HEALTH PHYSICS SOCIETY

PRELIMINARY PROGRAM

62nd Annual Meeting

Raleigh Convention Center
Raleigh, North Carolina
9-13 July 2017

62nd Annual Meeting

HEALTH PHYSICS SOCIETY

Raleigh Convention Center • Raleigh, North Carolina • 9-13 July 2017

Key Dates

1 June
Current Events/Works-In-Progress Deadline

7 June
HPS Annual Meeting Preregistration Deadline

14 June
Raleigh Marriott City Center Hotel
Registration Deadline

16 June
Sheraton Raleigh Hotel Registration Deadline

6-7 July
PDS Course

8 July
AAHP Courses

9-13 July
Professional Enrichment Program
HPS 62nd Annual Meeting

10 July
American Board of Health Physics
Written Exam

Registration Hours and Location

Raleigh Convention Center, Exhibit Hall A

Saturday 8 July
2:00 pm - 5:00 pm

Sunday 9 July
7:00 am - 5:00 pm

Monday 10 July
8:00 am - 4:00 pm

Tuesday 11 July
8:00 am - 4:00 pm

Wednesday 12 July
8:00 am - 4:00 pm

Thursday 13 July
8:00 am - 11:00 am

Table of Contents

Saturday

Saturday AAHP Courses will take place in the Raleigh Convention Center

Sunday-Thursday

PEPs, CELs, and Sessions will be at the Raleigh Convention Center

Student Worker Orientation

Mandatory Meeting
for Student Travel Grant Awardees

Saturday 8 July, 5:45 PM-6:45 PM

Current Events/ Works-In-Progress

The submission form for the Current Events/Works-in-Progress poster session is on the Health Physics Society Website at www.hps.org under the Raleigh Annual Meeting section. The deadline for submissions is Thursday, 1 June 2017. All presentations will take place as posters on Monday, 10 July, between 1:00-3:00 pm. Individuals will be notified of acceptance of their poster submissions by mid-June.

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

Note For CHPs

The American Academy of Health Physics has approved the following meeting-related activities for continuing education credits for CHPs:

- Meeting attendance is granted 1 CEC per contact hour, excluding meals and business meetings;
- AAHP 8-hour courses are granted 16 CECs each;
- HPS 2-hour PEP courses are granted 4 CECs each;
- HPS 1-hour CELs are granted 2 CECs each.

Officers

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2017 Exhibitors

(as of April 2017)

AAHP/ABHP
Ameriphysics, LLC
Army Medical Recruiting
Arrow-Tec
Bayer
Bertin Instruments
Best Dosimetry Services
Bionomics
Bladewerx
CAEN SYS srl
Centronic LLC
Chase Environmental Group, Inc.
ChemStaff
Dade Moeller
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Energy Solutions
Envinet GmbH
F&J Specialty Products
FLIR Systems
Fuji Electric Co., Ltd
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Gamma Products, Inc.
H3D, Inc.
Health Physics Instruments
Hi-Q Environmental Products Co.
Hitachi Ltd
Hopewell Designs, Inc.
HPS Journal
HPS Web Ops/Newsletter
Illinois Institute of Technology
J.L. Shepherd & Associates
K & S Associates
LabLogic Systems, Inc
Landauer
LND, Inc.
Ludlum Measurements, Inc
Mazur Instruments
Mirion
NATS Incorporated
NRRPT
NSSI
Ortec
Qal-Tek
Radiation Safety & Control Services Inc (RSCS)
Radiation Solutions
SafetyStratus
SE International
Spectrum Techniques
Technical Associates
Thermo Fisher Scientific
Thomas Gray & Associates, Inc.
Ultra Electronics

IMPORTANT EVENTS

4th 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 9 July, 2:30-3:30 pm, at the Raleigh Convention Center in Room 306C.

Welcome Reception

Please plan on stopping in at the Convention Center Plaza, Sunday 9 July, from 6:00-7:30 pm. There will be an opportunity to meet friends to start your evening in Raleigh. Cash bar and light snacks will be available.

Exhibits

Free Lunch! Free Lunch! – 12:00 pm, Monday, 10 July and Tuesday, 11 July. All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.

Breaks Monday Afternoon-Wednesday Morning – Featuring morning continental breakfasts and afternoon refreshments such as fruit, ice cream, and cookies. Be sure to stop by and visit with the exhibitors while enjoying your refreshments!

AAHP Exam

Monday, 10 July, Raleigh Convention Center, 304
Part 1 - 8:00-11:00 am; **Part 2** - 12:30-6:30 pm

HPS Works in Progress Submittal

Click **HERE** to submit.

Register HERE for the PDS

Sessions and Course Locations

AAHP Courses on Saturday are at the Raleigh Convention Center; Sunday PEPs are in the Raleigh Convention Center; PEPs, CELs, and all sessions Monday through Thursday will take place at the Raleigh Convention Center.

AAHP Awards Luncheon

Ballroom A, Raleigh Convention Center
Tuesday, 11 July • Noon-2:00 pm

HPS Awards Banquet

Spend an enjoyable evening with members of the Health Physics Society. This event will be held on Tuesday 11 July, in the Raleigh Convention Center, Ballroom B, and is an excellent opportunity to show your support for the award recipients as well as the Society. The awards will be presented after the dinner and the event will last from 7:00-9:00 pm. Included in Member, Non-Member, Emeritus, Past President, and Student Registrations.

HPS Business Meeting

Raleigh Convention Center, 305B
Wednesday, 12 July, 5:30-6:30 pm

Professional Development School

Join us for the PDS, 6-7 July 2017 at the Raleigh Marriott City Center.
See page 10 for more information.

Again this YEAR!

PEP Courses will have presentations posted online for those who have signed up for them prior to the meeting. There will be no hard copy handouts.
See page 35 for course information

Things to Remember!

All speakers are required to check in at the Speaker Ready Room in the Raleigh Convention Center, Room 202, at least one session prior to their assigned session.

Preregistration Policy: Unless payment accompanies your form, you will NOT be considered preregistered.

All posters up Monday–Wednesday in Exhibit Hall

Poster Session featured Monday, 1:00-3:00 pm
No other sessions at that time

PEP Refund Policy
See page 35

62nd Annual Meeting

HEALTH PHYSICS SOCIETY

Raleigh Convention Center • Raleigh, North Carolina • 9-13 July 2017

WELCOME

The North Carolina chapter of the Health Physics Society is excited to welcome you to the City of Raleigh, North Carolina, for the 62nd HPS Annual Meeting. It's been a while since the HPS held its mid-year meeting in Raleigh during 1991. The city of acorns welcomes you to its southern hospitality. Raleigh is located in the center of North Carolina's Research Triangle area which includes the cities of Durham, Chapel Hill, Morrisville, Cary and Apex. We encourage you to make plans to attend this meeting and enjoy the sites of central North Carolina. You can also visit the coast and mountains of North Carolina and create a real vacation with family. Visit the link to Visit NC at this link, www.visitnc.com.

WEATHER & LOCAL AREA

Raleigh has an average July temperature of 90 degrees F (32.2C) and may drop to just below the 70s (21.1C) at night, with high humidity along with sporadic thunderstorm activity. Both the Raleigh Marriott City Center and Sheraton Raleigh Hotel are air-conditioned and are located near the Raleigh Convention Center within easy walking distance.

Raleigh has a number of attractions during the summer including dining facilities featuring a variety of southern cuisine and breweries, bluegrass music, art exhibitions and the Raleigh Farmers Market held at the city plaza every Wednesday from 11AM -2PM. Please visit our Official Website for things to do while visiting Raleigh at www.visitraleigh.com/hps-booking.

TO/FROM AIRPORT, GETTING AROUND DOWNTOWN

RDU International airport is located midway between Durham and Raleigh and is about 16 miles from the Raleigh Convention Center. The RDU airport Taxi service runs 24/7 and fares may cost a little under $35. Reservations can be made by clicking on this link www.rdutaxiinc.com/ratesreservations.aspx#. In addition, both Uber and Lyft are now encouraged as alternatives to transportation between the hotels and the airport. As many of the local eateries are within walking distance from the convention center, there is also the R-LINE bus which provides free transportation via hybrid buses that can connect you to restaurants, retail, entertainment venues, museums, hotels and parking facilities in the downtown Raleigh area.

ACCOMMODATIONS

Raleigh Marriott City Center

500 Fayetteville St., Raleigh, NC 27601; Direct Phone 919-833-1120
HPS Rate: $152 per night. The Marriott is connected to the Convention Center off the Lobby.

Sheraton Raleigh Hotel

421 S. Salisbury St., Raleigh, NC 27601; Direct Phone 919-834-9900
HPS Rate: $131 per night. The Sheraton is directly across the street from the Convention Center.

TOURS & EVENTS

In order to register for tours using the weblink below, click on the tour
and then scroll through the calendar to July and click on the highlighted date to proceed.

Monday 10 July

Historic Raleigh City Walking Tour

9:30 am–11:00 am Preregistration: $20.82/Onsite: $31

Register for this tour here.

This Raleigh City tour covers approximately 2 miles of the second planned US State Capital City. Guests experience the Capital City from the late 1700's to current day progress. Folklore, architecture, government and stories about how the State managed to put its permanent seat of government in the area because of a bar & a drink! Highly entertaining.

Raleigh Haunted Footsteps Ghost Walk

7:30 pm–9:00 pm Preregistration: $17.62/Onsite: $22

Register for this tour here.

The "Raleigh Haunted Footsteps Ghost tour" is a family friendly 1.5 mile walking tour designed for goblins seeking a unique and different downtown Raleigh experience. What is the difference between a ghost and spirit? Are they all scary? What exactly is an orb and why are they different colors? We will answer all your questions and more during this tour. Many people think our ghost tours are just something to experience during the Halloween season like visiting a haunted house. Nothing could be further from the truth. The Raleigh Ghost Walk combines local ghost stories, folklore and local history as it takes you to four different Ghost & Paranormal sites. Stories from the late 1700's through the 20th century will be explored with an entertaining twist. It's entertaining and educational at the same time.

SAVE THE DATE

HPS 51st Midyear Meeting
4-7 February 2018, Denver, Colorado

HPS 63rd Annual Meeting
15-19 July 2018, Cleveland, Ohio

Tuesday 11 July

HPS Raleigh 5K Run

7:00 am **Preregistration: $25/Onsite: $30**

Register for this tour with your meeting registration.

The Raleigh 5K walk/run, sponsored by Radiation Safety & Control Services, Inc., will take place (weather permitting) at the beautiful John Chavis Memorial Park and the Little Rock Greenway. Join us as we either walk, trot, or run by the Allan Hershel Carousel which was built in 1937 and serves as an iconic landmark of the past. The Capital Area Greenway System is a network of public open spaces and recreational trails which provides for activities such as walking, jogging, hiking, bird watching, nature study, fishing, picnicking and outdoor fun. The trails connect to other parks in the city of Raleigh. Many of the city's major ecological features can be experienced in their natural state along the Greenway. The venue is about a ½ mile walk from the host hotel, so you'll be able to get plenty of stretching and warm-up in route to the starting line. Awards for top finishers, snacks, and other sundries.

Transportation to the Raleigh Museum of Art

10:00 am–2:00 pm **Preregistration: $22/Onsite: $28**

Enjoy a trip to the Museum. This is a museum where you can find your own place—either in contemplative spaces or through lively, engaging tours, or performing arts. The Museum itself is over 130,000 square feet of exhibit space and the Museum Park is 164 acres and is among the largest art museum parks in the world. Discover dramatic sculptures as you stroll though a forest or meadow. There are complimentary tours of the museum.

Haw River Wine Tour

11:00 am–6:00 pm **Preregistration: $107.21/Onsite: $105**

Register for this tour here.

North Carolina is home to over 100 wineries. The *Tobacco Road Haw River Wine Trail Tour* explores three of the best artisan wineries along the 50-mile wine trail. This short scenic drive winds through the heart of rural North Carolina, following the path of the Haw River. Located between Durham and Greensboro, the close proximity to NC's Triangle and Triad area make this a wonderful, convenient way to spend a leisurely day of wine tasting and beautiful countryside sightseeing. You will visit 2-3 wineries with tastings at each and have gourmet lunch at a scenic vineyard which is included.

Wednesday 12 July

Night Out

6:00 pm **Preregistration: $30/Onsite: $35**

This fun Night Out will take place at a Raleigh hot spot, the Big Easy. Located just a block and a half from the meeting hotels, this establishment has both great food and incredible music.

Enjoy an incredible dinner with colleagues followed by jazz music from local artists. Your meal will include a selection of Cajun dishes and a cash bar. During the meal you will be treated to jazz saxophone music by local artist, Mr. Glen Ingram. After the dinner another local jazz band will perform for our listening pleasure.

You won't want to miss this unique night out.

Raleigh 2017 HPS Pub Crawl Info

6:30 pm Preregistration: $20/Onsite: $25

Commemorative shirt included! Sign-up early as we have a limited amount of shirts.

The Pub Crawl is sponsored by Landauer, Inc. and promises to be a fun for all event. Most of us will be walking; however, the houses of spirits are conveniently located along or near the “R-line. The “R” line makes a loop around the inner city and will lead lost pub crawlers back to the host hotels and convention center. Raleigh is well known for its microbreweries, pubs, and taverns. Come join us as either an active participant or one who just likes great company. The following fine establishments will be visited on the crawl:

- Flying Saucer Draught Emporium, 328 W Morgan St
- Boxcar Bar + Arcade, 330 W Davie St
- Crank Arm Brewing, 319 W Davie St
- Bare Bones, 301-120 Fayetteville Street
- Trophy Tap and Table, 225 S. Wilmington St.
- Tir Na Nog, 108 E Hargett St.

Raleigh Haunted Footsteps Ghost Walk

7:30 pm–9:00 pm Preregistration: $17.62/Onsite: $22

Register for this tour here.

The “Raleigh Haunted Footsteps Ghost tour” is a family friendly 1.5 mile walking tour designed for goblins seeking a unique and different downtown Raleigh experience. What is the difference between a ghost and spirit? Are they all scary? What exactly is an orb and why are they different colors? We will answer all your questions and more during this tour. Many people think our ghost tours are just something to experience during the Halloween season like visiting a haunted house. Nothing could be further from the truth. The Raleigh Ghost Walk combines local ghost stories, folklore and local history as it takes you to four different Ghost & Paranormal sites. Stories from the late 1700’s through the 20th century will be explored with an entertaining twist. It’s entertaining and educational at the same time.

Thursday 13 July

TUNL Tour/ Durham City Tour

9:00 am–3:00 pm Preregistration: $86.89/Onsite: $93

Register for this tour here.

This tour includes transportation to and from the Raleigh Convention Center to Duke University. You will be dropped off at the Triangle University Nuclear Laboratory for a 1 hour tour. Guide-lead 2-hour walking Durham Tobacco Empire Tour. - Explore Durham’s tobacco empire history, architecture and culture. (1.5 mile max - on flat surface). Lunch on your own in downtown Durham - 1.5 hour. Guide can make suggestions. Transportation back to RCC. A bit more than a half century younger than Raleigh, Durham, grew around a railroad station established in rural Orange County. In 1849 Dr. Bartlett Durham gave less than four acres to the North Carolina railroad, Durham’s station was built and named in his honor. The first post office opened in 1853, but the town was not incorporated until 1869. The new town wanting a stronger voice petitioned the legislature to create Durham County from portions of Orange and Wake Counties. The first Tobacco factories opened in 1858. Growth was slow until after the Civil War when local industrialists opened their own factories and Durham’s main industry began to draw worldwide attention. You will visit the American Tobacco Campus, the Durham Bulls Ballpark area, City Place and the DPAC (Durham Performing Arts Center) just to name a few.

Raleigh NCSU Tour

10:00 am–2:00 pm Preregistration: $15/Onsite: $20

Register for this tour with your meeting registration.

This tour includes transportation to and from the Raleigh Convention Center to the North Carolina State University (NCSU) PULSTAR research nuclear reactor and Hunt Library. Due to group size restrictions, two tours of up to 20 people at each site will be provided. Each tour at each site will take approximately 1 to 1.5 hours. For the reactor tour, participants will need to provide government issued photo identification (e.g. driver license or passport). Additionally, no recording devices or weapons are allowed inside the reactor facility.

