HEALTH PHYSICS SOCIETY

63rd Annual Meeting

Huntington Convention Center • Cleveland, Ohio • 15-19 July 2018

FINAL PROGRAM

AAHP NRRPT ABHP

See us at HPS Booth 202 | Learn More about Counts.Pro in the Technical Session on Monday, MPM-F.4 | Serving the Nuclear Industry for 15 Years!

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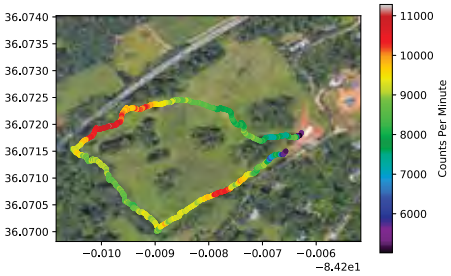

Introducing the **Counts.Pro** survey recording and data archiving system. Connect your current meters to an iOS device to document all your measurements and to make them easily available for analysis.

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63rd Annual Meeting

HEALTH PHYSICS SOCIETY

Huntington Convention Center • Cleveland, Ohio • 15-19 July 2018

Registration Hours and Location

Huntington Convention Center
Exhibit Hall A

Sunday, 15 July
7:00 AM - 5:00 PM

Monday, 16 July
8:00 AM - 4:00 PM

Tuesday, 17 July
8:00 AM - 4:00 PM

Wednesday, 18 July
9:00 AM - 4:00 PM

Thursday, 19 July
8:00 AM - 11:00 AM

Future Midyear Meetings

52nd Midyear Meeting
17-20 February 2019, San Diego, CA

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

Future Annual Meeting

64th Annual Meeting
7-11 July 2019, Orlando, FL

Look online for future meeting details
hps.org/meetings

Table of Contents

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Past President - Bob Cherry
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Gary Oyler
Shelley Miller

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Zach Tribbett, Task Force Chair
Jack Kraus, Program Committee Chair
Chris Shaw
Jason Davis
Deirdre Elder
Tim Kirkham
Greg Komp
Tanya Oxenberg

Hilton Cleveland Downtown

100 Lakeside Avenue East, Cleveland, OH 44114
Direct phone 216-413-5000

Westin Cleveland Downtown

777 Saint Clair Avenue NE, Cleveland, OH 44114
Direct phone 216-771-7700

Speaker Ready Room

Huntington Convention Center Room 2

Sunday, 2:00 PM – 5:00 PM
Monday-Wednesday, 7:30 AM – 5:00 PM
Thursday, 7:30 AM – 12:30 PM

You must check in at the Ready Room
(even if you have already submitted your presentation).

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 Events

Student Worker Orientation
Saturday, 5:45-6:45 PM
Center Street A, Hilton

Quiz Bowl
Sunday, 4:00-5:00 PM
Center Street C, Hilton

Student/Mentor Reception
Sunday, 6:00-7:00 PM
Hope E, Hilton

Exhibitor Luncheons
Monday & Tuesday, 12:00-1:30 PM
Exhibit Hall A, Convention Center

Welcome Reception
Sponsored by PerkinElmer
Monday, 5:30-7:00 PM
Exhibit Hall A, Convention Center

Plenary Awards Breakfast
Wednesday, 7:30-10:00 AM
Hilton Cleveland Downtown

Sunday-Thursday

PEPs, CELs, and sessions will be at the Huntington Convention Center

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IMPORTANT EVENTS

5th 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, 15 July, 4:00 PM – 5:00 PM, at the Hilton Cleveland in Center Street C.

Welcome Reception

Sponsored by PerkinElmer

The Welcome Reception this year will be held on Monday, 16 July, from 5:30 PM – 7:00 PM in Exhibit Hall A. 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 PM, Monday, 16 July, and Tuesday, 17 July. All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall. *Note: the free lunch is not included in your registration fee, but are paid for by our sponsors & exhibitors.*

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! *Tuesday morning break sponsored by ORAU. Tuesday afternoon break sponsored by Dan Caulk Memorial Fund*

AAHP Exam

Hilton, Center Street A
Monday, 16 July, 12:30 PM – 6:30 PM

Reception for Women and Minorities in RP

Huntington Convention Center, Room 12
Wednesday, 18 July, 1:15 PM – 2:15 PM

Sessions and Course Locations

AAHP courses are at the Cleveland Hilton; Sunday PEPs are in the Huntington Convention Center; PEPs, CELs, and all sessions Monday through Thursday will take place at the Huntington Convention Center.

AAHP Awards Luncheon

Huntington Convention Center, Room 9
Tuesday, 17 July • 12:00 PM – 2:00 PM

HPS Awards Plenary

Join us Wednesday, 18 July, from 8:00 AM – 10:00 AM for the new format of the Awards Program. We look forward to seeing you for the presentation at the Hilton Downtown Cleveland. There will be a buffet breakfast provided that begins at 7:30 AM. *Please note, this is in place of the Awards Banquet that was previously on Tuesday evenings.*

HPS Business Meeting

Huntington Convention Center, Room 1
Wednesday, 18 July, 5:30 PM - 6:30 PM

Professional Development School

Join us for the PDS, 18-20 July 2018, at the Cleveland Convention Center and CWRU.
See page 19 for more information.

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 65 for course information.

Things to Remember!

All speakers are required to check in at the Speaker Ready Room in the Huntington Convention Center, Room 2, at least one session prior to their assigned session.

All posters up Monday–Wednesday in Exhibit Hall

Poster Session featured Monday, 1:00 PM – 3:00 PM
No other sessions at that time

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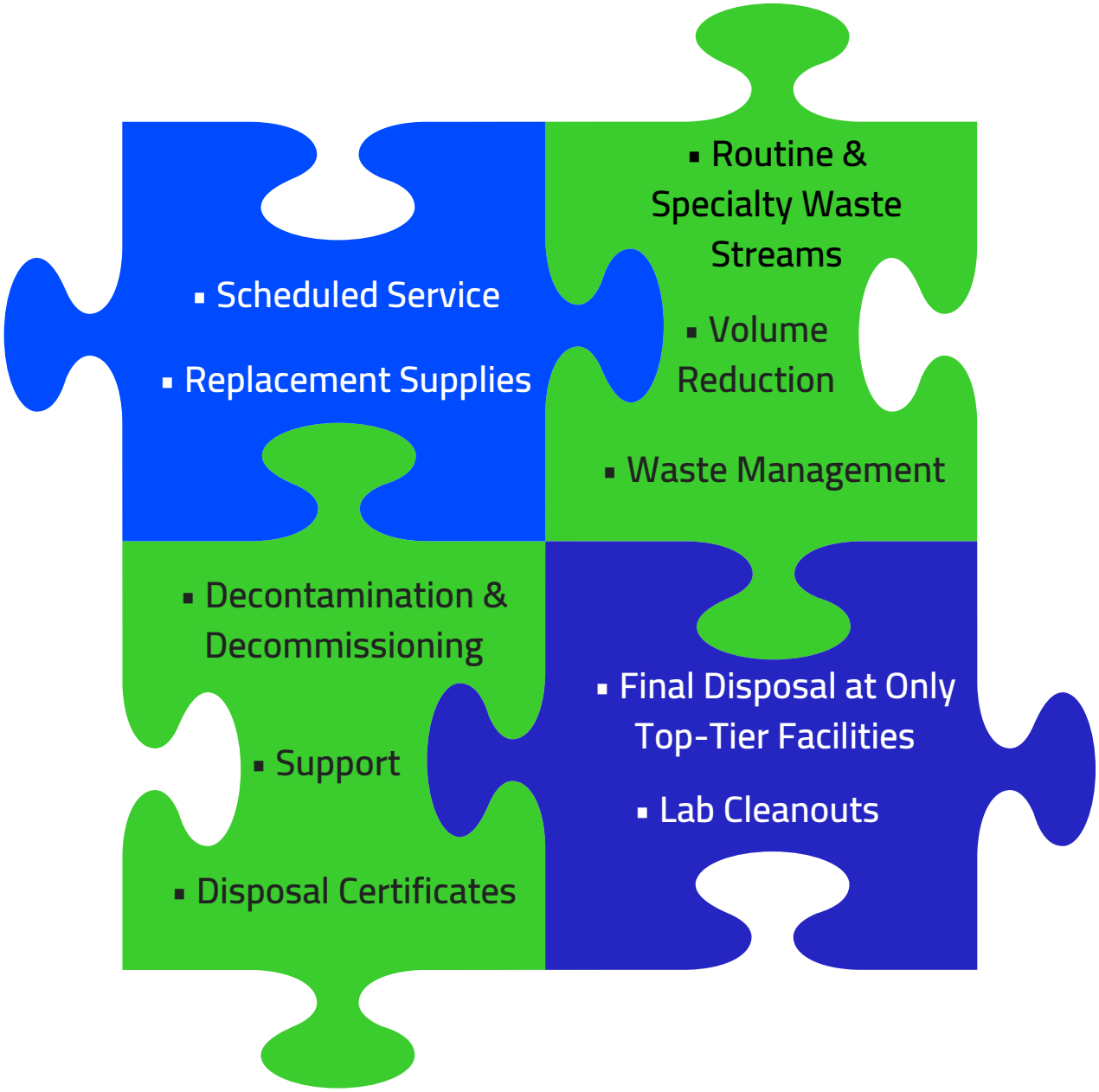

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HPS AWARDS PLENARY BREAKFAST

Wednesday, 18 July • Hilton Cleveland Downtown

7:30 AM – Breakfast Buffet

8:00 AM – 10:00 AM – Plenary Awards

Awards

Introduction by Eric Abelquist, President

Presented by Bob Cherry, Chair, Awards Committee

Recognition of 50 Year Members

Recognition of Student Fellowship & Scholarship Recipients

Recognition of Student Travel Grant Recipients

Recognition of Chapter Volunteers

Recognition of Student Science Awards

Announcement of Health Physics-Related Awards

Working Group Chairs for Published HPS/ANSI Standards - Plaque Presentation

Fellow of the Health Physics Society Awards and Certificate Presentations

Honor Roll Awards

Distinguished Scientific Achievement Award

Elda E. Anderson Award

Founders Award

Adjournment

2018 50 Year Members

James E. Carey

Louis B. Levy

Bernard R. Quinn, Sr.

McLouis J. Robinet

Genevieve S. Roessler

William A. Roventine

Student Fellowships 2017-2018

We appreciate the sponsors and recognize the merits of the students in the following fellowships that provide important financial support to students in our health physics teaching programs:

Burton J. Moyer Memorial Fellowship
Michael Abel, Purdue University

Health Physics Society Fellowships
Daniel Workman, Colorado State University
Bethany Broekhoven, Louisiana State University

Robert Gardner Memorial Fellowship
Amber Harshman, Colorado State University

Robert S. Landauer, Sr., Memorial Fellowship
Samuel Cope, North Carolina State University

Richard J. Burk, Jr., Fellowship
Trung Tran, University of Florida

J. Newell Stannard Memorial Fellowship
Li Mao, Rensselaer Polytechnic Institute

Dade W. Moeller Scholarship Award Memorializing Kelly Austin
Mara Watson, Clemson University

Dade W. Moeller Memorial Scholarship Award
Dawn Montgomery, Clemson University

F. Ward Whicker Scholarship
Jaimie Daum, University of Nevada, Las Vegas

HPS AWARDS PLENARY BREAKFAST

Student Travel Grant Recipients

These grants enable health physics students to attend and participate in our annual meeting. Additional support was received from the Medical Health Physics Section.

Bernice S. Akuana, Alcorn State University
Benedicta Amankwa, Alcorn State University
Kathryn Bales, University of Tennessee
Gerald Braley, Colorado State University
Chad Burns, Georgia Institute of Technology
Marco Carmona, University of Michigan
Edgar Chung, University of Michigan - Ann Arbor
Andrew Daudelin, Worcester Polytechnic Institute
Alec Donahue, Oregon State University
Ryan Fabian, Colorado State University
Barbara Fisher, Texas A&M University
Bhavin Gandhi, University of Michigan
Lekhnath Ghimire, University of Ontario Institute of Technology
Robert Golduber, University of Michigan
Blaine Gustafson, Idaho State University
Tinashe Gutu, UMass Lowell
Trish Hander, Illinois Institute of Technology
Joshua Hayes, Colorado State University
Norbert Hugger, Worcester Polytechnic Institute
Sofia Ioannidou, Georgetown University
Candace Krout, Bloomsburg University
Logan V Latosz, University of Michigan
Kevin Liu, University of Michigan - Ann Arbor
Samantha Lockerby, Illinois Institute of Technology
Lisa Manglass, Clemson University
Jasmine L Mapes, University of Michigan
Loren Mata, University of Michigan
Jonathan Miller, University of Michigan
Bria Moore, Duke University (Medical Health Physics)
Nhung Nguyen, Colorado State University
Austin Nichols, Texas State Technical College
Jordan Noey, University of Michigan
Blessing Oladele, Federal University of Technology Akure. Ondo State. Nigeria
Aaron Otterstein, Idaho State University
Joseph Perrotta, Rowan University
Justin Raudabaugh, Duke Univeristy
Marcia Robinson, Purdue University
Timothy Rogers, University of Massachusetts Lowell
Christopher Sain, University of Massachusetts Lowell
James Seekamp, University of Michigan
Brianna Smiley, Duke University
Melanie Snyder, Alcorn State University
Brooke Stagich, Clemson University
David Trimas, University of Michigan
Andrew Turner, Idaho State University
Jayendra Vattikonda, Alcorn State University
Adam Willey, Clemson University
Jeffery Xiao, University of Michigan - Ann Arbor
Fangbo Yuan, University of Michigan

Chapter Volunteer Awards

Recipients of the Society's Chapter Volunteer Awards have been selected by their chapter to recognize outstanding contributions to the accomplishments and long-term success of the chapter.

Florida Chapter
Donald M. Phillips

Student Science Award

The Student Science Award is given to recognize outstanding contributions by a student or students in grades 6-12 to the understanding of the applications of radiation and its impact on the environment and health.

The Award is given to a student or students who have contributed reports or presentations of projects on radiation benefits, applications and impacts. The project or projects shall be presented at local science fairs. The award or awards shall be presented at a meeting of the nominating chapter or a chapter near the awardees' residence following the announcement of the award, and will consist of a mounted certificate naming the awardee, the title of the project, and a cash award.

Steven Drabbant
Improved Reception Techniques to Overcome the Sun's Negative Effect on Radio Propagation

Yasmin Jackson
Radioactive Dinner

HPS AWARDS PLENARY BREAKFAST

Related Awards

American Academy of Health Physics

2018 William A. McAdams Outstanding Service Award
Presented annually to individuals who have made long-term and significant contributions to the certification process and have elevated professionalism in health physics.

Govind Rao

2018 Joyce P. Davis Memorial Award
Presented in recognition of exemplary service as a role model in upholding the ethical and professional standards of the Academy.

Charles Roessler

Accelerator Section Awards

H. Wade Patterson Memorial Award
Established in 2003, the H. Wade Patterson Memorial Award recognizes outstanding student presentations on accelerator health physics at the annual meeting. The winner receives a check and plaque.

Lutz Moritz Memorial Award
Established in 2009, the Lutz Moritz Memorial Award recognizes outstanding student presentations on accelerator health physics at the Annual Meeting. The winner receives a check and plaque.

Homeland Security Section Award

The Health Physics Society Homeland Security Section honors those who exemplfiy outstanding service and dedication to the HSS.

Brooke Buddemeier

Military Health Physics Section Awards

John C. Taschner Leadership Award
Established in 2014, the John C. Taschner Leadership Award recognizes a uniformed officer or senior enlisted person who has distinguished himself or herself in service to our country over a long career as a uniformed military health physicist and is presented at the annual meeting. The winner receives a plaque.

Captain John J. Cardarelli, II
USPHS

Superior Civilian Service Award
Established in 2014, the Superior Civilian Service Award recognizes a person who has distinguished himself or herself in service to our Country over a long career as a civilian military health physicist, and is presented at the Annual Meeting. The winner receives a plaque.

Paul K. Blake

Young Military Health Physicist of the Year Award

Established in 2014, the Young Military Health Physicist of the Year Award recognizes a young military health physicist for excellence in (1) research or development, (2) discovery or invention, (3) devotion to military health physics, and/or (4) significant contributions to the profession of military health physics and is presented at the annual meeting. The winner receives a plaque and a one-year membership in the Health Physics Society.

Lieutenant Dan A. Sowers
Medical Service Corps, US Navy

Non-Ionizing Radiation Section 2018 Service Award

David H. Sliney

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HPS AWARDS PLENARY BREAKFAST

Working Group Chairs for Published HPS/ANSI Standards

These HPS/ANSI standards have been published since July 2017. The Society has prepared plaques in recognition of this significant accomplishment by the respective working group chairs.

Rick Cummings/N13.52-2018
Title: Personnel Neutron Dosimeters
(Neutron Energies Less Than 20MeV)

Reaffirmed Standards for 2018

Carol Berger/N13.41-2011(R2018)
Title: Criteria for Performing Multiple Dosimetry

Mike Stabin/N13.54-2008(R2018)
Title: Fetal Radiation Dose Calculations

Chuck Salsbury/N43.3-2008(R2018)
Title: For General Radiation Safety--Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV

2018 Fellows

To honor senior members of the Society who have made significant administrative, educational, or scientific contributions to the profession of health physics.

Eric Abelquist
P. Andrew Karam
Michael Lewandowski
William Lorenzen
Ali A. Simpkins
Carl Tarantino
Steven H. Brown
Peter Darnell
Jim Willison

2018 Honor Roll Awards

This award is given posthumously to honor Society members who significantly contributed to the profession of health physics during their careers, but were not otherwise honored by the Society during their lifetimes. Such contributions may include, but are not limited to, education, research, and administration.

Francis M. Costello
Gary S. Kephart
Randall E. Scott

2018 Distinguished Scientific Achievement Award

This award is designed to acknowledge outstanding contributions to the science and technology of radiation safety. The recipient of the award is recognized for accomplishments of fundamental importance to the practice, acceptance, and advancement of the profession of health physics. It is awarded in memory of those scientists who contributed in an outstanding way to the development of scientific knowledge for the protection of man and his environment. (Prior to 1984 this was called the Distinguished Achievement Award.)

Xie George Xu
Award consists of a plaque and life membership in the Society

2018 Elda E. Anderson Award

This award is presented to a young member of the Health Physics Society to recognize excellence in:

1. Research or development
2. Discovery or invention
3. Devotion to health physics, and
4. Significant contributions to the profession of health physics

Shaheen A. Dewji
Award consists of a plaque and a $1,000 check

2018 Founders Award

This award recognizes exceptional service to the Heatlh Physics Society or the health physics profession.

Howard Dickson
Award consists of a plaque and life membership in the Society

The Health Physics Society Presents

OPEN "MIKE" NIGHT

07 . 16 . 2018 @ 8:30PM

Wilbert's @ 812 Huron Rd. East.

61ST ANNUAL MEETING OF HPS

Sign up to play and sing or just sit back with a drink and enjoy the amazing musical talent your friends in the industry have to offer.

There will be bar food and a cash/credit bar available to make getting up in front of a room full of Health Physicists far less terrifying.

Happy Hour prices all night !!
$3 16oz domestic + my Ribs are $9.99 includes home made fries and a salad!

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63rd Annual Meeting

HEALTH PHYSICS SOCIETY

Huntington Convention Center • Cleveland, Ohio • 15-19 July 2018

Welcome

The Northern Ohio Chapter of the Health Physics Society is thrilled to welcome you to the City of Cleveland, Ohio, for the 63rd HPS Annual Meeting.

Session Location

All sessions will take place in the Huntington Convention Center unless noted otherwise.

Local Arrangements Committee Room

Room 1, Huntington Convention Center, Sunday-Thursday

PEP/CEL Ready Room

The PEP/CEL Ready Room will be combined with the Speaker Ready Room in Room 2 in the Huntington Convention Center from Sunday-Thursday

Speaker Information

Technical Sessions Speaker Instructions

You are allotted a total of 12 minutes of speaking time unless you have been notified otherwise.

The Ready Room (Room 2) will be open Sunday from 2:00-5:00 PM, Monday through Wednesday from 7:30 AM-5:00 PM, and Thursday 7:30 AM-12:30 PM. You must check in at the Ready Room (even if you have already submitted your presentation) no later than the following times:

Presentation Time	Check-In Deadline
Monday AM	5:00 PM Sunday
Monday PM	11:00 AM Monday
Tuesday AM	5:00 PM Monday
Tuesday PM	11:00 AM Tuesday
Wednesday AM	5:00 PM Tuesday
Wednesday PM	11:00 AM Wednesday
Thursday AM	5:00 PM Wednesday
Thursday PM	11:00 AM Thursday

Please report to your session room 10 minutes prior to the session start to let your session chair(s) know that you are there.

Posters in Exhibit Hall must be put up for display between 10:00 AM and Noon on Monday and removed on Wednesday by 11:00 AM.

SAVE THE DATE

HPS 52nd Midyear Meeting
17-20 February 2019, San Diego, CA

HPS 64th Annual Meeting
7-11 July 2019, Orlando, FL

TOURS & EVENTS

Monday, 16 July

Great Lakes Brewery Tour

4:00 PM – 6:00 PM **Onsite: $64**

Leaves from the Hilton Hotel Lobby.

The brewery tour will lead you through more than just our production facility. Guests also journey through GLBC's and Cleveland's history and, of course, take each step with a beer in hand. Beginning in the new Beer Symposium, guests grab their first brew and view displays that showcase our heritage and unique company culture. An interactive kiosk leads users through the basics of brewing and our award-winning beers. A short video officially kicks off the tour before we venture across the street to the production brewery for more beer samples and a fun, in-depth exploration of the brewing process. Tours last approximately 60 minutes.

Open "Mike" Night

8:30 PM – 12:30 AM **Free**

Wiberts Food and Music, 812 Huron Road.

Sign up to play and sing or just sit back with a drink and enjoy the amazing musical talent your friends in the industry have to offer. There will be bar food and a cash/credit bar available.

Tuesday, 17 July

5K Fun Run/Walk

6:30 AM – 8:30 AM **Onsite: $37**

Leaves from the Hilton.

Edgewater Park.

Cleveland Museum of Art

9:30 AM – 1:30 PM **Onsite: $35**

Lunch on own at café.

Enjoy a private docent tour of the permanent collection at the Cleveland Museum of Art. After touring you'll enjoy lunch on your own at Provenance Café in the Museum.

Provenance Café features lunch and snack options made in an open kitchen. The café offers an incredible variety of seasonal soups and salads, hot and cold sandwiches, beverages, desserts, and more. The café's hearth oven features a selection of locally sourced, globally inspired dishes.

Tuesday, 17 July

Night Out - Hofbräuhaus Cleveland

6:30 PM **Onsite: $59**

Enjoy a memorable Night Out at the Hofbräuhaus Cleveland, modeled after the legendary 400+ year-old Hofbräuhaus in Munich, Germany! You will be able to enjoy many of the traditions from Germany that have made Hofbräuhaus famous. From the traditionally decorated rooms in the building to the beer that is brewed on-site, and of course the excellent German fare, Hofbräuhaus Cleveland is a memorable experience for all. Ticket price includes dinner and transportation.

Wednesday, 18 July

Pub Crawl

6:30 PM **Onsite: $25**

Commemorative shirt included!

Sign up early as we have a limited number of shirts.

The Pub Crawl is always a fun-for-all event. Cleveland is well known for its microbreweries, pubs, and taverns. Come join us as either an active participant or one who just likes great company.

Thursday, 19 July

Technical Tour: Thermo Scientific's Harshaw Dosimetry Lab

9:15 AM – 12:00 PM **Free**

Experience the manufacturing of the Thermo Scientific's Harshaw Dosimetry line for yourself. A factory tour at the Thermo Scientific manufacturing facility in Oakwood, Ohio, is scheduled to take place on Thursday, 19 July. All aspects of dosimetry production take place at this facility from crystal growth for TLDs to final assembly of TLD readers. Also included on the tour will be a look at the assembly and testing of personnel contamination monitors like the iPCM12 and vehicle portal monitors like the ASMIV. The tour is free to attend. Transportation will be provided from the convention center. We will be leaving at 9:15 AM from the convention center and returning around 12:00 PM. Space is limited so be sure to sign up using the online registration form to secure your spot.

ON-YOUR OWN TOURS

Rock and Roll Hall of Fame

The Rock and Roll Hall of Fame, located on the shore of Lake Erie in downtown Cleveland, Ohio, recognizes and archives the history of the best-known and most influential artists, producers, engineers, and other notable figures who have had some major influence on the development of rock and roll. Walk from hotel.

Open every day from 10:00 AM–5:30 PM.

Using the link and special promo code below, adult general-admission tickets can be purchased at the discount rate of $18 (regularly $26). Offer available online only.

- Go to ticketing.rockhall.com
- Enter promo code "BigJoeTurner18" in the upper right hand corner at checkout
- Hit "Submit" to activate the code

Cleveland Zoo

The Cleveland Metroparks Zoo is a 183-acre zoo divided into several areas: Australian Adventure; African Savannah; Wilderness Trek; The Primate, Cat & Aquatics Building; The Rain Forest; and Waterfowl Lake. It has one of the largest collections of primates in North America and features Monkey Island, a concrete island on which a large population of colobus monkeys are kept in free-range conditions (without cares or walls). The zoo is part of the Cleveland Metroparks system.

www.clevelandmetroparks.com/zoo

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COMPANION PROGRAM

Information for Registered Companions

Companion Registration cost is $110 and includes the Welcome Reception, Monday-Thursday breakfast buffet at the Hilton Cleveland, and lunch and breaks in the Exhibit Hall. There will not be a separate Hospitality Room; however, the Local Arrangements Committee staff in Convention Center, Room 8 will be happy to answer your questions or assist in finding the answer.

Monday, 16 July - Thursday, 19 July

Companion Breakfast

6:30 AM – 10:30 AM, Hotel Restaurant at the Hilton Cleveland

Companion Registration includes Monday–Thursday breakfast buffet at the Hilton Cleveland, 6:00 AM–10:30 AM. 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 Exhibit Hall.

Monday, 16 July

Welcome to Cleveland Companion Orientation

Cleveland Representative – 8:00 AM – 9:00 AM
Veterans A, Hilton Cleveland

The city orientation takes place Monday, 16 July, from 8:00 AM to 9:00 AM at the Hilton Cleveland, Veterans A. A representative from Cleveland will be on hand to describe some of the many opportunities, provide maps, and answer questions.

Be sure to consider the tour options on page 14 for the HPS-sponsored events.

Monday, 16 July

Welcome Reception, *Sponsored by PerkinElmer*

5:30 PM – 7:00 PM, Exhibit Hall A, Huntington Convention Centerr
Come see old friends and make new ones! Enjoy hors d'oeuvres with a cash bar, 5:30 PM – 7:00 PM.

Wednesday, 18 July

Awards Plenary

7:30 AM Breakfast, 8:00 AM – 10:00 AM
Hilton Cleveland Downtown
Join us for the new format of the Awards Program.

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PROFESSIONAL DEVELOPMENT SCHOOL

Welcome to the 2018 Professional Development School
Hands-On Medical Health Physics • Emerging Technologies & Challenges
18-20 July • Cleveland Convention Center and CWRU

The organizers of this PDS have applied to CAMPEP for approval of 20 medical physics CEC hours.

Technical advancements are transforming medicine and medical health physics. Today an enterprising medical health physicist is challenged with managing automated systems within a health care network. This professional development school (PDS) is intended for the medical radiation safety officer, adapting available technology to accreditation requirements such as reviewing/approving computed tomography (CT) protocols, patient education, and storing dose in electronic medical records (EMR). Additionally, an emphasis is placed on the knowledge and skills that 21st century medical health physicists need to remain relevant.

