobiology - Biological Response 16:00 – 17:15 Orlando VI</td>
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<td><strong>KEY</strong></td>
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<td><strong>TPM-D</strong> Special Session - Rad NESAHAPS 14:30 – 17:15 Orange A</td>
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<td>MPM = Monday PM Session</td>
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<td><strong>TPM-E</strong> Special Session: Rad NESAHAPS Section 14:30 – 18:00 Orange B</td>
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<td>TAM = Tuesday AM Session</td>
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<td><strong>TPM-F</strong> Academic Institutions 14:30 – 17:00 Orlando VI</td>
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<td>TPM = Tuesday PM Session</td>
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<td><strong>AAHP Open Meeting</strong> 17:00</td>
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NOTE FOR CHPs
The American Academy of Health Physics has approved the following meeting-related activities for continuing education credits for CHPs:
• Meeting attendance is granted 1 CEC per contact hour, excluding meals and business meetings;
• AAHP 8-hour courses are granted 16 CECs each;
• HPS 2-hour PEP courses are granted 4 CECs each;
• HPS 1-hour CELs are granted 2 CECs each.

### SCHEDULE AT-A-GLANCE

All events at the Hilton Orlando unless otherwise noted.

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<td>HPS Awards Plenary</td>
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<td>CEL-7 How do we know they’re good? Design and Administration of a Bioassay Oversight Program</td>
<td>CEL-8 The Importance of the Measurand in Health Physics</td>
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<tr>
<td>WAM-A Special Session: Chelation</td>
<td>CEL-9 Radiation Exposure to Terrestrial Organisms and Organisms in Space from Supernovae and Gamma Ray Burst?</td>
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<td>08:10 – 12:00 Orlando IV</td>
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<td>WAM-B Special Session: ICRP/IIRPA - Tolerance and Reasonableness</td>
<td>THAM-A Accelerator Health Physics</td>
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<td>08:10 – 12:30 Orlando V</td>
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<td>WAM-C Special Session Homeland Security Part 1</td>
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<tr>
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<td>WAM-D Instrumentation</td>
<td>THAM-C Dose Reconstruction and Radiation Effects</td>
<td>Wednesday</td>
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<tr>
<td>08:30 – 11:45 Orange A</td>
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<tr>
<td>WAM-E Special Session: Aerosols and Nanotechnology</td>
<td>THAM-D Contemporary Health Physics Topics</td>
<td>Thursday</td>
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<td>08:15 – 12:00 Orange B</td>
<td>10:00 – 11:15 Orange A</td>
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<tr>
<td>WAM-F Special Session: Military Health Physics</td>
<td>THPM-A IRPA Workshop on Public Understanding</td>
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<tr>
<td>08:30 – 12:15 Orange C</td>
<td>14:00 – 16:00 Lake Hart</td>
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<td>PEP Program</td>
<td>Registration Hours</td>
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<tr>
<td>12:15 – 14:15 Orlando IV</td>
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<tr>
<td>W-1 NDA Systems used for the qualification of TRU waste to WIPP</td>
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<td>12:15 – 14:15 Orlando IV</td>
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<tr>
<td>W-2 Fluoroscopic System Evaluation and Radiation Safety Consideration</td>
<td>Exhibit Hall Hours</td>
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<tr>
<td>12:15 – 14:15 Orlando VI</td>
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<tr>
<td>W-3 A Health Physics Perspective on Prevention Through Design - Modernization of a World-Class Radiation Physics Facility</td>
<td>Monday</td>
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<td>12:15 – 14:15 Orlando A</td>
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<tr>
<td>W-4 Radiation in Flight</td>
<td>Exhibit Hall</td>
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<td>12:15 – 14:15 Lake Hart</td>
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<td>W-5 Certification Options for Health Physicists</td>
<td>Monday</td>
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<tr>
<td>12:15 – 14:15 Lake Down</td>
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<tr>
<td>WPM-A Special Session: Social and Ethical Values in Radiation Protection</td>
<td>Monday 16:10 – 17:00 AIRRS Business Meeting</td>
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<td>14:15 – 17:15 Orlando IV</td>
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<td>WPM-B Special Session - International Collaboration Committee</td>
<td>Monday 16:30 – 17:00 Medical Business Meeting</td>
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<td>14:15 – 17:10 Orlando V</td>
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<td>WPM-C Emergency Response Part 2</td>
<td>Monday 16:30 – 17:00 Instrumentation Section Business Meeting</td>
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<td>14:30 – 16:00 Orlando VI</td>
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<td>WPM-D External Dosimetry</td>
<td>Monday 16:30 – 17:00 Orange C</td>
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<td>14:30 – 16:30 Orange A</td>
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<td>WPM-E1 Environmental Monitoring</td>
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<td>14:30 – 15:45 Orange B</td>
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<td>WPM-E2 Air Monitoring</td>
<td>11:05 – 12:00 Environmental/Radon Business Meeting</td>
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<td>16:15 – 17:15 Orange B</td>
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<td>HPS Business Meeting</td>
<td>12:30 – 14:15 Power Reactor Business Meeting</td>
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<td>17:30 – 18:00 Orlando IV</td>
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<td>HPS Business Meeting</td>
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<tr>
<td>11:15 – 12:00 Nanotechnology Business Meeting</td>
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<td>12:00 – 12:30 Accelerator Business Meeting</td>
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<td>12:00 – 12:30 Orlando IV</td>
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<tr>
<td>Women and Minorities in RP Business Meeting</td>
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Health Physics Society’s 64th Annual Meeting
7-11 July 2019 • Orlando, Florida