The PULSTAR Reactor features user facilities, irradiation facilities, internet reactor laboratories, and analytical services which are available for use by researchers from universities, government agencies, industry, and the international community. User facilities include an intense positron beam, neutron imaging facility, neutron powder diffraction facility, beam ports, and in-pool irradiation facilities. The PULSTAR Reactor Laboratory is a partner facility of the DOE-Idaho National Laboratory's Advanced Test Reactor Nuclear Science User Facilities (ATR-NSUF). The NSUF Rapid Turnaround Experiment (RTE) program makes research facilities, including those at the PULSTAR reactor, available at no cost to users whose projects are selected via a peer review process. The PULSTAR reactor is also part of the Research Triangle Nanotechnology Network (RTNN). RTNN technical capabilities span nanofabrication and nano-characterization of traditional and emerging materials.

The Hunt Library is a state-of-the-art, award winning facility that serves faculty, researchers, and students in engineering, textiles, and other science programs. A robot-driven bookBot automated book delivery system delivers books in minutes with a click in the Libraries' online catalog. Visitors can watch the bookBot in action through a glass wall on the first floor ("Robot Alley"), as four robots dart up and down enormous aisles to pinpoint and retrieve materials. An accompanying Virtual Browse system allows users to see a virtual shelf of all items related in subject, including the growing number of electronic books in the collection. This view can be expanded beyond the Libraries' collection. The system is both fascinating to watch and easy to use. Throughout the Hunt Library, visualization is a tool for creating and showcasing new knowledge in the university's five areas of research emphasis: health and well-being, energy and environment, education innovation, safety and security, and transportation.

Capital City Brewery Tour

12:30 pm–5:30 pm Preregistration: $81.29/Onsite: $88

Register for this tour here.

Our exclusive private tours average 3 to 4 hours as we travel between breweries across the Triangle. On a Beltline Brew Tour event, guests will learn about each brewery while enjoying multiple samples of the craft, award winning beers that they brew. Touring these Raleigh breweries will give you an educational and unique behind the scenes look at what goes on inside that bottle. It also allows guests the chance to taste the beers they are learning about at each different brewery and usually right out of the fermenter.

COMPANION PROGRAM

Information for Registered Companions

Companion Registration cost is $110 and includes the Welcome Reception, Monday-Thursday breakfast buffet at the Raleigh Marriott City Center, and lunch and breaks in the Exhibition hall. There will not be a separate Hospitality Room, however the Local Arrangements Committee staff in Convention Center Room 202 will be happy to answer your questions or assist in finding the answer.

Sunday 9 July

Welcome Reception

6:00-7:30 pm, Convention Center Plaza

Come see old friends and make new ones! Enjoy hors d'oeuvres with a cash bar, 6:00-7:30 pm.

Monday 10 July - Thursday, 13 July

Companion Breakfast

6:30-10:30 am, Raleigh Marriott City Center

Companion Registration includes Monday – Thursday breakfast buffet at the Raleigh Marriott City Center, 6:00 to 10:30 a.m. A delicious buffet awaits you including made-to-order omelets, scrambled eggs, breakfast meats (sausage and bacon), French toast, pancakes, hot oatmeal, assorted pastries, fresh fruits, juice, coffee, and tea.

Registered companions are welcome to come to the lunch and breaks in the Exhibition Hall.

Monday 10 July

Welcome to Raleigh Companion Orientation

Raleigh Representative – 8:00-9:00 am

RYE Personal Dining Room, the Marriott City Center Hotel

The city orientation takes place Monday, 10 July from 8:00 to 9:00 a.m. at the RYE Restaurant Personal Dining Room in the Marriott Hotel. . A representative from Visit Raleigh will be on hand to describe some of the many opportunities, provide maps, and answer questions.

Be sure to consider the tour options on pages 5-8 for the HPS sponsored events.

Sign up early for Social Events!

If social events do not meet minimums by the deadline of 7 June, there is a chance that they will be canceled. Don't get to the meeting and find that the tour or social event you kept meaning to sign up for was cancelled due to lack of reservations.

Meeting Refund Policy

Request for refunds will be honored if received in writing by 7 June. All refunds will be issued AFTER the meeting and will be subject to a 20% processing fee.

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

PROFESSIONAL DEVELOPMENT SCHOOL

Welcome to the 2017 Professional Development School in Raleigh.
Applied Health Physics • 6-7 July
Amy B. Orders, PhD. Academic Dean • Kevin Minter, Administrative Dean

Your professional development school (PDS) deans welcome you to the world-renowned Research Triangle Park and to the new Raleigh Convention Center, which will serve as the venue for this year's PDS.

Preceding the HPS annual conference, the PDS is set for 6–7 July 2017 on the topic of applied health physics. Considering health physics through the lens of integrated facility programs, this PDS will address operational and programmatic trends that continue to define and impact our industry. With four main topic areas, the two-day PDS event will be hosted in four sections, with focused content and subject-matter experts presenting regulatory points, best practices, and reality checks. Each section will incorporate information salient to new professionals, as well as seasoned management professionals, across major industries:

- Operational functions of health physics and medical physics, to include integration with environmental, health, and safety programs; integration with facilities operations; integration with local law-enforcement agencies and emergency responders; and integration with other compliance obligations of a facility or operations.
- Programmatic requirements associated with licensing and registrations as the profession continues to address the paradigm shift of radioactive material use and oversight of increased equipment diversity and applications of newer radiation-generating devices.
- Comprehensive increased security-control programs and organizational preparedness—the reality of logistics, planning, testing, and documentation.
- Public and community engagement, to include public education associated with popular press—how to be a public information officer, how to provide public education on advanced medical applications, and what is protection, awareness, and compliance.

The HPS Finance Committee has approved tuition for this school at $445.

Preliminary Agenda for the HPS PDS on Applied Health Physics

Thursday 6 July 2017

7:30 Continental Breakfast and Welcome

Section: Operational Functions of Health Physics/ Medical Physics

8:00 Sampling, Instrumentation, and Interpretation of Results
Ray Johnson (Radiation Safety Counseling Institute)

9:00 Source Material and Waste Management: Disposal, Decommissioning Vendor
Speaker to be determined

10:00 Break

10:30 Occupational Exposure Monitoring Programs: Dosimetry Advances, Bioassay, and ALARA Mitigations
Robert Reiman (Landauer)

12:00 Lunch

Section: Integrated Requirements Associated With Licensing and Registrations

1:00 Integrated Operations With Industrial Hygiene, Occupational Health, Occupational Safety, Facilities Operations
Jim Schwietzer (Purdue University) and
Wayne Thomann (Duke University)

2:00 Shielding X Ray, PET, etc., With Facility Planning and Renovations
Bill DeForest (Landauer-Prophysics)

3:00 Break

3:30 Shielding X Ray, PET, etc., With Facility Planning and Renovations (continued)

4:30 Questions and Answers

5:00 Adjourn

Friday 7 July 2017

7:30 Continental Breakfast

Section: Integrated Requirements Associated With Licensing and Registrations (continued)

8:30 EH&S Roles of the Health Physicist and Nontraditional Opportunities
Roger Sit (University of North Carolina Chapel Hill),
Amy Orders (North Carolina State University), and
Mark Pflug (Moses Cone Medical Center)

Section: Increased Security Controls and Organizational Preparedness

9:30 Implementation and Management of Increased Security Controls
Speaker to be determined

10:00 Break

10:30 FBI, Incident Command, Incident Control
Speaker to be determined

11:00 Radiation Safety's Role in Mitigating the Insider Threat Security Risk (Integrated Assessments: Drills, Peer Reviews, and Volunteer Security Programs)
Bob Emery (University of Texas Health Science Center, Houston)

12:00 Lunch

Section: Community and Public Engagement

1:00 Communicating Risk Assessment—Challenges and Strategies
Ray Johnson (Radiation Safety Counseling Institute)

2:00 Strategies for Correcting "Misinformation" in Radiological Events or "The Promise and Peril of Citizen Science and Why It Matters to Radiation Safety" (Role of the Public Information Officer in Event Management)
Bob Emery (University of Texas Health Science Center, Houston)

3:00 Break

3:30 One Voice: Role of the RSO and Regulators (Including Contractors and First Responders)
Amy Orders (North Carolina State University) and
Lee Cox (North Carolina Radiation Protection Section)

4:30 Questions and Answers

5:00 PDS Evaluations, Comments, Adjourn

Sunday Professional Enrichment Program (PEP)

All sessions take place in the Raleigh Convention Center

SUNDAY

8:00 AM – 10:00 AM

PEP 1-A Room 301B
Part I – How Habits Govern Our Risk Communication Style
Ray Johnson
Radiation Safety Counseling Institute

PEP 1-B Room 302A
EH&S "Boot Camp" for Radiation Safety Professionals, Part 1
Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

PEP 1-C Room 302B
International Electrotechnical Commission (IEC), Technical Committee (TC) 45 and Subcommittee: Nuclear Standards
Morgan Cox
Chairman TC 45

PEP 1-D Room 302C
TENORM Overview
Phil Egidi
US EPA

PEP 1-E Room 305A
Practical Computational Modeling for Health Physics (1) – Introduction to Monte Carlo Simulations
Shaheen Dewji, Maurituius Hiller
Oak Ridge National Laboratory

PEP 1-F Room 305B
Introduction to Stack Sampling
John Glissmeyer, Brian Asamoto
Glissmeyer Environmental LLC, HI-Q Environmental Products, Asamoto Engineering

PEP 1-G Room 306A
A Forgotten Nuclear Accident-Bravo
Casper Sun

PEP 1-H Room 306B
Fundamentals of Gamma Spectroscopy
David Pan
ORTEC

10:30 AM – 12:30 PM

PEP 2-A Room 301B
Part II – How to Change Our Habits for Improved Risk Communication
Ray Johnson
Radiation Safety Counseling Institute

PEP 2-B Room 302A
EH&S "Boot Camp" for Radiation Safety Professionals, Part 2
Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

PEP 2-C Room 302B
Status of ANSI N42 RPI Standards
Morgan Cox
Co-chair RPI and HSI standards

PEP 2-D Room 302C
Air Monitoring in Nuclear Facilities and the Environment Part I
Tom Voss

PEP 2-E Room 305A
Practical Computational Modeling for Health Physics (2) - Intermediate Monte Carlo Modeling with Anthropomorphic Phantoms
Shaheen Dewji
Oak Ridge National Laboratory

PEP 2-F Room 305B
Radiation Safety and the Gamma Knife — from the Perspective of a Health Physicist
John Gough
Swedish Medical Center

PEP 2-G Room 306A
Integration of HP into the Medical Management of Radiation Incident Victims
Steve Sugarman
REAC/TS

PEP 2-H Room 306B
Fundamentals of Alpha Spectroscopy
David Pan
ORTEC

2:00 PM – 4:00 PM

PEP 3-A 301B
The Fallacy of Safe-Siding Health Risk Estimates
Eric Daxon

PEP 3-B Room 302A
EH&S "Boot Camp" for Radiation Safety Professionals, Part 3
Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

PEP 3-C Room 302B
Gamma Spectroscopy Practical Applications
Doug Van Cleef
Mirion Technologies, Inc.

PEP 3-D Room 302C
Air Monitoring in Nuclear Facilities and the Environment Part II
Tom Voss

PEP 3-E Room 305A
Introduction to Stack Sampling
John Glissmeyer, Brian Asamoto
Glissmeyer Environmental LLC, HI-Q Environmental Products, Asamoto Engineering

PEP 3-F Room 305B
Superfund Radiation Risk Assessment
Stuart Walker, Fred Dolislager, Nasser Shubayr
US EPA, University of Tennessee at ORNL, ORISE Participant for US EPA

PEP 3-G Room 306A
How Do We Know They're Good? Design and Administration of a Bioassay Oversight Program
Cheryl Antonio
Dade Moeller and Associates

Preliminary Scientific Program

Presenter's name is asterisked (*) if other than first author.
All sessions take place in the Raleigh Convention Center

MONDAY

7:00 AM – 8:00 AM

CEL-1 Room 204
How MBTI Preferences Determine Our Risk Communication Habits
Ray Johnson
Radiation Safety Counseling Institute

CEL-2 Room 205
The Linear Non-Threshold Model and Its Implications for Radiological Security
Gus Potter
Sandia National Laboratories

8:30 AM – 12:00 PM Ballroom C

MAM-A: Plenary Session
Chair: Robert Cherry

12:00 pm Exhibit Hall

Lunch

12:15 PM – 2:15 PM

PEP M-1 Room 204
A Contemporary Approach to Managing Low-Level Radioactive and Mixed Waste at an Academic Institution
Michael Zittle
University of Washington

PEP M-2 Room 205
So Now You're the RSO: Elements of an Effective Radiation Safety Program
Thomas Morgan
Columbia University

PEP M-3 Room 206
Medical Laser Safety Program – What Health Physicists Need to Know
Deidre Elder
University of Colorado Hospital

PEP M-4 Room 302A
Establishing Site Reference Criteria for Remediation of Contaminated Land
Steven Brown
Centennial, Colorado

PEP M-5 Room 303
New Generation Models for Internal Dose Calculations
Michael Stabin
Vanderbilt University

1:00 PM – 3:00 PM Exhibit Hall A

P: Poster Session

Accelerator Facilities

P.1 Implementation of a Schottky Diode Detector at the McMaster Microbeam Accelerator
Urlich TR, Thompson J, Byun SH
McMaster University

Decontamination and Decommissioning

P.2 Review of the Historical Site Assessments for Site Release after Decommissioning of Nuclear Power Plants
Do TG, Lee JO, Park JH, Kim KP
Kyung Hee University

P.3 Software Support Features for Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Surveys in Visual Sample Plan
Fortin DC, Newburn LM
Pacific Northwest National Laboratory

P.4 Use of Integrated Sensor Detection Systems to Enhance Total Measurement Uncertainty While Maintaining as Low as Reasonably Achievable Conditions
Bales KE, Bogart WS, Camarena TS, Creasman SE, Nelius EW, McGhee MJ, Walford GV, Johnstone PJ*
University of Tennessee, University of Tennessee Health Science Center

Department of Energy Facilities

P.5 Dose Cave: Determining Shielding Requirements for Remote Handled Transuranic Waste Using Gamma Transmission Through Fixed Shields
Gernatt S, Biela D, Henderson B, Prowse J*
BHI Energy, Inc., CH2M Hill BWXT West Valley, LLC, Restoration Services, Inc.

P.6 Challenges of the Removal of a Hot Cell Window
Caudle JC, Bragg PB, Gamett DG*
Idaho National Lab

Dose Reconstruction

P.7 Methods to Reconstruct Doses Received by Japanese Wild Boar Residing in the Fukushima Exclusion Zone Using Electron Paramagnetic Resonance Dosimetry
*Harshman AM, Johnson TE**
Colorado State University

Emergency Response

P.8 Establishment of Criteria for Skin Decontamination in a Radiation Emergency
Yoo JR, Yang MY, Kim SJ, Jin YW
Korea Institute of Radiological and Medical Sciences (KIRAMS)

P.9 Validation of Whole-Body Counter for Radiation Emergency Preparedness and Response
Yoo JR, Pak MJ, Jin YW
Korea Institute of Radiological and Medical Sciences (KIRAMS)

P.10 Social-Psychological Status of the Population Residing on Radioactively Contaminated Territories of the Urals Region
Cheban AY, Burtovaya EY, Litvinchuk EA, Kantina TE, Akleyev AV
Urals Research Center for Radiation Medicine (URCRM)

P.11 Development of a Radiation Triage Mask
Brown CA, Waller EJ
University of Ontario Institute of Technology

Environmental Monitoring

P.12 Determination of Radioisotopes in Ocean Water Using Extraction Chromatography
*Daum JK, Sudowe R**
University of Nevada Las Vegas, Colorado State University

P.13 On the Use of Location and Occupancy Factors for Estimating External Exposure from Deposited Radonuclides
Tzivaki M, Waller E
University of Ontario Institute of Technology

P.14 Radionuclides in Whole-Body Field Mice (*Peromyscus maniculatus*) Behind a Sediment Retention Structure in Los Alamos Canyon at Los Alamos National Laboratory: 2005-2016
Fresquez PR, Gaukler SM, Burnett KS, McNaughton MW
Los Alamos National Laboratory

P.15 The Status of Nuclear DNA of the Peripheral Blood Cells of Herring Gull (*Larus argentatus*) Nesting Under Radioactive Contamination
Styazhkina EV, Egoreychenkov EA, Osipov DI, Mogilnikova NI, Pryakhin EA
Urals Research Center for Radiation Medicine, Chelyabinsk, Chelyabinsk State University, Chelyabinsk

P.16 Practical Improvement of Tritium Analysis in Foods Using a Liquid Scintillation Counting After Azeotropic Distillation Method
Soga K, Nishimaki-Mogami T, Kondo K, Hachisuka A
National Institute of Health Sciences, Tokyo, Japan

P.17 Characterization of Organically Bound Tritium in Vegetation at Los Alamos National Laboratory
Didla S, Whicker J, Beitollahi M, Gillis J, McNaughton M, Fresquez P
Alcorn State University, Los Alamos National Laboratory, University of Utah