The PDS provides 20 hours (*12 lecture and 8 hands-on*) of training concentrated on applying technology for collecting and managing information within a health care enterprise and working with the latest technologies and exotic radioisotopes. Lecture topics are coupled with hands-on breakout sessions:

Lectures

- Medical Health Physics Horizon and Beyond, *Kevin Nelson and David Jordan*
- Certification Process for Health Physicists, *Andy Miller and Steven King*
- Spectral CT From Idea to Product, *Thomas Morton*
- Being Relevant to Your Institution, *Dr. Derrwaldt, MD, and Joanne Rimac, RN*
- MRI Safety, *David Jordan*
- X-Ray QC, ACR Accreditation, *Peter Jenkins*
- Radiation Dose Management in the Digital World, *Chris Martel*
- Patient Dosimetry, *Peter Caraccapa*
- Nuclear Medicine Response to Exotic Spill and Issues, *Joseph Ring*
- Image-Guided Interventions

Breakout Sessions

- MRI Safety *(University Hospitals of Cleveland)*
- Nuclear Medicine Hot Laboratory Hands-On *(Cleveland Clinic Foundation)*
- Survey Instrument Calibration/Repair and Nuclide ID *(Case Western Reserve University)*
- Medical Physics Testing X-Ray and QC *(Veterans Healthcare Administration)*
- Radiation Dose Management Through Information Systems *(Philips Healthcare Systems)*

Faculty

- Ronald Leuenberger (Administrative Dean), *Northeast Ohio VA Healthcare System*
- Chris Martel (Faculty Dean), *Philips Healthcare Systems*
- David Jordan, *University Hospitals of Cleveland*
- Andy Miller, *Cleveland Clinic Foundation*
- Ramses Herrera, *Richmond VA Medical Center*
- Peter Caraccapa, *Rensselaer Polytechnic Institute*
- Peter Jenkins, *University of Utah*
- Steven King, Pennsylvania State University, *Hershey Medical Center*
- Kevin Nelson, *Mayo Clinic, Scottsdale*
- Joseph Ring, *Beth Israel Deaconess Hospital*

Vendors Providing Instrumentation for Hands-On Activities

- Medical Physics Testing X Ray and Fluoroscopy *(LACO)*
- Hand-Held Spectroscopy With Nuclide ID *(LACO)*
- Calibration and Repair of Survey Meters *(Ludlum)*
- Solid State Dosimetry With Bluetooth Technology and Phone App *(Mirion)*

"Responsive **C**ustomer Service
&
Exceptional **C**ustomer Maintenance"

Welcome to C&C Irradiator Service LLC! We are a newly-formed company created to offer the best customer support and maintenance services in the irradiator industry. Co-owners Christopher Nostrand and Chad Gunther have a combined 15+ years of experience providing preventative maintenance, dose validations, emergency repairs, relocations, and decommissioning to self-shielded irradiators. With the ability to service multiple types of irradiators with our NRC license, chances are we can service your device. With the agreement of C&C Irradiator Service and Precision X-Ray Inc, we are looking forward to providing the service you need when you decommission your devices and upgrade to an exceptional x-ray system.

Please come visit us at booth #400!

- Preventative maintenance
- Emergency repairs
- Dose validations
- Relocations
- Decommissioning

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X-RAD 160
X-RAD 225
X-RAD 320

C&C Irradiator Service LLC
1030 Evarts St. NE
Washington, DC 20018

Chad Gunther / 570-912-2389
chad@ccirradiator.com
Chris Nostrand / 240-604-7959
chris@ccirradiator.com

www.ccirradiator.com

C&C Irradiator Service is capable of servicing your irradiator until the end of its life cycle. Our agreement with Precision X-Ray Inc. offers you a seamless transition from your self-shielded irradiator to an industry leading x-ray system.

Committee Meetings

Meetings take place at the Huntington Convention Center (CC) or the Hilton Cleveland (H)

Friday, 13 July 2018

ABHP Board Meeting
8:30 AM – 5:00 PM — Center Street A (H)

NRRPT
9:00 AM – 4:00 PM — Room 1 (CC)

Saturday, 14 July 2018

American Board of Medical Physics Exam
8:00 AM – 12:00 PM — Room 9 (CC)

ABHP Board Meeting
8:00 AM – 12:00 PM — Hope AB (H)

Finance Committee
8:00 AM – 12:00 PM — Hope C (H)

ABHP Part II Panel
8:00 AM – 5:00 PM — Center Street D (H)

NRRPT
9:00 AM – 4:00 PM — Room 10 (CC)

HPS Executive Committee Meeting
12:00 PM – 4:00 PM — Hope C (H)

ABHP/AAHP Exec Committee
1:00 PM – 4:00 PM — Hope AB (H)

HP Journal Editorial Board
3:00 PM – 5:00 PM — Hope B (H)

Sunday, 15 July 2018

ABHP Part II Panel
8:00 AM – 5:00 PM — Center Street D (H)

AAHP Executive Committee
8:30 AM – 5:00 PM — Hope A (H)

NRRPT
9:00 AM – 4:00 PM — Room 10 (CC)

HPS Board of Directors
8:00 AM – 5:00 PM — Center Street A (H)

Student/Mentor Reception
6:00 PM – 7:00 PM — Hope E (H)

Student Support Committee - Meet & Great for HP Connect
6:00 PM – 7:00 PM — Hope E (H)

Monday, 16 July 2018

ICC Welcome Breakfast for Int'l Attendees
7:00 AM – 8:00 AM — Room 11 (CC)

NRRPT
9:00 AM – 4:00 PM — Room 10 (CC)

Medical Section Board Meeting
12:00 PM – 1:30 PM — Room 12 (CC)

HPS Nominating Committee
12:00 PM – 2:00 PM — Room 13 (CC)

ABHP Exam
12:30 PM – 6:30 PM — Center Street BC (H)

Professional Development Committee
1:00 PM – 2:00 PM — Room 19 (CC)

Chapter Council Meeting
1:30 PM – 2:30 PM — Room 1 (CC)

MHPS Committee on Issues
1:30 PM – 2:30 PM — Room 12 (CC)

Section Council
2:30 PM – 3:30 PM — Room 17 (CC)

ANSI N13.8 Rad Protection in Uranium Mining
2:30 PM – 4:00 PM — Room 13 (CC)

Academic Education Committee
3:00 PM – 4:30 PM — Room 19 (CC)

Web Ops
3:00 PM – 5:00 PM — Veterans C (H)

Tuesday, 17 July 2018

Exhibitor Breakfast
8:00 AM – 9:00 AM — Veterans C (H)

ANSI N13.38 Working Group
9:00 AM – 11:00 AM — Room 13 (CC)

NRRPT
9:00 AM – 4:00 PM — Room 10 (CC)

Ask the Editors Meeting
9:30 AM – 11:30 AM — Room 11 (CC)

AEC hosts Program Directors Meeting
12:00 PM – 1:30 PM — Room 19 (CC)

AAHP Nominating Committee
12:00 PM – 2:00 PM — Room 12 (CC)

Committee Meetings

Meetings take place at the Huntington Convention Center (CC) or the Hilton Cleveland (H)

Int'l Collaborations Committee
12:00 PM – 2:00 PM — Room 17 (CC)

AAHP Luncheon
12:00 PM – 2:30 PM — Room 9 (CC)

Continuing Education Committee
12:30 PM – 2:00 PM — Veterans A (H)

AAHP Title Protection/Prof Recognition Committee
1:00 PM – 2:00 PM — Room 13 (CC)

ANSI N13.61 Ambient Air Monitoring
1:00 PM – 5:00 PM — Room 14 (CC)

Membership Committee
2:00 PM – 3:30 PM — Room 11 (CC)

AIRRS Business Meeting
4:30 PM – 5:00 PM — Room 7 (CC)

Government Relations Committee
5:00 PM – 6:00 PM — Room 11 (CC)

CSU Alumni Reception
5:00 PM – 7:00 PM — Veterans D (H)

Purdue Alumni Reception
6:00 PM – 7:00 PM — Veterans B (H)

Wednesday, 18 July 2018

ANSI N13 Revision
9:00 AM – 5:00 PM — Veterans A (H)

President's meetings with BOD designates
10:30 AM – 5:00 PM — Room 13 (CC)

AEC/Student Branch Society Support Committee
12:00 PM – 1:00 PM — Room 19 (CC)

Standards Committee
12:30 PM – 2:30 PM — Veterans B (H)

PAC-2 Meeting
1:00 PM – 3:00 PM — Room 11 (CC)

Reception for Women and Minorities in RP
1:15 PM – 2:15 PM — Room 12 (CC)

Student Support Committee
2:00 PM – 3:00 PM — Room 9 (CC)

Thursday, 19 July 2018

HPS Finance & Executive Committees
8:00 AM – 10:00 AM — Veterans B (H)

ANSI N13 Revision
9:00 AM – 5:00 PM — Veterans A (H)

HPS Board of Directors
11:45 AM – 2:30 PM — Veterans B (H)

Program Committee Meeting
12:30 PM – 2:00 PM — Room 9 (CC)

Business Meetings

TUESDAY

Medical Section Business Meeting
11:00 AM – 12:00 PM — Room 5 (CC)

Accelerator Section Business Meeting
11:20 AM – 12:00 PM — Room 6 (CC)

AIRRS Business Meeting
4:30 PM – 5:00 PM — Room 7 (CC)

Nanotechnology Section Business Meeting
4:30 PM – 5:00 PM — Room 4 (CC)

Environmental/Radon Section Business Meeting
5:00 PM – 5:30 PM — Room 3 (CC)

AAHP Business Meeting
5:15 PM – 6:00 PM — Room 1 (CC)

WEDNESDAY

Homeland Security Section Business Meeting
4:45 PM – 5:15 PM — Room 6 (CC)

HPS Business Meeting
5:30 PM – 6:30 PM — Room 1 (CC)

THURSDAY

Military Section Business Meeting
11:00 AM – 12:00 PM — Room 1 (CC)

LECTURESHIP TRUST FUNDS

Landauer Memorial Lectureship

The Landauer Memorial Lectureship was instituted in Chicago in 1971 under the auspices of Northwestern University in honor of Dr. Robert S. Landauer, a prominent radiological physicist and teacher for many years in the Chicago area. This award was funded initially by his students, friends, and family. In 1973, the Landauer Lectureship was established and sponsored by R.S. Landauer, Jr., and Company, now known as Landauer, Inc. The purpose is to honor prominent individuals who have made significant contributions to the field of radiation research and protection.

The recipient of the Landauer Lecture award will be joining a group of distinguished individuals who have been so honored in the past. A large plaque is displayed at the corporate headquarters of Landauer, Inc. commemorating all of the recipients of this award.

Dade W. Moeller Lectureship

"When you are near a fountain of knowledge, do everything possible to get thoroughly soaked."
– Dr. Dade W. Moeller

Since 2009, Dade Moeller & Associates, Inc. ("Dade Moeller") has bequeathed funds to the Health Physics Society to maintain the Dade Moeller Fund. The fund has been established to advance Dr. Moeller's deeply held belief that continued education, sharing of knowledge, exposure to new ideas, and strong professional relationships are integral to an individual's success in his or her career. The Fund sponsors the Dade Moeller Lectureship and Scholarship Awards. The Lectureship Award enables distinguished experts to share their knowledge with our membership at Society meetings.

Dr. Moeller (1927-2011) was very active in the Society, serving as New England Chapter president in 1966 and national President in 1971-1972. He served on and chaired many committees for the NRC, EPA, NCRP, ICRP, NAS, and AAEES. He was a consultant to the WHO for 15 years, and following 16 years on the NRC's congressionally appointed Advisory Committee on Reactor Safeguards, became in 1988 the founding chairman of the agency's Advisory Committee on Nuclear Waste, on which he served for five years.

Dr. Moeller is remembered for his practicality, humility, thoughtfulness, gentle nature, generosity, and humor. Despite his multitude of awards and accomplishments, including induction in the National Academy of Engineering, he remained genuinely humble, always able to explain complex technical issues with uncanny clarity and simplicity. He was a leader in every sense of the word, a skilled mentor to so many, and an inspiration to the thousands of students, employees, and colleagues who knew him. He was one of those rare giants in our profession with a work ethic and moral compass worthy for all of us to emulate.

G. William Morgan Lectureship

When G. William Morgan died in 1984, he bequeathed a substantial fund to the Health Physics Society. The will requires that the fund's interest be used to have internationally known experts present papers at the Society's meetings. Michael C. O'Riordan of the United Kingdom's National Radiation Protection Board was the first international expert to be supported by the Society through the Morgan Fund. O'Riordan's presentation "Radon in Albion" was part of the Indoor Radon Session at the 1989 Albuquerque meeting.

G. William Morgan was a charter member of the Society, and during the Society's early years a very active member. Bill began his health physics career at Oak Ridge National Laboratory as part of the Manhattan Project. He later joined the Atomic Energy Commission and was instrumental in the development of the initial regulations that became part of 10 CFR Part 20. He was a great champion of education and helped establish the AEC Health Physics Fellowship Program. Bill later became very successful in the real estate business, but always retained his interest in the health physics profession. The Society's Presidents Emeritus Committee has responsibility for the selection of the international experts who will be supported by the G. William Morgan Trust Fund.

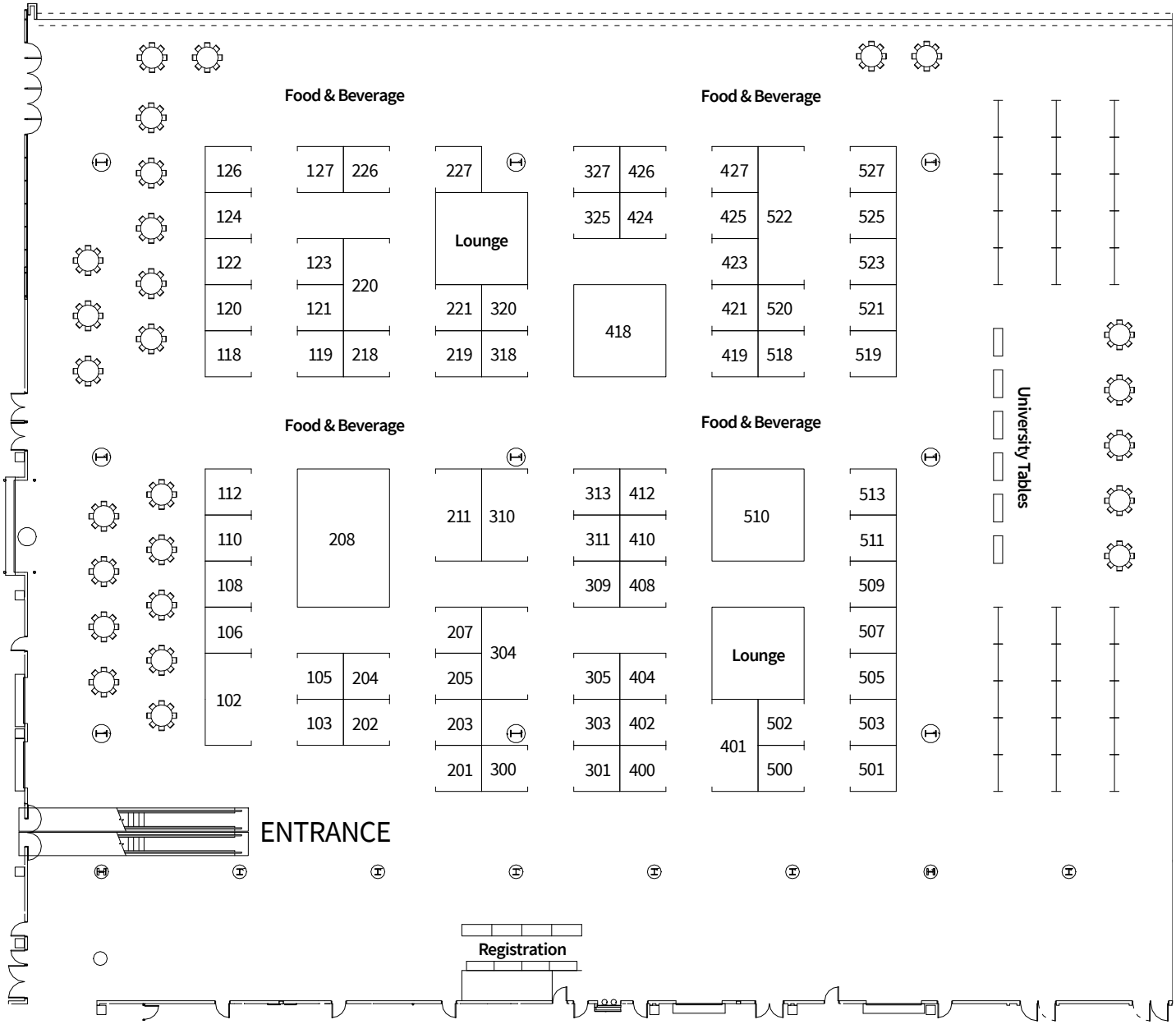
2018 EXHIBIT HALL FLOOR PLAN

EXHIBIT HALL HOURS

Monday, 16 July
Noon – 7:00 PM

Tuesday, 17 July
9:15 AM – 5:00 PM

Wednesday, 18 July
9:30 AM – Noon



EXHIBITOR LISTING

Breaks

Tuesday AM – Wednesday AM

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

Tuesday AM Break sponsored by ORAU.
Tuesday PM Break sponosred by the Dan Caulk Memorial Fund.

Lunches

Monday and Tuesday, 12:00 PM

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

Note: the free lunches are not included in your registration fee, but are paid for by our sponsors & exhibitors.

Welcome Reception

Sponsored by PerkinElmer

Monday, 5:30 PM – 7:00 PM

Join fellow attendees in Exhibit Hall A for a time to socialize and renew old acquaintances.

2018 EXHIBITORS

2019 Annual Meeting Orlando, Florida — Booth: 124

www.hps.org/meetings

AAHP/ABHP — Booth: 126

www.hps1.org/aahp

Army Medical Recruiting — Booth: 102

185 9th Calvary Regiment Ave
Fort Knox, KY 40121
502-626-1891
www.goarmy.com

Nuclear medical science officers are primarily responsible for medical defense that is related to chemical, biological, radiological, and nuclear matters. As an officer on the U.S. Army health care team, you'll have the opportunity to enhance your skills while conducting research that supports our national defense.

Arrow-Tech, Inc. — Booth: 412

417 Main Avenue West
PO Box 1240
Rolla, ND 58367
701-477-6164
www.dosimeter.com

Arrow-Tech, Inc. manufactures the Direct-Reading Dosimeter and offers a full line of radiation detection equipment. Arrow-Tech maintains a worldwide customer base and provides them with quality, reliable, durable products and services. Arrow-Tech provides calibration services to ANSI and NIST Standards for most types of dosimeters, survey meters, and area monitors. Industries served include Health Physics, Homeland Security, First Responders, and Non-Destructive Testing, Industrial and Medical Radiography.

Berthold Technologies — Booth: 127

99 Midway Lane
Oak Ridge, TN 37830
865-483-1488
www.berthold.com

Berthold Technologies provides reliable instrumentation for measuring radioactive contamination, dose rate, activity, and airborne activity. Our product portfolio includes portable devices and stationary monitoring systems. Berthold's global reputation rests on the quality of our advanced measurement technologies. Take advantage of Berthold's experience in design, installation and commissioning, calibration, and service.

Bertin Instruments — Booth: 519

10 bis avenue Ampère 78180
Montigny-le-Bretonneux France
33 (0)1 39 30 60 00
www.bertin-instruments.com

Bertin Instruments has developed and optimized Nuclear equipment to provide state-of-the-art instrumentation for the customer. Its products are associated with personal protection as well as process and environmental monitoring: Dosimetry systems, Contamination monitors, Environmental radiation monitoring systems, Survey meters, and Access control.

Best Dosimetry Services — Booth: 120

7643 Fullerton Road
Springfield, VA 22153
703-451-2378
www.bestdosimetry.com

Best Dosimetry Services (BDS) provides an economically priced radiation badge service for monitoring and tracking the radiation dose received by workers who are occupationally exposed to ionizing radiation. We serve a variety of customers including dental practices, veterinary practices, hospitals, and other organizations that utilize x-ray machines.

BIC Technology Ltd — Booth: 502

Ringtail Court, Burscough
Lancashire, L40 8LB UK
44 (0)151 321 2073
www.bictechnology.co.uk

BIC Technology supplies a wide range of radiation detectors , dosemeters, and innovative technologies for most applications including Pulsed X-ray Systems. We have strong customer bases in the UK & USA and offer a full backup/support service.

Bionomics — Booth: 201

PO Box 817
Kingston, TN 37763
865-220-8501
www.bionomics-inc.com

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Bionomics Inc. is the leading service provider to generators of low level radioactive waste and mixed waste. With 30+ years in business, we have the proven experience and knowledge to reduce client risks. We disposition common and specialty waste streams, with scheduled pickups to meet the needs of our clients. We use our own trained and qualified brokers and technicians to provide specialty supplies, make pickups, track waste, and arrange for final processing and disposal at only the top-tier facilities. We provide disposal certificates for all shipments. We also perform specialty projects, such as decontamination, decommissioning, lab cleanouts, surveys, and disposal of legacy wastes.

Bladewerx — Booth: 118

4529 Arrowhead Ridge Dr. SE
Rio Rancho, NM 87124
505-892-5144
www.bladewerx.com

Bladewerx and its subsidiary Shieldwerx provide instrumentation, custom software, neutron and gamma shielding, and neutron activation foils to the radiation protection and measurement industry.

C&C Irradiator Service, LLC — Booth: 400

1030 Evarts St. NE
Washington, DC 20018
240-604-7959
www.ccirradiator.com

Silver Sponsor

C&C Irradiator Service, LLC, is an irradiator service provider also offering the line of Precision X-Ray Inc. X-RAD systems as direct replacements for devices containing RAM.

CAEN SyS srl — Booth: 300

Via Vetraia 11
Viareggio, LU 55049 Italy
390584388398
www.caensys.com

CAEN SyS has a strong knowledge of nuclear measurements, developing Radiation Detection Systems and Spectroscopy Solutions applied to Nuclear Fuel Cycle, NPPs, Laboratories, and Security facilities. CAEN SyS provides expertise and technical support to minimize customers' Operational Expenses with on-time delivery and with a high degree of quality, safety and security.

Capintec, Inc. — Booth: 509

7 Vreeland Road
Florham Park, NJ 07932
201-825-9500
www.capintec.com

For over 50 years, Capintec has been recognized as a world leader in the development, manufacturing and marketing of state-of-the-art radiation measuring and monitoring instrumentation. With thousands of instruments in use world-wide, Capintec focuses on products with applications in Nuclear Medicine, Nuclear Cardiology, PET, Oncology, and Endocrinology.

Centers for Disease Control and Prevention — Booth: 503

4770 Buford Highway, NE
Mailstop F-59
Chamblee, GA 30341
770-488-3800
emergency.cdc.gov/radiation

The Centers for Disease Control and Prevention Radiation Studies Branch has developed two Radiation Emergency Tool Kits to provide guidance and resources to assist state and local officials plan for and respond to radiation emergencies. For more information visit: http://emergency.cdc.gov/radiation or stop by booth #503 to learn how to order a free kit.

Chase Environmental Group, Inc. — Booth: 318

11450 Watterson Ct.
Louisville, KY 40299
502-267-1455
www.chaseenv.com

Chase Environmental's Radiological Services Group is dedicated to servicing smaller quantity generators of low-level and mixed radioactive waste – as well as providing remediation and license termination needs of a wide range of clients. Additionally – we provide a dedicated consulting service for industrial type clients who either use radioactive materials in their process – or who wish to prevent the introduction of radioactive materials to their processes. We go to great lengths to ensure quality, compliance, safety, and value at every point in the process – while providing a great customer service experience. For more information – or to request a quote for services – please contact John O'Neil at 877-389-2124 or joneil@chaseenv.com. Please visit our website at www.chaseenv.com

ChemStaff Booth: 511

3180 Theodore Street, Suite 205
Joliet, IL 60435
800-741-5211
www.chemstaff.com

ChemStaff is an engineering consulting company serving the global power industry with core expertise in Chemistry, Engineering, Environmental, Radwaste, and Health Physics Programs. We are headquartered in Joliet, Illinois, with 40+ consultants located throughout the United States. Our team brings decades of experience working directly with customers to solve problems and help optimize industrial processes, reduce cost, improve compliance and build enduring value. Contact ChemStaff at info@chemstaff.com

CHP Consultants/CHP Dosimetry Booth: 202

305 Cumberland View Rd.
Clinton, TN 37716
888-766-4833
www.chpconsultants.com

CHP Consultants provides half price radiological instruments and creative solutions. We are introducing the Counts.Pro™ device to revolutionize the collection of survey and laboratory data. Counts.Pro™ turns count rate meters into mobile laboratories that instantly update to secure cloud storage. CHP Dosimetry provides NVLAP-accredited TLD badge service with great service.

Conference of Radiation Control Program Directors, Inc. Booth: 121

1030 Burlington Lane, Suite 4B
Frankfort, KY 40601
502-227-4543
www.crcpd.org

The Conference of Radiation Control Program Directors (CRCPD) is a nonprofit, non-governmental professional organization that promotes consistency in addressing and resolving radiation protection issues, encourages high standards of quality in radiation protection programs, and provides leadership in radiation safety and education.

Eagle Integrated Services Booth: 410

17400 Lafayette Drive
Olney, MD 20832
808-351-5078
www.eagleintegratedservices.com

Eagle Integrated Services (EIS) specializes in the installation of sustainable security systems at radiological sites. EIS has extensive experience in project management, network/IT services, and Sentry/TISH programming and installations. EIS is currently a prime security contractor in support of the DOE ORS program at many radiological facilities nationwide and can perform as subcontractor to a facility.

Eckert & Ziegler Isotope Products Booth: 310

1380 Seaboard Industrial Blvd.
Atlanta, GA 30318
404-352-8677
www.ezag.com

Eckert & Ziegler Isotope Products provides high-quality, NIST traceable radioactive calibration sources, solutions, and gases. We operate three ISO17025: 2005 DAkkS accredited calibration laboratories, two in the USA and one in Germany. Radiochemical performance evaluation samples are provided quarterly for effluent and environmental monitoring programs.

Environmental Instruments Canada Inc. Booth: 423

135 Robin Cres., Unit 202
Saskatoon, SK S7L 6M3 Canada
306-974-6055
eic.nu

EIC uses innovative technology to produce high-performance and cost effective radiation measurement instruments. Come to our booth to see a $250 alpha, beta, gamma contamination meter. See a small, highly sensitive microR meter that converts to a directional radiation detector. Talk to us about our neutron detection research.

F&J Specialty Products Inc. Booth: 408

404 Cypress Rd
Ocala, FL 34472
352-680-1177
www.fjspecialty.com

F&J manufactures traditional and microprocessor controlled air sampling systems, airflow calibrators, tritium collection systems, and lightweight battery-powered emergency response air samplers. F&J also manufactures advanced technology systems for nuclear power plant RETS-REMP compliance monitoring programs. F&J is the world's largest manufacturer of radioiodine collection cartridges, such as TEDA impregnated charcoal and silver zeolite cartridges.

Faxitron Bioptics, LLC — Booth: 303

3440 E Britannia Dr, Suite 150
Tucson, AZ 85706
520-399-8180
www.faxitron.com

Faxitron is the world's largest and only fully vertically integrated, dedicated cabinet Z-ray company. With an installed base of over 7,000 systems in medical facilities and scientific research laboratories around the globe, Faxitron is the industry standard in cabinet X-ray systems for specimen radiography, research, and NDT applications. For more than 40 years, Faxitron has defined cabinet X-ray by developing X-ray sensor technology and innovative systems to meet the evolving needs of our customers.

FLIR Systems Inc. — Booth: 106

27700 SW Parkway Ave
Wilsonville, OR 97070
503-498-3547
www.flir.com/radiation

The FLIR identiFINDER R-Series line of handheld systems range from small belt-worn spectroscopic pagers to large highly sensitive devices capable of rapidly locating and precisely identifying radioactive material. With over 20,000 units deployed globally, FLIR solutions ensure you are equipped with the right tool for the job.

Fluke/RaySafe/LANDAUER, Inc. — Booth: 510

2 Science Road
Glenwood, IL 60425
708-755-7000
www.landauer.com

LANDAUER joined Fluke Biomedical and RaySafe as a result of the Fortive acquisition in late 2017. By blending an array of Real-time dosimetry products, services and pioneering test tools for biomedical equipment, and devices, Fluke Biomedical/RaySafe/LANDAUER are better able to delivery critical patient and staff safety solutions to health care providers around the world. LANDAUER's core strength in dosimetry services and medical physics is complementary to Fluke Biomedical and RaySafe's efforts to help customers with test tools for biomedical equipment testing and navigating complex regulatory environments around radiation exposure.

Fuji Electric Co., Ltd — Booth: 419

1 Fuji-machi
Hino-shi, Tokyo 191-8502 Japan
81-42-585-6024
www.fujielectric.com/products/radiation

Fuji Electric has a sophisticated line-up of high-quality Radiation Detection instrumentation, including new electronic personal dosimeters and ultra-lightweight neutron survey meter. Fuji Electric radiation instrumentation has been used widely in nuclear, industrial, and medical facilities. For over 60 years, we have been committed to maintaining the safety of personnel and safeguarding the public and environment.