HPS Member Number: __ __ __ __ __

Name for badge: (First) ____________________________________________(Last) ______________________________________________________

Affiliation (for badge) (limit to 18 characters and spaces): ______________________________________________________________________________

Address: ___________________________________________________________________________________________________________________

City: _________________________________________State: ___________________ Zip/Postal Code: ______________________________________

Phone: _____________________________________________Fax: ___________________________________________________________________

Email (for confirmation): _________________________________________If Registering-Companion Name: __________________________________

Are you presenting? ❒ Yes ❒ No If yes, Abstract No: ______________________________

MEETING REGISTRATION FEES: (Mark Appropriate Box)

☒ HPS Member (Mon. Reception, Exhibitor Lunches) Early (Check) $495.00 Early (CC) $520.00 After 6/5 (Check) $595.00 After 6/5 (CC) $625.00

☒ Non-Member* (Mon. Reception, Exhibitor Lunches) $645.00 $678.00 $745.00 $783.00

☒ Emeritus Member (Mon. Reception, Exhibitor Lunches) $248.00 $261.00 $298.00 $313.00

☒ One Day ONLY ☒ Mon ☒ Tues ☒ Wed ☒ Thurs $280.00 $294.00 $280.00 $294.00

☒ Student (Mon. Reception, Exhibitor Lunches) $70.00 $74.00 $70.00 $74.00

☒ One Day ONLY Student ☒ Mon ☒ Tues ☒ Wed ☒ Thurs $40.00 $42.00 $40.00 $42.00

☒ Companion (Mon. Reception, Breakfast, Exhibitor Lunches) $110.00 $116.00 $110.00 $116.00

☒ Emeritus Companion (Mon. Reception, Breakfast, Exhibitor Lunches) $55.00 $58.00 $55.00 $58.00

☒ HPS Member PEP Lecturer (Mon. Reception, Exhibitor Lunches) No Fee No Fee No Fee No Fee

☒ HPS Member CEL Lecturer (Mon. Reception, Exhibitor Lunches) $245.00 $258.00 $345.00 $363.00

☒ HPS Non-Member CEL Lecturer* (Mon. Reception, Exhibitor Lunches) $395.00 $415.00 $495.00 $533.00

☒ AAHP Awards Lunch Ticket(s) (Tues.) CHP $10.00 $11.00 $10.00 $11.00

☒ AAHP Awards Lunch Ticket(s) (Tues.) Guest $15.00 $16.00 $15.00 $16.00

* Includes Complimentary 2019 Associate Membership – FIRST TIME MEMBERS ONLY – You will need to join at http://hps.org/join to submit your information and mailing address in order to take advantage of this offer. If you have questions, email Laurie Mullins at lmullins@burkinc.com.

Would you like your name included on the Attendee List? ❒ Yes ❒ No If you agree, your name, address and email information will be provided to all HPS Exhibitors after the meeting.