P.18 Radiocesium Soil-to-Plant Transfers in Fukushima Forests
Workman DA, Johnson T
Colorado State University

P.19 The Application of a Collimated High-Resolution Gamma-Ray Spectrometer for Quantification of Contaminant Mobility
Erdmann BJ, DeVol TA, Powell BA, Kaplan DI, Molz F
Clemson University, Savannah River National Laboratory

P.20 Radioactivity Introduced Per Acre of Farmland for Selected Crops
Tepeh J, Scott M, Clayborne C
Alcorn State University

External Dosimetry

P.21 X-Ray Beam Characterization Incorporating Regression Analysis Computation
Bruyere SA
INL

P.22 Measurements of Light Ions Produced by Heavy Ion Interactions
Srikrishna AP, Heilbronn LH, McGirl NA, Castellanos LA, Wang HC, Ratliff HN, Clowdsley MS, Zeitlin CJ, Rusek A, Sivertz M
University of Tennessee, NASA Langley Research Center, Wyle Laboratories, Brookhaven National Laboratory

P.23 Organ and Effective Photon Dose Coefficients for Reference Phantoms in Articulated Positions in Cranial and Caudal Irradiation Geometries
Dewji SA, Green M, Sanchez E*
Oak Ridge National Laboratory, University of Tennessee – Knoxville, University of Texas at Dallas

Homeland Security Monitoring

P.24 Radioisotope Identification Using Optimal Linear Associative Memory
Watson MM, DeVol TA
Clemson University

Instrumentation

P.25 Development of a Thick Gaseous Electron Multiplier Advanced Tritium Detector
Bernacci MR, Byun SH, Prestwich WV
McMaster University

P.26 Performance Characteristics of Novel Nano-particle based Detector System
Moore BM, Belley M, Langloss B, Yoshizumi T
Duke University, The University of Rhode Island

P.27 Resolution and Efficiency Based Studies on Three Different Detectors
Gibson K, Bailey J, Norwood L
Alcorn State University

P.28 Counting Efficiency (Beta Efficiency) of a Proportional Counter Using Different Beta Sources
Mensah C, Queen K, Giddings A, Smith R, Billa J, Adzanu S, Ankrah M
Alcorn State University, University of Kentucky

Internal Dosimetry

P.29 Monte Carlo Modeling of Rod-source Inserted Calibration Phantom for Whole Body Counting System
Park M, Yoo J, Ha W, Park S, Jin Y
Korea Institute of Radiological and Medical Sciences

P.30 Inhalation Dose Assessment Using Actual Measurement Data of Particulates at Zircon and Bauxite Industries
Ji SW, Jang JH, Kim WJ, Koo BC, Kim KP
Kyung Hee University, Korea Institute of Nuclear Safety

P.31 Study of Plutonium Distributions in Brain Samples
*Suslova KG, Sokolova AB, Batalov VR**
Southern Urals Biophysics Institute, Russia

Medical Dosimetry

P.32 Inter-Comparison of Optically Stimulated Luminescence (OSL) and Thermoluminescence Dosimeters (TLD) in a Clinical Environment
Agordzo HL, Jorgensen T, Smith D, Makambi K, Tsorxe I, Benevides L
Georgetown University Medical Center, Georgetown University, Duke University Medical Center

P.33 Comparison of Out-of-field Doses in Heterogeneous Phantoms using TPS and Monte Carlo Methods
Jung J, Mille M, Lee CI, Kuzmin G, Mosher E, Lee CS
East Carolina University, National Cancer Institute, University of Michigan

P.34 Analysis of Tube Voltage Influence on CTDIw or Radiation Dose to Patient
Park I, Song JY, Jang JH, Kim KP
Kyung Hee University

P.36 Analysis of Computed Tomography Usages in Korea, 2006-2015
Song JY, Park I, Kim KP
Kyung Hee University

P.37 Comparison of Diagnostic Reference Levels of the Most Frequent Adult and Pediatric Computed Tomography Protocols Between US and Various European Countries
Ioannidou SP, Benevides LA, Jorgensen TJ, Smith DA
Georgetown University, Washington DC

P.38 Effective Dose Equivalent Comparison Between Cyberknife Stereotactic Radiotherapy and Intensity Modulated Radiation Therapy Treatment Plans in Pediatric Patients: A Report of 6 Cases
Ioannidou SP, Campbell L, Rashid A, Benevides LA
Georgetown University, Medstar Georgetown University Hospital

P.39 Effects of High Volume Metal Oxide Semiconductor Field Effect Transistors Dosimetry in Pediatric CT
Smith AK, Nguyen GB, Yoshizumi T, Lowry C
Duke Radiation Dosimitry Lab, Duke Radiology

P.40 Feasibility of Quantifying the Manganese and Mercury in Toenail In Vivo with Portable X-ray Fluorescence Technology
Zhang X, Specht AJ, Weisskopf M, Weuve J, Nie LH
Purdue Univerisity, Harvard University

Nuclear Power Plants

P.41 Dose Reduction Using ClearView Radiation Shielding– A Transparent Liquid Radiation Shield
Bakshi J, Abernethy CA
Radium Incorporated

P.42 Analysis of Tritium Recapture from Airborne Gaseous Effluent Releases at Cook Nuclear Power Plant
Young JA, Harris JT
Purdue University

P.43 Radiation Dose Level and Radiation Protection in Potassium Handling Industries
Jaekook Lee Mr, Boncheol Koo Mr, Jaeho Jang Mr, Nabil M. Hassan Dr, Seungwoo Ji Mr, Kwang Pyo Kim Dr
KINS, ReP. of Korea, Kyung Hee University, Zagazig University

Radiation Effects

P.44 Effects of Radon Inhalation on Physical Properties of Blood in Rats
Ahmed AO, Eissa MT, Abdel-Salam OA, Shahin FY
Lecturer, Professor

P.45 Thyroid Screening of Ozyorsk Residents That Were Relocated from the Territories of the Ural region Contaminated with Radionuclides
*Rabinovich EI, Povolotskaya SV, Vasina MA**
Southern Urals Biophysics Institute, Ozyorsk, Chelyabinsk region, Russia

P.46 Assessment of 53 and MDM2 Gene Expression in Chronically Exposed People at Later Time Points
Nikiforov VS, Akleyev AV
Urals Research Center for Radiation Medicine, Chelyabinsk

P.47 Cytogenetic Effects in *In Utero* Exposed Individuals in the Southern Urals
Kiselyova EV, Vozilova AV
Urals Research Center for Radiation Medicine, Chelyabinsk

Radiology

P.48 Polydimethylsiloxane-based Coolant for Cryopreservation and Radiation Sterilization of Human Cadaveric Vascular Allografts for Further Transplantation
Lauk-Dubitskiy SE, Astrelina TA, Brumberg VA, Kobzeva IV, Suchkova YB, Usupzhanova DY, Brunchukov VA, Bushmanov YA, Bushmanov AY, Samoilov AS
SRC-FMBC, Russia

Risk Assessment

P.49 Quantification of Non-Linear Dynamics of Equilibrium Equivalent Radon Concentration in Atmosphere
Rehman W, Rafique M, Raza RA, Tareen AD, Shafique B
University of Azad Kashmir

P.50 Verification of Safety Compliance of Delivering Radionuclides at Vanderbilt University
Chen L, Helstern CM, Stabin MG
Vanderbilt University

P.51 Modeling the Fate of Radio-cesium in a Modern-day Urban Water-recycling Scenario
Ng GM, Higley KA
Oregon State University

P.52 Prevalence of Non-radiation Risk Factors in the Mayak Worker Cohort Occupationally Exposed to Ionizing Radiation
Zhuntova GV, Denisova AA, Azizova TV, Bannikova MV, Fomin EP, Korneva DN*
Southern Urals Biophysics Institute, Federal State Budgetary Health Care Institution affiliated to the Central Medical Sanitary Department No.71 of the FMBA of the RF

P.53 Uncertainty in the Estimation of Nominal Risk Coefficient for Leukaemia
Sasaki M, Fujimichi Y
Criepi

Waste Management

P.54 ALARA-CASK: Graphical User Interface Program for Evaluation of Neutron Flux of Dry Storage Casks
Park JH, Kim WJ, Chung HJ, Kim KP
Kyung Hee University, Korea Institute of Nuclear Nonproliferation and Control

3:00 PM – 5:00 PM 305 AB

MPM-A: Environmental Monitoring

Co-chairs: Lara Hughes, Brant Ulsh

3:00 PM **MPM-A.1**
Dose Assessment Comparison for Animals and Plants Based on Phylogeny
Condon CA, Higley KA
Oregon State University

3:15 PM **MPM-A.2**
Exploring How the Stress-Inducing Mechanisms from Radioisotopes of Cesium are Related
Gladfelder GC, Higley KA
Oregon State University

3:30 PM **MPM-A.3**
Stochastic Simulation and Analysis of the Dynamics Resulting from the Experimental Cesium Addition to a Small Mesotrophic Reservoir
Miller VJ, Johnson TE, Pinder JE
Colorado State University

3:45 PM **MPM-A.4**
Monte Carlo Simulations of Tritium and Strontium-90 for Various Siliciclastic Sand Compositions
Graham HR, Waller EJ
University of Ontario Institute of Technology

4:00 PM **MPM-A.5**
Quantifying Electrostatic Resuspension of Radionuclides from Surface Contamination
Marshall SA, Potter CA, Medich DC
Worcester Polytechnic Institute, Sandia National Laboratories

4:15 PM **MPM-A.6**
On the External Dose Reconstruction in the Former Village of Metlino, Techa River Region, Southern Urals, Russia
Hiller MM, Woda C, Bougrov NG, Degteva MO, Ivanov O, Ulanovsky A
Helmholtz Zentrum München, Germany, Urals Research Center for Radiation Medicine, Chelyabinsk, Russia, Kurchatov Institute Moscow, Russia

4:30 PM **MPM-A.7**
Retrospective Radiation Field Energy Determination from Dose Depth Profiles in Bricks
*O'Mara RP, Hayes RB**
North Carolina State University

4:45 PM **MPM-A.8**
Radiation Monitoring in the Vicinity of the Nuclear Legacy Site in the Far East Russia.
Starinsky VG, Akhromeev SV, Kiselev SM, Gimadova TI, Titov AV, Shandala NK
State Research Center – Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency (SRC-FMBC)

3:00 PM – 4:15 PM 302 BC

MPM-B1: Waste Management
Chair: John McCormick

3:00 PM **MPM-B1.1**
Texas Low-Level Radioactve Waste Disposal Compact Commission: Educational Workshops
Morris LL, Tachovsky JA, Ing SL
TX Low-Level Radioactive Waste Disposal Compact Commission

3:15 PM **MPM-B1.2**
U.S. EPA Superfund Policy Statements and Guidance Regarding Disposition of Radioactive Waste in non-NRC Licensed Disposal Facilities
Walker SA
US Environmental Protection Agency

3:30 PM **MPM-B1.3**
Modeling Radiological Hazard and Cost of a Centralized American Joint Spent Nuclear Fuel Interim Storage and Reprocessing Facility
McGrew JC
Vanderbilt University

3:45 PM **MPM-B1.4**
Cernavoda NPP Radioactive Waste Management Program
Daian IE, Nedelcu AE
Cernavoda NPP Romania

4:00 PM **MPM-B1.5**
Tritium Recovery from Mixed Waste
Shmayda CR, Cruz J, Shmayda WT
Torion Plasma, NSSI, University of Rochester, LLE

4:15 PM – 5:30 PM 302 BC

MPM-B2: Academic
Chair: Latha Vasudevan

4:15 PM **MPM-B2.1**
Mount Sinai Experience in Reducing and Removing the Risk of Malicious Use of Radioactive Materials
Kamen J
Mount Sinai Medical Center

4:30 PM **MPM-B2.2**
An Overview of Health Physics Activities During the Relocation of AGN-201M Nuclear Reactor at Texas A&M University
Vasudevan L
Texas A&M University, College Station

4:45 PM **MPM-B2.3**
Smart Labs: Should They Include RAM Labs?
Zakir N
Georgia Institute of Technology

5:00 PM **MPM-B2.4**
Remotely Accessible Radiation Detection Laboratory for Distance Education
*Emery G, Marianno CM**
Texas A&M University

5:15 PM **MPM-B2.5**
Tritium Diffusion by Plastic Liquid Scintillator Vials
Wang JJ
Colorado State University

3:00 PM – 5:30 PM 306 AB

MPM-C: Special Session: Low Dose Occupational Epidemiology: The Importance of Domismetry and Statistics in the Million Worker Study and the Mallinckrodt Chemical Works (MCWL) Cohort

3:00 PM **MPM-C.1**
The Past Informs the Future: The Million Worker Study and the Mallinckrodt Chemical Works Cohort
Boice JD
National Council on Radiation Protection, Vanderbilt University

3:15 PM **MPM-C.2**
Dosimetry is Key to Good Epidemiology: Dose Reconstruction at Mallinckrodt Chemical Works Considered 5 Different Source Exposures and the Inhalation of Pitchblende Dust
Ellis ED, Boice JD, Leggett RW
ORAU, National Council on Radiation Protection, Vanderbilt University, Oak Ridge National Laboratory

3:30 PM **MPM-C.3**
Dust Up: Is Kidney Disease Related to Radiation Dose, Inhaled Pitchblende and Silica, or Both?
Golden AP, Boice JD, Ellis ED, Cohen SS, Mumma MT, Girardi DJ
ORAU, National Council on Radiation Protection, Vanderbilt University, EpidStat Institute, International Epidemiology Institute

3:45 PM **MPM-C.4**
Statistical Consequences: Choice of Model and Adjustment Factors Matter
Golden AP, Cohen SS, Chen CL
ORAU, EpidStat Institute, Vanderbilt University

4:00 PM **MPM-C.5**
Panel Discussion

3:00 PM – 4:30 PM 301 AB

MPM-D: Military Health Physics

3:00 PM **MPM-D.1**
An Overview of DTRA's Health Effects From Nuclear and Radiological Environments Modeling Software
Bellman J, Dant T, Oldson D, Zaru-Roque I, Pirone J, Beaulieu S, Blake P
Applied Research Associates, Defense Threat Reduction Agency

3:15 PM **MPM-D.2**
Infection Casualty Estimation Model: Predicting Sepsis in Nuclear Detonation Burn Patient Populations Using Procalcitonin as a Biomarker
Bellman J, Zaru-Roque I, Pirone J, Beaulieu S
Applied Research Associates

3:30 PM **MPM-D.3**
Modeling Building Protection Factors with Comparison to Historic Experimental Analysis
Dant T, Kramer K, Zara-Roque I, Li A, Dillon M, Kane J, Hahn T
Applied Research Associates, LLNL, DTRA

3:45 PM **MPM-D.4**
Updating DTRA's HPAC Building Protection Factors to Improve Casualty Modeling
Dant T, Kramer K, Li A, Zara-Roque I, Dillon M, Kane S, Homann S, Hahn T
Applied Research Associates, ARA, LLNL, DTRA

4:00 PM **MPM-D.5**
Navy Radiation Health Program and Community History (Part 1)
Groves KL, Williams AS
S2-Sevorg Services, LLC, USN-BUMED

4:15 PM **MPM-D.6**
Navy Radiation Health Program and Community History (Part 2)
Williams AS, Groves KL
USN-BUMED, S2-Sevorg Services, LLC

4:30 PM **MPM-D.7**
Military Section Business Meeting

5:30 PM – 7:00 PM 303

Instrumentation Section Business Meeting

TUESDAY

7:00 AM – 8:00 AM

CEL-3 Room 204
Channeling Richard Feynman: How Lessons from the Great 20th Century Physicist Can Inform and Inspire Great Health Physicists in the 21st Century
Mark Hoover
National Institute for Occupational Safety and Health

CEL-4 Room 205
Radiation in Flight
Joseph Shonka
Shonka Research Associates

8:00 AM – 12:15 PM 305 AB

TAM-A: Special Session: Medical Health Physics

Chair: Caridad Borras

8:00 AM **TAM-A.0**
The Evolving Role of Medical Radiation Safety Officers – Are You Ready?
Martel C
Philips Healthcare

8:15 AM **TAM-A.1**
Medical Physics; Radiation Safety in the Cloud
Leuenberger RO
Louis Stokes Cleveland VAMC

8:30 AM **TAM-A.2**
Engineering Patient Safety in Radiation Oncology
Marks LB
UNC-Chapel Hill

9:00 AM **TAM-A.3**
Building a Culture of Safety; Essential Elements: Incident Reporting, Checklists, and Audits
Sandwall PA, Barwell S
US Oncology

9:15 AM **TAM-A.4**
Compliance with the Nuclear Regulatory Commission Revised Licensing Guidance for Radioactive Seed Localization
Sheetz MA
University of Pittsburgh

9:45 AM **TAM-A.5**
Discussion

10:00 AM **Exhibit Hall**
Break

10:30 AM **TAM-A.6**
Radiopharmaceutical Therapy and the Dialysis Patient
Bohan MJ
Yale-New Haven Hospital

10:45 AM **TAM-A.7**
Achieving Radiation Safety Compliance in Health Care Facilities: Beyond Regulatory Compliance
Borrás C
MHPS

11:15 AM **TAM-A.8**
Panel Discussion

11:30 AM **TAM-A.9**
Medical Section Business Meeting

9:00 AM – 12:00 PM 302 BC

TAM-B: Section Session: Contemporary Topics in Radon

Co-chairs: Wendy Kuhne, J. Matthew Barnett

9:00 AM **TAM-B.1**
Effects of 222Rn Dose Factor Variability
Harley NH
New York University Medical School

9:30 AM **TAM-B.2**
G. William Morgan Lecture: Radon - Past and Now
Schoenhofer F
E/R Section Guest

10:00 AM **TAM-B.3**
Status of a Primary Reference and Formal System of Intercomparisons for Measurements of Radon in Air
Ronca-Battista MJ, Jenkins PH
Tribal Air Monitoring Support Center, NAU, Bowser-Morner, Inc.