G/O Corp — Booth: 309

70161 Highway 59, Suite "E"
Abita Springs, LA 70420
800-933-8501
www.gocorp.com

G/O Corporation is a supplier of custom-designed products for the nuclear industry, the DOE, weapon sites, shipyards, and various industrial and pharmaceutical accounts. Our distribution facility is located in Abita Springs, Louisiana. For over 30 years we have served our customers with custom made products consisting of H.P. supplies, garments, containments, barriers, all types of signage, and D. Con supplies.

Gamma Products, Inc. — Booth: 301

7730 West 114th Place
Palos Hills, IL 60465
708-974-4100
www.gammaproducts.com

Gamma Products, Inc. has been designing and manufacturing scientific instruments for over 45 years. We specialize in low-background α/β automatic & manual proportional counting system, gas free automatic α/β counting system, Ra226/228 & gamma automatic sample changers, lead or steel counting and storage shields.

Global Nucleonics — Booth: 119

Silver Sponsor

16203 Park Row #110
Houston, TX 77084
281 578 7900
www.GlobalNucleonics.com

Global Nucleonics is a Houston, Texas-based company that specializes in the design and manufacture of gas filled radiation detectors. Product offerings include GM tubes of all types including high-temperature and ruggedized models, He3 and BF3 tubes, ionization chambers and x-ray proportional counters.

H3D, Inc. Booth: 205

3250 Plymouth Road, Suite 303
Ann Arbor, MI 48105
734-661-6416
www.h3dgamma.com

H3D offers the world's highest-performance gamma-ray imaging spectrometers. From storage to measurement in two minutes, we guarantee 1.1% FWHM at 662 keV and omnidirectional isotope-specific images, all in a portable package. H100/H400 series are used in nuclear power plants globally, and we have products for defense, security,and medical applications.

Health Physics Instruments Booth: 203

330 South Kellogg Ave., Suite D
Goleta, CA 93117
805-964-3615
www.fwt.com

Health Physics Instruments manufactures and calibrates instruments and detectors that measure gamma, neutron, beta, and alpha radiation. The product line includes portable neutron survey meters, Geiger-counters, sophisticated fixed monitors, rem meters, dosimeters, multichannel analyzers, and custom solutions. HPI has been serving the Health Physics community for over 40 years.

Hi-Q Environmental Products Co. Booth: 103

Silver Sponsor

7386 Trade Street
San Diego, CA 92121
858-549-2820
www.HI-Q.net

HI-Q Environmental Products Company is an ISO 9001:2015 Certified designer/manufacturer that has been providing air sampling & monitoring equipment, systems and services to the nuclear and environmental monitoring industries since 1973. Our product line ranges from complete stack sampling systems to complex ambient air sampling stations. Our product catalog includes continuous duty high & low volume air samplers, radiation measurement instrumentation, radiation monitoring systems, air flow calibrators, radioiodine sampling cartridges, collection filter paper and both paper-only or combination style filter holders. Along with the ability to design complete, turn-key, stack and fume hood sampling system, HI-Q has the unique capability to test ducts and vent stacks as required by ANSI N13.1-1999/2011.

Hopewell Designs, Inc. Booth: 513

5940 Gateway Drive
Alpharetta, GA 30004
770-667-5770
www.hopewelldesigns.com

Hopewell Designs, Inc. provides automated and manual irradiator systems and radiation shielding for government laboratories, nuclear power plants, private industry, medical laboratories, and universities in the Americas and throughout the world. We began operations in 1994 by designing and manufacturing the first fully automated calibration laboratory for the Department of Energy at the Savannah River Site. Today we are the primary provider of automated irradiator systems for calibrating radiation survey meters. Our expertise and experience in radiation and shielding design, software development, systems integration, manufacturing, training, and complex project management enables us to deliver quality products and service for hundreds of clients.

HPS Journal/Newsletter Web Operations Booth: 522

www.hps.org

Illinois Institute of Technology Booth: 421

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Chicago, IL 60616
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K&S Associates, Inc. — Booth: 320

1926 Elm Tree Drive
Nashville, TN 37210
615-883-9760
www.kslab.com

K&S Associates is a calibration laboratory accredited by A2LA for the calibration of precision instruments and survey instruments including environmental level measurements. K&S is also accredited by the AAPM for precision dosimetry calibrations for radiation therapy and diagnostic x-ray and by A2LA for kVp, time, voltage, current and light calibrations.

LabLogic Systems, Inc — Booth: 305

East Pointe Park, 1040 East Brandon Blvd.
Brandon, FL 33511
813-626-6848
www.lablogic.com

LabLogic specializes in instrumentation and software dedicated to the measurement and analysis of radioisotopes used in environmental, pharmaceutical, nuclear medicine, and research laboratories. Our products include liquid scintillation counters, radiation monitors, personal dosimeters, radio chromatography instruments and software, microplate readers and a variety of radiation safety consumables. For further information please visit www.lablogic.com or call our office at 813-626-6848.

LAURUS Systems Inc. — Booth: 110

3460 Ellicott Center Drive, Suite 101
Ellicott City, MD 21043
410-465-5558
www.laurussystems.com

LAURUS Systems specializes in the sales, service, and calibration of radiation and chemical instruments to hazmat professionals, emergency responders, the nuclear industry, military and homeland security. LAURUS is a private, 100% woman-owned small business concern that offers all its products and services through the GSA.

LND, Inc. — Booth: 204

3230 Lawson Blvd.
Oceanside, NY 11572
516-319-1342
www.lndinc.com

For over 50 years LND, Inc. has been a leading manufacturer of Nuclear Radiation Detectors. Products include GM Detectors, X-ray Proportional Counters, He3 and Bf3 Neutron Detectors, Ionization Chambers, Fission Counters, and Gas Sampling Detectors. Industries supported include Health Physics, Research, Homeland Security, Materials Analysis, and thin foils production.

Ludlum Measurements, Inc — Booth: 418

501 Oak Street
Sweetwater, TX 79556
325-235-5494
ludlums.com

Ludlum Measurements, Inc. has been designing, manufacturing and supplying radiation detection and measurement equipment in response to the world's need for greater safety since 1962. Throughout its more than 5-decade history, it has developed radiation detection technologies and instruments in support of enhancing the safety of personnel and the environment.

Mazur Instruments — Booth: 404

200 South Wilcox Street #448
Castle Rock, CO 80104
303-325-7463
www.mazurinstruments.com

Mazur Instruments designs, develops, and manufactures handheld survey meters used by professionals and organizations across the globe to detect, measure and monitor nuclear radiation. Made in the USA, the company's instruments are competitively priced and offer ruggedness, high reliability, outstanding battery life, autonomous data-logging, inline statistics and wireless connectivity.

Mirion Technologies — Booth: 208

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5000 Highlands Parkway
Smyrna, GA 30082
800-243-4422
www.mirion.com

Mirion Technologies is a leading provider of innovative products, systems, and services related to the measurement, detection and monitoring of radiation. The company delivers high-quality, state-of-the-art solutions that constantly evolve to meet the changing needs of its customers. With the addition of the Canberra brand in 2016, Mirion expanded its portfolio and the breadth of its expertise to bring a new standard of solutions to the market. Every member of the Mirion team is focused on enhancing the customer experience by delivering superior products, exceptional service, and unsurpassed support. Mirion Technologies: Radiation Safety. Amplified.

NRRPT — Booth: 520

PO Box 3084
Westerly, RI 02891
401-637-4811
www.nrrpt.org

To encourage and promote the education and training of Radiation Protection Technologists and, by doing so, promote the science of Health Physics.

NSSI — Booth: 401

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5711 Etheridge Street
Houston, TX 77087
713-641-0391
www.nssienvironmental.com

NSSI, established in 1971, is a fully licensed and permitted provider of hazardous, mixed, and radioactive waste storage and treatment services. Our services support a diverse customer base in the government, industrial, radio pharmaceutical, and education sectors.

Nuclear News (ANS) — Booth: 424

555 N. Kensington Ave.
La Grange Park, IL 60526
800-682-6397
ans.org/nn

Nuclear News, the monthly membership magazine of the American Nuclear Society, is recognized worldwide as the flagship trade publication for the nuclear field. A free issue – with a special section dedicated to Health Physics and Isotopes & Radiation – is included in your HPS registration bag. Advertise, Subscribe, or Join today!

Nucsafe, Inc. — Booth: 123

601 Oak Ridge Turnpike
Oak Ridge, TN 37830
865-220-5050
www.nucsafe.com

Since 1999, Nucsafe has been focused on nuclear security markets including border, port security, mobile and aerial monitoring and specialized portable applications. Nucsafe manufactures radiation measurement systems for the nuclear safeguards industry, law enforcement and federal agencies tasked with providing nuclear safety and protecting the public.

NUVIA Dynamics Inc. — Booth: 226

222 Snidercroft Road
Concord, ON L4K 2K1 Canada
905-760-9512
nuviatech-instruments.com

We offer standard and tailored measurement solutions to nuclear owners, operators, and stakeholders for all stages of a facility's life cycle under the NUVIATech Instruments brand. Either components (detectors, analyzers or software) or complete systems which can incorporate carrier/conveyor equipment, GPS control and/or signal processing units are available.

NV5-Dade Moeller — Booth: 211

1835 Terminal Drive, Suite 200
Richland, WA 99354
509-946-0410
www.NV5.com

NV5-Dade Moeller provides professional and technical services to government and commercial clients in radiological and nuclear safety, public and worker protection, and environmental project operations. We have experience in a wide range of disciplines, including health physics, industrial hygiene, occupational safety, training, environmental services, infrastructure, engineering, and program management.

Off-Site Source Recovery Program — Booth: 327

PO Box 1663, Mail Stop E539
Los Alamos, NM 87545
505-667-7920
osrp.lanl.gov

The Off-Site Source Recovery Program (OSRP) has an NNSA-sponsored mission to remove excess, unwanted, abandoned, or orphan radioactive sealed sources that pose a potential risk to national security, health, and safety.

On Site Systems — Booth: 426

8780 Big Bend Boulevard
St Louis, MO 63119
314-963-9934
www.hpassist.com

ORAU — Booth: 507

Silver Sponsor

100 ORAU Way
Oak Ridge, TN 37831
865-241-3744
www.orau.org

ORAU provides professional training in health physics, reconstructs radiation doses, conducts independent environmental assessments and verification, performs epidemiologic studies and exposure assessments, and manages health data for millions of active and former energy workers. A 501(c)(3) nonprofit corporation and federal contractor, ORAU manages ORISE for the Department of Energy.

ORTEC — Booth: 304

801 S. Illinois Ave
Oak Ridge, TN 37830
865-483-2124
www.ortec-online.com

ORTEC has been an industry leader in the design and manufacture of ionizing radiation detectors, nuclear instrumentation, analysis software, and integrated systems for over 55 years. Our products are deployed globally for Nuclear Security, Waste Management, Health Physics, and Radiochemistry Laboratory Applications. Visit our booth today and allow us to assist you with your nuclear measurement needs.

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940 Winter St.
Waltham, MA 02451
781-663-6900
ww.perkinelmer.com

PerkinElmer is a global leader focused on improving human and environmental health, for the better. We offer complete Radiometric Detection solutions for Life Science Research, Environmental Monitoring, and Health Physics. Our Instruments, radiochemicals, cocktails, vials and microplates were developed together to provide you tools for your most sensitive assays.

Perma-Fix Environmental Services, Inc. — Booth: 227

1093 Commerce Park Dr., Suite 300
Oak Ridge , TN 37830
865-251-2078
www.perma-fix.com

Perma-Fix Environmental Services, Inc., is a nuclear services company and leading provider of nuclear waste management services. We provide project management, decontamination and decommissioning, waste management, remediation, and radiological protection, surveying, safety and industrial hygiene services. Perma-Fix operates three waste treatment facilities, providing the most comprehensive waste management services nationwide.

Philotechnics, Ltd. — Booth: 311

201 Renovare Blvd
Oak Ridge, TN 37830
865-483-1551
www.philotechnics.com

Philotechnics, Ltd. is a full-scope radiological services company headquartered in Oak Ridge, Tennessee. At the very core of our philosophy is our commitment to being the most responsive, broad-spectrum radiological services provider in the nation dedicated to advising you on the most appropriate method to accomplish your objectives.

Radiation Safety & Control Services Inc (RSCS) — Booth: 218

91 Portsmouth Ave
Stratham, NH 03885
603-778-2871
www.radsafety.com

RSCS offers expertise in all aspects of radiation safety and measurement applications. We specialize in operational and decommissioning services for nuclear, industrial, medical, and government radiological facilities. Our services include health physics consulting, technical staffing, training, instrumentation (sales, installation, calibration, and repair), emergency planning, and specialized radiological characterizations and measurements.

Radiation Solutions Inc — Booth: 207

5875 Whittle Road
Mississauga, Ontario L4Z 2H4 Canada
905 890 1111
www.radiationsolutions.com

Radiation Solutions Inc (RSI) is a manufacturer of low level radiation detection instruments. Specializing in large and small scale mobile systems for land vehicle, marine, airborne, and stationary monitoring as well as handheld nuclide identification (RIID) units. Applications range from environmental, emergency response, security and geological mapping. The various systems offer Survey/,Search , ID, Mapping and Directional capabilities. In addition, vehicle portal monitoring systems are also produced for homeland security, the scrap metal recycling industry and for solid waste transfer stations and trash sites.

Rexon TLD Systems, Inc. — Booth: 122

24500 Highpoint Rd
Beachwood, OH 44122
216-292-7373
www.rexon.com

All-American four division firm manufacturer of custom design & high volume scintillation and dosimetry radiation detection for Personnel, Nuclear, High-Energy & Astro Physics, Environmental & Industrial Monitoring, Security, Medical & Clinical projects, Medical Camera & Detector Repair & Refurbishment, Geophysical areas, Government & Military Research markets. Rexon Healthcare sends wide array of equipment sets for any medical & scientific laboratory worldwide. Rexon Machine Services OEM machines unique & common metals, crystals, & other hard-to-machine materials into HW & SW.

RSO, Inc. — Booth: 505

PO Box 1450
Laurel, MD 20725
301-953-2482
www.rsoinc.com

RSO, Inc. offers a variety of radioactive waste management and disposal services. We also offer radiation safety services such as license audits, decommissioning, license termination, source leak tests, personnel dosimetry, and instrument calibration. See our online catalog for sales items.

SafetyStratus — Booth: 402

Silver Sponsor

714 Valley Road
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607-280-6047
www.safetystratus.com

SafetyStratus is a cloud-based EH&S enterprise software platform serving higher-education, research, healthcare, and general industry. Our Radiation Management System manages cradle to grave tracking of radioactive materials across multiple campuses and facilities. With SafetyStratus, radiation safety professionals and their end users can manage all components of a comprehensive radiation safety program, including: license and permit limits, purchasing and receiving, inventory and decay, and waste disposal and shipments.

S.E. International, Inc. — Booth: 313

PO Box 39
Summertown, TN 38483
931-964-3561
www.seintl.com

Manufacturer of the Radiation Alert® product line, offering affordable handheld ionizing radiation detection instruments including Geiger counters, dosimeters, multi-channel analyzers, and area monitors for surface and air contamination. Proven reliable in Emergency Response, environmental, industrial, laboratory, research, Health physics, and educational fields. We provide excellence in instrumentation, reliability and customer service.

Spectral Labs Incorporated — Booth: 325

15920 Bernardo Center Drive
San Diego, CA 92127
858-451-0540
www.spectrallabs.com

Spectral Labs Incorporated's (SLI) portfolio ranges from immersive simulation training software and apps to air particle and contraband detectors and technology interfaces. SLI's Employee Owners demonstrate a "Passion for Practical Solutions" through innovative hardware and software technologies that benefit military, responder, and law enforcement customers.

Spectrum Techniques — Booth: 500

106 Union Valley Road
Oak Ridge, TN 37830
865-482-9937
www.spectrumtechniques.com

Spectrum Techniques is your primary source for exempt quantity radionuclides, radiation detection and measurements instrumentation. Applications include teaching in nuclear medicine, health physics, chemistry, biology and nuclear engineering. See our website at Spectrumtechniques.com for MCAs, nuclear counters and ratemeters. Source types include disk, rod, laminated and needle sources.

Technical Associates/ Overhoff Technology — Booth: 112

7051 Eton Avenue
Canoga Park, CA 91303
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www.tech-associates.com

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Teletrix — Booth: 108

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Pittsburgh, PA 15239
412-798-3636
www.teletrix.com

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TestAmerica — Booth: 425

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Richland , WA 99354
309-264-7200
www.testamericainc.com

With a nationwide network of over 80 locations, TestAmerica Laboratories, Inc., provides clients with innovative technical expertise and comprehensive analytical testing services. TestAmerica's team of over 2,000 industry professionals offers support to clients in both the public and private sectors. Our analytical services include routine environmental parameters and specialty analyses such as source and ambient air testing, explosives, specialty organics, dioxins, sediments and tissues, emerging contaminants, radiochemistry and mixed waste, and drinking water testing.

Thermo Fisher Scientific — Booth: 105

Silver Sponsor

One Thermo Fisher Way
Oakwood Village, OH 44146
800-274-4212
www.thermofisher.com

The Radiation Measurement and Security Instruments business of Thermo Fisher Scientific is the world leader in gamma radiation spectroscopy, and TLD crystal growth and dosimeter manufacturing. Our instrumentation is used to detect, measure, and analyze radiation, meeting military theatre application standards. We offer solutions from telemetry to command-and-control software.

Transco Products Inc. — Booth: 518

200 N. LaSalle St. , Suite 1550
Chicago, IL 60601
312-896-8458
www.transcoproducts.com

Transco Products Inc. is proud to introduce RadVision3D – a suite of 3D gamma detection, visualization, and mitigation products and services. With over seven decades of experience in the power industry, Transco has provided products and services to over 200 nuclear power plants around the world. Visit our website at http://www.transcoproducts.com/products/radvision3dsolutions to learn more.

Ultra Electronics Energy — Booth: 501

7 Lancaster Road , Ferndown Industrial Estate
Wimborne, Dorset BH21 7SQ UK
44 1202 850450
www.ultra-electronics.com

Ultra Electronics Nuclear Control Systems specializes in the supply of radiation detection systems to the nuclear industry. Products supplied include measurement instruments for dose-rate, contamination, and the measurement of radioactive concentration in air and liquids. Ultra Electronics - NCS supports operating NPP's, fuel cycle facilities and decommissioning projects around the World.

Versant Medical Physics and Radiation Safety — Booth: 220

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888-316-3644
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UNIVERSITY TABLES

Colorado State University

CSU/ERHS
1618 Campus Delivery
Fort Collins, CO 80523
970-491-0563
csu-cvmbs.colostate.edu/academics/erhs/health-physics

Colorado State University offers both PhD and an ABET accredited MS program in in health physics, as well as concentrations in radio-ecology and radiochemistry. We have an established relationship with Fukushima University where many of our students perform their research. Most students are supported via grants from multiple agencies.

Duke University Health Physics Graduate Program

2223 Pratt Street, Box 3155 DUHS
Durham, NC 27710
919-812-7231
www.yoshizumilab.com

The Duke University Health Physics Graduate Program has offered both MS and PhD since 2015. Program offers exceptional educational learning opportunities at one of the leading medical centers and universities. We would love to talk to you to discuss your graduate education plans.

Oregon State University, School of Nuclear Science and Engineering

141 Batcheller Hall
Corvallis, OR 97331
541-737-7063
www.ne.oregonstate.edu

The School of Nuclear Science and Engineering (NSE) at Oregon State University supports nationally recognized programs at the undergraduate and graduate level in health physics, radiochemistry,and nuclear engineering. NSE is known for its cutting edge research, large-scale test facilities, international footprint and industry and governmental partnerships.

Purdue University

550 Stadium Mall Drive
West Lafayette, IN 47907
765-494-1419
www.purdue.edu/hhs/hsci

Purdue University's School of Health Sciences is committed to creating, disseminating, preserving and applying knowledge in the areas of Radiological, Occupational and Environmental Health Science through leading-edge scholarly research, teaching and engagement. The School offers a long-standing and nationally recognized educational program in Radiological Health Science (Health Physics).

University of Alabama at Birmingham

Department of Clinical & Diagnostic Sciences,
Health Physics Program
1716 9th Ave S.
Birmingham, AL 35294
205-934-7637
www.uab.edu/shp/cds/health-physics

Master of Science in Health Physics program at the University of Alabama at Birmingham started in 2016. Highly qualified faculty members and well-equipped laboratories are avaialable. Opportuniites are avaialable in the local hospitals and organizations for practicum and hand-on experience.

University of Michigan, Department of Nuclear Engineering and Radiological Sciences (NERS)

2355 Bonisteel Blvd
Ann Arbor, MI 48109
734-763-9117
ners.engin.umich.edu

Academic department within engineering college offering undergraduate (Bachelor's), master's, and doctoral degrees in radiological sciences, including health physics. Top-ranked nuclear engineering program in the the United States.

University of Nevada, Las Vegas

Department of Health Physics and Diagnostic Sciences
4505 S. Maryland Parkway
Las Vegas, NV 89154
702-895-4320
www.unlv.edu/hpds

Students within the Department of Health Physics and Diagnostic Sciences may pursue certificate, minor, bachelor, and graduate degrees in the areas of health physics, nuclear medicine, comprehensive medical imaging, radiochemistry, and radiography. The mission of the health physics program is to provide a high-quality education experience for students in the fields of environmental health physics, medical physics, and radiation safety. The educational experience is accomplished through rigorous classroom instruction aided by computer and multimedia instruction, practical laboratory experiences, an introduction to the principles of research, and mentoring. Students interested in the medical physics programs should consult the SDAMPP Student Guide to a Medical Physics Career.

Sunday Professional Enrichment Program (PEP)

All sessions take place in the Huntington Convention Center

SUNDAY

8:00 AM – 10:00 AM

PEP 1-A **Room 1**
CAPP88-PC Version 4.1 Update
Brian Littleton, Ray Wood

PEP 1-B **Room 3**
Status of ANSI N42 RPI and HSI Standards
Morgan Cox

PEP 1-C **Room 4**
RadNet Deployable
Michael Messer

PEP 1-D **Room 5**
Power Reactor Dry Fuel Storage Neutron Measurements - Practical Applications
Patrick LaFrate

PEP 1-E **Room 6**
Nonionizing Radiation: An Overview of Biological Effects and Exposure Limits
Ben Edwards

PEP 1-F **Room 7**
Radiation Litigation Part I - Understanding the Legal Concepts for Radiation Litigation
Ray Johnson

10:30 AM – 12:30 PM

PEP 2-A **Room 1**
ASTM Standards That Either Directly Impact or Influence Radiation Protection Planning and/or Operations
Ed Walker

PEP 2-B **Room 3**
Integration of Health Physics Into Emergency Response
Steve Sugarman

PEP 2-C **Room 4**
A Forgotten Nuclear Accident: Bravo
Casper Sun

PEP 2-D **Room 5**
Nanotechnology and Radiation Safety
Mark Hoover

PEP 2-E **Room 6**
Laser Safety for Health Physicists
Ben Edwards

PEP 2-F **Room 7**
Radiation Litigation Part II - Preparation as an Expert or Fact Witness and Risk Communication
Ray Johnson

2:00 PM – 4:00 PM

PEP 3-A **Room 1**
Statistics, Uncertainty, and Detection Decisions - A Practical Review for Health Physics Practitioners
Doug van Cleef

PEP 3-B **Room 3**
Where Did This Come From? Lessons Learned From High-Routine Bioassay Investigations
Eugene Carbaugh

PEP 3-C **Room 4**
Coping With Natural Disasters and Radioactive Materials
Phil Simpkins

PEP 3-D **Room 5**
Promise and Peril of "Citizen Science" and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change
Robert Emery

PEP 3-E **Room 6**
Performing ANSI Z136-Based Laser Hazard Calculations
Ben Edwards

PEP 3-F **Room 7**
Radiation Dosimetry in Nuclear Medicine Therapy
Michael Stabin

Final Scientific Program

Presenter's name is asterisked (*) if other than first author. All sessions take place in the Huntington Convention Center.
This meeting has applied to CAMPEP for approval of 25 MPCEC hours.

MONDAY

7:15 AM – 8:15 AM

CEL-1 **Room 3**
Modeling Data for Radiological Impact Assessment: Humans and Biota
Stephanie Bush-Goddard, Tanya Oxenberg
United States Nuclear Regulatory Commission

CEL-2 **Room 4**
Retired but not Yet Green Field
Robert Miltenberger

8:30 AM – 12:30 PM Global Center Ballroom AB

MAM-A: Plenary Session: Health Physics and the Realm of Low-Dose Radiation
Chair: Eric Abelquist

8:30 AM **MAM-A.1**
Opening Remarks
Abelquist E
HPS President and ORAU

8:40 AM **MAM-A.2**
Welcome to Cleveland
The Honorable Frank Jackson
Cleveland Mayor

8:45 AM **MAM-A.3**
What Have Inappropriate Radiation Limits Done to Our Nuclear Waste Disposal Program?
Conca J
UFA Ventures, Inc.

9:30 AM **MAM-A.4**
Prudence and the Hidden Burden of Conservatism
Coates R
IRPA

10:15 AM **Exhibit Hall**
BREAK

10:35 AM **MAM-A.5**
Low-Dose Radiation Biology, Past, Present, and Future
Brooks AL
Washington State University

11:20 AM **MAM-A.6**
Latest Development and Applications of the Multiscale Chinese Reference Phantoms
Qiu R, Wu Z, Li C, Ren L, Wang W, Zhu H, Dai M, Pan Y, Ma R, AH
Tsinghua University, Nuctech Company Limited

12:05 PM **MAM-A.7**
Panel Discussion

Exhibitor Lunch
12:30 PM
All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.
Note: the free lunches are not included in your registration fee, but are paid for by our sponsors & exhibitors.

12:15 PM – 2:15 PM

PEP M-1 **Room 3**
So Now You Are the RSO: Elements of an Effective Radiation Safety Program
Thomas Morgan

PEP M-2 **Room 4**
Ethical Decision Making With Link to Safety Culture & Radiation Safety's Role in Mitigating Insider Security Risks
Janet Gutierrez, Bob Emery

1:00 PM – 3:00 PM — Exhibit Hall

P: Poster Session

Accelerator

P.2 Preliminary Study on the Dose Estimation for Nondestructive Imaging System Based on Laser-Wakefield Acceleration
Wei SY, Qiu R, Yang B, Ma C, Zhang H, Wu Z, Li CY, Li JL
Tsinghua University, China Academy of Engineering Physics

Emergency Response

P.3 U.S. Environmental Protection Agency's Environmental Sampling & Analytical Methods Program
Hall KM
U.S. Environmental Protection Agency

P.4 Initial Comparison of Fallout Modeling Codes Within Fallout Planning Tool and Specialized Hazard Assessment Response Capability
Cook KM
Oak Ridge National Lab

P.5 Effects of Elevation and Humidity on External Contamination Screening Criteria
Samuels CE, Ansari AS, Hertel NE
Georgia Institute of Technology, Centers for Disease Control and Prevention

Environmental Monitoring

P.6 Quantitation of Radioactivity in Environmental Samples using Eight 11 cm x 42.5 cm x 5.5 cm NaI(Tl) Detectors
Shubayr NA, Miller JM, Seekamp J, Di Fulvio A, Xiao J, Kearfott KJ
University of Michigan

P.7 Preliminary Evaluation of a Gamma-ray Spectral Signature Analysis Technique for 11 cm x 42.5 cm x 5.5 cm NaI(Tl) Detectors in Fixed Locations with a Well-Characterized Background
Seekamp J, Wang Y, Di Fulvio A, Yuan F, Mata LA, Xiao J, Kearfott JH
University of Michigan, Tsinghua University

P.8 A Simple Mathematical Model for Predicting the Radon Removal Efficiency of an Activated Charcoal System for Radon Mitigation
Zhou Q, Zhao G, Xiao D, Qiu S, Kearfott KJ
University of Michigan, University of South China

P.9 Application of U.S. EPA SWMM 5 to a Radio-Nuclide-Contaminated Urban Catchment with Low-Impact Developments
Ng GM, Higley KA
Oregon State University

P.10 Environmental Natural Radioactivity in Soils Collected Near a coal-fired Power Plant
Gella U, Billa J, Adzanu S, Amankwah B, Moore B, Adjaye J, Ankrah M
Alcorn State University, University of Kentucky

P.11 Studies on Isotopic Transfer Factor and Resultant Dose from Selected Tobacco Leaves
Nandi S, Billa J, Trevor L, Nelson E, Adzanu S, Adjaye J, Ankrah M
Alcorn State University, University of Kentucky

P.12 Radium Levels in Sludge Samples from Water-Treatment Facilities
Brempong O, Billa J, Amankwah F, Martin J, Bonds J, Adzanu S, Ankrah M, Barker Q, Adjaye J
Alcorn State University

P.13 Radiometric Studies on Organic Fertilizers
Queen K, Billa J, Adzanu S, Akuana B, Snyder M, Ankrah M, Adjaye J
Alcorn State University

P.14 Development and Characterization of Extractive Scintillating Resins for Determination of Ultra-Low-Level Plutonium in Aquatic Systems
Fullmer WK, Seliman A, Husson SM, Powell BA, DeVol TA
Clemson University

P.16 Determination of Bioavailability of Radiocesium and Plutonium in the Fukushima Exclusion Zone Using a Sequential Extraction Technique
*McNabb IM, Sudowe R**
Colorado State University

P.17 Radon Concentrations in Ground Water from Selected Counties of Mississippi
Tepeh J, Vattioknda J, King J, Billa J, Adzanu S, Adjaye J, Ankrah M
Alcorn State University

P.18 Ecological and Occupational Hazards Due to Natural Radioactivity and Heavy Metals in Soils of Some Selected Mining Sites in Nigeria
Dike CG, Oladele BO, Olubi OE, Aderibigbe A*
Federal University of Technology Akure, Achievers University Owo, University of Ibadan

P.19 Geo-Spatial Analysis of Radon and Gamma Dose Rates in Indoor/Outdoor Environment of Muzaffarabad City
Rafique M, Abbasi S, Kearfott KJ, Khan Tareen AD, Rahman SU
University of Azad Jammu and Kashmir, University of Michigan, Nuclear Medicine, Oncology and Radiotherapy Institute

External Dosimetry

P.20 Application of Traditional Type Test Standards to Nontraditional Dosimetry: Using IEC 62387-2012 to Type Test the Mirion Instadose Products
Baca MA
Mirion Technologies, Inc.