SOCIAL PROGRAM

☐ New this year! Children’s Conference Shirt (Preregistration Only)

Shirt Size: ☒ S ☐ M ☐ L # of Shirts X $15 (Check) $___________

Pub Crawl (Wed, 7/10, 18:30) # of Tickets X $25 (Check) $___________

Pub Crawl - Shirt Size: ☒ S ☐ M ☐ L ☐ XL ☐ XXL # of Tickets X $27 (CC) $___________

Your housing while in Orlando, FL: _____________________________________________________________________________________________________

DISABILITIES: The Annual Meeting is accessible to persons with disabilities. Please specify assistance required and a HPS representative will contact you.

PAYMENT INFORMATION – Government Requisitions are accepted for registration, however Purchase Orders are NOT accepted for PEP, AAHP, Social Registration. HPS TAX ID # 04-6050367

Check Payment: Health Physics Society, 950 Herndon Parkway, Suite 450 Herndon, VA 20170

Cardholder’s Information: ☒ VISA ☐ MasterCard ☐ American Express ☐ Discover

Card Number: ______________________________________________________
Exp. Date: ______________________________ CV2: ________________
Billing Address: _____________________________________________________________________________________________________
Cardholder Name: ____________________________________________________
Phone Number: _____________________________________________________
Signature: __________________________________________________________
Email Address for receipt: _____________________________________________

PREREGISTRATION DEADLINE 5 JUNE 2019

If FAXing registration form, (703) 790-2672 please do not mail the original.

Payment Section Total $ ________________
Social Program Total $ ________________
AAHP/PEP Total (From Other Form) $ ________________
TOTAL FEES ENCLOSED $ ________________

Please see AAHP/PEP Registration form on next page.
## AAHP COURSES

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Course Details</th>
<th>AAHP Total</th>
<th>PEP Total</th>
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</thead>
<tbody>
<tr>
<td>Saturday, 7/6</td>
<td>08:00 – 17:00</td>
<td>AAHP-1 Radiation Risk Assessment (Walker, Dolislager), 08:00 – 17:00</td>
<td>$395.00</td>
<td>$415.00</td>
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<td>AAHP-2 2019 Radiological Operations Support Specialist (ROSS) Continuing Education Training (Buddemeier), 08:00 – 17:00</td>
<td>$395.00</td>
<td>$415.00</td>
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<tr>
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<td></td>
<td>AAHP-3 Medical Health Physics (Dolislager), 08:00 – 17:00</td>
<td>$395.00</td>
<td>$415.00</td>
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## PROFESSIONAL ENRICHMENT PROGRAM