10:15 AM **TAM-B.4**
The Radon Dose Conversion Factor and Smoking
Chambers DB
Arcadis

10:30 AM **Exhibit Hall**
Break

11:00 AM **TAM-B.5**
Environmental Radon Section Business Meeting

8:00 AM – 12:00 PM 306 AB

TAM-C: AAHP Special Session: What Every Certified Health Physicist Should Know About ..., Part 1

Chair: Kent Lambert

8:00 AM **TAM-C.0**
Introduction
Kent Lambert

8:15 AM **TAM-C.1**
What Every Certified Health Physicist Should Know About Technical Writing
Wahl LE
HPS Web Ops

9:00 AM **TAM-C.2**
Radon Measurement Methods and Devices – An Overview
Jenkins PH
Bowser-Morner, Inc.

9:30 AM **TAM-C.3**
What Every Certified Health Physicist Should Know About Radon Mitigation
Price SG
Spruce Environmental Technologies, Inc

10:00 AM **Exhibit Hall**
Break

10:30 AM **TAM-C.4**
What Every Certified Health Physicist Should Know About Transportation of Radioactive Materials
Austin SM
Plexus Scientific Corporation

11:15 AM **TAM-C.5**
What Every Certified Health Physicist Should Know About Our Federal Government
Connolly DA
HPS

12:00 PM – 2:00 PM Ballroom A

AAHP Awards Luncheon

8:30 AM – 9:15 AM 301 AB

TAM-D1: Homeland Security Monitoring

Chair: Ronald Benke

8:30 AM **TAM-D1.2**
Detection of a Weak Radiological Source in Ambient Background Using Spectral Analysis
Meengs MR
Colorado State University

8:45 AM **TAM-D1.3**
Determination of Resuspension Properties of Am-241
Potter CA, Marshall S, Medich DC
Sandia National Laboratories, Worcester Polytechnic Institute

9:00 AM **TAM-D1.4**
Source in a Box: First Use of a Website to Quantify Threats of Concealed Radioactive Material
Benke RR
Atom Consulting

9:15 AM **Exhibit Hall**
Break

9:45 AM – 11:45 AM 301 AB

TAM-D2: Accelerator Section Special Session: Accelerator Health Physics

9:45 AM **TAM-D2.1**
Radiation Safety Challenges of High Gradient SRF Acceleration
Degtiarenko P, Hamlette D, Kharashvili G, Welch K, Vylet V*
Jefferson Lab

10:00 AM **TAM-D2.2**
Radiological Characterization and D&D of PET Cyclotron and Radioisotope Production Facility
Jones PA, Hansen TW
Ameriphysics

10:15 AM **TAM-D2.3**
Electron Spectra Measurements and Tenth-Value Layer Calculations for High-Intensity Laser Interactions with Solid Targets
Liang TT, Bauer JM, Liu JC, Rokni SH
Georgia Tech, SLAC National Accelerator Laboratory

10:30 AM **TAM-D2.4**
The Potential use of Nanotechnology in Accelerators
Marceau-Day ML
MD & Associates, Inc.

10:45 AM **TAM-D2.5**
Characterization of a Magnetic Horn For Disposal
Quinn MA
Fermi National Accelerator Laboratory

11:00 AM **TAM-D2.6**
The Radiological Issue Report (RIR) Program at SLAC
Campos Torres MM
SLAC

11:15 AM **TAM-D2.7**
Accelerator Section Business Meeting

8:00 AM – 12:15 PM 303

TAM-E: Homeland Security Special Session: Nuclear Terrorism-Real or Crying Wolf

Chair: Jerome Hauer

8:00 AM **TAM-E.0**
Introduction
Hauer J

8:15 AM **TAM-E.1**
Response Needs in the Aftermath of Nuclear Terrorism
Buddemeier BR
LLNL

9:00 AM **TAM-E.2**
Medical Response to Terrorist Use of an IND
Hauer JM
Cranfield University

9:45 AM **Exhibit Hall**
Break

10:15 AM **TAM-E.3**
Public Health Preparedness for an Improvised Nuclear Device Detonation
Ansari A
Centers for Disease Control and Prevention

10:45 AM **TAM-E.4**
The Role of Radiological Professionals in Radiological and Nuclear Terrorism
Lanza JJ
FL Dept of Health

11:15 AM **TAM-E.5**
Radiological Operations Support Specialist Reference Toolkit
Buddemeier BR, Doshi AP, Tai LI, Alai M
Lawrence Livermore National Laboratory

11:45 AM **TAM-E.6**
Homeland Security Business Meeting

12:15 PM – 2:15 PM

PEP T-1 Room 204
The Case Against LNT
Alan Fellman
Dade Moeller and Associates

PEP T-2 Room 205
Radiological Operation Support Specialist Refernce Toolkit
Brooke Buddemeier, Dan Blumenthal
LLNL, NNSA

PEP T-3 Room 206
NDA Systems Used for the Qualification of TRU Waste to WIPP
Jeff Chapman
Oak Ridge National Laboratory

PEP T-4 Room 302A
Nanotechnology and Radiation Safety
Mark Hoover
National Institute for Occupational Safety and Health

PEP T-5 Room 303
Nuclear Security Awareness for the HP
Craig Marianno
Texas A&M University

2:30 PM – 4:30 PM 305 AB

TPM-A: Rad Air NESHAPs

Co-chairs: Matthew Barnett, Colleen Ostrowski

2:30 PM **TPM-A.1**
U.S. Environmental Protection Agency Update on Radionuclide NESHAPs
Walsh JP
U.S. Environmental Protection Agency

2:45 PM **TPM-A.2**
U.S. Environmental Protection Agency Update on Compliance Codes
Walsh JP, Mosser J, Wood R
U.S. Environmental Protection Agency, Trinity Engineering Associates

3:00 PM **TPM-A.3**
DOE Subpart H Report
*Ostrowski CN, Snyder SF**
US Department of Energy, Pacific Northwest National Laboratory

3:15 PM **Exhibit Hall**
Break

3:45 PM **TPM-A.4**
Comparison of the Current Center of Site Annual Atmospheric Dose Modeling at the Savannah River Site with Other Assessment Methods
Jannik GT, Moore KR, Stagich BH, Dixon KL, Newton JR
SRNL, Augusta University

4:00 PM **TPM-A.5**
Discussion of the CAP88-PC Model with Regard to Short versus Long-Term Emissions
Warren RW
National Security Technologies, LLC

4:15 PM **TPM-A.6**
Update on Standards, Guides and Directives for Monitoring Radioactive Air Emissions
Glissmeyer JA, Parkin J, Blunt B
Glissmeyer Environmental LLC, Electronics Nuclear Control Systems, Blunt Consulting LLC

2:30 PM – 4:40 PM 302 BC

TPM-B: Special Session: NORM/TENORM
Chair: Bill Kennedy

2:30 PM **TPM-B.1**
Dealing with Fears of Radiation from NORM
Johnson RH
Radiation Safety Counseling Institute

2:50 PM **TPM-B.2**
NORM as an Existing Situation, "What do you mean there is no public dose limit?"
Egidi PV
US EPA

3:10 PM **TPM-B.3**
The Relative Risk From Oilfield NORM
Fellman A
Dade Moeller, an NV5 Company

3:30 PM **Exhibit Hall**
Break

4:00 PM **TPM-B.4**
Radiation Action Plans in Pennsylvania
Fellman A
Dade Moeller, an NV5 Company

4:30 PM **TPM-B.5**
Radiation Dose Assessment for the Disposal of Geothermal Waste at the Clean Harbors Westmorland, LLC Facility
Kennedy, Jr. WE, Bump SL, Nielsen DB
WE Kennedy Consulting, NV5 - Dade Moeller, Clean Harbors Westmorland, LLC

2:00 PM – 6:15 PM 306 AB

TPM-C: AAHP Special Session: What Every Certified Health Physicist Should Know About ..., Part 2
Chair: Kent Lambert

2:00 PM **TPM-C.1**
What Every Certified Health Physicist Should Know About Medical Management of Large, Acute Doses
Dainiak N
Radiation Emergency Assistance Center/Training Site

2:45 PM **TPM-C.2**
What Every Certified Health Physicist Should Know About Securing Radioactive Sources
Rhodes WG
Sandia National Laboratories

3:30 PM **Exhibit Hall**
Break

4:00 PM **TPM-C.3**
What Every Certified Health Physicist Should Know About Being an Expert Witness
Frazier JR
Consultant

4:30 PM **TPM-C.4**
(Almost) Everything a CHP Needs to Know about Radioactive Waste
Zittle MJ
University of Washington

5:15 PM **TPM-C.5**
AAHP Business Meeting

2:15 PM – 5:00 PM 301 AB

TPM-D: Medical Health Physics

Co-chairs: Steven King, Kendall Berry

2:15 PM **TPM-D.1**
Automatic Method to Map Patient CT Scan Location On Computational Human Phantoms for Accurate Organ Dose Estimations
Kuzmin GA, Mosher E, Lee C
National Cancer Institute

2:30 PM **TPM-D.3**
Peak Skin Dose Estimations – Where to Start?
Berry KE
Hahnemann University Hospital

2:45 PM **TPM-D.4**
VirtualDose-IR: A New Software Focused on Organ Dose and Effective Dose Estimation for Patients Undergoing Interventional Radiology Procedures
Gao Y, Caracappa PF, Crossin J, Xu XG
Virtual Phantoms, Inc.

3:00 PM **TPM-D.5**
Computed Tomography Scan Organ Dose and Effective Dose Estimation for Pediatric Patients of Various Ages
Gao Y, Quinn B, Xu XG, Dauer LT
Memorial Sloan Kettering Cancer Center, Rensselaer Polytechnic Institute

3:15 PM **TPM-D.6**
Ask The Expert: Medical and Dental Questions/Answers You Can Help!
King SH, Lambert KN
Penn State Health - Hershey Medical Center, Drexel University

3:30 PM **Exhibit Hall**
Break

4:00 PM **TPM-D.7**
Evaluation of Total Entrance Skin Dose from X-ray Imaging in Robotic Radiosurgery for Non-small Cell Lung Cancer Treatment
Jiang W, Hightower JH, Sharma SK, Lin C
East Carolina University, Vidant Medical Center

4:15 PM **TPM-D.8**
Clinical Trial in External Beam Radiation Therapy Using Nano-particle Detector
Moore B, Chino J, Therien M, Dale T, Yoshizumi T
Duke University

4:30 PM **TPM-D.9**
Development of a Novel *In Vivo* Associated Particle Neutron Elemental Imaging System for Noninvasive Medical Diagnostics
Abel MR, Nie LH
Purdue University

4:45 PM **TPM-D.10**
Validation of the Software for Performing NCRP Report 147 Shielding Calculations Methodology
Majali M, Remeithi A, Yammahi A
Federal Authority for Nuclear Regulation

12:00 PM – 2:00 PM 306 C

TPM-E: Academic Education Committee

12:00 PM **TPM-E.1**
Radiation Protection Research Needs Workshop
Abelquist EW, Hertel NE, Dewji SA, Davis JE*
ORAU, ORNL/Georgia Institute of Technology, Oak Ridge National Laboratory

12:30 PM **TPM-E.2**
Committee Meeting Workshop

Do you have a job opportunity?
Are you looking for an HP to fill a position?

Email your job description and HPS will post it at the meeting. Send a pdf or Word document to Tammy Liberati at **reception@burkinc.com**.

HPS Awards Banquet

Spend an enjoyable evening with members of the Health Physics Society. This event will be held on Tuesday, 11 July, in the Raleigh Convention Center, Ballroom B, and is an excellent opportunity to show your support for the award recipients as well as the Society. The awards will be presented after the dinner and the event will last from 7:00-9:00 pm. Included in Member, Non-Member, Emeritus, Past President, and Student Registrations.

WEDNESDAY

7:00 AM – 8:00 AM

CEL-5 Room 204
Air Crew Dose Controls
Nancy Kirner

CEL-6 Room 205
A First Time Hot Cell Window Replacement at the Idaho National Laboratories Hot Fuel Examination Facility
Patrick Bragg

8:15 AM – 12:00 PM 305 AB

WAM-A: External Dosimetry

Co-chairs: Shaheen Dewji, Chris Passmore

8:15 AM **WAM-A.1**
Neutron Buildup Factors for Concrete
Duckic P, Hayes RB, Trontl K
University of Zagreb, North Carolina State University

8:30 AM **WAM-A.2**
An Investigation of the Dose Equivalent vs. Shielding Thickness Minimum for Space Travel
de Wet WC, Zaman F, Townsend LW
University of Tennessee, Knoxville

8:45 AM **WAM-A.3**
Accepting Testing of Thermoluminescent Dosimeter Holders
Romanyukha A, Grypp MD, Sharp TJ, DiRito JN, Nelson ME, Benevides LA, Mavrogianis S, Torres J
Naval Dosimetry Center, Naval Academy, Naval Surface Warfare Center

9:00 AM **WAM-A.4**
Characterization of a Commercial Optically Stimulated Luminescent Dosimetry System
Remley BL, Minniti R, O'Brien M, Benevides L
Georgetown University, National Institute of Standards and Technology

9:15 AM **WAM-A.5**
Using Participant Motion to Ensure Dosimeter Wear Compliance
Valentino DJ, Thistlethwaite J, Barot T, Iqbal F, Salasky M
LANDAUER, Inc

9:30 AM **Exhibit Hall**
Break

10:00 AM **WAM-A.6**
Body-Size Dependent Dose Coefficients for Adult Males Exposed to External Photon Fields
Chang LA, Borrego D, Lee C
NCI/Houston Methodist, National Cancer Institute

10:15 AM **WAM-A.7**
Computation of Photon Effective Dose Coefficients for PIMAL Stylized Phantoms in Upright and Bent Positions in Standard Irradiation Geometries
Dewji SA, Reed KL, Hiller M*
Oak Ridge National Laboratory, Center for Radiation Protection Knowledge, Georgia Institute of Technology

10:30 AM **WAM-A.8**
Computation of Neutron Dose Coefficients for PIMAL Stylized Phantoms in Upright and Bent Positions in Standard Irradiation Geometries
*Dewji SA, Bales K**
Oak Ridge National Laboratory, University of Tennessee – Knoxville

10:45 AM **WAM-A.9**
Correlation of TLD Placement and Organ Dose for Adult Reference Phantoms in Articulated Positions
Sanchez E, Dewji SA
University of Texas at Dallas, Oak Ridge National Laboratory

11:00 AM **WAM-A.10**
Improved Contact Dose Rate Conversion Factors and Secondary Electron Correction Factors for Encapsulated Gamma Sources
Heritage EM, Waller EJ
University of Ontario Institute of Technology

11:15 AM **WAM-A.11**
Beta-ray and Gamma-Ray Spectral Measurements at Ontario Power Generation's Pickering CANDU Reactor
Wong M, Bohra F, Garnett R, Atanackovic J, Byun SH
McMaster University, Hamilton, Ontario Power Generation, Whitby

11:30 AM **WAM-A.12**
Development of Eye Dosimeter Using Additive Manufacturing to Monitor Occupational Eye Lens Exposures to Interventional Radiologists
Choi JH, Romanyukha A, Jorgensen TJ, Smith D, Benevides L
Georgetown University, Naval Dosimetry Center, US Navy

11:45 AM **WAM-A.13**
First-of-its-Kind Hybrid Wearable & Smart Home Device for Radiation Detection
Perle SC
Dosime, Inc.