P.21 Buildup Factor and Linear Attenuation Coefficient of MCP-69 Alloy
Maqbool M, Islam MS, Clark J
University of Alabama at Birmingham, Ball State University

P.22 Characteristic of a PuBe Neutron Source
Willey AH, DeVol TA, Martinez NE
Clemson University

P.23 Comparison of Monoenergetic Photon Organ Dose Rate Coefficients for Male and Female Pediatric Stylized and Voxel Phantoms Submerged in Air
Dewji SA, Bales KE, Griffin K, Lee C, Hiller MM*
Oak Ridge National Laboratory, University of Tennessee, National Institute of Health, Independent Contributor

P.24 Management of Large Numbers of Al2O3:C Optically Stimulated Luminescent Dosimeters for a Nonautomated System
Trimas DJ, Golduber RM, Liu K, Abraham SA, Latosz LV, Mapes JL, Kearfott KJ
University of Michigan

P.25 Calibration and Statistical Performance of Al2O3:C Optically Stimulated Luminescent Dosimeters With and Without Annealing
Latosz LV, Mapes JL, Liu K, Abraham SA, Golduber RM, Miller JM, Trimas DJ, Kearfott KJ*
University of Michigan

Historical

P.26 World List of Early Nuclear Reactors, Africa and Asia – A Philatelic Look at Health Physics History
Johnston TP
National Institute of Standards & Technology

P.27 World List of Early Nuclear Reactors, Europe – A Philatelic Look at Health Physics History
Johnston TP
NIST

P.28 World List of Early Nuclear Reactors, the Americas and Antarctica – A Philatelic Look at Health Physics History
Johnston TP
NIST

P.29 Space Applications With Radiation Sources and Detectors, Part 1
Johnston TP
National Institute of Standards & Technology

P.30 Space Applications With Radiation Sources and Detectors, Part 2
Johnston TP
NIST

Instrumentation

P.31 Student Investigation of a New Device for Creating a Digital Library With Standard HP Survey Instruments
Krout CL, Simpson DR, Gunter RJ, Bass N, Guernsey AM, Karchner MA
Bloomsburg University, CHP Consultants

P.32 Development of High Efficiency of Multielement Gaseous Neutron Dosimeter
Kim YE, Byun SH
McMaster University

Internal Dosimetry

P.33 Reassessment of an Intake of Insoluble Plutonium
LaBone TR, Hyman SD, Eckerman KF
MJW Corporation, Savannah River Nuclear Solutions, Oak Ridge National Laboratory (retired)

P.34 Biokinetic Modeling for Rats: Americium-241 Inhalation Exposure
Swanson JL, Brey RR, Miller G, Melo D, Weber WM, Doyle-Eisele M
Idaho State University, Melohill Technology, LLC, Lovelace Respiratory Research Institute

P.35 Development of 3D Printed Age-Specific Thyroid Phantoms for In-Vivo Measurement After Accidental Incorporation
*Beaumont T, Caldeira Ideias P, Broggio D, Franck D**
IRSN

Medical Dosimetry

P.36 Evaulating Eye Lens Dose for Interventional Radiologists Using Optically Stimulated Luminescence Dosimetry in a Clinical Environment
*Ford JS, Jorgensen TJ, Smith DA, Kim AY, Benevides**
Georgetown University

P.37 Fast Monte Carlo Simulation Applied in Brachytherapy
Hu AK, Qiu R, Wu Z, Li CY, Zhang H, Li JL
Tsinghua University, Beijing, China

Medical Health Physics

P.38 Y-90 Shielding in the Nuclear Medicine Hot Lab
Rayadurgam P, Miller A
Cleveland Clinic

P.39 Design of a Beam Shaping Assembly for Boron Neutron Capture Therapy Using a D-D Neutron Generator
Liu K, Beyer KA, Zhang Y, Latosz LV, Clarke SD, DiFulvio A, Pozzi SA, Kearfott KJ
University of Michigan

P.40 Comparison of the Responses of Common Thermoluminescent and Optically Stimulated Luminescent Dosimeters in a Humanoid Phantom
Liu K, Latosz LV, Abraham SA, Trimas DJ, Golduber RM, Kearfott KJ
University of Michigan

P.41 Monte Carlo Simulations of Elemental Imaging Using the Neutron Associated Particle Technique
Abel MR, Nie LH
Purdue University

P.42 Innovative Use of Radioactive Seeds as an Alternative to Wire Localization for Surgery of Nonpalpable Breast Lesions
Kitich A, Hargreaves J, Kroger L, Mayadev J, Sauder C*
UCD Health

P.43 Optimization of Adult Abdominal Computed Tomography Protocol at Medstar Georgetown University Hospital Using Iterative Reconstruction Algorithm Levels
Ioannidou S, Mitchell CA, Jorgensen TJ, Benevides L, Smith DA
University of Florida, Georgetown University

P.44 Radiation Dose Enhancement of Bismuth Nanoparticles in a Breast Cancer Phantom Model
Gray JM, Xu XG
Rensselaer Polytechnic Institute, University of Science and Technology of China

P.45 Radiation Dose Tracking From X-Ray Procedures: Where Are We and Where Should We Be?
Borras C, Beckfield F, Elder D, Kroger L, Lemieux BP, Noska MA, Thomas JA
Medical HP Section

P.46 The Alpha Advantage: Supporting Bone Marrow Ablation Research Using At-211
Sober JC, Zahniser SG
Fred Hutchinson Cancer Research Center

P.47 State of Radiation Protection Practice by Radiologic Technologists at Saudi Pediatric Hospitals
Almashhki AM, Sayed MG
Asir Children's Hospital, CSUDH

P.48 Gamma Attenuation of Military Vehicles
Burns CD
Georgia Institute of Technology

Radiation Effects

P.49 Understanding the Radiation Induced Bystander Effect (RIBE)
Mensah C, Ganguly K, Mallett MW, Seagraves DT, Gleasner CD
Los Alamos National Laboratory

P.50 Detection of Soil Radon Anomalies for Earthquake Forecasting Using Machine Learning Techniques
Khan Tareen AD, Khawaja A, Kearfott KJ, Rafique M, Ahmad Nadeem MS, Iqbal T, Rahman SU
University of Azad Jammu and Kashmir, Quaid e Azam University, University of Michigan, Nuclear Medicine, Oncology and Radiotherapy Institute

Radiation Safety Officers

P.51 Implementation of a Radiation Safety Program in a Medical Device Company:The Advantages of a Corporate-Wide and Global Program
Riopel AM
Stryker, Inc.

P.52 Evaluation of Hypothetical Actinium-225 Needle-Stick Incidents and Appropriate Prevention Methods
*Gibbons WR, Budzevich MM, Weaver AS**
University of South Florida, Moffitt Cancer Center

Radiobiology - Biological Response

P.53 Single Celled Organisms and Their Usefulness in Studying Dose Response Relationships
Turner AJ, Brey RR
Idaho State University

P.54 Biological Effects of Melanin in the Intact and Irradiated Organism
Bulinina TM, Ivanov AA, Andrianova IE
State Research Center – Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

P.55 Accumulation of ^{90}Sr and ^{137}Cs by Higher Aquatic Vegetation of the Reservoir 10 of the Techa Reservoir Cascade
Dyusenova RD, Tryapitsina GA
Urals Research Center for Radiation Medicine; Chelyabinsk State University

P.56 Association Between Immune System's Genes Polymorphisms and Immunity Parameters in Persons Exposed to Chronic Radiation Exposure
Kotikova AI, Blinova EA, Akleyev AA
Urals Research Center for Radiation Medicine, FMBA of Russia, South Ural State Medical University

P.57 Influence of Chronic Radiation Exposure the Hematopoiesis in the Head Kidney of Roach (Rutilus rutilus) in In Situ Experiments
Tiukhai MV, Pryakhin EA, Akleyev AV
Urals Research Center for Radiation Medicine (URCRM), Chelyabinsk, Russia

Works in Progress

P.58 Biokinetics of 238Pu: Analysis of Several Inhalation Incidents at Los Alamos National Laboratory
Poudel D, Klumpp JA, Waters TL, Bertelli L
Los Alamos National Laboratory

P.59 University of California System-wide Cesium Irradiator Replacement Program
MacKenzie CJ, Smith K
University of California, Berkeley

P.60 Study of Radon Inhalation Dose Rate in the Area of Highest Lung Cancer Incidence in India
Bawitlung Z, Rohmingliana PC, Chhangte LZ, Siama RL, Chungnunga H, Lawma VR, Sahoo BK, Sapra BK
Zirtiri Residential Science College, Aizawl, Bhabha Atomic Research Centre, Mumbai, India

P.61 A Novel Platform for Digitization of Radiation Measurements in Radioprotection, Decommissioning & Dismantling and Nuclear Waste Management
Mini G, Morichi M, Locatelli M, Pepe F, Rogo F
CAEN SyS srl, CAEN Technologies Inc.

P.62 Special Nuclear Material Portable Identifier
Locatelli M, Mini G, Morichi M, Mangiagalli G, Fanchini E, Stevanato L, Lunardon M, Fontana C
CAEN Technologies Inc., CAEN SyS srl, University of Padova

3:00 PM – 5:15 PM Room 1

MPM-A: Medical Health Physics, Part I

Co-chairs: Mike Stabin, James Menge

3:00 PM MPM-A.1
New RADAR Resources for the Practicing Health Physicist
Stabin MG
Vanderbilt University

3:15 PM MPM-A.2
Approved Method for Domestic Production of Mo-99
Mohaupt TH
NorthStar Medical Radioisotopes

3:30 PM MPM-A.3
Occupational Dose for Medical Staff During the Preparation and Administration of Therapy Treatments of Iodine-131 Metaiodobenzylguanidine
Barnes JA, de la Guardia M, Ripley E
Cook Children's Medical Center, Medical Physics Consultants

3:45 PM MPM-A.4
Lutathera Radiopharmaceutical Therapy Experience at an NCI Accredited Cancer Center
Harvey RP
Roswell Park Cancer Institute

4:00 PM MPM-A.5
Radiation Safety Reviews of Patient Skin Dose - Differentiating Controllable and Noncontrollable Variables
Nelson KL, Pavlicek W
Mayo Clinic Arizona

4:15 PM MPM-A.6
Quality Management of Interventional Fluoroscopy (IVF) Programs to Reduce Radiation Risks to Patients and Staff
Menge JP, Dielman R
SME Associates LLC, Radiation Safety Advisors

4:30 PM MPM-A.7
Improving Radiation Protection of Workers and Patients in Interventional Cardiology
*Gilley D, Pinak M**
IAEA

4:45 PM MPM-A.8
Occupational Radiation Protection of Radiologists and Technicians Performing Fluoroscopically Guided Interventional Procedures–An Investigation of Posture and Movement Effects
Mao L, Liu T, Gao Y, Dauer LT, Caracappa PF, Xu XG
Rensselaer Polytechnic Institute, Memorial Sloan Kettering Cancer Center, University of Science and Technology of China

5:00 PM MPM-A.9
Effect of Body Size Dependent Dose Coefficients in Fluoroscopically Guided Interventional Procedures (FGIP) to the United States Radiologic Technologists (USRT) Cohort
Chang LA, Borrego D, Lee C
Houston Methodist Hospital, National Cancer Institute

2:30 PM – 5:00 PM Room 3

MPM-B: Special Session: Measurement of Ac-227 in the Workplace

Chair: Gorvind Rao

2:30 PM **MPM-B.1**
Radiological Protection Challenges in Supporting Actinium-227 Research at the Oak Ridge National Laboratory
Stafford MW
Oak Ridge National Laboratory

3:00 PM **MPM-B.2**
Radon Compensation and Source-Term Considerations When Performing Particulate Air Monitoring in the Presence of Actinium-227
Reaves KL
UT-Battelle, ORNL

3:30 PM **MPM-B.3**
The Challenge of Providing Bioassay Monitoring for the Most Restrictive Radionuclide Listed in Appendix A of 10 CFR 835 - Purified Actinium-227
McLaughlin DA, Rao GR
ORNL

4:00 PM **MPM-B.4**
Ac-227 Analysis for Exposure Assessment: Handling Progeny, Deconvolution, and Low-Level Counting
Stavola AJ, Kurosaki H, McLaughlin DA, Rao GR
UT-Battelle, ORNL

4:30 PM **MPM-B.5**
Lessons Learned From an Actinium-227 Contamination Incident at the Oak Ridge National Laboratory
Stafford MW, McKinney JW
Oak Ridge National Laboratory

2:30 PM – 5:10 PM Room 4

MPM-C: Special Session: International Collaboration Committee

Chair: Alex Brandl

2:30 PM **MPM-C.1**
ICRP's Role in Global Harmonisation of Radiological Protection Standards, Legislation, and Practice: 90 Years of Recommendations
Clement CH
International Commission on Radiological Protection

2:55 PM **MPM-C.2**
IRPA's Role in the Harmonisation of Radiation Protection Standards
Coates R
IRPA

3:20 PM **MPM-C.3**
Radiation Protection - International Guidance and Application in Practice
Miroslav Pinak MP
IAEA

3:45 PM **MPM-C.4**
Harmonization of Radiation Protection in Europe
Magnusson SM
Icelandic Radiation Safety Authority

4:10 PM **MPM-C.5**
A Federal Agency's Perspective on Harmonization
Boyd MA
U.S. EPA

4:30 PM **MPM-C.6**
Harmonization of Radiation Protection Rules and Regulations at the State Level
McBurney RE
Conference of Radiation Control Program Directors

4:50 PM **MPM-C.7**
Management of Exposure to Ionizing Radiation – NCRP Recommendations for Radiation Protection 2018
Cool DA, Kase KR
Electric Power Research Institute, National Council on Radiation Protection & Measurements

3:00 PM – 4:15 PM Room 5

MPM-D: Radiation Biology

Co-chairs: Ron Goans, Joshua Hayes

3:00 PM **MPM-D.1**
Power Function Retention of Radionuclides in a Wound
Goans RE
MJW Corporation

3:15 PM **MPM-D.2**
The Pseudo Pelger-Huet Anomaly as a Potential Biodosimeter for Chronic Low Dose Radiation Exposure of Mammalian Species Within the Fukushima Daiichi Exclusion Zone
Hayes J, Pederson S, Rollert M, Thomas H, Bailey S, Okuda K, Johnson T
Colorado State University, Fukushima University

3:30 PM **MPM-D.3**
Comparative Analysis of the Effect Of Low Doses Of Ionizing Radiation On Human Mesenchymal Stem Cells
Usupzhanova DY, Astrelina TA, Nikitina VA, Nugis VY, Suchkova YB, Kobzeva IV, Brunchukov VA, Rastorgueva AA, Bushmanov AY, Samoilov AS
State Research Center – Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

3:45 PM **MPM-D.4**
Gene Expression MDM2, BCL-2, OGG1, and Indicators of Immune System in Persons Exposed to Chronic Radiation
Nikiforov VS, Blinova EA, Akleyev AA
Urals Research Center for Radiation Medicine, Chelyabinsk State University, South Ural State Medical University

4:00 PM **MPM-D.5**
Assessment of Chromosomal Aberrations by Using Dicentric Chromosome Assay in Two Selected Populations in Sri Lanka
Weerakkody TL, Warnakulasuriya TD, Dabarera MD, Williams HS, Rathnayake NP, Wickremasinghe AR
Sri Lanka Atomic Energy Board, University of Kelaniya

2:30 PM – 5:15 PM Room 6

MPM-E: Special Session: Rad Air NESHAPs

Co-chairs: Matthew Barnett, Colleen Ostrowski

2:30 PM **MPM-E.1**
U.S. Environmental Protection Agency Update on Radionuclide NESHAPs
Walsh JP
U.S. EPA

2:45 PM **MPM-E.2**
U.S. Department of Energy Subpart H Report
*Ostrowski CN, Snyder SF**
US Department of Energy, Pacific Northwest National Laboratory

3:00 PM **MPM-E.3**
Update on Standards and Technical Reports for Monitoring Radioactive Air Emissions
Glissmeyer JA, Parkin JM, Blunt B, Barnett JM
Glissmeyer Environmental LLC and HI-Q Environmental Products, National Physical Laboratory, Blunt Consulting LLC, Pacific Northwest National Laboratory

3:15 PM **MPM-E.4**
U.S. Environmental Protection Agency Update on Compliance Codes
Littleton B
U.S. Environmental Protection Agency

3:30 PM **MPM-E.5**
Age-Dependent Dose Calculations Using CAP-88 PC Version 4
Ralston LG, Nelson NS
U.S. Environmental Protection Agency

3:45 PM **MPM-E.6**
Terrain Effects on Dose Estimates From Airborne Emissions
Birdwell KR, Scofield PA
UT-Battelle ORNL

4:00 PM **MPM-E.7**
Open-Air Demolition: Validation of EPA Approved Alternative Method for Emission Estimation
Blunt BC, Fox JR, Krentz MP
Blunt Consulting, CH2M Hill BWXT West Valley, DOE - West Valley Demonstration Project

4:15 PM **MPM-E.8**
Performance of Shrouded Probes at the Waste Isolation Pilot Plant Following the 2014 Accidental Radiological Release
Ward AL, Thakur P, Hardy R*
U.S. DOE, CEMRC

4:30 PM **MPM-E.9**
Interim Status on 10-Year Nuclear-Grade HEPA Filter Lifetime Evaluation
Barnett JM, Brown DM, Rishel JP, McDonald KM, Bliss M
PNNL

4:45 PM
Questions & Answers

2:30 PM – 5:15 PM Room 7

MPM-F: Exhibitors of the HPS: A Special Discussion on Products and Services

Chair: Dustin Miller

2:30 PM **MPM-F.1**
Chase Brokerage and Remediation Services
Miller DG
Chase Environmental Group

2:45 PM **MPM-F.2**
Hopewell Designs, Inc.
Mickum GS
Hopewell Designs

3:00 PM **MPM-F.3**
Release of NuVISION, the Next Generation of Gamma Cameras
Rothan D
NUVIA

3:15 PM **MPM-F.4**
CHP Consultants introduces the Counts.Pro Survey Data Collection and Retention System
Gunter RJ, Bass NK
CHP Consultants

3:30 PM **MPM-F.5**
ODYSSEY – A Modern Management System for Radiation Safety Programs and Personnel Dosimetry
Ramsay B, Ramsay A, Roller D
Versant Medical Physics

3:45 PM **MPM-F.6**
Real-Time Gamma Camera
Jokerst T
Mirion Technologies

4:00 PM **MPM-F.7**
Mirion's RadKnight UAVs
Kost J
Mirion Technologies

4:15 PM **MPM-F.8**
Mirion's Instadose+
Potuck V
Mirion Technologies

4:30 PM **MPM-F.9**
The Off-Site Source Recovery Program
Feldman A, Taplin T
LANL, NNSA

4:45 PM **MPM-F.10**
Integrating Hardware Simulators and Virtual Reality in Radiation Protection Training to Elevate Hands-On Learning Activities
Podobnik M
Teletrix

5:00 PM **MPM-F.11**
Spectroscopic Noble Gas Stack Monitor with Continuous Unattended Operation and Analysis
Zickefoose JK, Bronson F, Huckins B, Mowry R, Persson H, Mueller W, Oginni B*
Mirion Technologies (Canberra) Inc.

6:45 AM – 7:45 AM

CEL-3 **Room 1**
Channeling Stephen Hawking: How Lessons From the Renowned Astrophysicist Can Inform and Inspire Great Health Physics for the Future
Mark Hoover

8:00 AM – 11:45 AM Room 1

TAM-A: Special Session: AAHP - Potential Health Effects of Low-Dose Radiation and The Role of Radiation Protection Professionals

Co-chairs: Kyle Kleinhans, Armin Ansari

8:00 AM **TAM-A.0**
Introduction - Why Is This Important?
Kleinhans K, Ansari A

8:15 AM **TAM-A.1**
Radiation Epidemiology and Low Dose Health Effects
Boice JD
NCRP, Vanderbilt

8:45 AM **TAM-A.2**
Estimating Cancer Risks at Low Doses and Dose Rates: Lessons From Dr. Land
Pawel DJ
U.S. Environmental Protection Agency

9:15 AM **TAM-A.3**
What Does Radiation Biology Tell Us about Potential Health Effects at Low Dose and Low-Dose Rates
Azzam E
Rutgers New Jersey Medical School

9:45 AM **TAM-A.4**
Enhancing Low Dose Risk Assessment Using Mechanistic Mathematical Models of Radiation Effects
Shuryak I
Columbia University Medical Center

10:15 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

10:45 AM **TAM-A.5**
Low-Dose Radiation: Interagency Collaboration on Planning Research Could Improve Information on Health Effects
Neumann J, Cook J, Chan A, Ostrander J
Government Accountability Office

11:15 AM **TAM-A.6**
Translating Science to Recommendations - NCRP CC-1
Cool DA
Electric Power Research Institute

8:00 AM – 12:15 PM Room 3

TAM-B: Environment and Radon Section: Modeling Special Session

Chair: Philip Egidi

8:30 AM **TAM-B.1**
International Engagement in the Revision of the IAEA Safety Standard on Source, Environmental, and Individual Monitoring for Radiation Protection
Yankovich TL
IAEA

9:00 AM **TAM-B.2**
The Use of Environmental Radiation Models in Regulatory Decision Making
Walsh JP
U.S. EPA

9:30 AM **TAM-B.3**
The Importance of Deposition Velocity in Modeling Ground Contamination for Emergency Response
Whicker JJ, McNaughton M
Los Alamos Nat. Lab.

10:00 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

10:30 AM **TAM-B.4**
A Review of Recent Organically Bound Tritium Studies and Their Impact on Environmental Dose-Assessment Models
Manglass L, Martinez N
Clemson University

11:00 AM **TAM-B.5**
Heuristics and Machine Learning Approaches to Radiation Protection
Gomez Fernandez ME, Higley KA, Tokuhiro A
Oregon State University, University of Ontario Institute of Technology

11:30 AM **TAM-B.6**
Sectional 3D Model Development for the Reference Tree
Condon CA, Higley KA
Oregon State University

8:00 AM – 12:15 PM Room 4

TAM-C: Detection and Measurement

Co-chairs: Mark Hogue, Ed Walker

8:00 AM **TAM-C.1**
Haight Asbury to Health Physics – A Long Strange Trip
Kephart GS, Mahathy JM, Long M, Adams WC*
ORAU, URS/CHM2, Strata-G, LLC

8:15 AM **TAM-C.2**
ANSI N13.65 Standard for Measurement and Evaluation of Radiation and Radioactive Sources Using Portable Radiation Detection Instruments
Walker EE
Consultant

8:30 AM **TAM-C.3**
Calibration of Tissue Equivalent Organic Scintillators in a Facility Calibrated for Photon Exposure
Hogue MG, Hadlock DJ, Taylor GA
Savannah River Nuclear Solutions

8:45 AM **TAM-C.4**
Development of Novel Nano-Fiber Optic Detector Technology for Real-Time Detection of Iodine-131 Beta Energy
Hyatt SP, Moore BM, Petry NA, Therien MJ, Yoshizumi TT
Duke University

9:00 AM **TAM-C.5**
Synthesis and Scintillation Properties of Nano BaSiF6, BaF2, and CaF2 Scintillators
Davis JE, Gibin G, Simpson MD, Mobley ZR, Ila D, Luo Z
ORAU, Fayetteville State University

9:15 AM **TAM-C.6**
Preliminary Design of a Prototype Optically Stimulated Luminescent Dosimeter Reader for Material Characterization
Abraham SA, Wong CY, Frank SJ, Seekamp J, Kearfott KJ
University of Michigan

9:30 AM **TAM-C.7**
Intercomparison of Commercially Available Radon Measurement Devices for Consumer, Mitigator, and Research Applications
Carmona M, Shubayr NA, Zhou Q, Kearfott KJ
University of Michigan

9:45 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

10:15 AM **TAM-C.8**
A Robotic Arm for the Automation of an Optically Stimulated Luminescent Dosimeter Reader
Gandhi BR, Chung LK, Trimas DJ, Kearfott KJ
University of Michigan

10:30 AM **TAM-C.9**
The Effects of Radiation and Emitted Light Transport on the Positional Response of 11 cm x 42.5 cm x 5.5 cm NaI(Tl) Detectors
Noey JD, Xiao J, Di Fulvio A, Carmona MA, El-amir IN, Liu K, Seekamp J, Sosa CS, Trimas DJ, Kearfott KJ
University of Michigan

10:45 AM **TAM-C.10**
Design of an Extremely Sensitive Large-Volume Gamma-Ray Spectrometer for Environmental Sample Screening
Seekamp J, Noey JD, Miller JM, Shubayr NA, Chung LK, DiFulvio A, Wong CY, Xiao J, Kearfott K
University of Michigan

11:00 AM **TAM-C.11**
Use of Autoradiography for the Visualization and Quantification of Alpha Emitting Radionuclides on Air Filters
Sorcic AK, Sudowe R
Colorado State University

11:15 AM **TAM-C.12**
Three Examples of On-Line Continuous Quantitative Gamma Spectroscopy of Primary Coolant at Nuclear Power Plants
Bronson FL
Mirion Technologies - Canberra

11:30 AM **TAM-C.13**
Three-Dimensional Position-Sensitive Pixelated CdZnTe Detector Technology for Isotope Detection, Localization, Quantification, and Trending
Wang W, Boucher YA, Kaye WR, Wahl CG, Jaworski JM, Zhang F, Yang H, Matthews T, Moran KF, Tefft DP
H3D, Inc.