<table>
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<tr>
<th>Date</th>
<th>Time</th>
<th>Course Details</th>
<th>Fee</th>
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</thead>
<tbody>
<tr>
<td>Sunday, 7/7</td>
<td>08:00 – 10:00</td>
<td>1-A DOE-STD-1153-2019 A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota (McLellan)</td>
<td>($99.00 Check)</td>
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<td>1-B Basic Training for the NRRPT exam – Fundamentals (Voss)</td>
<td>($99.00 CC)</td>
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<td>1-C Fundamentals of Reproducible Research (LaBone, Chalmers, Brackett)</td>
<td>($99.00 Check)</td>
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<td>1-D Quick and dirty radiological dose assessment following a rad/nuke emergency (Karam)</td>
<td>($99.00 CC)</td>
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<td>1-E Integration of Health Physics into Emergency Response (Sugarman)</td>
<td>($99.00 Check)</td>
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<td>1-F Design of MARSSIM and MARSAME Surveys (Stuenkel)</td>
<td>($99.00 CC)</td>
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<td>1-G Radiation Protection Consideration during Construction, Commissioning and Production of Mo-99 with a 40 kW 35 MeV Electron Linac (Chowdhury)</td>
<td>($99.00 Check)</td>
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<td>1-H RDD Guidance (Buddemeier)</td>
<td>($99.00 CC)</td>
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<td>1-I The Fallacy of Safe-Siding Radiation Health Risk (Daxon)</td>
<td>($99.00 Check)</td>
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<tr>
<td>Sunday, 7/7</td>
<td>10:30 – 12:30</td>
<td>2-A RESRAD-BIOTA Code for the Evaluation of Radiological Doses to Flora and Fauna (Yu, Komboj, Cheng, LePoire)</td>
<td>($99.00 Check)</td>
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<td>2-B Basic Training for the NRRPT exam – Practical Applications (Voss)</td>
<td>($99.00 CC)</td>
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<td>2-C Thorium Molten Salt Reactors (TMSR): Key Radiation Protection Challenges (Sun)</td>
<td>($99.00 Check)</td>
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<td>2-D Practical Computational Modeling for Health Physics (1) – Introduction to Monte Carlo Simulations (Dewji)</td>
<td>($99.00 CC)</td>
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<td>2-E Alpha Spectroscopy for the Health Physicist (Maddigan)</td>
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<td>2-F Evaluation of MARSSIM and MARSAME Surveys (Stuenkel)</td>
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<td>2-G Dosimetry methods for second cancer risk estimation following radiotherapy (Mile)</td>
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<td>2-H Status of ANSI N42 RPI &amp; HSI standards (Cox)</td>
<td>($99.00 CC)</td>
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<td>2-I Evolution of Occupational Radiological Protection (Melio)</td>
<td>($99.00 Check)</td>
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<tr>
<td>Sunday, 7/7</td>
<td>14:00 – 16:00</td>
<td>3-A What do Industrial HPs work on? (Bray)</td>
<td>($99.00 Check)</td>
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<td>3-B Basic Training for the NRRPT exam – Review of the applicable CFRs (Voss)</td>
<td>($99.00 CC)</td>
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<td>3-C What Neurosciences Can Tell Us about Radiation Safety Decisions (Johnson)</td>
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<td>3-D Practical Computational Modeling for Health Physics (2) - Intermediate Monte Carlo Modeling with Anthropomorphic Phantoms (Ekalinowski, Dewji)</td>
<td>($99.00 CC)</td>
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<td>3-E Gamma Spectroscopy for the Health Physicist (Maddigan)</td>
<td>($99.00 Check)</td>
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<td>3-F Technical Basis and Operational Experience for Clearance of Personal Property From SLAC Accelerator Facilities (Liu, Ford, Allan, Rokni)</td>
<td>($99.00 CC)</td>
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<td>3-G Federal Radiological Response Teams (Groves)</td>
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<td>3-H Neutrons: Discovery, Detection, Applications and Health Physics (Chapman)</td>
<td>($99.00 CC)</td>
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<td>3-I Radiological Safety Challenges Associated with Operating Non-Medical X-Ray Devices (Torantino)</td>
<td>($99.00 Check)</td>
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<tr>
<td>Monday, 7/8</td>
<td>12:15 – 14:15</td>
<td>M-1 A Radiation Protection Program Logic Model: Inputs, Outcomes and Benchmarking Opportunities and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change (Gutierrez, Emery)</td>
<td>($99.00 Check)</td>
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<td>M-2 CAP88-PC Version 4.1 Update (Littleton, Wood)</td>
<td>($99.00 CC)</td>
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<td>M-3 Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers (Stabin)</td>
<td>($99.00 Check)</td>
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<td>M-4 How to Choose the Correct Portable Radiation Detection Instrument for Your Needs (Kenoyer)</td>
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<td>M-5 Considerations for Implementation of NCRP 179, Guidance for Emergency Response Dosimetry (Salame-Alfi e, Chapman)</td>
<td>($99.00 Check)</td>
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<tr>
<td>Tuesday, 7/9</td>
<td>12:15 – 14:15</td>
<td>T-1 HEU to LEU conversion and the Production of Mo-99 without the use of HEU (Fairobent, Chapman)</td>
<td>($99.00 Check)</td>
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<td>T-2 Where Did This Come From? Lessons Learned from High-Routine Bioassay Investigations (Rosenberg)</td>
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<td>T-3 An overview and the lessons learned from a response to a radiological event involving potentially significant internal radiation doses from Americium-241 (Mejias, Dewey)</td>
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<td>T-4 Basic Physics for Radiation Detection (Van Cleef)</td>
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<td>T-5 Considering Uncertainty and Risk in Public Protection Decisions (Cochran)</td>
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## Cancellation/Substitution Policy:
Substitutions of meeting participants may be made at any time without penalty. All conference and tour cancellations must be in writing and must reach the HPS Office by 5 June to receive a refund. All refunds will be issued after the meeting minus a 20% processing fee. Refunds will not be issued to no-shows.