8:00 AM – 12:15 PM 302 BC

WAM-B: Special Session: NCRP/ Nanotechnology

Co-chairs: Mark Hoover, Kathryn Held

8:00 AM **WAM-B.1**
National Council on Radiation Protection and Measurements: Progress and Priorities to Meet Our 21st Century National Needs
Held KD, Boice JD
National Council on Radiation Protection and Measurements

8:30 AM **WAM-B.2**
Overview of National Council on Radiation Protection and Measurements Report 176 on Radiation Safety Aspects of Nanotechnology
Hoover MD
CDC/NIOSH

9:00 AM **WAM-B.3**
Operational Health Physics Considerations for Working with Radioactive Nanomaterials: Guidance from NCRP Report 176
Myers DS, Smith R, Hoover MD
Livermore, CA, Public Health England, National Institute for Occupational Health and Safety

9:30 AM **Exhibit Hall**
Break

10:00 AM **WAM-B.4**
Internal Radiation Dosimetry Considerations for Working with Radioactive Nanomaterials: Guidance from NCRP Report 176
*Guilmette RA, Hoover MD**
Ray Guilmette and Associates, LLC, National Institute for Occupational Safety and Health

10:30 AM **WAM-B.5**
Working Across Radiation Protection Disciplines in the Face of Uncertainties and Evolving Technologies: Some Insights from Development of NCRP Report No. 176 on Radiation Protection Aspects of Nanotechnology
Grissom MP
MPG--HP, Inc.

11:00 AM **WAM-B.6**
Unique Interactions Between Nanotechnology and the Practice of Health Physics
Marceau-Day ML
MD & Associates, Inc.

11:30 AM **WAM-B.7**
Nanowires for Radiation Detection
Davis JE, Luo Z, Johnson SS
ORAU , Fayetteville State University

11:45 AM **WAM-B.8**
Nanotechnology and Radiation Protection: HPS Nanotechnology Committee Activities and Opportunities
Hoover MD, Marceau-Day ML, Cash LJ, Davis J, Ficklen C, Hay T, Holiday S, Walker SL
National Institute for Occupational Safety and Health, Scientist Emerita, Los Alamos National Laboratory, Oak Ridge Associated Universities, Ficklen and Associates, Washington State Department of Health, Nuclear Regulatory Commission, CHP

8:30 AM – 11:30 AM 306 BC

WAM-C: Special Session: REAC/TS

Co-chairs: Dan Blumenthal, John Crapo

8:30 AM **WAM-C.1**
Radiation Emergency Assistance Center/Training Site: Past, Present and Future
Dainiak N, Iddins C
REAC/TS

9:15 AM **WAM-C.2**
The Pseudo Pelger-Huet Cell – From Bats to Humans and Everything in Between
Goans RE, Iddins CJ, Toohey RE, McComish SL, Tolmachev SY, Dainiak N
MJW Corporation, REAC/TS, MH Chew and Associates, USTUR

10:00 AM **Exhibit Hall**
Break

10:30 AM **WAM-C.3**
HP Emergency Response: Applying Common Sense in the Field
Sugarman SL
REAC/TS

11:00 AM **WAM-C.4**
U.S. Transuranium and Uranium Registries: 50 Years of Research Relevant to New Biomarker
Tolmachev SY
US Transuranium, Uranium Registries

8:00 AM – 12:00 PM 301 AB

WAM-D: Medical Health Physics

Co-chairs: Mike Stabin, Patrick Hann

8:00 AM **WAM-D.1**
A Study of Eye Lens Dose of Interventional Radiologist Wearing Protective Eye Glasses Using Fast Monte Carlo Simulation Code - ARCHER
Mao L, Liu T, Gao Y, Dauer LT, Xu XG
Rensselaer Polytechnic Institute, Memorial Sloan Kettering Cancer Center

8:15 AM **WAM-D.2**
Development of Proton Tissue Equivalent Materials for Dosimetry Studies to Assess Patient Out-of-field Organ Doses
Olguin EA, Flampouri S, Bolch WE
University of Florida, UF Health Proton Therapy Institute

8:30 AM **WAM-D.3**
Radiation Safety for Post Radioembolization Liver Transplant
Hann PE, Keklak JC, Shamimi-Noori S
Thomas Jefferson University Hospital

8:45 AM **WAM-D.4**
New Standardized Dose Estimates for Radiopharmaceuticals
Stabin MG, Siegel JA
Vanderbilt University, Nuclear Physics Enterprises

9:00 AM **WAM-D.5**
Mo-99 Production in the U.S.
Mohaupt TH
NorthStar Medical RadioIsotopes

9:15 AM **WAM-D.6**
Mo-99 Production by NorthStar Medical RadioIsotopes
*Harvey J, Mohaupt TH**
NorthStar Medical RadioIsotopes

9:30 AM **WAM-D.7**
Perspectives from Inside the Accelerator Cave
Shingleton KL
LLNL, Retired

9:45 AM **Exhibit Hall**
Break

10:15 AM **WAM-D.8**
Internal Dosimerty Assessment of Canine Patients Treated with 64Cu-ATSM
Bell J, Mann K, Leary D, Brandl A
Colorado State University

10:30 AM **WAM-D.9**
Estimated Organ Doses to Nuclear Medicine Patients Over Five Decades: 1960-2010
Villoing D, Drozovitch V, Simon SL, Kitahara CM, Linet MS, Melo DR
National Cancer Institute, National Institutes of Health, Melohill Technology LLC

10:45 AM **WAM-D.10**
Data Show Clinical Health Care Industry Representatives Face Higher Than Expected Radiation Dose and Require Monitoring
Passmore CN, Kirr M
Landauer

11:00 AM **WAM-D.11**
Effects of Hydrogen Peroxide Sterilization Techniques on Dosimetric Properties of Extremity Dosimeters Based on LiF:Mg, Ti Detectors
Kirr M, Passmore CN, Moscatel M, Zhang R
Landauer

11:15 AM **WAM-D.12**
Radiation Safety Considerations in a Biosafety Level 4 (BSL-4) Laboratory
Gibbs DR
National Institutes of Health

11:30 AM **WAM-D.13**
Analysis of Material Composites and Advanced Design Strategies to Alleviate Orthopedic Issues Associated with Wearable X-ray Protective Aprons
*Waterman G, Jain P, Milstein O, Kase K**
StemRad

11:45 AM **WAM-D.14**
Determination of Bone Sodium (Na) and Na Exchange in Pig Leg Using *In Vivo* Neutron Activation Analysis (IVNAA)
Coyne MD, Lobene AJ, Zhang X, Joo MH, Neumann CR, Lachcik PJ, Weaver CM, Nie LH
Purdue University

8:30 AM – 10:30 AM 303

WAM-E: Special Session: Power Reactor Panel

Chair: Tom Voss

8:30 AM **WAM-E.1**
Power Reactor Panel Discussion
Voss T
LANL

10:00 AM **Exhibit Hall**
Break

10:30 AM **WAM-E.2**
Power Reactor Business Meeting

12:15 PM – 2:15 PM

PEP W-1 Room 204
Determination of Dose to the Lens of Eye of Fukushima Prefecture Wild Mice
Brian Perri
Colorado State University

PEP W-2 Room 205
Decay Chain Calculations: A Primer
David Stuenkel
Trinity Engineering Associates

PEP W-3 Room 206
Science-based Response Planning Guidance for the First 100 Minutes of the Response to a Radiological Dispersal Device Detonation (Planning Guidance)
Stephen Musolino
Brookhaven National Laboratory

PEP W-4 Room 302A
Optimizing Decision Thresholds for Low-Signal Detection at Varying Distances Amid Elevated Background
Joseph Fischer
Colorado State University

PEP W-5 Room 303
Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesiona
Richard Harvey
Roswell Park Cancer Institute, University of Buffalo

2:30 PM – 4:30 PM 305 AB

WPM-A1: Special Session: Aerosol Measurements

Co-chairs: Morgan Cox, Robert Hayes

2:30 PM **WPM-A1.1**
An Algorithm to Determine Radon/Thoron Working Levels Using Alpha Spectroscopy
Baltz DK
Bladewerx

2:50 PM **WPM-A1.2**
Analyses of Uncertainties for Two Grab-Sample Methods of Measurements of Radon Progeny in Air
Jenkins PH
Bowser-Morner, Inc.

3:10 PM **WPM-A1.3**
General Physics and Modeling of Resuspension: Implications for Measurement and Prediction of Radioactive Dust Emissions from Contaminated Areas
Whicker JJ, McNaughton M, Ruedig E, Fuehne DP
LANL

3:30 PM **Exhibit Hall**
Break

3:50 PM **WPM-A1.4**
Preliminary Work Toward Discrimination of Anthropogenic and NORM in Air Samples
Cope SJ, Hayes RB
North Carolina State University

4:30 PM – 5:15 PM 305 AB

WPM-A2: Air Monitoring

Chair: Morgan Cox

4:30 PM **WPM-A2.1**
Assessment of Radiological Ambient Air Monitoring Network at Savannah River Site
Abbott KA, Jannik GT, Viner BJ, Maze GM, Stabin MG, Clarke JS
Vanderbilt University, Savannah River National Laboratory, Savannah River Nuclear Solutions, Oak Ridge Associated Universities

4:45 PM **WPM-A2.2**
Challenges of Air Monitoring Around a Legacy Waste Disposal Site in an Urban Location
Fuehne DP, Green AA, McNaughton MW, Ruedig E, Whicker JJ
Los Alamos National Laboratory

5:00 PM **WPM-A2.3**
Radon Measurements by Alpha Track Detectors in Some Workplaces in a Southwestern State, Nigeria.
Ajayi IR
Crawford University

2:30 PM – 5:00 PM 306 AB

WPM-C: Internal Dosimetry

Chair: Jim Neton

2:30 PM **WPM-C.1**
A Bioassay Monitoring Lesson Learned from a Special Exposure Cohort Evaluation
Taulbee TD, Davis JE, Findley WM
National Institute for Occupational Safety and Health, Oak Ridge Associated Universities, MJW Corporation

2:45 PM **WPM-C.2**
Plutonium in Tissues of Occupationally Exposed Individuals
Tabatadze G, Avtandilashvili M, Tolmachev SY
U.S. Transuranium and Uranium Registries, Washington State University

3:00 PM **WPM-C.3**
Interpretation of Nasal Swab Measurements Following Suspected Releases of Actinide Aerosols
Klumpp JA, Poudel D
Los Alamos National Laboratory

3:15 PM **WPM-C.4**
Enhancement of Plutonium Excretion Following Late Ca-EDTA/DTPA Treatment
Dumit S, Avtandilashvili M, Tolmachev S
United States Transuranium and Uranium Registries, Washington State University

3:30 PM **Exhibit Hall**
Break

4:00 PM **WPM-C.5**
Update of the Dose and Risk Calculation Software System
Eckerman KF, Leggett RW, Ward RC
Easterly Scientific, Oak Ridge National Laboratory

4:15 PM **WPM-C.6**
Doses Averted from Surgical Excisions Following Incorporation of Plutonium into the Wounds
Poudel D, Klumpp JA, Bertelli L, Waters TL
Radiation Protection Division, Los Alamos National Laboratory

4:30 PM **WPM-C.7**
90Sr Bone Dosimetry – Accounting for the Variability of Bone Structure Parameters
Volchkova AY, Tolstykh EI, Shishkina EA, Timofeev YS, Zalyapin VI, Degteva MO, Napier BA
Urals Research Center for Radiation Medicine, Chelyabinsk, South Ural State University (National Research University), Chelyabinsk, Pacific Northwest National Laboratory

4:45 PM **WPM-C.8**
Study of Microdistribution of Productional Alpha-Emitting Particles in the Lungs of Professional Workers of Nuclear Facilities
*Sypko SA, Bobov GN, Vvedensky VE, Nazarenkova AV**
Southern Urals Biophysics Institute, Russia

2:30 PM – 4:30 PM 301 AB

WPM-D: DOE/Decontamination and Decommissioning

Chair: Steven Brown

2:30 PM **WPM-D.1**
Radiological Safety of Radiation Generating Devices at ORNL
Mei GT, Whittenbarger MS
Oak Ridge National Laboratory

2:45 PM **WPM-D.2**
A First Time Hotcell Window Replacement at the Idaho National Laboratories Hot Fuels Examination Facility
Bragg PB, Caudle JS
Idaho National Laboratory

3:00 PM **WPM-D.3**
Lifting Equipment Repair the Idaho National Laboratory's (INL) Fuel Conditioning Facility (FCF)
Humphrys DW
Idaho Nationial Labratory

3:15 PM **WPM-D.4**
Waste Box Disposal Dose Reduction at the Fuel Conditioning Facility
Humphrys DW
Idaho National Laboratory

3:30 PM **Exhibit Hall**
Break

4:00 PM **WPM-D.5**
Approach for Establishing Acceptable Risk / Dose Based Remedial Criteria for Residual Radionuclide Contamination of Land (Soil)
Brown S
SHB Inc.

4:15 PM **WPM-D.6**
Sensitivity Analysis of Volumetric Release Limits for a Concrete Room, A Future-use Scenario Not Considered by HPS/ANSI N13.12
Ruedig E, Gillis J, McNaughton M, Whicker JJ
Los Alamos National Laboratory

THURSDAY

7:00 AM – 8:00 AM

CEL-7 Room 204
Proceedings of the Annual Core Research Reactor Characterization
Alexandra Robinson
Sandia National Laboratory

CEL-8 Room 205
Safety Culture in Research: Anticipating Danger Where No One Has Gone Before
Alice Dale
University of Kansas

8:15 AM – 11:45 AM 305 AB

THAM-A: Emergency Response

Chair: William Irwin

8:15 AM **THAM-A.1**
Exploring Risk Assumptions in Evacuation and Reoccupation Decision Making
Braley GS
Colorado State University

8:30 AM **THAM-A.2**
First Responder Advanced Radiological Contamination (ARC) Training Using 99mTc
Owens C., Albanese M, Balzer M.
Guardian Center, Qal Tek Associates LLC

8:45 AM **THAM-A.3**
Screening Criteria for External Contamination in a Radiation Emergency
Samuels CE, Hertel NE, Ansari AJ
Georgia Institute of Technology, Center for Disease Control and Prevention

9:00 AM **THAM-A.4**
The Radiological Operations Support Specialist (ROSS). Meeting the Radiological/Nuclear Emergency Expertise Needs of our Times
Irwin WE
Vermont Dept. of Health

9:30 AM **THAM-A.6**
Introducing RadResponder Network - A National Standard and Whole Community Solution for the Management of Radiological Data During Radiological Emergencies
Chen G
Environmental Protection Agency

9:45 AM **Exhibit Hall**
Break

10:15 AM **THAM-A.7**
Tailored Decision Aids for Use in Radiological Emergencies
Bowman DR
Department of Energy

10:30 AM **THAM-A.8**
Introduction and Demonstration of an Internal Contamination Assessment Tool (ICAT)
Finklea LR, Ansari A, Anigstein R
Centers for Disease Control and Prevention, S. Cohen & Associates

10:45 AM **THAM-A.9**
Capturing "Real Time" Data During a Full-Scale Community Reception Center Exercise
Finklea LR, Goff R
Centers for Disease Control and Prevention, Tennessee Department of Public Health

11:00 AM **THAM-A.10**
Quantifying the Value of Aerial Radiation Measurements for Incident Response
Hoteling N, Blumenthal D, Crapo J, Beal WC
Remote Sensing Laboratory, Department of Energy

11:30 AM **THAM-A.12**
Ground Survey of Disaster City Training Area in Preparation for a Short-Lived Radiological Contamination Exercise
Tsorxe IY, Marianno CM
Duke University, Texas A&M University

8:30 AM – 11:30 AM 302 BC

THAM-B: Instrumentation

Co-chairs: Frazier Bronson, GS Mickum

8:30 AM **THAM-B.1**
A Novel High Dose Rate Research Irradiator Design Analysis
Mickum GS, Rushton RO, Hope ZJ
Hopewell Designs

8:45 AM **THAM-B.2**
Building a Statistical Model for Detection of a Weak Radiological Source in Ambient Background
Brogan J, Klumpp J, Brandl A
Colorado State University, Los Alamos National Laboratory

9:00 AM **THAM-B.3**
Total Uncertainty Propagation in Monte Carlo N-Particle Dosimetry Simulations
*O'Mara RP, Hayes RB**
North Carolina State University