11:45 AM **TAM-C.14**
Designing and Constructing of a Survey Meter with two gamma detectors to detect and Identify Radioisotopes
Alghamdi AS, Abuhoza AA, Almalki SA, Alshehri MA, Alshuwaymi AS, Almudayfir IA
Nuclear Science Research Institute, KACST, National Center for Radiation Detector Technology, KACST, National Center for Nuclear Technology, KACST

12:00 PM **TAM-C.15**
Highly Sensitive Field Measurement of Hard-to-Detect Contamination Using Portable Instruments
Iwatschenko-Borho MA
Thermo Fisher Scientific Messtechnik GmbH

8:00 AM – 12:00 PM Room 5

TAM-D: Special Session: Medical Health Physics

Co-chairs: Kendall Berry, Deirdre Elder

8:00 AM **TAM-D.1**
Radiation Safety Considerations for Brachytherapy Using Pd-103 CivaSheet™
Berry KE, Edwards B, Kendrick J
Fox Chase Cancer Center

8:15 AM **TAM-D.2**
Lutetium-177 Therapies and Health Physics Challenges
Elder DH
University of Colorado Hospital

8:45 AM **TAM-D.3**
Radiation Safety for Administration of Iodine-131 Monoclonal Antibody
Konerth S, Fisher D, Durrack L
Versant Physics

9:15 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

9:45 AM **TAM-D.4**
Ra-223 Xofigo Health Physics Review
Miller A
Cleveland Clinic

10:15 AM **TAM-D.5**
A Review of Dosimetrically Determined Doses of I-131 NaI for Thyroid Cancer
Lemieux B, Ain K
UK HealthCare

10:30 AM **TAM-D.6**
Dosimetry Challenges of New Nuclear Medicine Theranostic Agents
Stabin MS
Vanderbilt University

11:00 AM **TAM-D.7**
Medical Section Business Meeting

8:00 AM – 12:00 PM Room 6

TAM-E: Special Session: Accelerator

Chair: Vaclav Vylet

8:00 AM **TAM-E.1**
X-Ray Sterilization With Superconducting Electron Linear Accelerators
Bakken AC, Grimm AK, Mamtimin M, Starovoitova VN, Boulware CH, Grimm TL
Niowave, Inc.

8:15 AM **TAM-E.2**
Irradiation of LED Lamps to High Levels of Radiation
Campos Torres M, Santana M, Fields C
SLAC National Accelerator Laboratory

8:30 AM **TAM-E.3**
Use of a Tritium Target at Jefferson Lab
Welch KB
Thomas Jefferson National Accelerator Facility

8:45 AM **TAM-E.4**
iOS Application for Dosimeter Exchange
*Price G, Xiao S**
University of California-Riverside, SLAC Accelerator Laboratory

9:00 AM **TAM-E.5**
Estimation of Skyshine Neutron Dose From LCLS-II Operation at SLAC National Accelerator Laboratory
Liang TT, Liu JC, Santana Leitner M
SLAC National Accelerator Laboratory

9:15 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

9:45 AM **TAM-E.6**
Shielding and Skyshine Calculations for the Upgraded Injector Test Facility at JLab
Vylet V
Jefferson Lab

10:00 AM **TAM-E.7**
Operational Health Physics Applications in Suport of the Isotope Production Facility Pertaining to the Production of Radioisotopes for Nuclear Medicine Purposes
Overbay LA, Smith EA, Bliss JL
Los Alamos National Laboratory

10:15 AM **TAM-E.8**
Planning and Execution of Radiological Work for Spallation Neutron Source Inner Reflector Plug Changeout
Schwahn SO, Elam CL, Foster ND, Stephens GM, Byers SA
Oak Ridge National Laboratory

10:30 AM **TAM-E.9**
Radiological Characterization and Shielding Studies for the X-Ray Produced in Ultraintense Laser–Solid Interaction
Qiu R, Yang B, Wei SY, Yu MH, Jiao JL, Lu W, Yan YH, , Li JL
Tsinghua University, China Academy of Engineering Physics

10:45 AM **TAM-E.10**
Design and Fabrication a scCVD Diamond as a Radiation Detector and Vacuum Window
Tong X, Thompson J, Byun SH
McMaster University

11:00 AM **TAM-E.11**
Student Awards Presentation

11:20 AM
Accelerator Section Business Meeting

8:00 AM – 12:00 PM Room 7

TAM-F: Special Session: Nonmilitary Radium

Co-chairs: Todd Jackson, Chris Grossman

8:00 AM **TAM-F.1**
U.S. Nuclear Regulatory Commission Staff Efforts for Addressing Decommissioning Issues at Nonlicensed Radium Sites Unaffiliated With the Military
Grossman CJ, Chang R, Misenhimer D, Whited J, Meyer M
U.S. Nuclear Regulatory Commission

8:20 AM **TAM-F.2**
Radium Program Survey Summaries
King DA
Oak Ridge Associated Universities

8:50 AM **TAM-F.3**
Confirmatory Radiation Surveys of an Apartment Building Located in a Former Radium Clock Dial-Painting Factory
Jackson TJ, Powell RJ
USNRC, CHP

9:10 AM **TAM-F.4**
Technical Basis for Dose Assessments for Potential Exposures to Discrete Sources of Radium-226 and Associated Contamination
Grossman CJ, King DA
U.S. Nuclear Regulatory Commission, Oak Ridge Associated Universities

9:30 AM **Exhibit Hall**
BREAK, *sponsored by ORAU*

10:00 AM **TAM-F.5**
Radium Program Survey Strategy
King DA
Oak Ridge Associated Universities

10:30 AM **TAM-F.6**
Controlling and Monitoring Ongoing Public Radiation Exposures at an Unlicensed Former Radium Clock Dial-Painting Factory
Jackson TJ
USNRC

11:00 AM **TAM-F.7**
Experience in Implementing the U.S. NRC Radium Program at Unlicensed Sites With Confirmed Residual Ra-226 Contamination
Roberts MC
USNRC, Region I

11:30 AM **TAM-F.8**
Cleanup of a Former Watch-Manufacturing Facility
Norton MD
DDES, LLC

Exhibitor Lunch
12:00 PM
All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.
Note: the free lunches are not included in your registration fee, but are paid for by our sponsors & exhibitors.

12:15 PM – 2:15 PM

PEP T-1 **Room 1**
Radiation Shielding - A Lost Art?
Edward Waller

PEP T-2 **Room 3**
Radiological and Nuclear Terrorism Tools: Customize for Your Community
Brooke Buddemeier
Lawrence Livermore National Laboratory

2:30 PM – 6:00 PM Room 1

TPM-A: Special Session: AAHP - Potential Health Effects of Low-Dose Radiation and the Role of Radiation Protection Professionals

Co-chairs: Kyle Kleinhans, Armin Ansari

2:00 PM **TPM-A.1**
Low-Dose Radiation Research and Implementation of Radiation Protection Policy at the Department of Energy
Favret DJ, Metting NF, Dillard JR, Al-Nabulsi I, Wallo A
U.S. Department of Energy

2:30 PM **TPM-A.2**
Studies of Low Dose Health Effects Inform EPA Regulations
Boyd MA
U.S. EPA

3:00 PM **TPM-A.3**
The U.S. Nuclear Regulatory Commission Radiation Protection Policy and Opportunities for the Future
Jones CG
US Nuclear Regulatory Commission

3:30 PM **Exhibit Hall**
BREAK

4:00 PM **TPM-A.4**
INPO Approach for Maintaining Low Worker Dose
Mitchell B
INPO

4:30 PM **TPM-A.5**
State Radiological & Toxicological Risk Assessment and the Linear No-Threshold Perspective
Irwin WE
Vermont Department of Health

5:00 PM **TPM-A.6**
The Role of Radiation Protection Professionals
Ansari A
Centers for Disease Control and Prevention

5:15 PM
AAHP Business Meeting

2:30 PM – 5:30 PM Room 3

TPM-B: Environment and Radon Section: Modeling Special Session

Chair: Philip Egidi

2:00 PM **TPM-B.1**
Modernization and Enhancement of RESRAD Family of Codes
Yu C, LePoire D, Gnanapragasam E, Cheng JJ, Kamboj S, Wang C, Beckman K, Favret D, Anderson A, Szilagyi A
Argonne National Lab, Department of Energy

2:30 PM **TPM-B.2**
Using Approximations to Guide Understanding of New RESRAD-OFFSITE Source Terms, Releases, and Pathways
LePoire DJ, Gnanapragasam E, Yu C
Argonne National Laboratory

3:00 PM **TPM-B.3**
Applications of the RESRAD-OFFSITE New Source Term Features for Evaluating Potential Human Health Risks Associated With Radioactive Waste Disposal
Cheng J, Gnanapragasam E, Yu C, Oxenberg T, Bush-Goddard S
Argonne National Laboratory, Nuclear Regulatory Commission

3:30 PM **Exhibit Hall**
BREAK

4:00 PM **TPM-B.4**
Impact of the New ICRP Publication 107 Nuclear Decay Data on Dose Coefficients and Risk Assessment
Kamboj S, Gnanapragasam E, Yu C, Favret D
ANL, DOE

4:30 PM **TPM-B.5**
MILDOS-AREA Evolution
Biwer B, LePoire D, Kamboj S, Chang YS, Sun C, Webb J
Argonne National Laboratory, U.S. Nuclear Regulatory Commission

5:00 PM **TPM-B.6**
Environment and Radon Section Business Meeting

2:30 PM – 5:00 PM Room 4

TPM-C: Special Session: Nanotechnology and Radiation Protection

Chair: Mark Hoover

2:30 PM **TPM-C.1**
Nanotechnology and Radiation Protection: HPS Nanotechnology Section Activities and Opportunities
Hoover MD, Marceau-Day ML, Cash LJ, Davis J, Hay T, Holiday S, Walker II LS
National Institute for Occupational Safety and Health, LSU Scientist Emerita, Los Alamos National Laboratory, Oak Ridge Associated Universities, Washington State Department of Health, Nuclear Regulatory Commission, Consultant

3:00 PM **TPM-C.2**
Challenges Regulating Radioactive Nanoparticles From a Regulator's Point of View
Hay TR
Washington Department of Health Radiation Protection

3:20 PM **Exhibit Hall**
BREAK

3:45 PM **TPM-C.3**
Biokinetic Changes at the Nano Level – Dissolution and Phagocytosis
Davis JE, Nichols GP
ORAU, HDIAC

4:15 PM **TPM-C.4**
Revision of ANSI 13.56, Sampling and Monitoring Releases of Airborne Radioactivity in the Workplace of Nuclear Facilities
Whicker JJ, Hoover MD
Los Alamos Nat. Lab., CDC/NIOSH/RHD

4:30 PM
Nanotechnology Section Business Meeting

2:30 PM – 5:30 PM Room 5

TPM-D: Medical Health Physics, Part II

Co-chairs: Ninni Jacob, Richard Harvey

2:30 PM **TPM-D.1**
Brain and Eye Lens Doses to Operators in Interventional Radiology: A Monte Carlo Study Using Hybrid Computational Phantoms
Tran T, Brown J, Borrego D, Balter S, Bolch WE
University of Florida, National Cancer Institute, Columbia University

2:45 PM **TPM-D.2**
The Role of the RSO in Radiology QA
Jacob N
Stratton VA Medical Center

3:00 PM **TPM-D.3**
Herding Cats (Or Managing Rental Lasers in Health Care)
Peckham ZH, Sturchio GM
Mayo Clinic

3:15 PM **TPM-D.4**
Evaluation of Dose Indices for Cone Beam Computed Tomography (CBCT) for Estimation of Patient Organ Doses
Niskanen HK, Caracappa PF, Xu XG
Rensselaer Polytechnic Institute

3:30 PM **Exhibit Hall**
BREAK

4:00 PM **TPM-D.5**
Characterization of Sr/Y-90 Eye Applicator Using Radiochromic Film
Rashidifard NB, Geslin JA, Darois EL
Radiation Safety & Control Services

4:15 PM **TPM-D.6**
Cool Ways of Renovating Hot Labs
Sims HE, Miller MA
Cleveland Clinic

4:30 PM **TPM-D.7**
Background Checks for Information Technology Employees
Harvey RP
Roswell Park Cancer Institute

4:45 PM **TPM-D.8**
Hospital Waste Portal Monitor Performance
Miller A, Sims E, Nordwig G, Pauer T, Manchook J
Cleveland Clinic

5:00 PM **TPM-D.9**
Cloud-Based Medical Physics; Evolution Relevant to Health Care System Enterprise
Leuenberger RD
Northeast Ohio VA Healthcare System

5:15 PM **TPM-D.10**
Testing Protocols for Dental Computer Tomography Cone Beam X-Ray Machines: A Challenge to Standardize Quality Assurance Methods to Achieve Meaningful Results
Mis FJ
Contractor for the NY State Department of Health

2:30 PM – 4:45 PM Room 6

TPM-E: Internal Dosimetry

Co-chairs: Dan Strom, Eugene Carbaugh

2:30 PM **TPM-E.1**
A Simple Visualization of the "LEKSKaM 2005 Model" of Systemic Plutonium Biokinetics
Strom DJ
Washington State University

2:45 PM **TPM-E.2**
Dumit-USTUR Decorporation Model Simultaneously Fits Ca-DTPA Affected and Nonaffected Urine Bioassay Data After Plutonium Contamination
Dumit S, Strom DJ, McComish SL, Avtandilashvili M, Tabatadze G, Tolmachev SY
United States Transuranium and Uranium Registries, Washington State University

3:00 PM **TPM-E.3**
Difficulties with Current Urinary Bladder Dose for Internal Emitters
Eckerman KF, Veinot KG
Easterly Scientific, Y-12 National Security Complex

3:15 PM **Exhibit Hall**
BREAK

3:45 PM **TPM-E.4**
A Contingency Plan for Catastrophic Loss of Bioassay Services
Carbaugh EH, Antonio CL, Lynch TP, Nelsen LA
NV5, Mission Support Alliance

4:00 PM **TPM-E.5**
Radiation Dose to the Bone Marrow from Therapeutic Administrations of 177Lu- DOTATATE
Tsorxe I, Gunasingha R, Kurgatt S, Reiman R, Yoshizumi T
Duke University Medical Center, Duke Radiation Dosimetry Laboratory and Duke Radiation Safety Division

4:15 PM **TPM-E.6**
The Determination of Actinides in Human Bones and the Impact of Matrix Constituents
Nguyen NT, Sudowe R
Colorado State University

4:30 PM **TPM-E.7**
Estimation of the Contribution of Different Exposure Pathways to the Thyroid Dose for the Public Following the Chernobyl and Fukushima Accidents
Maksimov AA, Shinkarev SM
State Research Center – Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

2:30 PM – 5:00 PM **Room 7**

TPM-F: AIRRS Business Meeting
Chair: Fred Mis

6:30 AM – 7:30 AM

CEL-4 **Room 1**
Elements of an Effective Radiation Protection Program
Jim Dillard
Department of Energy

HPS Awards Plenary Breakfast

7:30 AM Breakfast Buffet
8:00 AM Plenary Awards

See Page 7 for Full Details

Join us Wednesday, 18 July, from 8:00 AM – 10:00 AM for the new format of the Awards Program. We look forward to seeing you for the presentation at the Hilton Downtown Cleveland. There will be a buffet breakfast provided that begins at 7:30am. *Please note, this is in place of the Awards Banquet that was previously on Tuesday evenings.*

10:30 AM – 11:30 AM Room 1

WAM-A: Air Monitoring

Chair: James Menge

10:30 AM **WAM-A.1**
Mechanisms in Particle Collection in Aerosols
Menge JP
SME Associates LLC

10:45 AM **WAM-A.2**
Validation of a Rapid, Conservative Transuranic Alpha Activity Method in Air Samples
Cope SJ, Hayes RB
North Carolina State University

11:00 AM **WAM-A.4**
Using Ba-133 as a Calibration Surrogate for Simulation of Gaseous I-131 in a Silver Zeolite Cartridge
Hamideh AM, Wilson CA, Wang WH
Louisiana State University

11:15 AM **WAM-A.5**
Spanish Moss as a Bio-Indicator for Air Pollution in the Low Country of Savannah River Basin
Sun ZJ
South Carolina State Unviersity

10:30 AM – 11:45 AM Room 3

WAM-B: Department of Energy

Co-chairs: Spencer Mickum, Jennifer Bean

10:30 AM **WAM-B.1**
Investigation of Modern Self-Contained, Dry-Storage Irradiators
Mickum GS, Rushton RO, Hope ZJ
Hopewell Designs

10:45 AM **WAM-B.2**
Retrieval and Disposition of Legacy Gamma Calibration Range Sources
Paulus LR
Sandia National Laboratories

11:00 AM **WAM-B.3**
Operational Health Physics Measurement and Decontamination Techniques Implemented With the Metallurgy Process of Thorium-232 at the Sigma Facility
Smith EA, Overbay LA, Bliss JL
Los Alamos National Laboratory

11:15 AM **WAM-B.4**
Clearance of Potentially Activated Materials from Accelerator Facilities and Radiation-Generating Devices
Hall HA, McCormick DQ, Rojas CA, Schaller IC, Vacca JH
Argonne National Laboratory

11:30 AM **WAM-B.5**
Attila Evaluation of Dose Rates Around the Low-Activity Waste Facility Melter at the Hanford Tank Waste Treatment and Immobilization Plant
Bean JM
Bechtel National, Inc

10:30 AM – 11:30 AM Room 4

WAM-C: Academic Institutions

Co-chairs: Kim Kearfott, Thomas Morgan

10:30 AM **WAM-C.1**
Undergraduate Health Physics Research at the University of Michigan
Kearfott KJ, Pozzi SA, Gilgenbach RM
University of Michigan

10:45 AM **WAM-C.2**
Discovery of Legacy Radium in a Building on a University Campus
Jo MC, Woolf SA, Wilson TR, Howe AC, Beckley KK, Allard DJ
University of Nevada, Reno, Nevada Radiation Control Program, Pennsylvania Bureau of Radiation Protection

11:00 AM **WAM-C.3**
Future-Proofing an Academic Radiation Safety Program With Cloud-Based Software
Morgan TL, Kwolek G
Columbia University, SafetyStratus

11:15 AM **WAM-C.4**
Contextual Information for the Potential Enhancement of Annual Radiation Protection Program Review Reports
Gutierrez JM, Emery RJ
UTHealth in Houston, TX

10:30 AM – 12:00 PM Room 5

WAM-D: Medical Roundtable

Co-chairs: Deirdre Elder, Linda Kroger

10:30 AM **WAM-D.1**
Medical Health Physics Roundtable Discussion
Kroger LA, Elder DH
UC Davis, Univ of Colorado Hospital

10:30 AM – 11:45 AM Room 6

WAM-E: Special Session: Government Relations

Co-chairs: Craig Little, David Connolly

10:30 AM **WAM-E.1**
The HPS Government Relations Program: Helping Members Have a Stronger Voice in Washington
Little CA
HPS Government Relations Program

10:45 AM **WAM-E.2**
HPS Interaction With Congress
Connolly DA
Health Physics Society

11:00 AM **WAM-E.3**
Health Physics Society Government Relation Committee
Ring JP, Anderson K, Elder D, Hiatt JW, Sheetz MA, Jadick M, Little CA, Rudin MJ
Beth Israel Deaconess Medical Center, Barnes-Jewish Hospital, University of Colorado Hospital, Nuclear Energy Institute, University of Pittsburg, U.S. Customs & Border Protection, Health Physics Society, Boise State University

11:15 AM **WAM-E.4**
NRC/HPS: A Relationship That Informs Radiation Protection
Flannery C
U.S. NRC

11:30 AM **WAM-E.5**
EPA Benefits from HPS Support
Veal LA
U.S. EPA

10:30 AM – 11:45 AM Room 7

WAM-F: Waste Management

Chair: John McCormick

10:30 AM **WAM-F.1**
Towards Ensuring Viable Low-Level Radioactive Wastes Disposal in the United States
Lanza JJ
Florida Department of Health

10:45 AM **WAM-F.2**
The Scrapyard Delemma - Ghost Radiation and the U.S. Military Cutting Us Off
Matthews SP
State of Washington, Department of Health, Office of Radiation Protection, Radioactive Materials Section

11:00 AM **WAM-F.3**
Liability Issues and Solutions for Disposition of Unwanted Sealed Sources
McCormick JW
Bionomics, Inc.

11:15 AM **WAM-F.4**
Capturing Radioactive Waste Before It Leaves the Hospital
Sims HE, Miller MA
Cleveland Clinic

11:30 AM **WAM-F.5**
U.S. EPA Superfund Policy Statements and Guidance Regarding Disposition of Radioactive Waste in Non-NRC Licensed Disposal Facilities
Walker SA
U.S. Environmental Protection Agency

12:15 PM – 2:15 PM

PEP W-1 **Room 1**
Measuring and Displaying Radiation Protection Program Metrics That Matter to Management
Janet Guiterrez

PEP W-2 **Room 3**
Radiology Dosimetry: Organ Doses vs. Effective Dose
Cari Borras

PEP W-3 **Room 4**
The MARSAME Methodology: Fundamentals, Applications, and Benefits
Alex Boerner, Tarzia

PEP W-4 **Room 7**
Medical Health Physics – Preparing Yourself for the future
Kevin Nelson, David W. Jordan
Mayo Clinic Arizona, University Hospitals Cleveland Medical Center

PEP W-5 **Room 5**
A Radiation Grassroots Response Group-Your Responsibility and How to
John C. White

2:15 PM – 3:15 PM

CEL-5 **Room 7**
Certification Options for Health Physicists
Steven King, Andy Miller

2:30 PM – 5:30 PM Room 3

WPM-B: Aerosol Measurements

Co-chairs: Morgan Cox, Ed Walker

2:30 PM **WPM-B.1**
ANSI N42 and IEC Standards for Nuclear Reactor Applications
Cox M
Consultant

3:00 PM **WPM-B.2**
ASTM Committee D22 Air Quality
Walker E
Washington Department of Health Radiation Protection

3:30 PM **WPM-B.3**
Plutonium Aerosol Informatics: Update on Understanding, Communicating, and Managing Radiation Safety in Plutonium Science
Hoover MD, Cash LJ
National Institute for Occupational Safety and Health, Los Alamos National Laboratory

4:00 PM **WPM-B.4**
A Total Uncertainty Analysis for A Radon Reference Laboratory
Jenkins PH
Bowser-Morner, Inc.

4:30 PM **WPM-B.5**
Measuring Monodisperse Aerosol Transmission in the Los Alamos Respirable Release Fraction Measurement Chamber
*Tao Y, Moore ME**
Los Alamos National Laboratory

5:00 PM **WPM-B.6**
Estimating Worker Dose of Transuranic Aerosol Inhalation by Measuring Cerium Oxide Powder Releases From Drop-Tested Storage Containers
Moore ME, Tao Y
Los Alamos National Laboratory

2:30 PM – 5:15 PM Room 4

WPM-C: Environmental Monitoring

Co-chairs: Timothy DeVol, Tamara Yankovich

2:30 PM **WPM-C.1**
Uncertainty/Sensitivity Analysis for the Savannah River National Laboratory's Environmental Dosimetry Model LADTAP XL©
Stagich BH, Jannik GT, Dixon KL, Minter KM, Martinez NE
Clemson University, Savannah River National Laboratory

2:45 PM **WPM-C.2**
Hybrid Extractive Scintillator Resin for Simultaneous Adsorption and Detection of Cesium-137 From Aqueous Solutions
DeVol TA, Pujari A, Sistryak R, Husson SM, Bliznyuk VN, Seliman AF
Clemson University

3:00 PM **WPM-C.3**
NORM, TENORM, and the Challenges in Sampling and Analysis
Lake MI, Thompson DM, Litman R
ChemStaff, Sulas Radiation Safety Consultants, LLC

3:15 PM **Foyer**
BREAK

3:45 PM **WPM-C.4**
Implications of Wide Area Soil Tests for Cs-137 Fallout
Whitman RT
Indiana University IUPUI

4:00 PM **WPM-C.5**
Monitoring for Release Criteria in High Background Areas
Menge JP
SME Associates LLC

4:15 PM **WPM-C.6**
Observed Variations in Ionizing and Nonionizing Radiation Background Using a Spectroscopic Radiation Weather Station
Yuan F, Carmona M, Xiao J, Di Fulvio A, Kearfott KJ
University of Michigan

4:30 PM **WPM-C.7**
30 Years Following the Accident at the Chazhma Bay (Primorsky Territory): Environmental Assessment of the Contaminated Areas
Belskikh IS, Kiselev SM, Titov AV, Isaev DV, Starinsky VG, Shandala NK
SRC FMBC, Moscow, Russia

4:45 PM **WPM-C.8**
Occupational Radon Assessment in an Exploration Core Processing Facility
Asuni GA, Deshenenkov I, Cowie MI, Khasawinah SA
Saudi Aramco

5:00 PM **WPM-C.9**
Biota Dose Assessment of Small Mammals Sampled Near Uranium Mines in Northern Arizona
Jannik GT, Minter KM, Kuhne WW, Kubilius WP, Hinck JE, Cleveland D
Savannah River National Laboratory

2:30 PM – 5:00 PM Room 5

WPM-D: Radiation Effects

Chair: Sam Keith

2:30 PM **WPM-D.1**
Design and Dosimetry for an Experiment to Assess Carcinogenesis Following Low-Dose-Rate, Long Duration Exposures to High LET Radiation
Fabian RM, Borak TB
Colorado State University

2:45 PM **WPM-D.2**
Risk of Childhood Leukemia From Exposure to Natural Background Radiation
Kim JJ, Pawel DJ, Puskin JS
ORISE, U.S. EPA

3:00 PM **WPM-D.3**
Health Effects From Exposure to Thorium
Keith LS, Wohlers DW, Ingerman L
ATSDR, SRC

3:15 PM **WPM-D.4**
Lung Cancer Risk from Inhalation of ^{210}Po in Cigarette Tobacco
Harley NH
NYU School of Medicine

3:30 PM **Foyer**
BREAK

4:00 PM **WPM-D.5**
Interspecific Extrapolation of Risk Curves for Deterministic Effects
*Osovets S, Tikhonova M**
Southern Urals Biophysics Institute

4:15 PM **WPM-D.6**
Photon-Fluence-Weighted LET for Radiation Fields Subjected to Epidemiological Studies
Sasaki M
CRIEPI

4:30 PM **WPM-D.7**
ALARA: Are We Creating More Hype by Logging Less Dose?
Sowers DA, Dolan DJ
Naval Health Clinic New England, Naval Undersea Medical Institute

4:45 PM **WPM-D.8**
Implementation of the 2017 "PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents" in the FEMA Radiological Emergency Preparedness (REP) Program
Howe MF, Ward PT, Fill JF, Wierman KL
DHS/FEMA/Technological Hazards Division, Radiological Emergency Preparedness Program

2:30 PM – 5:15 PM Room 6

WPM-E: Homeland Security

Co-chairs: Eva Lee, Lee Ann Veal

2:30 PM **WPM-E.1**
Strategy Toward Long-Term Recovery from Major Nuclear Events
Chen S
Illinois Inst. Technology

2:45 PM **WPM-E.2**
Permanent Removal of the Risk of Terrorist Attack using Radioactive Materials as a Dirty Bomb (RDD) by Means of Alternative Technologies
Kamen J
Mount Sinai Medical Center

3:00 PM **WPM-E.3**
A Simulated Radiation Detector for Training First Responders
Stump RF
Texas Tech Health Sciences Center El Paso

3:15 PM **WPM-E.4**
Conversion Electron Spectroscopy for Isotopic Analysis of Special Nuclear Material
Watson MW, DeVol TA
Clemson University

3:30 PM **WPM-E.5**
Strategic Planning and Risk Assessment of Radiological Emergency Incidents
Lee EK
Georgia Institute of Technology

3:45 PM **WPM-E.6**
Using EPA's Risk Assessment Tools for Superfund When Addressing Late-Phase Response to Terrorist Attacks and Nuclear Power Plant Major Accidents
Walker SA
U.S. Environmental Protection Agency

4:00 PM **WPM-E.7**
Sourceless Performance Verification of Neutron Detectors for Homeland Security Purpose
Iwatschenko-Borho MA
Thermo Fisher Scientific Messtechnik GmbH

4:15 PM **Foyer**
BREAK

4:30 PM **WPM-E.8**
38 Minutes of Terror: Learning From the Hawaii False Missile Alert
Schuster PF, Munk M
University of Michigan, University of Illinois Urbana-Champaign

4:45 PM
Homeland Security Section Business Meeting

6:45 AM – 7:45 AM

CEL-6 **Room 1**
Lessons Learned During Independent Verification Activities
David King
Oak Ridge Associated Universities (ORAU)

8:00 AM – 12:00 PM Room 1

THAM-A: Special Session: Military Health Physics

Co-chairs: John Cuellar, Anthony Williams, Alan Hale

8:00 AM **THAM-A.1**
The "Regional RHO": The Role of Mentoring in Success of Navy Radiation Health Officers
Sowers DA
Naval Health Clinic New England

8:15 AM **THAM-A.2**
Evaluating the Impact of the Relative Biological Effectiveness of Neutrons in an Urban Environment Following a Nuclear Detonation
Dant JT, Kramer K, Stricklin D
Applied Research Associates, Inc.