9:15 AM **Exhibit Hall**
Break

9:45 AM **THAM-B.4**
A Prototype Flexible Continuous Quantitative On-line Gamma Spectroscopy Acquisition System
Bronson FL, Anderson T
Mirion Technologies [Canberra]

10:00 AM **THAM-B.5**
Modeling Minimum Detectable Activity as Function of Detector Velocity
Falkner JT, Marianno CM
Texas A&M University

10:15 AM **THAM-B.6**
A Collimated CZT Detector for Quantitative Gamma Assays
Bronson FL, Herman C, Muller W, Zickefoose J
Mirion Technologies [Canberra]

10:30 AM **THAM-B.7**
How Radiological Performance Testing Captures Personal Radiation Detector (PRD) Capabilities
Fisher BD, Warner JS, Wysocki PA
Texas A&M University, Argonne National Laboratory

10:45 AM **THAM-B.8**
Tailored Polylactic Acid Biopolymers for Low-Cost, Near Real-Time Detection and Dosimetry in High Intensity Radiation Environments
Bakken AC, Boyle NM, Archambault BC, Taleyarkhan RP
Purdue University, Sagamore Adams Laboratories, LLC

11:00 AM **THAM-B.9**
A New Digital Dosimeter Using a MOS Capacitor-based Accumulating Radiation Sensor
Valentino DJ, Scott SM, Salasky MR, Thistlethwaite JR, McNamee T, Mousoulis H, Peroulis D
LANDAUER, Inc, Purdue University

8:30 AM – 11:30 AM 306 AB

THAM-C: Risk Assessment

Chair: Ray Johnson

8:30 AM **THAM-C.1**
Stopping Health Effects Caused by an Exaggerated Fear of Radiation Exposure – Limiting the Terror
McKenna TJ, Callen JB
Consultant, Institute for Applied Systems Analysis

8:45 AM **THAM-C.2**
Using EPA's Risk Assessment Tools for Superfund When Addressing Late-Phase Response to Terrorist Attacks and Nuclear Power Plant Major Accidents
Walker SA
US Environmental Protection Agency

9:00 AM **THAM-C.3**
Understanding Radiation Risks – Going from Doubt to Certainty
Johnson RH
Radiation Safety Counseling Institute

9:15 AM **THAM-C.4**
Stopping Deaths from Unjustified Protective Actions During a Nuclear Emergency - Developing a Comprehensive Public Protective Action Strategy
McKenna TJ, Callen JB
Consultant, Institute for Applied Systems Analysis

9:30 AM **Exhibit Hall**
Break

10:00 AM **THAM-C.5**
Development of an Integrated Spatial and Temporal Stochastic Model for Computational Radiation Biology
Liu RU, Higley Ka
Oregon State University

10:15 AM **THAM-C.6**
Multivariate Analysis of Radiation Responsive Proteins to Predict Radiation Exposure in Total Body and Partial Body Irradiation Models
Sproull M, Kramp T, Shankavaram U, Camphausen K
NIH/NCI/ROB

10:30 AM **THAM-C.7**
Evaluation of Transcriptional Changes in E.coli After Single-source Radiation Exposure for Use as Biosensors for Radiation Discrimination
Manglass L, Wintenberg M, Montgomery D, Blenner M, Martinez N
Clemson University

10:45 AM **THAM-C.8**
Hypertension in the Mayak Worker Cohort Occupationally Exposed to Ionizing Radiation
Kuznetsova KV, Azizova TV, Bannikova MV
Southern Urals Biophysics Institute

11:00 AM **THAM-C.9**
Quantifying Biomarkers in Wildlife Exposed to Low Doses of Environmental Radiation
Halim N, Johnson TE, Hinton TG, Bailey SM
Colorado State University, Fukushima University

11:15 AM **THAM-C.10**
How Expectations Fuel Decisions for Radiation Safety
Johnson RH
Radiation Safety Counseling Institute

12:15 PM – 2:15 PM

PEP TH-1 Room 204
Potential Radiation Effects from Diagnostic and Interventional Radiological Procedures
Cari Borrás
MHPS President

PEP TH-2 Room 205
International Guidance on Radiation Emergency Management
Ed Waller
University of Ontario

PEP TH-3 Room 206
ASTM Standards that Influence or are Directly Apllicable to Radiation Protection
Edward Walker

PEP TH-4 Room 302A
Neutrons: Discovery, Detection Application and Health Physics
Jeff Chapman
Oak Ridge National Laboratory

PEP TH-5 Room 303
Point Kernel Methods for Shielding Analysis
Nolan Hertel
GW Woodruff School of Mechanical Engineering

AAHP COURSES

Raleigh Convention Center • 8 July 2017 • 8:00 AM-5:00 PM

AAHP 1 Radioanalytical Chemistry for the Health Physicist

Thomas Rucker
Leidos

Room 306A

Health Physicists are often involved in projects and programs that rely on radioanalytical data for decision making that impacts human health and the environment. These projects include site characterization for cleanup and compliance demonstration, decommissioning of nuclear facilities, emergency response, remedial and removal actions, effluent monitoring of licensed facilities, environmental site monitoring, background characterization, waste management activities, and bioassay monitoring and internal dosimetry activities. Health Physicists may be involved in preparing project planning documents, such as sampling and analysis plans (SAPs) and radioanalytical statements of work (SOWs), quality assurance project plans (QAPPs) including development of data quality objectives (DQOs) and measurement quality objectives (MQOs). Health Physicist may also supervise radioanalytical laboratories or oversee obtaining radioanalytical laboratory services. Health Physicists are also often involved in evaluating and interpreting radioanalytical data, and may be involved in overseeing data validation and data quality assessment.

It is important that data are of known quality and are appropriate for their intended use. Making incorrect decisions causes delays in project completions and can result in the loss of public trust and confidence. This course will provide the Health Physicist with a working understanding of the processes involved in radiochemical analysis and the specifications required to insure data of known quality are obtained and are appropriate for their intended use. Furthermore, this course will provide insights into how to interpret radioanalytical data and the limitations on their use.

This course will provide an overview of the Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual, which provides guidance for the planning, implementation, and assessment phases of those projects that require the laboratory analysis of radionuclides. The overview of MARLAP guidance will include key issues to be considered during the development of analytical protocol specifications, developing MQOs, obtaining laboratory services, selecting and applying analytical methods, evaluating laboratories, field sampling issues that affect laboratory measurements, sample preparation in the laboratory, sample dissolution, chemical separation techniques, and instrumentation for measuring radionuclides. The course will also include a detailed discussion of radioanalytical uncertainties, detection decisions, and detection and quantification capability. Finally, the course will include on overview of the radioanalytical data validation process based on ANSI/ANI 41.5-2012, "Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation."

AAHP 2 The Radiological Operations Support Specialist: Deeper Dives into the Latest Rad/Nuc Emergency Response Tools

Brooke Buddemeier, William Irwin, Lauren Finklea, Stephen Musolino, Jim Rogers
FEMA CBRNE

Room 306B

The Radiological Operations Support Specialist (ROSS) is a radiological and nuclear emergency subject matter expert trained to provide timely and actionable guidance to decision makers in even the most catastrophic radiological and nuclear emergencies. This training provides an update on ROSS training, testing and certification activities, and provides new training for those who are ROSS already, or want to become ROSS. Topics to be covered include the DHS Science-based Response Planning Guidance for the First 100 Minutes of the Response to a Radiological Dispersal Device Detonation, the improvised nuclear device Rapid Hazard Assessment Tool, the NCRP's latest report on Guidance for Emergency Response Dosimetry, the DHS project for using Preventive Radiological Nuclear Detection equipment for consequence management, the latest Federal Radiological Monitoring Assessment Center data products for radiological and nuclear emergencies, and the CDC's new Risk Hazard Scale, their IND and nuclear power plant emergency communications fact sheets, and information for clinicians and public health, Risk Hazard Scale.

AAHP 3 Radioactive Air Sampling and Monitoring

Daniel Strom

Room 306C

This course begins with the motivation for radiological air sampling, and covers types of radioactive air contaminants, aerosol particle size distributions, and processes affecting aerosols. Air flow measurement is presented, along with expressions for concentration in air. The effects of weather on aerosols, fallout, and exposure pathways from airborne radioactivity are covered. Introduction to inhalation and the human respiratory tract leads to understanding of derived limits and reference values. Next, strategies for placement (location) of air samplers (part 1) can include general area (GA), fixed breathing zone (BZ), and lapel samplers. Adsorption for noble gasses, iodines, HT and HTO, and passive air sampling (no pump) are presented. Collecting particles is affected by isokinetic, anisokinetic, and shrouded probe sampling, which are important in stack sampling. Particle size selection and respirable mass sampling are briefly covered. Measuring particle size distributions is discussed. Grab samplers and the interpretation of grab measurements are discussed, including computations and counting statistics. Sampling for radon and thoron and their short-lived decay products is discussed, as well as their omnipresent interference in measurements of other radionuclides. Continuous air monitors (CAMs) and radon and thoron progeny compensation methods are explained, followed by interpreting CAM measurements using computations and counting statistics. Limitations of CAMs are discussed. A few special cases are presented. The role of meteorology in air sampling is revisited. Dilution ventilation as a removal mechanism is outlined. A very brief discussion of Bayesian inference (formally incorporating everything you know) will follow, with a final discussion of placement of air samplers (2). Exercises are given for selected topics.

PROFESSIONAL ENRICHMENT PROGRAM (PEP)

Sunday 9 July through Thursday 13 July

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, 9 July, a series of 23 courses will be offered between 8:00 am - 4:00 pm.

In addition to the above-mentioned sessions for Sunday, five PEP lectures are scheduled on Monday-Thursday, 12:15 - 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 which still have space available after the waiting list has been admitted. Student admission will be on a first-come, first-served basis and will only begin 15 minutes after the start of the session to allow for completion of ticket processing.

Please Note!!

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

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

Refund Policy

Requests for PEP refunds will be honored if received in writing by 7 June. All refunds will be issued AFTER the meeting. Exceptions will be handled on a case-by-case basis.

Sunday 8:00 AM – 10:00 AM

PEP 1-A Part I – How Habits Govern Our Risk Communication Style

Ray Johnson
Radiation Safety Counseling Institute

Our natural preference or style for risk communication is a habit based on our lifetime of choices and experience. Our communication preferences have evolved so slowly and so naturally that we are not even aware that we have a particular communication style. Our preferred style can be identified by the Myers Briggs Type Indicator (MBTI). The MBTI measures our preferences for gaining energy (by Extroversion vs Introversion), how we gather information (by Sensing or Intuition), how we make decisions (by Thinking or Feeling), and how we prefer to relate to others (by Perceiving or Judging). This class will show us how to identify our MBTI preferences and how those preferences govern our habitual ways of communication. MBTI Insights have been gained from presentations of MBTI workshops to over 4,000 radiation safety specialists, mostly in the 1980s. These insights were reported in monthly columns in the HPS Newsletter for over ten years. The predominant communication preference for HPs is the Thinking language based on logical, rational, analysis of facts according to the scientific method. The second communication preference for HPs is Intuition based on creative insights, gut instinct, concepts, and imagination. HPs often begin to experience difficulties in communication with those who prefer Sensing based on sensory data and practical factual information (devoid of imagination). For many HPs the greatest challenge is communicating with those who prefer Feeling based on empathy, values, circumstances, and emotion. This class will show you the hierarchy of your communication preferences, as well as the strengths and limitations of each preference. Participants in this class should determine their MBRI preferences before the class by going to a free website at www.16personalities.com/free-personality-test. Please bring your profile information to the class for evaluation.

PEP 1-B EH&S "Boot Camp" for Radiation Safety Professionals, Part 1

Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

A Unique 3 Part PEP Course Series

It is currently quite rare for organizations to maintain standalone 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 unique Professional Enrichment Program (PEP) series 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. The PEP series will consist of three 2 hour segments:

- Part 1 will address "The Basics of Risk Management & Insurance" and "The Basics of Fire & Life Safety". The risk management & insurance portion of the session will address the issues of retrained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle), and how these aspects impact EH&S and RM operations. Included in the fire & life safety segment will be a discussion on the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will also be discussed
- Part 2 will examine "Security 101 for Radiation Safety Professionals" and "The Basics of Biological & Chemical Safety". The first part of this session will focus on security as it is applied in the institutional settings. Various strategies employed to improve security controls will be presented. The second part of the session will address the classification of infectious agents and the various assigned biosafety levels. Aspects of chemical exposures, exposure limits, monitoring and control strategies will also be discussed
- Part 3 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.

Each PEP segment is designed so that participants can take any session individually, although the maximum educational benefit will be derived from the participation in all three sessions. The particular topics included in the PEP series have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy". Ample time will be allotted for questions answers and discussion, and each segment will be supplemented with key reference information.

PEP 1-C International Electrotechnical Commission (IEC), Technical Committee (TC) 45 and Subcommittee: Nuclear Standards

Morgan Cox
Chairman TC 45

This presentation of international standards covers the efforts of 16 working groups & project teams addressing important issues such as 1) the instrumentation & control (I&C), & electrical power for nuclear facilities; 2) radiation detection & protection for workplace personnel, the public & the environment, & from airborne & waterborne effluents; and 3) safeguarding special nuclear materials at all locations.

Those efforts are from working groups and project teams in IEC Technical Committee 45, and from Subcommittees SC 45A and SC 45B. The overall work is distributed among over more than 250 experts as volunteers from some twenty plus countries of the world.

The SC 45B standards include those from Working Group (WG) B-5 responsible for radioactive aerosol measurements and environmental monitoring; WG B-8 for electronic personnel and portable detectors, plus passive radiation dosimeters; WG B-9 is responsible for installed radiation monitoring systems at all nuclear facilities including power reactors; WG B-10 continuously handles all of the issues of radon and radon progeny monitoring; WG B-15 is responsible for controlling the illicit trafficking of all types of radioactive materials, using a variety of detectors; WG B-16 develops standards for radioactive contamination monitors & meters; and WG B-17 covers security inspection systems using active interrogation with radiation sources.

The SC 45A standards include those from WG A-2 for sensor & measurement technology; WG A-3 uses the application of digital processing to safety in nuclear power plants; WG A-5 responds to special processing measurements & radiation monitoring; WG A-7 addresses the reliability of electrical equipment in reactor safety systems; WG A-8 covers the design of control rooms; WG A-9 is termed instrument systems; WG A-10 is upgrading & modernizing I&C systems; and WG A-11 addresses all electrical systems.

PEP 1-D TENORM Overview

Philip Egidi
US EPA

Natural radiation is ubiquitous, and naturally occurring radioactive material (NORM) often is unintentionally concentrated or relocated as part of industrial processes outside the nuclear fuel cycle. These radioactive materials are grouped together in a broad category called technologically enhanced NORM, or TENORM. While some federal regulations capture specific TENORM effluents or residuals, there is no specific cleanup standard or defined waste management regime for TENORM. Regulation and management of TENORM is left to the states to address. States have taken a variety of approaches to TENORM, creating a plethora of waste disposal limits, cleanup limits, and uncertainty in worker, public and environmental protection approaches. Unlike situations involving man-made radioactive materials, (TE)NORM is considered an existing situation by the International Commission on Radiation Protection. This overview will touch on sources of background radiation; evolution of the TENORM paradigm, provide examples of industrial practices impacted by TENORM, review the characteristics of some of these materials, and review some of the challenges presented by TENORM.

PEP 1-E Practical Computational Modeling for Health Physics (1) – Introduction to Monte Carlo Simulations

Shaheen Dewji, Maurituius Hiller
Oak Ridge National Laboratory

Radiation transport codes are used in a breadth of application scopes in health physics, including estimating doses due to radiation exposures, characterizing radiation fields from sources, and conducting shielding calculations. In this introductory course, we will review the fundamentals of radiation interactions with matter and construct simple problems defining simulation geometries, materials, sources, and tallies. The objectives of this course are to: (1) provide participants with a background in Monte Carlo radiation transport code development; (2) provide a fundamental understanding of radiation interactions with matter; (3) help participants create and visualize a basic input file for Monte Carlo simulation; and (4) conduct and analyze the simulation data to interpret meaningful results.

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

PEP 1-F Introduction to Stack Sampling

J.A. Glissmeyer, Brian Asamoto
Glissmeyer Environmental LLC, HI-Q Environmental Products, Asamoto Engineering

This course will present essential information on stack sampling for radionuclides. The topics of bulk stream radiation monitoring, extractive sampling, sample transport, collection and monitoring will be introduced. The system design tools for these processes will also be covered. The performance criteria for locating sample extraction probes are described. Problems involved with stack sampling, and possible solutions, will also be discussed.