8:30 AM **THAM-A.3**
Release of Environmental Monitoring Results: Maintaining Assurances to a Community
Fairchild GR, Blouin JL, Fahey SB
United States Navy

8:45 AM **THAM-A.4**
Review of Radiation Exposure Aboard USS Nautilus SSN-571, 1955-1956
Johnston TP
National Institute of Standards & Technology

9:00 AM **THAM-A.5**
The Colonel, the Captain, and the Commander
Johnston TP
NIST

9:15 AM **THAM-A.6**
Methodology for Assessing Radiation Doses of Participants in the Enewetak Atoll Cleanup Project (1977–1980)
McKenzie-Carter MA, Case DR, Chehata M, Falo GA, Fong SH, Schaeffer DM, Alleman LA
Leidos, Inc., US Army Public Health Center, Defense Threat Reduction Agency

9:30 AM **THAM-A.7**
Improved Casualty Estimations With Updated Population-Based Radiation Protection Factors in DTRA's HPAC 6.5
Dant JT, Li A, Kramer K, Zaru-Roque I, Bellman J, Wilkinson E
Applied Research Associates, Inc.

9:45 AM **Foyer**
BREAK

10:15 AM **THAM-A.8**
Department of the Navy's Radiological Affairs Support Program
Sorcic J
U.S. Navy

10:30 AM **THAM-A.9**
2018 Nuclear Posture Review's Impact on Military Health Physics
VanHorne-Sealy JD
U.S. Army

10:45 AM **THAM-A.10**
Joint Service Initiatives in Radiation Protection
Williams AS, Cuellar JP, Nemmers SA, Stewart HM, Sharp TJ
Bureau of Medicine and Surgery, U.S. Army Medical Command, Office of the Air Force Surgeon General, Defense Health Agency, Naval Dosimetry Center

11:00 AM
Military Section Business Meeting

8:00 AM – 11:45 AM Room 3

THAM-B: Emergency Response

Co-chairs: Frazier Bronson, William Irwin

8:00 AM **THAM-B.1**
How Many Efficiency Calibrations Are Needed by HPs for Semi-Quantitative InSitu Spectroscopy for Emergency or Quick-Response Situations ?
Bronson FL
Mirion Technologies - Canberra

8:15 AM **THAM-B.2**
Radiation Exposure of Workers in Public Shelters and Community Reception Centers in the Aftermath of a Nuclear Detonation
Anderson JL, Failla G, Finklea LR, Charp P, Ansari AJ
National Institute for Occupational Safety and Health, Varex Imaging, Inc., Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry

8:30 AM **THAM-B.3**
RadResponder Network – A Quick Walkthrough With the Newest Updates
*Chen G, Palmer B**
EPA, Chainbridge Technologies

8:45 AM **THAM-B.4**
Foresight 2020 - Radiological & Nuclear Emergency Preparedness for the Future: A State Perspective
Irwin WE
Vermont Department of Health

9:00 AM **THAM-B.5**
Implementation of the 2017 "PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents" in the FEMA Radiological Emergency Preparedness (REP) Program
Howe MF, Ward PT, Fill JF, Wierman KL
DHS/FEMA/Technological Hazards Division, Radiological Emergency Preparedness Program

9:15 AM **THAM-B.6**
Emergency Preparedness – The Environmental Protection Agency's Protective Action Guides Are Not a Basis for Justified or Adequate Protective Actions during an Emergency
McKenna TJ, Callen JB
Consultant, Applied Systems Analysis (IIASA) and Technische Universität Wien (TU W)

9:30 AM **THAM-B.7**
Considering Uncertainty and Risk in Public Protection Decisions
Kraus TD, Cochran LD
Sandia National Laboratories

9:45 AM **THAM-B.8**
Radiological and Nuclear Emergency Preparedness Strategies for the Future: A Federal Perspective
Blumenthal DJ
U.S. Department of Energy

10:00 AM **Foyer**
BREAK

10:30 AM **THAM-B.9**
Emergency Response – Limitation of Dose Projections and Downwind-Based Protective Actions
McKenna TJ, Callen JB
Consultant, Applied Systems Analysis (IIASA) and Technische Universität Wien (TU W)

10:45 AM **THAM-B.10**
Development of Data Products Using the Radiation Hazard Scale for Use in Radiation Emergencies
Ansari A, Salame-Alfie A, Blumenthal D, Askin A, Buddemeier B
Centers for Disease Control and Prevention, DOE/National Nuclear Security Administration, Lawrence Livermore National Laboratory

11:00 AM **THAM-B.11**
Bone Marrow Selective Shielding Impact on ARS Prognosis
Waterman G, Gustafson JS, Milstein O
StemRad

11:15 AM **THAM-B.12**
A Radiation Grassroots Group - Your Responsibility and How-To
White JC
VA North Texas

11:30 AM **THAM-B.13**
Towards Net Risk in Evacuation and Reoccupation Decision Making
Braley GS
Colorado State University

8:00 AM – 12:00 PM Room 4

THAM-C: Special Session: Ethics and Radiation Protection

Co-chairs: Nicole Martinez, Alexander Brandl

8:00 AM **THAM-C.0**
Introduction

8:10 AM **THAM-C.1**
Introduction to ICRP Publication 138: Ethical Foundations of the System of Radiological Protection
Martinez NE
Clemson University

8:30 AM **THAM-C.2**
Ethical Decision Making in Radiation Protection
Brandl A, Tschurlovits M
Colorado State University, Vienna University of Technology

8:50 AM **THAM-C.3**
The Respectful Behavior Policy: What Is It?
Montgomery D, Gillenwalters E, Marshall E, Martinez N
Clemson University, Siemens Molecular Imaging, Health Physics Society

9:00 AM **THAM-C.4**
The Respectful Behavior Policy: What Does It Mean for Everyday Interactions?
Montgomery DA, Manglass LM, Watson MM, Martinez NE
Clemson University

9:15 AM **THAM-C.5**
Creating Accessible Visual Media
Manglass LM, Martinez N
Clemson University

9:30 AM **THAM-C.6**
Values and Personal Power of the Snowflake Generation: Implications for the Radiation Protection Profession
Kearfott KJ
University of Michigan

9:45 AM **Foyer**
BREAK

10:15 AM **THAM-C.7**
Wearable Sensors: An Ethical Framework for Decision Making About Employee Monitoring, Including in Radiation Protection
Hoover MD, Morley AM
National Institute for Occupational Safety and Health

10:30 AM **THAM-C.8**
Ethics in Space Radiation Protection
Bahadori AA
Kansas State University

10:45 AM **THAM-C.9**
Ethics: A Practical Approach to Safety
Lee MB
Los Alamos National Laboratory

11:00 AM **THAM-C.10**
Reducing Radio-Phobia: We Need to Change
Daxon EG
Independent Consultant

11:15 AM **THAM-C.11**
Lack of an Ethical Basis for Public Action and Concerns During a Radiological Emergency
McKenna TJ, Callen JB
Consultant, Applied Systems Analysis (IIASA) and Technische Universität Wien (TU W)

11:30 AM **THAM-C.12**
Discussion

8:00 AM – 12:00 PM Room 5

THAM-D: External Dosimetry

Co-chairs: Steven Grimm, Chris Passmore

8:00 AM **THAM-D.1**
Measurement and Analysis of Beta-ray Spectra at CANDU Reactors
Bohra F, Byun SH, Laranjeiro AS, Wong MM, Atanackovic J, Hanu AR
McMaster University, Ontario Power Generation, Bruce Power

8:15 AM **THAM-D.2**
Optimization of a LaBr3 Spectrometer for High-Rate Gamma-Ray Spectrometry at CANDU Reactors
Laranjeiro AS, Bohra F, Wong MM, Hanu AR, Atanackovic J, Byun SH
McMaster University, Bruce Power, Ontario Power Generation

8:30 AM **THAM-D.3**
Site Specific Neutron Dosimetry Correction Factors
Rashidifard NB, Babineau GM, Darois EL
Radiation Safety & Control Services

8:45 AM **THAM-D.4**
Discrepancies of Neutron Dose Reported From a Passive Dosimeter, Electronic Dosimeter, and a Neutron Survey Meter
Grimm S, Rose, Jr P, Spichiger G
Georgia Institute of Technology

9:00 AM **THAM-D.5**
Energy Dependence of TLD-100 Dosimeters in Broad-Beam kV X-Ray Beams
Moore BM, Yoshizumi T
Duke University

9:15 AM **THAM-D.6**
Optimization of Time Temperature Profiles for an Automated Thermoluminescent Dosimeter Reader With Removable Planchets
Latosz LV, Golduber RM, Trimas DJ, Liu K, Abraham SA, Kearfott KJ
University of Michigan

9:30 AM **Foyer**
BREAK

10:00 AM **THAM-D.7**
Observations from an Intercomparison Study of Real Time and Passive Dosimeters When Exposed to Reference Laboratory Conditions
Kirr M, Passmore C
Landauer

10:15 AM **THAM-D.8**
Spatial Nonuniformities in Air Kerma for Dosimeters Irradiated on a Standard Test Phantom with Cs-137
Golduber RM, Trimas DJ, Latosz LV, Liu K, Abraham SA, Kearfott KJ
University of Michigan

10:30 AM **THAM-D.9**
Hp(3) Comes into Focus - Views From a Health Physicist
Passmore CN, Kirr M
Landauer

10:45 AM **THAM-D.10**
A Dosimetry Calibration Facility in a Space-Constrained Environment
Mapes JL, Liu K, Latosz LV, Abraham SA, Golduber RM, Trimas DJ, Wilhelm AS, Chung LK, Kearfott KJ
University of Michigan

11:00 AM **THAM-D.11**
Determination of Site-Specific Neutron Energy Correction Factors for Albedo Dosimeters
Romanyukha A, Hoy AR, Sharp TJ, Consani KA, Benevides LA
Naval Dosimetry Center, National Institute of Standards and Technology, Naval Surface Warfare Center

11:15 AM **THAM-D.12**
Angular Dependence of Optically Stimulated Luminescence Dosimeters for Use in Radioactive Material Laboratories
Samuels CE, Spichiger GM
Georgia Institute of Technology

11:30 AM **THAM-D.13**
Lifetime Absorbed Dose Reconstruction of Japanese Wild Boar Using Tooth Enamel With Electron Spin Resonance Dosimetry
Harshman AM, Johnson TE
Colorado State University

11:45 AM **THAM-D.14**
Construction of Chinese Adult Female Mesh-type Phantoms with Detailed Breast Structure and Application in Dose Estimation for External Radiation
Hu AK, Qiu R, Ren L, Wang WJ, Wu Z, Li CY, Li JL
Tsinghua University, Beijing, China

9:00 AM – 12:00 PM Room 7

THAM-E: Radiological Accident Assessment Concepts Update Workshop/Training, Part 1

Chair: Michael Howe

9:00 AM **THAM-E.1**
Radiological Accident Assessment Concepts Update Workshop/Training
*Fill J, Ward P, Wierman K, Howe M**
DHS/FEMA

9:45 AM **THAM-E.2**
FEMA Radiological Accident Assessment Concepts Workshop
Howe M
FEMA/DHS

2:30 PM – 4:45 PM Room 1

THPM-A: Contemporary Topics

Co-chairs: Amir Bahadori, Wayne Gaul

2:30 PM **THPM-A.1**
Decomissioning Issues at Adavanced Medical Sytems
Snee M, Miller A
Ohio Department of Health, Clevleland Clinic

2:45 PM **THPM-A.2**
A Simplified Approach to Decommissioning Common University Radioactive Material Labs
Spichiger GM, Grimm SL
Georgia Institute of Technology

3:00 PM **THPM-A.3**
Long-Term Effects of Tritium in Plastic Liquid Scintillator Vials
Wang JJ, Brandl A
Colorado State University

3:15 PM **Foyer**
BREAK

3:45 PM **THPM-A.4**
Discussion on Radiation Protection Design Under Accident Condition of China Nuclear Power Plant
Wang XX, You W, Mi AJ, Mao YW
China Nuclear Power Engineering Co., Ltd

4:00 PM **THPM-A.5**
Pencil Beam Algorithm Based on Self-Consistent Profile Kernel Model
Wang H, Zheng HQ, Cheng M, Song J, Zhao Y, Wu YC
Key Laboratory of Neutronics and Radiation Safety, Institute of Nuclear Energy Safety Technology, Chinese Academy of Sciences

4:15 PM **THPM-A.6**
Photon Production in Hydrogenous Space Radiation Shields
Bahadori AA, Stegeman LA, Pal Chowdhury R
Kansas State University

4:30 PM **THPM-A.7**
What is the Quantitative Nature of Coping With Risk?
Kumazawa S, Kato K
Former JAERI, RISS

2:30 PM – 4:30 PM Room 3

THPM-B: Education and Outreach

Co-chairs: Kim Kearfott, Jason Harris

2:30 PM **THPM-B.1**
A Discovered Radon Chamber for Educational and Research Purposes
Carmona M, Mata LA, Shubayr NA, Miller JM, Chung LK, Xiao J, Yuan F, Zhou Q, Kearfott KJ*
University of Michigan

2:45 PM **THPM-B.2**
A Radiation Weather Station System for Research and Public Outreach
Kearfott KJ, Xiao J, Carmona M, Yuan F, Chung LK, DiFulvio A, Pozzi SA
University of Michigan

3:00 PM **THPM-B.3**
An Advanced, Practical Laboratory Class for Applied Health Physics Measurements for Seniors and Graduate Students
Kearfott KJ, Abraham SA, Mapes JL, Liu K, Noey JD, Seekamp J, Xiao J*
University of Michigan

3:15 PM **THPM-B.4**
Simple Nuclear Science Related Raspberry Pi Projects for Precollege Outreach in Science, Technology, Engineering, and Math
Myslak W, El-amir IN, Yuan F, Chung LK, Gandhi BR, Seekamp J, Xiao J, Kearfott KJ
University of Michigan

3:30 PM **Foyer**
BREAK

4:00 PM **THPM-B.5**
Computer Science and Engineering Challenges Associated With a Complexly Instrumented and Geographically Distributed Radiation and Environmental Parameter Measurement System
Yuan F, Xiao J, Carmona M, Nguyen CB, Rush CJ, Kearfott KJ
University of Michigan

4:15 PM **THPM-B.6**
An Affordable Do-It-Yourself Radiation Detector for Nuclear Science Outreach
Xiao J, El-amir IN, Seekamp J, Chung LK, Gandhi BR, Myslak W, Kearfott KJ
University of Michigan

2:30 PM – 3:15 PM Room 5

THPM-D: Special Session: Nonionizing Radiation

Chair: Ed Kelly

2:30 PM **THPM-D.1**
Laser Eye Dazzling Research
Kelly ER, McLin LN, Williamson CA
USAF-AFRL, DSTL, UK

2:45 PM **THPM-D.2**
Laser Safety Officer, Are You Prepared for a Laser Incident?
Barat KL
Laser Safety Solutions

3:00 PM **THPM-D.3**
Ionizing Radiation Hazards Generated From High-Intensity Non-ionizing Optical Lasers
Liang TT
SLAC National Accelerator Laboratory

1:00 PM – 5:00 PM Room 7

THPM-E: Radiological Accident Assessment Concepts Update Workshop/Training, Part 2

Chair: Michael Howe

1:00 PM **THPM-E.1**
FEMA Radiological Accident Assessment Concepts Workshop
Howe M
FEMA/DHS

AAHP COURSES

Huntington Convention Center • 14 July 2018

8:00 AM – 12:00 PM **AAHP 1A**

Practical External Dosimetry Management

Tosh Ushino

This course addresses practical management of external dosimetry program. We will review the fundamentals of radiation interactions, radiation sources, and detector theory. We will discuss different types of dosimeters (passive and active), their characteristics, and how radiation interacts with them. In additional to the standard dosimeter badges for beta, gamma, and x-ray radiation, the course will cover dosimeters for neutron, eye, extremity and environmental monitoring. The course will also present multi-badging and EDE calculations.

The course will discuss potential sources of errors, dose investigations, dose assignment and documentation, how radiation dosimetry services work, and Do-It-Yourself Quality Assurance. Example investigations are presented and discussed. If time permits, the course will also cover use of the Varskin code for calculating shallow dose from contamination.

1:00 PM – 5:00 PM **AAHP 1B**

Internal Dosimetry Review, Standards, and Ongoing Considerations

Charles "Gus" Potter, PhD, CHP

In the 21st century environment, the focus on engineering controls for radiological work has greatly reduced, if not eliminated, the need for a true "routine" internal dosimetry program. The internal dosimetrist is now typically focused on reviewing exposure measurements, documenting zeros, and reducing the program scope and associated cost. An effective program, therefore, has to be agile, integrate with radiation protection operations, and determine doses on an infrequent basis. Therefore, the presence of individuals with considerable experience in dose calculation is greatly reduced. The need for operational health physicists to be able to calculate internal doses is still important for those times when individuals do get exposed internally. Accordingly, this presentation will provide a refresher in simple techniques for internal dose calculation. The discussion will center around the model systems currently incorporated into U.S. regulation and how they are employed in determining radionuclide intake and effective dose. In addition, information on pending updates of ICRP recommendations for internal dosimetry will be provided as well as discussion of ongoing controversies over calculational methods and evaluation of bioassay data.

8:00 AM – 5:00 PM **AAHP 2**

Radiological Dispersal Device (RDD) and Nuclear Detonation Response Tools for ROSS and HPs Engaged in Radiological and Nuclear Emergency Response

Brooke Buddemeier, Bill Irwin, Angela Leek, Matt McKinley, Jim Rogers

Radiological Operations Support Specialists (ROSS) and ROSS training instructors will present the latest radiological dispersal device and nuclear detonation response tools and resources. Brooke Buddemeier, CHP, of Lawrence Livermore National Laboratory will present guidance for radiation protection following a broader range of nuclear detonation scenarios such as might be associated with a Nation State actor. He will review new DHS first responder RDD response training videos which demonstrate the empirically validated dose rates and doses first responders would potentially experience in carrying out their duties following detonation of an explosive RDD. These videos should confirm for responders that they can do their job in this contaminated environment without significant accumulated dose. Brooke will also share the results of DHS work that shows how Preventive Radiological Nuclear Detection instrumentation can be repurposed for consequence management.

Angela Leek of Iowa, Matt McKinley of Kentucky, and Bill Irwin of Vermont are Type 1 ROSS and ROSS training instructors for the Counter Terrorism Operations Support group. They will describe tools taught to and used by Radiological Operations Support Specialists. These tools are available for other health physicists to use in radiological and nuclear emergency preparedness, too. The tools include incident command and incident planning job aids and the ROSS Toolkit. The ROSS Toolkit is an html-based collection of national and international guidance for radiation control perimeters, radiation dose decision points, personnel contamination screening levels, shelter and evacuation guidance, and fact sheets and other resources for nuclear power plant, RDD and nuclear detonation emergencies. They will close the course with an interactive session demonstrating the use of RadResponder to implement the 10-point monitoring plan following detonation of an RDD.

This course is sponsored by the Radiological Operations Support Specialist Steering Committee, which is comprised of Jim Rogers, FEMA Project Manager for ROSS; Dr. Dan Blumenthal, CHP of the DOE National Nuclear Security Administration; Ben Stevenson of the DHS Science and Technology Directorate's National Urban Security Technology Laboratory and Dr. Bill Irwin, CHP of the Conference of Radiation Control Program Directors. It serves as continuing education for both the American Academy of Health Physics and the nearly 50 people currently trained as ROSS.

8:00 AM – 5:00 PM **AAHP 3**

Radiation Risk Assessment

Fred Dolislager, Stuart Walker

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 who want to obtain a working knowledge on conducting Superfund radiation risk assessments.

PROFESSIONAL ENRICHMENT PROGRAM (PEP)

Sunday, 15 July, through Wednesday, 18 July • Huntington Convention Center

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.

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, 15 July, a series of 18 courses will be offered between 8:00 AM and 4:00 PM.

In addition to the above-mentioned sessions for Sunday, seven PEP lectures are scheduled on Monday-Wednesday, 12:15 PM – 2:15 PM. 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 that 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.

Sunday 8:00 AM – 10:00 AM

PEP 1-A CAP88-PC Version 4.1 Update

Brian Littleton, Ray Wood

Room 1

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 1-B Status of ANSI N42 RPI & HSI standards

Morgan Cox

Room 3

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 17 ANSI N42 standards for Radiation Protection Instrumentation (RPI) in effect, being revised or being combined, including those for performance and 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 in ANSI N42.51.

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 20 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 response, being developed.

PEP 1-C RadNet Deployable

Michael R. Messer

Room 4

The RadNet deployable consists of 40 deployable monitoring stations. These monitoring stations are equipped with low- and high-volume air samplers, gamma exposure radiation detector, near-real-time satellite communications, GPS, and weather station.

These units can be deployed to critical monitoring locations after a radiological incident has occurred or where an imminent threat is encountered. EPA relies on federal, state and local partners to assemble and operate RadNet deployables during a radiological incident. The PEP workshop will consist of an orientation of the RadNet deployable and program followed by an exercise to allow participants to gain hands on experience to build, operate and tear down the deployable monitor.

PEP 1-D Power Reactor Dry Fuel Storage Neutron Measurements - Practical Applications

Pat LaFrate

Room 5

ANI Information Bulletin 11-02, Neutron Monitoring, requires nuclear utilities to perform neutron characterizations where significant neutron exposure is a concern, including reactor containments, Independent Spent Fuel Storage Installations (ISFSIs), Dry Shielded Canisters (DSCs), and station neutron sources. The purpose of this evaluation was to determine if the current personnel TLD Neutron Correction Factors (NCFs) were appropriate for worker neutron exposure from Dry Fuel Storage campaigns and neutron monitoring activities.

Objective: Upon completion of this course, students will receive a brief overview of neutron measurement principles using a neutron spectrometer, Tissue Equivalent Proportional Counters (TEPCs), TLDs, and neutron-sensitive electronic dosimeters along with some practical examples of neutron spectroscopy and TEPC analyses relevant to health physicists.

PEP 1-E Nonionizing Radiation: An Overview of Biological Effects and Exposure Limits

B. Edwards
Cree Inc.

Room 6

This course provides a fundamental overview of nonionizing radiation (NIR) hazards and biological effects. Course attendees will learn the basic terminology and nomenclature, spectral region designations, regulatory framework, and consensus guidance associated with NIR. The course material will begin at the edge of the ionizing part of the electromagnetic (EM) spectrum and walk participants through a tour of the optical, radiofrequency (including microwave), and extremely low frequency (ELF) portions of the EM range, finally ending with static electric and magnetic fields. The existence of a series of exposure limits covering the entire NIR spectrum forms one of the course's basic themes. This continuous line of "safe" exposure levels helps establish the concept that NIR dose-response curves are at least well enough understood at all parts of the spectrum to provide a reasonably safe exposure envelope within which we can operate. After completing this course, attendees will be conversant in the major sources and associated hazards in each part of the NIR spectrum, along with the recognized exposure limits and control measures for those sources. Armed with this information, safety professionals can better recognize, evaluate, and communicate the hazards associated with the spectrum of significant NIR sources and address workers' concerns in a credible, fact-based, knowledgeable, and professional manner. While some knowledge of optical, radiofrequency, ELF, and static electromagnetic field characteristics may be helpful, both experienced and novice health physicists with NIR interests or responsibilities will benefit from this course.

PEP 1-F Understanding the Legal Concepts for Radiation Litigation – Part I

Raymond Johnson

Room 7

Plaintiffs in radiation litigation cases will normally file a lawsuit based on a claim of negligence on the part of a radioactive material licensee. To justify a negligence case, the plaintiff has to present four elements in a lawsuit. **1. Standard of Care** – the plaintiff has to establish that the licensee has a duty to protect workers. In other words the licensee is legally bound not to cause an unreasonable risk of harm to workers or others. The question then is, "What is the duty owed?" Is it ALARA? Is it the federal (or state) dose limits? How much radiation can a worker receive? **2. Breach of Duty Owed** – the plaintiff has to show that the licensee failed to implement radiation safety practices, for achieving the duty owed, which resulted in an unacceptable radiation exposure? **3. Proof of Causation** - the plaintiff has to prove that the breach of duty led directly to the damages claimed? This leads to questions such as, does radiation cause the ailment claimed by the plaintiff? Was the dose sufficient? Was the time sequence proper (taking latency into account)? Could other factors have caused the ailment? Is the ailment more likely than not to have been caused by radiation, i.e., greater than 50% probability of causation? **4. Damages** – legally recognized damages may include physical pain, emotional distress, economic loss, medical expenses, and loss of consortium. The strategy of the plaintiff's attorney will be to dramatically present the four elements for negligence and appeal to the juror's fears (such as fear of cancer). Typically both the plaintiff and attorney will rely upon popular radiation myths and junk science to justify their lawsuit. They may fail to distinguish between real and perceived risks. Both mythology and perceived risks will be addressed as well as other defense strategies and how to avoid radiation litigation.

Sunday 10:30 AM – 12:30 PM

PEP 2-A ASTM Standards That Either Directly Impact or Influence Radiation Protection Planning and/or Operations

Ed Walker

Room 1

This presentation will be in two parts. The first part will describe the organization of ASTM, the different types of standards

generated, and the processes that produce consensus standards. This will include a description of the ease of membership in ASTM, the benefits of receiving published standards, and the involvement for any member to participate in the development and approval process for new and existing standards. It will also include a brief description of five of the standards committees (out of a total of 140) that have generated standards that either directly impact or are relative to the design, installation, and operation of equipment, systems, and operating protocols. The second part of the presentation will describe the subcommittees within the five main committees that generate and maintain the standards of interest for a radiation protection program. A brief description of standards by each subcommittee will be described and how and/or why the radiation protection programs and associated radiation protection professional should incorporate, either directly or by reference, these standards into any radiological facility radiation protection program.

PEP 2-B Integration of Health Physics Into Emergency Response

Stephen Sugarman

Room 3

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 health care 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 health care 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 and 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 2-C A Forgotten Nuclear Accident: Bravo

Casper Sun, PhD, CHP

Room 4

This is a PEP presentation based on decades of personal experience from managing the Marshall Islands Radiological Safety Program (MIRSP) at Brookhaven National Laboratory (BNL).

It starts with the selection of Bikini Island for the U.S. Pacific Test Ground in the Republic of Marshall Islands (RMI). Later, on 1 March, 1954, the Bravo detonated. Since then, Bikini has never been the same – space and the people. The catastrophic event was resulted (1) from unpredicted weapon yields and (2) by the nuclear debris and fallout reached to the east of many inhabited Atolls.

BNL scientists played an important role on the radiological health and medical care of exposed populations funded by the Department of Energy (DOE) for about 40 years. The MIRSP was established for bioassay monitoring and internal dose assessment. The overview will l explain the dose assessment methods including whole-body counting, urinalysis, and LLNL's environmental and diet/intake studies.

Finally, the presentation summarizes and analyzes the operational activity as lessons learned that could be applied and implemented to modern emergency planning and accident preparedness.

PEP 2-D Nanotechnology and Radiation Safety

Mark Hoover

Room 5

This course will present an update for health physics professionals on relevant national and international experience and resources in nanotechnology safety, including a graded approach to sampling, characterization, and control of nanomaterials and advanced manufacturing hazards in the workplace. Case studies of good practice will be presented, as well as experience "from when things have gone wrong." Highlights from NCRP Report 176 on Radiation Safety Aspects of Nanotechnology will be included. Nanotechnology and nano-engineered structural materials, metals, coatings, coolants, ceramics, sorbents, and sensors are increasingly being evaluated and applied in radiation-related activities. Anticipating and recognizing hazards, evaluating exposures, and controlling and confirming protection from risks to safety, health, well-being, and productivity during these activities is essential.

PEP 2-E Laser Safety for Health Physicists

B. Edwards
Cree Inc.

Room 6

This course provides an overview of laser physics, biological effects, hazards, and control measures, as well as a concise distillation of the requirements in the ANSI Z136.1-2014 Standard for the Safe Use of Lasers. Non beam hazards, emerging issues, and accident histories with lessons learned will also be covered. Course attendees will learn practical laser safety principles to assist in developing and conducting laser safety training, performing safety evaluations, and effectively managing an institutional laser safety program. While some knowledge of laser hazards will be helpful, both experienced and novice health physicists with laser safety responsibilities will benefit from this course. Attendees may find it helpful to bring their own copy of ANSI Z136.1-2014.