PEP 1-G A Forgotten Nuclear Accident – Bravo

Casper Sun

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 US Pacific Test Ground in Bikini and Enewetak Atolls, the Republic of Marshall Islands (RMI). Later, on March 1st, 1954, the Bravo detonated and many outcome were unexpected. Since then, all northern atolls of RMI were never be the same – farmlands and the populations. The unexpected event is catastrophic resulting (1) from unpredicted weapon yields; (2) by the nuclear debris and fallout reached to the east of many inhabited Atolls and (3) to the Lucky Dragon, the nearby Japanese fishing vessel. Nuclear rescue missions to the populations exposed by Bravo fallout were performed; medical remediation for those badly injured were investigated.

BNL scientists and physicians played an pioneer and vital roles on the islanders radiological health and safety programs funded by the Department of Energy (DOE) for 40+ years, including the Marshall Islands Radiological Safety Program (MIRSP) which was established for bioassay monitoring and dose assessment. An overview of health physics whole-body counting, plutonium urinalysis, and LLNL's diet/intake/environmental studies will be discussed. Finally, the PEP presentation will analyze and summarize the global nuclear operational incidents as lesson learned that could be implied and implemented to up-to-date emergency planning and accident preparedness.

PEP 1-H Fundamentals of Gamma Spectroscopy

David Pan
ORTEC

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

Sunday 10:30 AM – 12:30 PM

PEP 2-A Part II – How to Change Our Habits for Improved Risk Communication

Ray Johnson
Radiation Safety Counseling Institute

The Myers Briggs Type Indicator (MBTI) shows us how our natural communication style has evolved as a lifelong habit. Fortunately insights from MBTI can also show us where our opportunities lie for improved risk communication. However, to communicate in a different way requires that we change our habit or natural style for communication.

The good news is that with MBTI insights we can understand why we have difficulties in risk communication and how we can change our communication habits if we wish to be more effective. We all know, however, that changing a habit can be exceedingly difficult. This class will show you the options for improved risk communication with your coworkers, your family, or the general public, if you are willing to commit the effort. The first step is to recognize that we have preferred communication habits and that there are other ways to communicate. The next step is to begin to appreciate the communication preferences of others. As we begin to appreciate the ways or habits for communication preferred by others we now have the option of learning their language and style. This class will show you how to begin learning and developing new habits for risk communication. Participants in this class should determine their MBRI preferences before the class by going to a free website at https://www.16personalities.com/free-personality-test. Please bring your profile information to the class for evaluation.

PEP 2-B EH&S "Boot Camp" for Radiation Safety Professionals, Part 2

Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

See PEP 1B for description.

PEP 2-C Status of ANSI N42 RPI standards

Morgan Cox
Co-chair RPI and HSI standards

This summary covers the current status of American National Standards Institute (ANSI) N42 standards for health physics instrumentation in two sections:

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

The new ANSI N42.54 standard is combining the salient materials for airborne radioactivity monitoring from ANSI N42.17B, ANSI N42.18, ANSI 323C and ANSI N42.30, with the comprehensive title of "Instrumentation and systems for monitoring airborne radioactivity".

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

Instrumentation (HSI), including those for performance criteria for personal radiation detectors in ANSI N42.32 that has been revised; portable radiation detectors in ANSI N42.33 in revision soon; 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 in revision 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; and portable contamination detectors for emergency response in ANSI N42.58 needing some attention.

PEP 2-D Air Monitoring in Nuclear Facilities and the Environment - Part 1

Tom Voss

Basic fundamentals of air sampling and monitoring includes basic calculations, interferences, and limitations of air sampling and monitoring systems.

The following exercise is presented:

Calculate – concentration using count rate, counting efficiency, and sample volume, DAC and DAC-h, mrem/h and mrem from inhaling airborne radioactivity

The following discussion of the interferences encountered in air sampling and air monitoring for airborne radioactive materials is presented:

- Radon and Thoron interference in aerosol and gas sampling
- Radon/thoron progeny concentrations compared to concentration limits for transuranics

Basic air effluent plume models are presented and discussed. Various plume modeling software programs are demonstrated.

Demonstration of the basics of air sampling and monitoring will be performed. Room radon will be collected on a filter, measured for alpha, beta, and gamma, then allowed to decay until the end of the 2 hour class when the decay measurements are made.

An overview of the requirements in the following documents is presented; 10CFR20, 10CFR835, 29CFR1910, 40CFR50, 40CFR61, NUREG 1400, ANSI N13.1-2011, and NUREG1400.

Deposition 2001a software developed at Texas A&M University is demonstrated.

Deposition Calculator Version 1 developed by Brent Blunt of Blunt Consulting LLC is demonstrated.

PEP 2-E Practical Computational Modeling for Health Physics (2) - Intermediate Monte Carlo Modeling with Anthropomorphic Phantoms

Shaheen Dewji
Oak Ridge National Laboratory

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

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

PEP 2-F Radiation Safety and the Gamma Knife — from the Perspective of a Health Physicist

John Gough
Swedish Medical Center

The Leksell Gamma Knife is a Stereotactic Radiosurgery system made by Elekta that is used for the treatment of intracranial tumors and essential tremors. In August 2010, Swedish Medical Center at their Radiosurgery Center, in Seattle, WA purchased and installed a Gamma Knife Radiosurgery system. The system uses cobalt-60 as the radiation source and has a nominal installed activity of 6000 Ci. This course will review typical requirements for the installation of a gamma knife system including site planning, licensing, radiation shielding, coordination of installation, and source security. Additionally, we will explore the unique challenges for this installation at Swedish Medical Center and the support that was provided by the in-house health physics and radiation safety to complete this project.

PEP 2-G Integration of Health Physics into the Medical Management of Radiation Incident Victims

Stephen Sugarman
REAC/TS

In the event of a radiation incident it is essential that the radiation dose a patient may, or may not, have received is rapidly assessed so that proper medical treatment can be planned. The initial information needs to be easily

obtained and able to provide a realistic potential of dose magnitude. Various techniques can be employed to help gather the necessary information needed. Evaluation of nasal swabs and wound counts can help with ascertaining the potential for significant intakes of radioactive materials, and mathematical dose estimations can help with determining the potential magnitude of external doses. Externally contaminated areas must be assessed so that treatment and decontamination priorities can be determined. As time goes on and more information, such as bioassay or biological dosimetry data, is received the health physicist will be called upon to interpret that data and communicate its meaning to the healthcare staff. Support duties can also include assistance with communicating with the patient, other medical staff, or external entities such as regulators and the media. Coupled with a good event history and other data, health physicists and physicians can develop a strategy for providing proper medical care to individuals who may have been involved in a radiological event. It is, therefore, essential that health physicists are able to seamlessly integrate themselves into the patient care environment and effectively communicate their findings to a wide variety of people. This PEP will describe methodologies to rapidly assess radiation doses and use real case reviews to reinforce the teaching points.

PEP 2-H Fundamentals of Alpha Spectroscopy

David Pan
ORTEC

This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis. The course includes a review of the nature and origins of alpha-particle emitting radioactivity, basic physics of alpha particle interaction with matter, considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data.

Sunday 2:00 PM – 4:00 PM

PEP 3-A Title: The Fallacy of "Safe-Siding" Health Risk Estimates

Eric G. Daxon

Health physicists live in two worlds that were never meant to merge – the regulatory compliance world and the health risk management world. The former was intended for the occupational use of ionizing radiation. The later is intended for use primarily in emergency environments but has its uses in the occupational setting. It is common practice to use safe-sided health risk estimates in both environments by either high-siding the dose estimates or high-siding the risk estimates or both. This is especially true in the early stages of a major nuclear incident. The purpose of this PEP session is to re-examine the practice of safe-siding health risk estimates or dose estimates from the standpoint of total health risk. The session will use case studies as a vehicle to conduct this re-examination. One case study will be focused on the individual in an occupational setting; the second on a groups in occupational and emergency settings; the third will be on the use of guidance doses in emergency response operations and military operations.

PEP 3-B EH&S "Boot Camp" for Radiation Safety Professionals, Part 3

Robert Emery, Janet Gutierrez
The University of Texas Health Science Center at Houston

See 1B for description.

PEP 3-C Gamma Spectroscopy for Health Physicists – Practical Applications

Doug Van Cleef
Mirion Technologies, Inc.

This course present a quick revive of gamma spectroscopy principles and technology, followed by three examples of gamma spectroscopy applications for health physicists. We will consider gamma spectroscopy as a tool for common health physics laboratory applications, waste packaging applications including TRU, and nuclear materials interdiction applications. Common limitations and interferences will be included in the examples. The course will include ample time for Q&A to allow students 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 brief review of gamma spectroscopy principles and some practical examples of gamma spectroscopy analyses relevant to health physicists.

PEP 3-D Air Monitoring in Nuclear Facilities and the Environment – Part 2

Tom Voss

Hands-on use of Air Sampling and Air Monitoring Equipment Including Analysis Methods and Algorithms

Air sampling pumps, air flow and dP gauges are demonstrated in this class.

- Simple calculations for air flow and pressure drops in sample lines are demonstrated.
- Types of air sample pumps (rotary vane, centrifugal, and diaphragm), vacuum and pressure lines, sample nozzles, air sample flow controllers (such as throttling valves, mass flow controllers, critical flow orifices, and pinch valves) are discussed and their operational characteristics are explained.
- Types of sample flow measurement systems (such as dP gauges, mass flow meters, and rotameters) are discussed and their operational characteristics are explained.
- Power required versus air sampling rate for various types of air sample pumps is discussed.
- Types of filter media are compared and the suggested applications for each are discussed. Various air sample filters are used in the hands-on demonstration.
- Typical operation, maintenance, and calibration proce¬dures are presented.
- Calibration equipment is provided to demonstrate how the air samplers and monitors are calibrated.
- Air sample filters are counted and airborne concentra¬tions are calculated.
- The uncertainties and limitations in the completed air sampling report are explored.

PEP 3-E Introduction to Stack Sampling

J.A. Glissmeyer, Brian Asamoto
Glissmeyer Environmental LLC, HI-Q Environmental Products, Asamoto Engineering

This course will present essential information on stack sampling for radionuclides. The topics of bulk stream radiation monitoring, extractive sampling, sample transport, collection and monitoring will be introduced. The system design tools for these processes will also be covered. The performance criteria for locating sample extraction probes are described. Problems involved with stack sampling, and possible solutions, will also be discussed.

PEP 3-F US EPA Superfund Radiation Risk Assessment Training

Stuart Walker, Fred Dolislager, Nasser Shubayr
US EPA, University of Tennessee at ORNL, ORISE Participant

EPA and the Oak Ridge National Laboratory (ORNL) collaboratively developed this training. This training is a full-day advanced course that focuses on specific technical and regulatory issues that site managers and technical staff address when managing sites under the US Environmental Protection Agencies Superfund remediation program that have a risk assessment conducted for radioactive contaminants. These tools can facilitate better decision making for accelerated cleanups. The instructional methodology for this course includes lectures and demonstrations of using EPA risk and dose assessment calculators developed by the Superfund remedial program. The target audience for this course is site managers, risk assessors and others that want to obtain a working knowledge on conducting Superfund radiation risk assessments.

PEP 3-G How Do We Know They're Good? Design and Administration of a Bioassay Oversight Program

Cheryl Antonio
Dade Moeller and Associates

An essential part of running a bioassay program is the quality oversight of the measurements. Whether the program is for a large or small number of measurements, there are key elements critical to assuring that good measurements are obtained. Standards such as ISO-17025, ANSI/HPS N13.30, and DOELAP provide guidance but the practical issues of implementing that guidance sometimes are rather subjective. Key elements include a well-developed contractual statement of work, knowledge of the measurement and data handling processes as well as the lab quality assurance and control provision, plus the client's own review and verification of measurements. The importance of adequate documentation of these elements cannot be understated, particularly in light of litigations and trends in worker compensation programs. Experience gained through many years of running large scale bioassay programs as both a provider and a client, as well as auditing both large and small scale programs will highlight many of the challenges posed to the oversight process, as well as how these challenges can be efficiently and cost-effectively met.

Monday 12:15 pm – 2:15 pm

PEP M-1 A Contemporary Approach to Managing Low-Level Radioactive and Mixed Waste at an Academic Institution

Michael Zittle
University of Washington

Management of low-level radioactive and mixed waste at academic institutions is challenging due to the small quantities and wide variety of wastes generated. These organizations are often non-profit or government funded and it is critical to maintain regulatory compliance while minimizing disposal costs, despite the unpredictable and often unreasonable cost of waste disposal.

This course will present waste management strategies for various waste streams and processes including sanitary sewer disposal, decay-in-storage, bench top treatment, minimization techniques and waste processing services, as well as the EPA mixed waste conditional exemptions. This course emphasizes the importance of training generators and utilizing process knowledge, accurate sample analysis, standard operating procedures, and quality assurance to efficiently manage radioactive and mixed waste.

The presenter recently overhauled the course to include an updated broker/processor directory, a variety of new recycling and disposal options, and case studies of waste disposal challenges and successes. Participants with low-level radioactive or mixed waste disposal challenges are encouraged to bring detailed descriptions of their waste for discussion of disposal options.

PEP M-2 So Now You're the RSO: Elements of an Effective Radiation Safety Program

Thomas Morgan
Columbia University

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 a 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-3 Medical Laser Safety Program – What Health Physicists Need to Know

Deirdre Elder
University of Colorado Hospital

Medical laser systems are used in many clinical settings, including ophthalmology and dermatology clinics, interventional radiology and cardiology and the operating room. Whether it is a small clinic or a large academic medical center, a health care facility with laser applications should have a program in place to ensure the safety of patients and personnel. Health Physicists and Medical Physicists may be asked to oversee laser safety programs at medical facilities and need the tools to run an effective program. The requirements of the American National Standard for Safe Use of Lasers in Health Care (ANSI Z136.3) and the Recommended Practices for Laser Safety in Perioperative Practice Settings developed by the Association of Perioperative Registered Nurses will be discussed.

PEP M-4 Establishing Site Reference Criteria for Remediation of Contaminated Land

Steven Brown
Centennial, Colorado

This one hour course will present a brief overview of methods currently being used in the US (and similarly in Canada) to establish acceptable levels of residual radionuclide contamination (e.g., Bq/gram in soil) that will meet the regulatory authority's annual public dose limits and/or related radiological public risk based criteria. The course will describe and define the public exposure scenarios (living conditions and characteristics under which future exposure can occur) and the associated exposure pathways being applied to each of these major exposure scenarios. In general, these methods are being applied in circumstances in which the radiological quality / composition of the "source term" is known and therefore the important radionuclides that will ultimately dominate the dose from deposition onto / into the soil are predictable (prior to operations) or known (through site characterization post operations) with acceptable confidence. This allows the analyst to identify one or two specific radionuclides as the " reference nuclide(s)" based on reasonable assumptions as to its "dominance" for dose delivery within the relevant exposure scenarios and pathways being considered. A simplified list of the "steps" of this process would proceed as follows:

1. Define the relevant present and future public exposure "scenarios" for a specific locale at present, and in the future given considerations of land use, demographic considerations, human occupancy times, etc. (e.g., residential housing, farmers, ranchers, recreational use, etc)
2. Define the relevant exposure pathways for each of selected exposure scenarios (e.g., direct exposure via ground or cloud shine, ingestion of water and/ or foodstuffs, direct inhalation (e.g., radon at uranium contaminated sites), inhalation via soil resuspension, etc.)
3. Using appropriate transport and dose assessment models (acceptable to the regulator), perform fate - transport / pathway and dose modeling to establish the concentration in soil for the reference nuclide that will result in just reaching the regulators annual public exposure limit (the "reference" concentration and associated "reference" dose)
4. A "reverse" fate - transport / pathway and dose analysis is then performed for other important nuclides in the mixture to establish their "reference concentrations", i.e., the concentration of each nuclide that would result in achieving the same reference dose (e.g., regulatory limit) as the reference radionuclide.
5. Following operations to achieve unrestricted release of the site, and/or when it is required or desirable to release a portion of the impacted land area for unrestricted release, a "sum of fractions" rule is then applied for all the important radionuclides that have been defined from the source term mix to ensure that the regulatory public dose limit is not violated, regardless of the specific relative concentrations of each nuclide at any location (or any soil sample) based on the verification survey data set, e.g., radiological surveys and analytical results.