PEP 2-F Preparation as an Expert or Fact Witness and Risk Communication – Part II

Raymond Johnson

Room 7

As a specialist in radiation safety you may be called upon to provide testimony for either the plaintiff or defense in a radiation lawsuit. To qualify as an expert you will need to meet the Daubert Criteria. Namely, your testimony has to be grounded in defensible science and your hypotheses must be testable, subject to peer review, with a known error rate according to existing standards, and generally accepted within the scientific peer community. You will also be challenged on your credentials as an expert in terms of your education and experience directly relevant to the case. Having advanced degrees, such as a PhD or certification as CHP, may not be adequate credentials relevant to a particular case. While someone may be an expert in some area, this does not necessarily qualify them as an expert for the particular elements of a lawsuit. Part of the professional ethics for CHPs is not to practice beyond their area of knowledge and expertise. Opposing attorneys will scrutinize every aspect of your credentials to identify weaknesses that may be used to discredit your expertise. If you do not meet the Daubert Criteria, the opposing counsel may ask the judge not to allow your testimony. As an expert you may be called upon to use tools for effective risk communication to explain radiation risks to attorneys, judges, and jurors. We will review some of these tools in this session as well as what it means to "tell the truth" and elements of credibility for a witness. We will also review tools for counseling upset workers (such as active listening) as a strategy for avoiding radiation litigation.

Sunday 2:00 PM – 4:00 PM

PEP 3-A Statistics, Uncertainty, and Detection Decisions – A Practical Review for Health Physics Practitioners

Doug van Cleef

Room 1

This course presents a quick but thorough review of the basic elements of counting statistics, uncertainty, and detection decisions and their application to radiation detection. In the course of the review, we will review basic procedures for estimating and propagating uncertainty, appropriate sources of reference information for detection system performance, and consensus standards guidance for these practices. The course will include ample time for Q&A to allow attendees to address specific application considerations. The course is two hours in duration and the American Academy of Health Physics will grant XX Continuing Education Credits (course number) for completion.

Objective: Upon completion of this course, students will have a solid working foundation for understanding the principles and applications of uncertainty as it applies to the radiation detection processes.

Who should attend: Experienced technologists who need a review of the current thinking on application of statistics for radiation measurements and reporting or new technologists seeking a solid, practical introduction to the importance of statistics in radiation measurements. The subject will presented almost entirely from a layman's perspective, so experienced statisticians who are seeking a thorough review of statistical principles might be disappointed in the depth of the content.

PEP 3-B Where Did This Come From? Lessons Learned From High-Routine Bioassay Investigations

Eugene Carbaugh

Room 3

This PEP class provides actual case studies of high-routine bioassay measurements and discusses the investigation process, resolution, and lessons learned from each. High-routine bioassay results can come from several sources, including normal statistical fluctuation of the measurement process, interference from nonoccupational sources, and previous occupational intakes, as well as new intakes. A good worker monitoring program will include an investigation process that addresses these alternatives and comes to a reasonable conclusion regarding which is most likely. A subtle nuance to these investigations is the possibility that a newly detected high-routine measurement might represent an old intake that has only now become detectable. This can

result from the worker being placed on a different bioassay measurement protocol, a change in analytical sensitivity, unusual biokinetics associated with highly insoluble inhalations, or lack of a clear work history. As sites close down, the detailed dosimetry records of specific worker exposures are archived, becoming relatively inaccessible, with only summary dose information available. Likewise, the "tribal knowledge" of the site becomes lost or seriously diluted as knowledgeable employees retire or move on. Therefore, it is incumbent upon the site performing a potential intake investigation to thoroughly address the possible alternatives or face the consequence of accepting responsibility for a new intake. The presenter has encountered all of the foregoing issues in the course of investigating high-routine bioassay measurements at the U.S. 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 3-C Coping With Natural Disasters and Radioactive Materials

Philip Simpkins

Room 4

Baker Hughes, a GE company (BHGE), operates in 120 countries, with approximately 70,000 employees, generating $23 billion combined revenue with 125 years of experience. At BHGE doing the right thing takes priority over everything else. As a result, health, safety and environment (HSE), quality and integrity are built into everything that we do. That includes when natural disasters threaten!

As a company, we work with radioactive materials, at our bases, multiple jobsites both onshore and offshore. We also have sources in transit and on dedicated marine vessels. This coupled with the people tooling and equipment we have to meet legal, client, and internal requirements successfully means that we need robust procedures, competent personnel and excellent communications between all parties concerned.

This session will look at the problems and solutions associated with using licensed radioactive materials in and around the Gulf Coast States, including the Gulf of Mexico, and particularly Texas and Louisiana, and how as a company BHGE complies with all of its requirements and responsibilities when natural disasters threaten or strike.

PEP 3-D Promise and Peril of "Citizen Science" and Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change

Robert Emery

Room 5

The practice of radiation safety is actually the convergence of a variety of professional disciplines, thus changes and developments that affect the field can emerge from various sources. This PEP is designed to address two contemporary issues confronting radiation safety program operations. The first contemporary topic covers the promise and peril of "citizen science" and why this matters to radiation safety. The second contemporary topic covers strategies for keeping your radiation safety program on course in a sea of constant change.

Promise and Peril of "Citizen Science" & Why This Matters to Radiation Safety

The proliferation of personal electronic devices has resulted in an exponential expansion in the ability to rapidly gather and disseminate information – some accurate, some not so accurate, and some downright wrong. With virtually every member of the workforce and community now equipped with this technology, the notion of "citizen science" has expanded, wherein citizens and employees can collect and instantly transmit data and information about exposures and situations. While this technique holds great promise as a "force multiplier" to address various concerns, the technique is largely unfiltered and can result in the dissemination of misinformation, apprehension, and confusion. This presentation will discuss the evolution of "citizen science" and how it has changed with recent technological developments and then will provide a series of suggested steps for radiation safety programs to take to proactively address the challenge.

Strategies for Keeping Your Radiation Safety Program on Course in a Sea of Constant Change

The University of Texas School of Public Health recently conducted a straw poll of approximately 50 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 3-E Performing ANSI Z136-Based Laser Hazard Calculations

B. Edwards
Cree Inc.

Room 6

This course provides a step-by-step guide to performing laser hazard calculations based on the principles and methodology in the ANSI Z136.1-2014 Standard for the Safe Use of Lasers. Attendees will gain an understanding of how to complete these calculations for continuous wave, pulsed, and repetitively pulsed laser systems. While some knowledge of laser hazards will be helpful, both experienced and novice health physicists with laser-safety responsibilities will benefit from this course. However, anyone not already familiar with the fundamentals of radiometry and the arcane conventions of the Z136 series of standards for the safe use of lasers would benefit from attending the Laser Safety for Health Physicists PEP so they'll have some familiarity with the concepts under discussion. Attendees will also find bringing their own copy of ANSI Z136.1-2014 a useful reference.

PEP 3-F Radiation Dosimetry in Nuclear Medicine Therapy

Michael Stabin

Room 7

Dose estimates for radiopharmaceuticals may be established based on data from preclinical (i.e., animal species) or clinical studies (involving human patients or volunteers). This session will describe current approaches in both areas and show examples. Traditional mathematical model-based anatomical models have now been replaced with more realistic standardized anatomical models based on patient image data and have been incorporated into the software code OLINDA/EXM 2.0. The code employs these anthropomorphic models, the new ICRP human alimentary tract (HAT) model and updated (ICRP 103) tissue-weighting factors for calculation of effective dose. Adjustments to traditional dose calculations based on patient-specific measurements are routinely needed, especially in therapy calculations, for marrow activity (based on measured blood parameters or image data), organ mass (based on volumes measured by ultrasound or Computed Tomography (CT), and other variables. Many interesting radiopharmaceutical therapy agents are currently in use for thyroid disorders, neuroendocrine tumors, and treatment of bone metastases. Clinical experience, success rates, and management of normal tissue toxicity with many nuclear medicine therapy agents will be reviewed. The need for patient-individualized approaches to therapy will be emphasized. Discussions of relevant release criteria for therapy patients and current issues in radiobiology will be included.

Monday 12:15 PM – 2:15 PM

PEP M-1 So Now You Are the RSO: Elements of an Effective Radiation Safety Program

Thomas Morgan
Columbia University

Room 3

Designation as a radiation safety officer brings with it unique opportunities and challenges. The author will offer insights on how to manage a radiation safety program from his 20+ years' experience as an RSO at medical, university, and industrial facilities. Regardless of the type of facility, number of radiation workers, or scope, an effective radiation safety program must be driven from the top down. Senior management must embrace the goals of the program. The RSO must have the trust of senior management as well as a good working relationship with line managers and workers. These relationships are built on the integrity, knowledge, experience, and accessibility of the RSO. This talk will focus on the role of the RSO in achieving and maintaining an effective program.

PEP M-2 Ethical Decision Making With Link to Safety Culture & Radiation Safety's Role in Mitigating Insider Security Risks

Robert Emery, Janet Gutiérrez

Room 4

The practice of radiation safety is actually the convergence of a variety of professional disciplines, thus changes and developments that affect the field can emerge from various sources. This PEP is designed to address two contemporary issues confronting radiation safety program operations. The first contemporary topic covers ethical decision making and the link to safety culture. The second contemporary topic covers the radiation safety professional's role in mitigating insider security risks.

Ethical Decision-Making Tools for Enhancing Organizational Safety Culture

Recent investigations of several tragic events have repeatedly identified the absence of a culture of safety as a common contributing factor. An organization's safety culture is a collective reflection of individual decisions made by its workforce, each carrying with them ethical implications. Safety culture, good or bad, is the sum product of many individual ethical decisions, yet the notion of ethical safety decision-making is not often discussed. This presentation will describe ethical dilemmas safety professionals can encounter and how the decisions that are made can impact an organization's overall safety culture. A set of ethical decision-making tools will be presented, along with a suggested path forward for actually improving safety culture within an organization.

Radiation Safety's Role in Mitigating the "Insider Threat" Security Risk

While organizations maintain many layers of controls to prevent outsiders from gaining unauthorized access to cause loss or harm, persons who have been granted legitimate access can become an "insider threat" and, because they are very difficult to detect, cause over $100 billon in losses annually. Although the typical insider targets assets or data, in some cases their actions can also have significant impacts on workplace and environmental health and safety. Because much of an organization's radiation safety program activities are carried out with the workers in their workplace, this represents a unique opportunity to assist in the possible detection of insider threats. This presentation will discuss the threats represented by insiders and will detail their recognized traits so that radiation safety professionals can enhance their situational awareness and report suspicions to the appropriate authorities.

Tuesday 12:15 PM – 2:15 PM

PEP T-1 Radiation Shielding - A Lost Art?

Edward Waller

Room 1

Is radiation shielding an art that is being lost? Have modern computer resources made it such that non-Monte Carlo techniques for radiation shielding are being lost? Do we always need a voxelized phantom model when a blob of water may well do the job??

This PEP will explore these questions and provide some insight into the evolution of radiation shielding calculations and design. For the health physicist, radiation shielding represents the primary engineered barrier for the prevention of external dose and is an essential component of any ALARA program. As such, the health physicist and nuclear engineer must work hand-in-hand to ensure the safety of the shielding design. This presentation will briefly review the history of radiation shielding, provide an overview of key concepts related to neutron and gamma radiation shielding calculations, and finally discuss applications to a variety of scenarios, including specific examples from medical x-ray facilities, radiation sources and power reactors. The overall goals of radiation shielding will be presented with the intent of providing a general refresher on the importance of radiation shielding. References for this PEP include (but are not limited to) *Radiation Shielding*, by Shultis & Faw, ANS, 2000; Reactor Shielding for Nuclear Engineers, N.M. Schaeffer (ed.), AEC TID-25951, 1973 and Engineering Compendium on Radiation Shielding, R. G. Jaeger (Editor), Springer-Verlag, 1968.

PEP T-2 Radiological and Nuclear Terrorism Tools: Customize for Your Community

Brooke Buddemeier
Lawrence Livermore National Laboratory

Room 3

Radiation safety professionals may be called upon to help put radiological "dirty bombs" and nuclear detonations into perspective. Template presentations and several free software tools are available to help you create customized presentations that demonstrate impacts of these events in your community. When used in conjunction with recent guidance from the Department of Homeland Security and National Council on Radiation Protection and Measurements, these tools can be used create powerful visual demonstrations that put the science into context on how to respond in a manner that can significantly reduce impacts and casualties.

Wednesday 12:15 PM – 2:15 PM

PEP W-1 Measuring and Displaying Radiation Protection Program Metrics That Matter to Management

Janet Gutiérrez

Room 1

It is currently quite rare for organizations to maintain stand-alone radiation safety programs. Resource constraints and workplace complexities have served as a catalyst for the creation of comprehensive environmental health & safety (EH&S) or risk management (RM) programs, which include, among other health and safety aspects, radiation safety programs. But many of these consolidations were not inclusive of staff training to instill an understanding of the areas now aligned with the radiation safety function. This situation is unfortunate because when armed with a basic understanding of the other safety programs, the radiation safety staff can provide improved customer service and address many simple issues before they become major problems. This Professional Enrichment Program (PEP) course is designed to address this shortcoming by providing an overview of a number of key aspects of EH&S and RM programs from the perspective of practicing radiation safety professionals who now are involved in a broader set of health and safety issues.

This PEP session will focus on "Measuring and Displaying Radiation Protection Program Metrics That Matter to Management." Radiation protection programs typically accumulate data and documentation so that regulatory officials can assess compliance with established regulations. The implicit logic associated with this activity is that compliance equates to safety. But in this era of constricted resources, mere regulatory compliance is no longer sufficient to justify all necessary programmatic resources. Radiation protection programs are

now expected to readily demonstrate how they add tangible value to the core missions of an organization. The demonstration of this value is expected to be in the form of some sort of performance metrics, but this is an area in which many radiation safety professionals have not been trained. The issue is further compounded by the need to display the metrics in manners that are succinct and compelling, yet another area where formal training is often lacking. This session will first describe a variety of possible radiation protection program performance measures and metrics and then will focus on the display of the information in ways that clearly convey the intended message. Actual before and after data display "make-overs" will be presented, and ample time will be provided for questions, answers, and discussion.

The particular topics included have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy."

PEP W-2 Radiology Dosimetry: Organ Doses vs. Effective Dose

Cari Borrás

Room 3

The course will focus on the definition and determination of quantities and units used for radiation protection in the medical field, highlighting the problems in patient dosimetry. Although many scientific papers quantify occupational and medical exposures in terms of effective dose, its use in patient dosimetry–where dose limits do not apply–carries large uncertainties. The International Commission on Radiological Protection (ICRP) defined effective dose as a quantity to be used only for occupationally exposed workers and members of the public, where doses are assumed to be well below 100 mSv, and thus, only stochastic effects are considered. At doses above about 0.5-1 Sv, where tissue reactions (deterministic effects) may occur, the dosimetric quantity to use is the absorbed dose in the irradiated organ or tissue, modified by the radiobiological effectiveness of the radiation specific to the biological endpoint of concern; it is expressed in gray (Gy). Effective dose is applied to a reference person–the terms wR and wT used in its computation are derived averages over age and gender from large populations–and it was never intended to provide a measure of risk to individuals, as is the case in medical exposures. That measure can be inferred only by determining organ doses. Current methods of organ dose estimation – like placing calibrated ion chambers, diodes, film, and/or thermoluminescent or optically stimulated luminescent dosimeters on patients or in phantoms, making measurements in physical phantoms that simulate patients, and performing Monte Carlo radiation transport calculations using mathematical phantoms, not only have large uncertainties, but also they may be very time-consuming. Examples of staff and patient dose assessment in radiological procedures, especially in relatively high-exposure modalities such as interventional radiology and computed tomography (CT), will be illustrated. The ability of electronically calculating, displaying, transferring and archiving doses from radiography, mammography, CT and diagnostic and interventional fluoroscopy–with its advantages and caveats–will be explored. The recent "Patient-Radiation Dose Structured Report," developed by the Digital Imaging and Communications in Medicine (DICOM) Standards Committee, which estimates organ absorbed doses based on individual image acquisition parameters and specific patient characteristics, will be introduced. The Committee on Biological Effects of Ionizing Radiation (BEIR VII) has calculated risks for many organs/tissues exposed to low doses of low Linear Energy Transfer (LET) radiations and ICRP has published new threshold dose values for tissue reactions. With these values, risks to patients can be estimated. However, the real question is whether we need to assess individual risk in order to optimize patient protection. If the goal is not to assess risks, but to reduce them, dose-related machine parameters can be measured easily and compared against previously established diagnostic reference levels (DRL)s generated for a specific modality and type of procedure. DRL-acceptable dosimetric quantities for projection radiography and fluoroscopy are incident air kerma (Kai), entrance surface air kerma (Kae or ESAK) and air kerma area product (PKA, also called KAP or DAP), and, additionally, for interventional fluoroscopy, reference point air kerma Ka,r. In CT, currently accepted metrics are volumetric CT dose index (CTDIvol), dose-length-product (DLP) and size-specific dose estimate (SSDE). Examples of DRLs for adult and pediatric studies will be presented and discussed.

PEP W-3 The MARSAME Methodology: Fundamentals, Applications, and Benefits

Alex Boerner, Tarzia

Room 4

Published in January 2009, the *Multi-Agency Radiation Survey and Assessment of Materials and Equipment* manual (MARSAME) was a joint effort between the U.S. Department of Energy (DOE), the U.S. Department of Defense (DoD), the U.S. Environmental Protection Agency (EPA), and the U.S. Nuclear Regulatory Commission (NRC) to aid sites in the clearance of materials and equipment (M&E). The MARSAME manual supplements the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), published in 1997.

As cited in the MARSAME, a variety of M&E can be applied to this process, including (but not limited to) metals, concrete, tools, equipment, piping, conduit, and furniture. The MARSAME methodology is a defense in depth methodology which involves a

stepwise approach to material release. The process starts with an initial historical assessment to identify potential radionuclides and radioactive processes that could have impacted the material. After this initial knowledge is gained, Measurement Quality Objectives (MQOs) are developed as a basis to plan characterization and final surveys for material release. Finally, the survey plans and survey implementation results are reviewed against Data Quality Assessment (DQA) criteria developed to ensure that the survey results meet the original objectives.

Flexibility and a graded approach are inherent components of the MARSAME methodology. Because large quantities of M&E potentially affected by radioactivity are present in the United States and abroad, owners of the M&E need to identify acceptable disposition options. Thirteen disposition scenarios are described in MARSAME. If the methodology is appropriately planned and implemented, the benefits of the MARSAME approach include worker and public protection, reduction in the amount of disposed radioactive waste, reuse of materials (resulting in environmental and material sustainability advantages), and cost savings.

This class introduces participants to the MARSAME methodology. It will be an interactive learning environment and (limited) exercise discussions are included. (Please bring a calculator just in case!) During the class, practical applications of MARSAME will be discussed to present how the process can be adapted to release material under a variety of scenarios. Lessons learned from MARSAME implementation will also be discussed.

PEP W-4 Medical Health Physics – Preparing Yourself for the future

Kevin Nelson, David W. Jordan
Mayo Clinic Arizona, University Hospitals Cleveland Medical Center

Room 7

Medical health physics is tightly integrated with technology, and technology advancements in the next two decades can be expected to dramatically outpace those of the past two decades, which have been considerable. Developing skills and preparing for an uncertain future requires some extrapolation – and some imagination. Some likely future trends for health care technology and the practice of medical physics will point to options and opportunities for developing new practice models to deliver value in the health care enterprise of 2038 and beyond. This presentation will explore how technology might impact the role of medical physicists and medical health physicists and provide insight on how to best prepare yourself to meet the demands facing your institution in the years ahead.

PEP W-5 A Radiation Grassroots Response Group-Your Responsibility and How to

John C. White

Room 5

In any major event, National and even State resources can take some time to marshal and be effective. During that critical early period, it is essential that local responders have the ability to use equipment and contact Subject Matter Experts already present in the local area. In a major Radiological Incident of any type, Radiation Safety professionals will be a critical need. It is essential that the Health Physicist know the local responders and emergency managers, and have a working relationship with those groups. It is also essential that an understanding of local resources is widespread, to be able to bring the maximum capabilities to bear to reduce exposures and manage the response environment. This Lecture presents one such solution to this difficult problem. North Texas is the fourth largest Metropolitan area in the country, but has 143 municipal authorities in a Home Rule State. The North Texas Radiation Response Group was formed to gather and disseminate information, and provide a common meeting event for responders to become familiar with area capabilities, determine equipment gaps, and advance training and radiological response programs in the Metro area. Significant success has been achieved with equipment purchase, training capabilities notification, and face-to-face meetings of those with common purpose.

This lecture will demonstrate the need for your action in your area, and provide you the basic building blocks to organize your own local Group with a focus on radiological response.

CONTINUING EDUCATION LECTURES (CELs)

Monday, 16 July, through Thursday, 19 July

Monday

CEL-1 **7:15 AM – 8:15 AM**

Modeling Data for Radiological Impact Assessment: Humans and Biota

Stephanie Bush-Goddard, Tanya Oxenberg
United States Nuclear Regulatory Commission

Room 3

Protection of the environment from radiation is nothing new. Both humans and biota are well studied and the regulatory framework is well established. However, there are gaps in biota data and an explicit assessment to integrating human and biota doses is not well documented.

This Continuing Education Lecture explores the International Atomic Energy Agency (IAEA) MODAIRA II (Modelling and Data for Radiological Impact Assessment) Working Group (WG) 3 program. MODAIRA's primary objective is to enhance the capabilities of Countries to simulate radionuclide release, mobilization, and transfer in the environment and, thereby, assess resulting public exposure. The charter for Working Group 3, entitled: "Assessments and Control of Exposures to Public and Biota for Planned Releases to the Environment," charter is to develop and apply an integrated approach to studying the impact of environmental releases on both humans and biota from ionizing radiation resulting from applications of radionuclides in power production, medicine, research, and industry.

Therefore, this lecture will explore international and national guidance and regulations to demonstrate compliance with protecting the environment against ionizing radiation for humans and biota. It will also summarize state-of-the-art methods and computer codes for performing dose assessments and identify a set of scenarios where explicit assessment of the environment would be necessary.

CEL-2 **7:15 AM – 8:15 AM**

Retired but not Yet Green Field

Robert Miltenberger

Room 4

This presentation discusses some the issues associated with retirement and ways to stay active in the profession without necessarily being actively employed as a health physicist. While most applicable to the eligible for retirement professional, the presentation provides ideas for expanded career growth to professionals at earlier stages of their career.

Tuesday

CEL-3 **6:45 AM – 7:45 AM**

Channeling Stephen Hawking: How Lessons From the Renowned Astrophysicist Can Inform and Inspire Great Health Physics for the Future

Mark Hoover

Room 1

From making theoretical predictions about radiation and black holes, to developing a theory of cosmology, to commenting on the future of humanity, Stephen Hawking (1942-2018) was a thoroughly discerning thinker and communicator. This lecture will revisit some of the many scientific and philosophical insights of this renowned champion of discovery that can inform and inspire our pursuit of great health physics in the future. Individuals planning to attend the lecture are invited to read the entertaining and informative writings of Prof. Hawking, including his 1988 classic *A Brief History of Time*, as well as his 2011 assessment of the impactful products of the scientific giants of history: *The Dreams That Stuff Is Made of: The Most Astounding Papers of Quantum Physics and How They Shook the Scientific World*.

CONTINUING EDUCATION LECTURES (CELs)

Monday, 16 July, through Thursday, 19 July

Wednesday

CEL-4 **6:30 AM – 7:30 AM**

Elements of an Effective Radiation Protection Program

Jim Dillard
Department of Energy

Room 1

Having a GOOD radiation protection program is often not good enough. Along with identifying measures developed and implemented to achieve continuing compliance with applicable regulations, as well as providing a framework for addressing radiation safety issues in the workplace, an effective program also provides a process for continuous and systematic improvements. Although there is a vast array of guidance with regards to radiation protection program development, ALARA planning, and conducting self-assessments, very little discusses strategies and mechanisms for ensuring continuous improvement is achieved. This discussion will highlight the essential elements of an effective radiation protection program that looks beyond specific regulatory requirements and discusses incorporation of operational experiences and lessons learned, implementing an integrated safety-management approach to optimize worker protection from all hazards and cultivating a culture of safety in a radiation protection environment.

CEL-5 **2:15 PM – 3:15 PM**

Certification Options for Health Physicists

Steven King, Andy Miller

Room 7

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.

Thursday

CEL-6 **6:45 AM – 7:45 AM**

Lessons Learned During Independent Verification Activities

David King
Oak Ridge Associated Universities (ORAU)

Room 1

Oak Ridge Associated Universities (ORAU) has served as an independent (third party) verification (IV) contractor for both the U.S. Department of Energy and the U.S. Nuclear Regulatory Commission. This paper summarizes lessons learned that ORAU has gathered from decades of IV activities across a broad range of decontamination and decommissioning (D&D) projects. As presented herein, lessons learned are grouped into their applicable phase of the data life cycle as outlined in the *Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM)* (DOE/NRC 2000), including planning, implementation, and assessment. These lessons learned may be common to several sites or may be identified at a single site but significant enough to cause a dramatic shift in D&D activities. In either case, the objectives of this paper are to contribute to the health physics body of knowledge and to help D&D projects avoid similar issues that tend to detrimentally impact budgets, project schedules, and customer/contractor reputation.

WORKS-IN-PROGRESS ABSTRACTS

P.58 Biokinetics of 238Pu: Analysis of Several Inhalation Incidents at Los Alamos National Laboratory

Poudel D, Klumpp JA, Waters TL, Bertelli L
Los Alamos National Laboratory

The biokinetic data from experimental animal studies and accidental human exposures have indicated that the behavior of 238Pu oxides is significantly different than that of 239Pu oxides. This has been explained as being due to the high specific activity of 238Pu (the specific activity of 238PuO2 is approximately 260-fold that of 239PuO2) that causes fragmentation of 238Pu particles resulting in faster dissolution in the lungs and thus faster uptake into the blood. The new ICRP document Occupational Intakes of Radionuclides: Part 4 (OIR4, currently in draft) provides material-specific absorption values for ceramic and non-ceramic forms of 238PuO2. We analyze – in light of the new ICRP models (ICRP Publications 100, 130 and OIR4) – the bioassay data collected from several individuals involved in different 238Pu inhalation incidents at Los Alamos National Laboratory, and report on the biokinetics as inferred from the bioassay data.

P.59 University of California System-wide Cesium Irradiator Replacement Program

MacKenzie CJ, Smith K
University of California, Berkeley

The purpose of this poster will be to explain the University of California's system-wide effort to replace Cesium Irradiators with alternative technologies. In December of 2017, the University of California owns 41 Cesium irradiators and collectively the University made a decision to transition away from the use of Cesium irradiators where alternative technologies are deemed equivalent. Two technical conferences for the research community were held in January of 2018 at UCLA and UCSF on Cesium Irradiators and Alternative Technologies to discuss the technical challenges to transition off of cesium irradiators to X-ray irradiators. A UC system-wide Radiation Source Replacement Work Group was formed with faculty from each of the campuses to explore whether a science-informed consensus could be reached on source equivalency for research applications. The key findings and recommendations of the Working Group will be shared in this poster. The University has moved forward to remove the disused cesium irradiators from our facilities and to remove and replace under the National Nuclear Security Administrations (NNSA) Cesium Irradiator Replacement Program (CIRP) those cesium irradiators that researchers have identified as willing to transition to X-ray irradiators. A three year plan for this transition has been established and the progress to date will be discussed.

P.60 Study of Radon Inhalation Dose Rate in the Area of Highest Lung Cancer Incidence in India

Bawitlung Z, Rohmingliana PC, Chhangte LZ, Siama RL, Chungnunga H, Lawma VR, Sahoo BK, Sapra BK
Zirtiri Residential Science College, Aizawl, Bhabha Atomic Research Centre, Mumbai, India

The effect of radon, thoron and their progenies on human population has been well- established and this radiation damage to bronchial cells eventually can be the second leading cause of lung cancer next to smoking. Inhalation dose rate due to these natural radiations has been studied in Mizoram,India and the importance of the study lies with the fact that Mizoram has the highest lung cancer incidence rate in India as per the Population Based Cancer Registry, Civil Hospital, Aizawl, Mizoram 2010-2014 report.The radon exposures to general population has been assessed by monitoring 72 dwellings selected from 8 districts in this region. The dwellings were selected on the basis of spot gamma background radiation and construction type of the houses. The dwellings were monitored for one year, in 4 month cycles to indicate seasonal variations, for radiation doses comprising inhalation doseand gamma dose respectively. The study was conducted during 2009-2011. A time integrated method using Solid State Nuclear Track Detector (SSNTD) based pin-hole dosimeters were used for measurement of indoor Radon/Thoron concentration. For the progeny concentration measurement, deposition based direct Radon/Thoron progeny sensors (DRPS/DTPS) were used. Total inhalation dose rate due to radon/thoron and their progenies were calculated using suitable formulae given by UNSCEAR 2000.Gamma dose measurements for indoor as well as outdoor were carried out using Geiger Muller survey meters.Seasonal variation in concentration of indoor radon/ thoron and their progenies were monitored in Mizoram and the annual average inhalation dose rate was calculated. The result shows that the average radon(thoron) inhalation dose rate is 772.9 (289.6) µSv/y in which is below the UNSCEAR 2000 value (=1010 µSv/y) for radon but higher for thoron where the UNSCEAR 2000 value is 84 µSv/y for indoor environment. In both the cases, it is found to be within the acceptable limits.The spot survey of gamma background radiation level varies between 9 to 24 µR/h inside and outside the dwellings throughout Mizoram which are all within acceptable limits. From the above results, there is no direct indication that radon is responsible for the high lung cancer incidence in the area. In order to find epidemiological evidence of natural radiations to high cancer incidence in the area, one may need to conduct a case-control study which is beyond this scope. However, the derived data of measurement will provide baseline data for further studies. On the other hand, Global Adult Tobacco Survey India, in its report 2009-2010 indicated that Mizoram has the highest percentage of tobacco user from the population which is 67% and also 40 % of current smokers from the age 15 and above, which is also the highest

throughout India. Consequently, the food habit and high level consumption of tobacco and its products in the study area has been found to increase the risk of lung cancer incidence rather than the inhalation dose rate due to natural radiation sources.

P.61 A Novel Platform for Digitization of Radiation Measurements in Radioprotection, Decommissioning & Dismantling and Nuclear Waste Management

Mini G, Morichi M, Locatelli M, Pepe F, Rogo F
CAEN SyS srl, CAEN Technologies Inc.

An innovative Platform for a seamless digitization of the information produced during the characterization of radioactive waste, contaminated objects, and in general radioprotection measurements has been developed by CAEN SyS. The Platform is based on a spectroscopic handheld instrument integrating RFID technology, barcode reader, camera, voice recorder, and geo-localization, a selection of radiation tolerant RFID tags tested above 300 Gy integrated dose, ruggedized portable RFID readers and a secure database framework capable to collect data also from external sources such as gamma scanners and imaging systems. The Platform allows for real-time measurement of dose rate, radiation spectroscopy, tagging, tracking and inventorying of items. All data produced by the Platform are securely stored into the non-volatile memory of the RFID tags and in the database for both onsite and remote access to the information by operators. This paper presents the current development of the Platform and shows the advantages of such approach to achieve an easy yet reliable waste traceability, waste bagging optimization, and a structured methodology for radiation measurements, meeting an excellent quality control as increasingly required by Safety Authorities. Applications here envisaged and explored are dismantling and decontamination operations, radioprotection measurements and patrols, nuclear material management, safeguards and verification inspections. More in general, the Platform can address the needs of all plants, research laboratories and facilities that are looking to improve their Safety Standards, decrease operational costs, have a precise knowledge of the contaminated environment and objects as well as optimization for personnel dose minimization.

P.62 Special Nuclear Material Portable Identifier

Locatelli M, Mini G, Morichi M, Mangiagalli G, Fanchini E, Stevanato L, Lunardon M, Fontana C
CAEN Technologies Inc., CAEN SyS srl, University of Padova

The increased frequency of terroristic threats in recent years creates a growing level of concern among citizens. The main dangers are represented by dirty bombs or silent sources placed in crowded areas. To address this problem, we designed an innovative SNM portable identifier suited for: • rapid scanning in public access areas • preventive and early warning detection • sequential and geo-localized in-field measurements for orphan source searching • law enforcement by customs inspectors for masked source identification • personnel and site security in critical infrastructures This device can be easily hidden in a backpack/trolley and deployed for radioactive, SNM and NORM source search, identification and mapping for a discrete monitoring of strategic areas. The system is based on two different detectors: a liquid scintillator and a high-resolution crystal. The liquid scintillator is used for neutron and gamma detection. Such detector can discriminate neutrons from gammas by Pulse Shape Discrimination performed by integrated digital electronics with the following capabilities: • fast discrimination of gamma rays from neutrons. Alarms are triggered separately when the rate of gammas or neutrons exceeds the corresponding natural background. Alarm threshold allows detection with 95% detection probability at 95% confidence level for a dose rate on the front face of the scintillator of at least 50 nSv/h • identification of neutron sources discriminating between fissile material (e.g. 252Cf), alpha-n type sources (e.g. Am/Be), Uranium and Plutonium through a patented algorithm. The high-resolution crystal provides the identification of gamma sources thanks to a proprietary algorithm able to identify multiple radionuclides simultaneously. In addition, it is also possible to calculate the Pu and U enrichment grade. After each identification measurement a report is available providing all the identified radionuclides classified in standard categories (NORM, Medical, Industrial, SNM). This device is compliant to IEC 62327 standard and to the Homeland Security instrumentation requirements being able to detect a neutron source in gamma field up to 100 µSv/h. Further enhancement demonstrated the capability of identifying neutron sources even at a gamma dose rate of 300 µSv/h by a dedicated algorithm.

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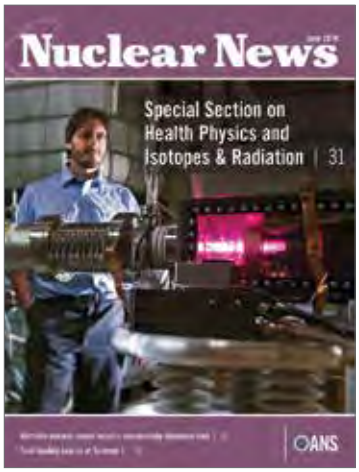
The American Nuclear Society (ANS) publishes two trade magazines, *Nuclear News* and *Radwaste Solutions*, which cover all aspects of the nuclear industry, including Isotopes & Radiation and Radiation Protection & Shielding. See why more than 10,000 readers worldwide subscribe to our magazines to help stay informed. Visit us at booth 424.



ans.org/nn

Published since 1959, *Nuclear News* reports on the latest developments in the nuclear field. News reports cover plant operations, maintenance and security; policy and legislation; international developments; waste management and fuel; and business and contract award news. Also covered are nonpower uses of nuclear science and technology, including nuclear medicine, food irradiation, and space nuclear applications.

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This specialty magazine provides dedicated coverage of the generation, handling, treatment, transportation, storage, and disposal of radioactive waste. Articles are contributed by people working with utilities and those involved in U.S. DOE site work, in the medical, legal, university, consulting, and commercial areas, and from all levels of government.

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HUNTINGTON CONVENTION CENTER FLOOR PLAN

CONCOURSE LEVEL - MEETING ROOMS

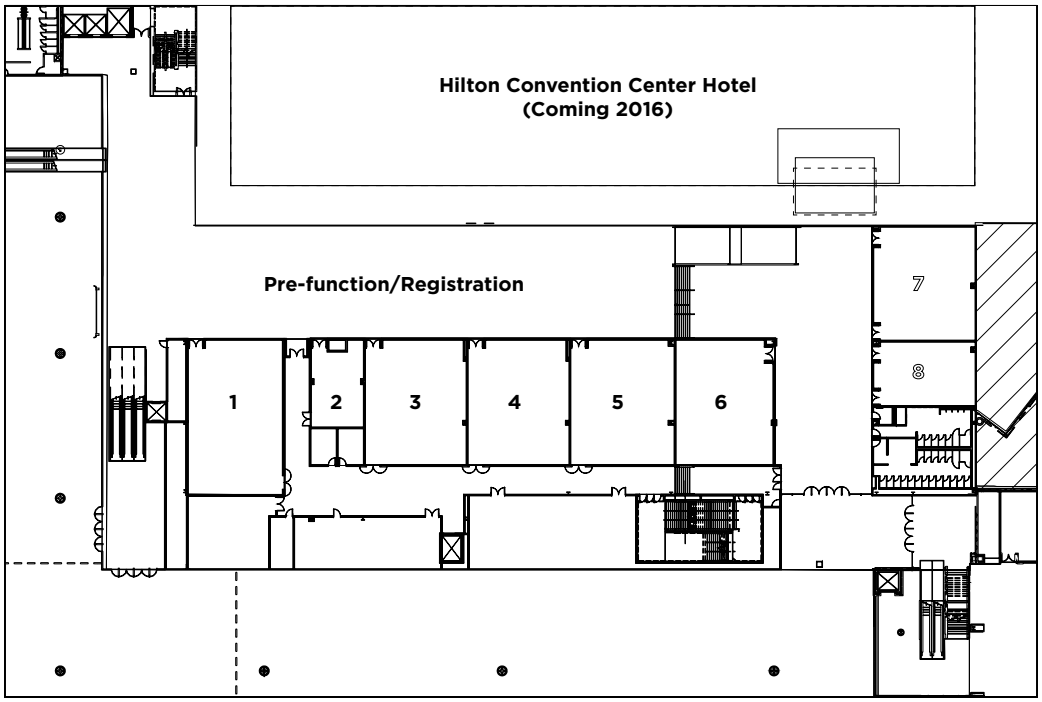
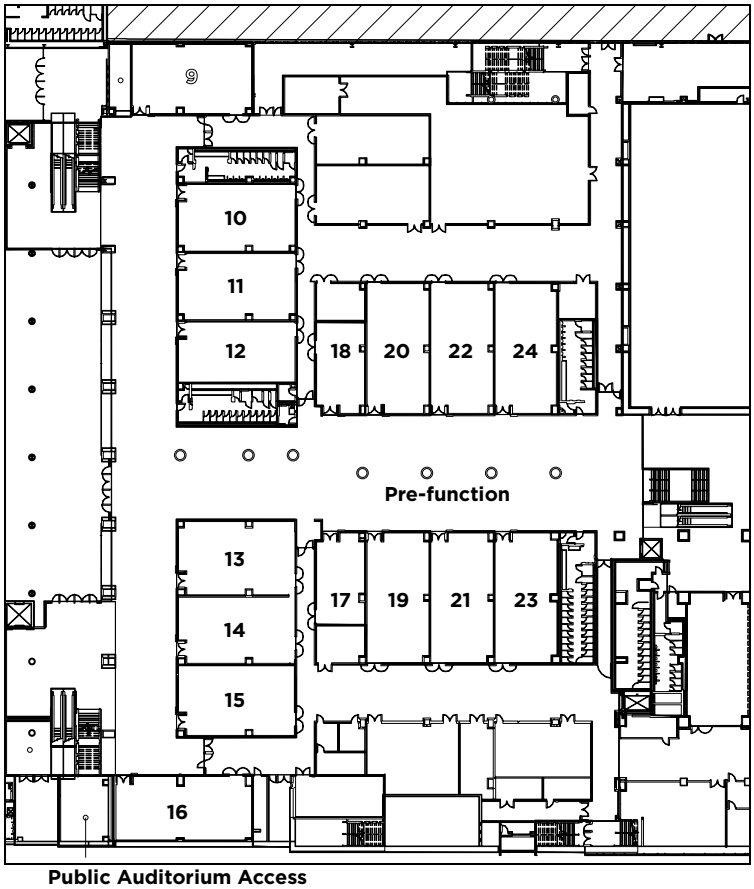
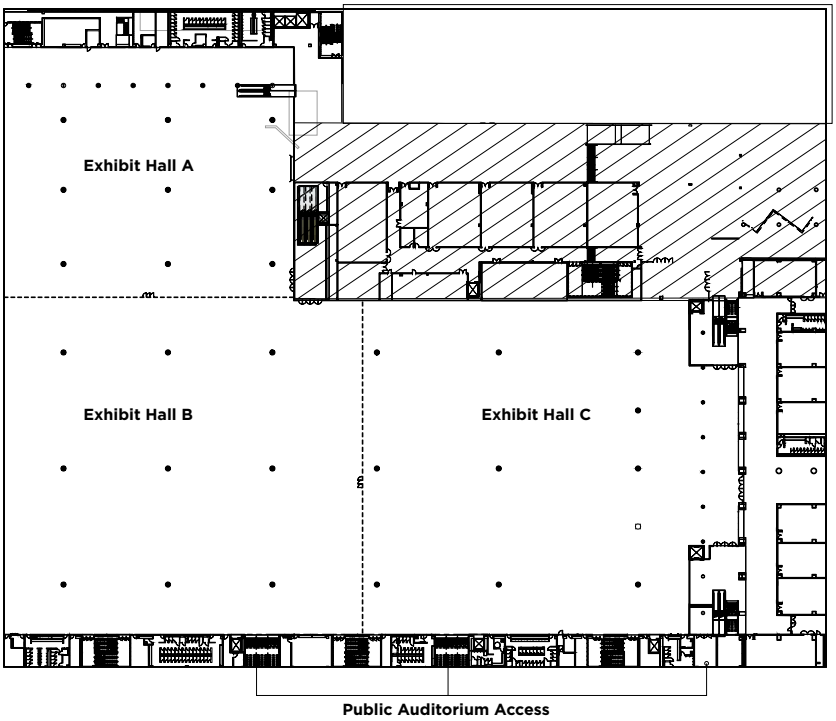


EXHIBIT HALL LEVEL MEETING ROOMS

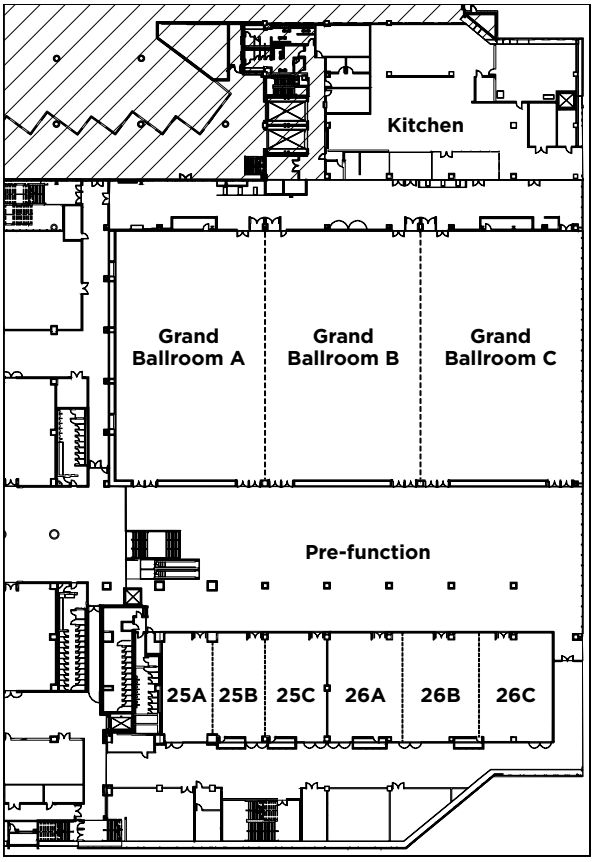


HUNTINGTON CONVENTION CENTER FLOOR PLAN

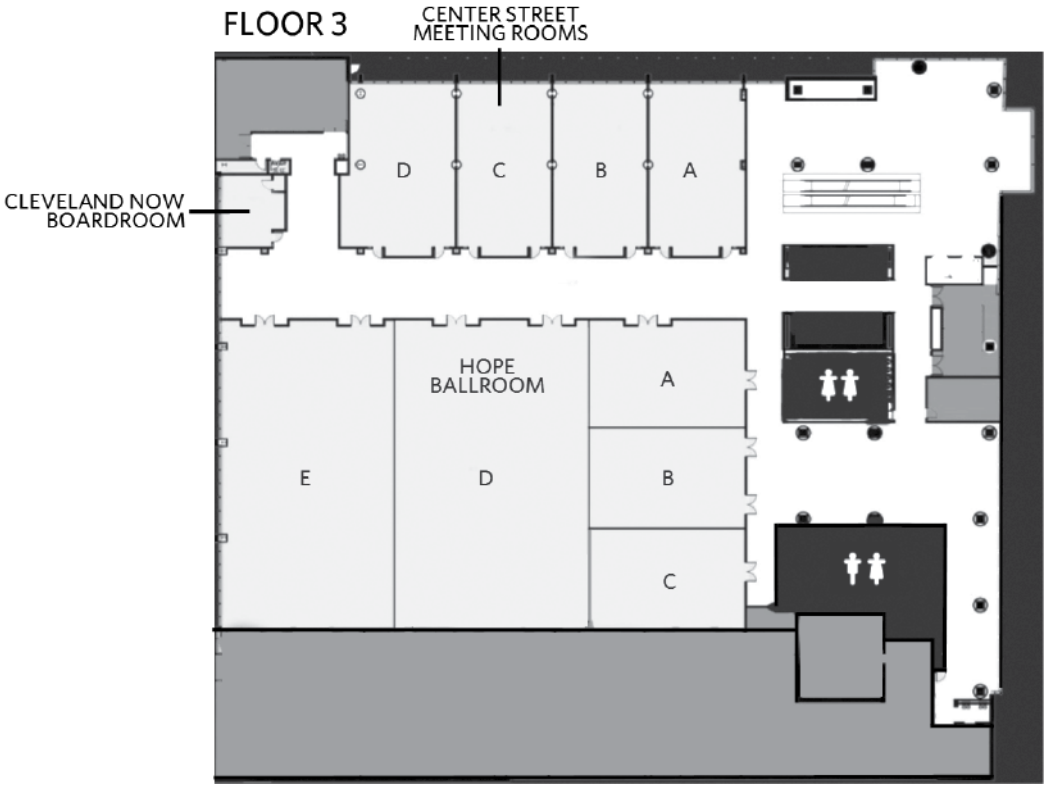
EXHIBIT HALL LEVEL

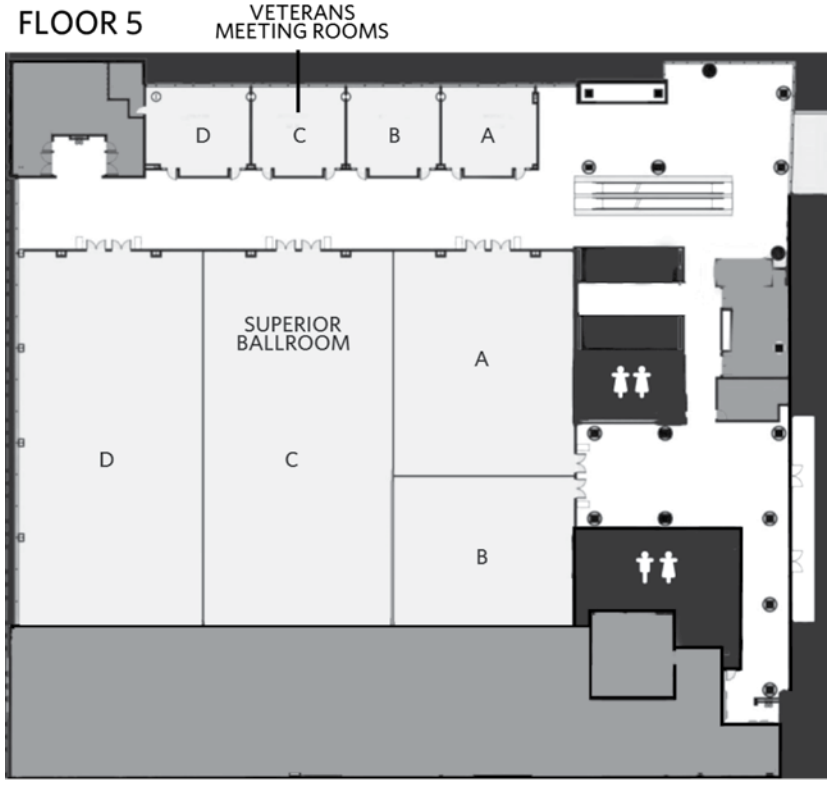


BALLROOM LEVEL



HILTON HOTEL FLOOR PLAN





SCHEDULE AT-A-GLANCE

All events at the convention center unless otherwise noted.

Saturday, 14 July

All AAHP Courses take place at the Huntington Convention Center

AAHP 1A Practical External Dosimetry Management
8:00 AM-12:00 PM — TBD

AAHP 1B Internal Dosimetry Review, Standards, and Ongoing Considerations
1:00 PM-5:00 PM — TBD

AAHP 2 Radiological Dispersal Device (RDD) and Nuclear Detonation Response Tools for ROSS and HPs Engaged in Radiological and Nuclear Emergency Response
8:00 AM-5:00 PM — TBD

AAHP 3 Radiation Risk Assessment
8:00 AM-5:00 PM — TBD

Student Worker Orientation
5:45 PM-6:45 PM — Center Street A, Hilton

Sunday, 15 July

All PEP Courses take place at the Huntington Convention Center

PEP 1-A thru 1-F
8:00 AM-10:00 AM

PEP 2-A thru 2-F
10:30 AM-12:30 PM

PEP 3-A thru 3-F
2:00 PM-4:00 PM

Student/Mentor Reception
6:00 PM-7:00 PM
Hope E, Hilton

Sunday PEP Locations

PEP A = Room 1
PEP B = Room 3
PEP C = Room 4
PEP D = Room 5
PEP E = Room 6
PEP F = Room 7

KEY

MPM = Monday PM Session
TAM = Tuesday AM Session
TPM = Tuesday PM Session
WAM = Wed. AM Session
WPM = Wed. PM Session
THAM = Thurs. AM Session
THPM = Thurs. PM Session

Monday, 16 July

CEL-1 Modeling Data for Radiological Impact Assessment: Humans and Biota
7:15 AM-8:15 AM — Room 3

CEL-2 Retired but not Yet Green Field
7:15 AM-8:15 AM — Room 4

MAM-A Plenary Session: Health Physics and the Realm of Low-Dose Radiation
8:30 AM – 12:30 PM — Global Center Ballroom AB

PEP Program — 12:15 PM-2:15 PM

M-1 — Room 3
So Now You Are the RSO: Elements of an Effective Radiation Safety Program

M-2 — Room 4
Ethical Decision Making With Link to Safety Culture & Radiation Safety's Role in Mitigating Insider Security Risks

ABHP Exam
12:30 PM-6:30 PM — Center Street A, Hilton

Poster Session
1:00 PM-3:00 PM — Exhibit Hall

MPM-A Medical Health Physics, Part I
3:00 PM – 5:15 PM — Room 1

MPM-B Special Session: Measurement of Ac-227 in the Workplace
3:00 PM – 4:15 PM — Room 3

MPM-C Special Session: International Collaboration Committee
2:30 PM – 5:10 PM — Room 4

MPM-D Radiation Biology
3:00 PM – 4:15 PM — Room 5

MPM-E Special Session: Rad Air NESHAPs
2:30 PM – 5:15 PM — Room 6

MPM-F Exhibitors of the HPS: A Special Discussion on Products and Services
2:30 PM – 5:15 PM — Room 7

Welcome Reception, *Sponsored by PerkinElmer*
5:30 PM-7:00 PM — Exhibit Hall A

Tuesday, 17 July

CEL-3 Channeling Stephen Hawking: How Lessons From the Renowned Astrophysicist Can Inform and Inspire Great Health Physics for the Future
6:45 AM-7:45 AM — Room 1

TAM-A Special Session: AAHP
8:00 AM – 12:00 PM — Room 1

TAM-B Environment and Radon Section: Modeling Special Session
8:00 AM – 12:00 PM — Room 3

TAM-C Detection and Measurement
8:00 AM – 12:15 PM — Room 4

TAM-D Special Session: Medical Health Physics
8:00 AM – 12:00 PM — Room 5

TAM-E Special Session: Accelerator
8:00 AM – 12:00 PM — Room 6

TAM-F Special Session: Nonmilitary Radium
8:00 AM – 12:00 PM — Room 7

AAHP Awards Luncheon
Noon-2:00 PM — TBD

Complimentary Lunch — Exhibit Hall

PEP Program — 12:15 PM-2:15 PM

T-1 — Room 1
Radiation Shielding - A Lost Art?

T-2 — Room 3
Radiological and Nuclear Terrorism Preparedness Tools: Customized for Your Community

TPM-A Special Session: AAHP - Potential Health Effects of Low-Dose Radiation and the Role of Radiation Protection Professionals
2:30 PM – 6:00 PM — Room 1

TPM-B Environment and Radon Section: Modeling Special Session
2:30 PM – 4:00 PM — Room 3

TPM-C Special Session: Aerosol Measurements
2:30 PM – 6:00 PM — Room 4

TPM-D Medical Health Physics, Part II
2:30 PM – 5:15 PM — Room 5

TPM-E Internal Dosimetry
2:30 PM – 4:45 PM — Room 6

TPM-F Special Session: AIRRS
2:30 PM – 5:00 PM — Room 7

AAHP Open Meeting
5:00 PM — TBD

SCHEDULE AT-A-GLANCE

All events at the convention center unless otherwise noted.

Wednesday, 18 July

CEL-4 Elements of an Effective Radiation Protection Program
6:30 AM-7:30 AM — Room 1

CEL-5 Certification Options for Health Physicists
2:15 PM-3:15 PM — Room 7

HPS Awards Plenary
8:00 AM-10:00 AM — Superior C/D, Hilton

WAM-A Air Monitoring
10:30 AM – 11:30 AM — Room 1

WAM-B Department of Energy
10:30 AM – 11:45 AM — Room 3

WAM-C Academic Institutions
10:30 AM – 11:30 AM — Room 4

WAM-D Medical Roundtable
10:30 AM – 12:00 PM — Room 5

WAM-E Special Session: Government Relations
10:30 AM – 11:45 AM — Room 6

WAM-F Waste Management
10:30 AM – 11:45 AM — Room 7

PEP Program — 12:15 PM-2:15 PM

W-1 — Room 1
Measuring and Displaying Radiation Protection Program Metrics That Matter to Management

W-2 — Room 3
Radiology Dosimetry: Organ Doses vs. Effective Dose

W-3 — Room 4
The MARSAME Methodology: Fundamentals, Applications, and Benefits

W-4 — Room 7
Medical Health Physics – Preparing Yourself for the future

W-5 — Room 5
A Radiation Grassroots Response Group-Your Responsibility and How to

WPM-B Aerosol Measurements
2:30 PM – 5:00 PM — Room 3

WPM-C Environmental Monitoring
2:30 PM – 5:15 PM — Room 4

WPM-D Radiation Effects
2:30 PM – 4:45 PM — Room 5

WPM-E Homeland Security
2:30 PM – 4:45 PM — Room 6

HPS Business Meeting
5:30 PM-6:30 PM — Room 1

Thursday, 19 July

CEL-6 Lessons Learned During Independent Verification Activities
6:45 AM-7:45 AM — Room 1

THAM-A Special Session: Military Health Physics
8:00 AM – 12:00 PM — Room 1

THAM-B Emergency Response
8:00 AM – 11:45 AM — Room 3

THAM-C Special Session: Ethics and Radiation Protection
8:00 AM – 11:45 AM — Room 4

THAM-D External Dosimetry
8:00 AM – 12:00 PM — Room 5

THAM-E Radiological Accident Assessment Concepts Update Workshop/Training, Part 1
9:00 AM – 12:00 PM — Room 7

THPM-A Contemporary Topics
2:30 PM – 4:45 PM — Room 1

THPM-B Education and Outreach
2:30 PM – 4:30 PM — Room 3

THPM-D Special Session: Nonionizing Radiation
2:30 PM – 3:15 PM — Room 5

THPM-E Radiological Accident Assessment Concepts Update Workshop/Training, Part 2
1:00 PM – 5:00 PM — Room 7

Registration Hours

Registration at the Huntington Convention Center

Saturday	2:00 PM - 5:00 PM
Sunday	7:00 AM - 5:00 PM
Monday	8:00 AM - 4:00 PM
Tuesday	8:00 AM - 4:00 PM
Wednesday	9:00 AM - 4:00 PM
Thursday	8:00 AM - 11:00 AM

Exhibit Hall Hours

Exhibit Hall

Monday	Noon - 7:00 PM
Tuesday	9:15 AM - 5:00 PM
Wednesday	9:30 AM - Noon

BUSINESS MEETINGS

TUESDAY

11:00 AM — Room 5
Medical Section Business Meeting

11:20 AM — Room 6
Accelerator Section Business Meeting

4:30 PM — Room 7
AIRRS Business Meeting

4:30 PM — Room 4
Nanotechnology Section Business Meeting

5:00 PM — Room 3
Environmental/Radon Section Business Meeting

5:15 PM — Room 1
AAHP Business Meeting

WEDNESDAY

4:45 PM — Room 6
Homeland Security Section Business Meeting

5:30 PM — Room 1
HPS Business Meeting

THURSDAY

11:00 AM — Room 1
Military Section Business Meeting

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.

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