Several specific case studies will be presented to demonstrate "real life" applications including examples that have been accepted by the US DOE (for use in their Abandoned Uranium Mine program) and by the US NRC (for license termination and release for unrestricted use at former uranium sites) and methods being used by the US EPA at radiologically contaminated sites under their purview,

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PEP M-5 New Generation Models for Internal Dose Calculations

Michael Stabin
Vanderbilt University

Traditional mathematical model-based anatomical models have been replaced with more realistic standardized anatomical models based on patient image data. Other recent model changes that will affect standardized dose estimates for radiopharmaceuticals include replacement of the traditional ICRP 30 GI tract model with the ICRP human alimentary tract (HAT) model and use of updated tissue weighting factors for calculation of effective dose. Calculation of internal dose estimates from animal or human data sets requires knowledge of a number of important principles and relationships in kinetic analysis and dose assessment, and knowledgeable use of available software tools. 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), organ mass (based on volumes measured by ultrasound or Computed Tomography (CT)), and other variables. This program will give an overview of standard calculation techniques and models, and demonstrate how new models have introduced changes to standard calculations, with practical examples worked out in several important areas of application. A review of current clinical trials for therapeutic use of radiopharmaceuticals will be presented, along with discussion of current issues in radiation biology that are pertinent to the interpretation of calculated dose estimates.

Tuesday 12:15 pm – 2:15 pm

PEP T-1 The Case Against LNT

Alan Fellman
Dade Moeller and Associates

Radiation safety programs must establish compliance with radiation regulations which continue to be based on the linear no-threshold (LNT) hypothesis and the ALARA principle, despite overwhelming sound, peer-reviewed science that demonstrates the existence of a carcinogenic threshold and/or hormesis at low doses. LNT and ALARA insist that when we make changes that lower worker dose by as little as one µSv, we are making the workplace safer. Public health authorities and many radiation safety professionals have convinced most members of the public that when we evacuate 150,000 persons following Fukushima to keep them from receiving tens of mSv, we are improving public health despite the fact that this decision has resulted in more than 1,600 fatalities among evacuees. Yet despite compelling evidence revealing LNT to be fraudulent, the consistent response taken by regulatory agencies and scientific bodies whose recommendations are cited as the basis of regulatory actions is to deflect or rationalize away the science at best or simply pretend it doesn't exist at

worst so as to maintain allegiance to a worldview of radiation safety built on ALARA and LNT. A sample of relevant findings supporting this allegation will be presented.

PEP T-2 Radiological Operations Support Specialist Reference Toolkit

Brooke Buddemeier, Dan Blumenthal
LLNL, NNSA

Lawrence Livermore National Laboratory (LLNL) has developed a prototype ROSS Reference Toolkit in support of the ROSS. The ROSS Reference Toolkit provides summaries of recommendations from key references in easy to look up tables and clickable links to the references for response and planning for radiological events and exercises. The objective of the Toolkit is to provide a resource to help discern the appropriate guidance and recommendations for different categories of radiological response issues. Key issues have been broken out into several categories, including: Perimeters/Zones, Worker Safety, Shelter & Evacuation, Population Monitoring, and Recovery Resources.

There is a lack of scientific community consensus on several key response issues, decision points, and courses of action. The goal of the ROSS Reference toolkit is to catalog appropriate guidance for different types of events and discuss the pro et contra for various options that ROSS may need to consider. Scientific community review and feedback is being sought to help make this a robust tool for radiation safety professionals responding to a radiological or nuclear event.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-724924

PEP T-3 NDA Systems Used for the Qualification of TRU Waste to WIPP

Jeff Chapman
Oak Ridge National Laboratory

This session will present an overview of NonDestructive Assay (Assay) systems currently deployed across the U.S. for the measurement of transuranic waste. Additionally, and where applicable, measurement devices used in the "IAEA community" for the conduct of Material Control and Accountancy will be discussed. Methodology, Instrumentation, and application limitations will be discussed.

PEP T-4 Nanotechnology and Radiation Safety

Mark Hoover
National Institute for Occupational Safety and Health

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 nanoparticles in the workplace. Case studies of good practice as well as experience "when things have gone wrong" will be presented. Highlights from the new NCRP report on Radiation Safety Aspects of Nanotechnology will be presented. Nanotechnology and nanoengineered structural materials, metals, coatings, coolants, ceramics, sorbents, and sensors are increasingly being evaluated and applied in radiation-related activities. Anticipating, recognizing, evaluating, controlling, and confirming protection of worker safety, health, well-being, and productivity during these activities is essential.

PEP T-5 Nuclear Security Awareness for the Health Physicist

Craig Marianno
Texas A&M University

Health physicists can play a vital role in security at nuclear and radiological facilities. Their awareness of nuclear security and its implementation should go beyond source control and accounting. This PEP is meant to provide participants an overview of nuclear security fundamentals. The concept of nuclear security culture and its relation to safety culture will be provided. The topics of threat assessment and insider threat analysis/mitigation will also be presented. Security risk will be discussed in addition to how risk is evaluated at facilities. The class will conclude with a tabletop exercise that will help students understand security and safety integration.

Wednesday 12:15 pm – 2:15 pm

PEP W-1 Determination of Dose to the Lens of Eye of Fukushima Prefecture Wild Mice

Brian Perri
Colorado State University

The March 11, 2011 Fukushima nuclear accident in Japan resulted in widespread radioactive contamination within the 20-km evacuation zone. Mice living within the contaminated region receive radiation doses from both external

environmental contamination, as well as internally deposited contamination. Cataract formation in the eyes of mice is a possible deterministic effect of ionizing radiation. The development of a voxelized mouse model, produced from Computed Tomography (CT) data, will allow use of a Monte Carlo Nth Particle (MCNP) simulation. Simulations will include doses to the lens of the eyes from external sources (received while both above and below ground), as well as doses from internal contamination. Concentration of radionuclides in the soils in the area of where mice are captured will be evaluated and used in the Monte Carlo models to determine external dose. Average concentration of radionuclides in tissues of captured mice will also be determined and utilized in the Monte Carlo Models to determine internal dose. Additionally, veterinary ophthalmologists will be assessing the lenses of the mice captured in Fukushima Prefecture to determine if cataracts are present. Lens dose determination is a key part of ascertaining the dose to cataract formation in wild mice in Fukushima Prefecture.

PEP W-2 Decay Chain Calculations: A Primer

David Stuenkel
Trinity Engineering Associates

Many problems encountered in health physics require the calculation of the activities of radionuclides in a decay chain or cascade at a later time based on the initial activities and/or production rates of the radionuclides in that decay chain. This PEP session presents the system of differential equations describing the decay and ingrowth of radionuclides in a decay chain along with methods to solve it. It will include discussion of both analytical solutions (i.e., the Bateman equations) and numerical methods for practical problems that involve decay branching, physical or biological removal mechanisms, and external sources. This PEP includes a discussion of the stability of various single-step and multi-step numerical methods through an analogy with the movement of a mass attached to spring. Understanding the system of differential equations describing the decay and ingrowth of radionuclides and some of the methods to solve this system of equations will help the health physicist to select an appropriate solution method when confronted with such a problem.

PEP W-3 Science-based Response Planning Guidance for the First 100 Minutes of the Response to a Radiological Dispersal Device Detonation (Planning Guidance)

Stephen Musolino
Brookhaven National Laboratory

This Department of Homeland Security Science and Technology Directorate has developed planning guidance for the initial response to a radiological dispersal device detonation. The guidance that delineates Missions and Tactics that should be executed by first responders and local response agencies in the first 100 minutes of a response based on realistic estimates of the possible consequences. It includes recommendations for equipment requirements, including personal protective equipment (PPE), and public messaging. The first 100 minutes of a response to an RDD detonation are critical as this period sets the stage for how the overall response will be executed. First responders will be tasked with multiple activities, such as confirming a radiological release, conducting lifesaving rescue operations, issuing protective actions, and characterizing the scene. These activities must take place within the first few minutes of responders arriving on scene and the effectiveness and coordination of these early actions will define how well or how poorly the response will go in the emergency phase and beyond, as other state and federal assets and specialized teams arrive on scene to support the response. This document provides actionable guidance, sample text for an RDD response protocol, and annexed tools that can be used for local planning of an effective response to an RDD to protect first responders and the general public, and establish interagency coordination and integration of state and federal assets. In addition, the lecture will include a primer on the scientific experiments that underlie the guidance and realistic health and environmental consequences of an RDD.

PEP W-4 Optimizing Decision Thresholds for Low-Signal Detection at Varying Distances Amid Elevated Background

Joseph Fischer
Colorado State University

Current methods to detect low signal sources in areas with elevated background are insufficient for assessing real-time events. Background radiation fluctuates throughout the day, which thwarts the effectiveness of decision thresholds (y*) calculated from long background count times. The goal of this project is to optimize a y* such that a weak

signal can be discerned from background using real-time data. A sodium iodide scintillator will be utilized with the corresponding ProSpect acquisition software to assess gross counts. A series of measurements will be taken using short count times and assessed with the optimized y* to detect weak signals at varying distances

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PEP W-5 Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions

Richard Harvey
Roswell Park Cancer Institute, University of Buffalo

Low activity radioactive seeds are now being used for localization of non-palpable lesions in order to assist the surgeon with excision of cancerous tissue. This method is being used in breast wide excision with and without sentinel lymph node procedures. This course will focus on the initiation of a radioactive seed localization program and recent experiences.

Thursday 12:15 pm – 2:15 pm

PEP TH-1 Potential Radiation Effects from Diagnostic and Interventional Radiological Procedures

Cari Borrás
MHPS President

The radiobiological principles underlying radiation protection standards in the medical field, published by the International Commission on Radiological Protection (ICRP), the National Council on Radiation Protection and Measurements (NCRP) and the Biological Effects of Ionizing Radiation (BEIR) Committee, will be reviewed. The effects of ionizing radiation at the cellular level, in animal experiments and in epidemiological studies will be summarized. The possibility of stochastic effects and tissue reactions (previously known as deterministic effects), due to diagnostic and interventional radiological procedures will be assessed. Human data on radiation induced cancers and threshold doses of tissue reactions, such as cardiovascular diseases and cataract induction, for follow up times up to 20-40 years, will be explored. The dose response of normal tissues will be considered, including effects on children and the developing embryo and fetus. The latest risk estimates per unit dose will be presented and current guidelines on radiation protection optimization will be discussed.

PEP TH-2 International Guidance on Radiation Emergency Management

Ed Waller
University of Ontario

The year 2016 marked the 30th anniversary of the Chernobyl nuclear power plant accident and this year we mark the 30th anniversary of the radiological accident in Goiania, Brazil. Both accidents, with tragic loss of life and widespread social, psychological and economic effects, underscore the importance of being prepared to respond to a nuclear or radiological emergency. In our very recent memory, the accident at the Fukushima-Daiichi nuclear power plant solidifies our need to continually improve upon our response capabilities and communications strategies in the event of an accident or malicious act involving nuclear or radiological material. The IAEA has, over the years, provided guidance on emergency preparedness and response (EPR) for nuclear or radiological emergencies. IAEA Safety Standard GSR Part 7 defines the goals of emergency response, and other documents provide details related to implementation.

In this PEP, we discuss, in broad terms, the major components related to international guidance on radiation emergency management, based primarily on IAEA GSR Part 7 Preparedness and Response for a Nuclear or Radiological emergency. As such, this talk outlines a "roadmap" of international guidance and how to utilize it. It is proposed that the topics discussed form the basis of local training in emergency preparedness and response.

PEP TH-3 ASTM Standards that Influence or are Directly Applicable to Radiation Protection

Ed Walker

The American Society for Testing and Materials (ASTM) is a consensus standard organization producing standards ranging from test methods and material specifications to consumer product testing to guides for analyzing and safeguarding people and the environment. ASTM is organized into over 140 main committees that have generated and maintain 12000+ standards. Most individuals in the profession of radiation protection are familiar with and apply ANSI standards generated by N13, N42, and N43. Few individuals outside of analytical labs, however, are aware of ASTM standards that influence or directly impact radiation protection. There are at least six committees that have subcommittees that generate such standards. This presentation will describe the ASTM organization structure and the protocols that are used to generate and

maintain standards. The presentation will then describe the various subcommittees producing applicable standards and provide a brief summary of standards that support development and conduct of radiation protection and measurement programs.

PEP TH-4 Neutrons: Discovery, Detection Application and Health Physics

Jeff Chapman
Oak Ridge National Laboratory

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

PEP TH-5 Point Kernel Methods for Shielding Analysis

Nolan Hertel
GW Woodruff School of Mechanical Engineering

Point kernel methods have long been used in the solution of photon shielding problems. Initially they were the most sophisticated solution that could be accommodated by hand calculations and early computers. They continue to be a workhorse in shielding problems, particularly when solutions are needed in real time. The course will review the use of point kernel methods and buildup factors, address the challenges in using such line-of-sight computations, discuss the selection of buildup factors, and address the shortcomings of such methods. Solutions for several shielding problems computed by point kernel methods will be compared to results from more sophisticated codes such as MCNP.

CONTINUING EDUCATION LECTURES (CELs)

Monday 10 July through Thursday 13 July • 7:00 AM – 8:00 AM

Monday

CEL-1 How Expectations Fuel Decisions for Radiation Safety

Ray Johnson
Radiation Safety Counseling Institute

While most people may believe their decisions for radiation safety are well thought out, rational, and prudent. That may not be the case. For survival all of us are hard wired to be constantly alert to anticipate or expect dangers before they occur. Expectations rule our lives and our minds are wonderful expectation-prediction machines. Actually the past, present, and future are closely connected. Our minds function like a time machine. When presented with a stimulus or new information, we immediately search our stored knowledge and memories to evaluate the new information and make predictions about the future. We are especially sensitive to predictions that may indicate possible harm to ourselves or our families. For many (most) people the word "radiation" is automatically associated with danger. The media has done a good job of instilling the notion that "radiation" really means "deadly radiation." These are the words that may come up when anyone searches their stored memories and impressions to make a decision about radiation safety today. Since this search and retrieval is done at a subconscious level, people are not aware that their fears and corresponding decisions for radiation safety may not be relevant to today's circumstances. Fueling decisions for radiation safety are expectations or images of unacceptable consequences of exposure to radiation. Fears are always about imagination of dangers to be avoided. When asked about what would happen if exposed to radiation, one person said, "I will get red bumps all over my body." While this image has no connection to reality as HPs might understand radiation effects, the image of "red bumps" is a powerful expectation to be avoided at all costs. Most people's fearful expectations of the dangers of radiation are not helped by information on risk probabilities. While they may not understand probabilities, they do know they do not want to take a "chance" on cancer, no matter how small the chance may be as predicted by HPs. There are no rewards for most people (except possibly radiation workers or cancer patients) to take any risks for radiation. Negative expectations will rule when making decisions for radiation safety.

CEL-2 The Linear Non-Threshold Model and Its Implications for Radiological Security

Gus Potter
Sandia National Laboratories

The system of radiation protection controls, from international and national guidance through regulation, is based on the linear non-threshold model (LNT); that is, that any amount of radiation exposure will cause harm and the frequency of harm in a human population is directly proportional to the dose received by the population. The LNT has been under review and reconsideration recently to the point where it has been shown that the likelihood of harm may have been overstated at its origin. The Health Physics Society itself is on record opining that there is no evidence for radiological harm, whether stochastic or deterministic in nature, for doses of 10 rem or less.

The US Environmental Protection Association in its Protective Action Guides (PAG) has recommended evacuation of population likely to receive a 5-rem dose and relocation of those who might receive 2 rem in the first year following a radiological event. It has been shown that evacuations of large populations result in deaths through motor vehicle accidents, physical maladies, or otherwise, perhaps comparable to those expected by the LNT. While the 1993 guide was specifically designed for reactor accidents, the recent 2016 guide has expanded the PAGs to include radiological terrorism such as a radiation dispersal device or radiation exposure device.

This situation lowers the bar for the radiological terrorist. The adversary has no need for a device to cause any radiological harm, only to create an exclusion area to the 5 or 2-rem PAG. This results in evacuation or relocation of the affected population and associated response. While there is no increased risk from such exposure, there is now an increased risk from the evacuation itself. Re-evaluation of post-event actions requires strong consideration and balancing of risk between deterministic risk from radiation exposure and additional risk introduced by response actions.

Tuesday

CEL-3 Channeling Richard Feynman: How Lessons from the Great 20th Century Physicist Can Inform and Inspire Great Health Physics in the 21st Century

Mark Hoover
National Institute for Occupational Safety and Health

Whether working on the atomic bomb, exploring and explaining quantum physics, investigating the Challenger disaster, or declaring his prescient vision of a future for nanotechnology ("There's plenty of room at the bottom."), Richard P. Feynman (1918-1988) was an insightful and thoroughly grounded practitioner and thinker. This lecture will revisit some of the many experiences of this great 20th century physicist that can inform and inspire our pursuit of great health physics in the 21st century, especially our need to make decisions in the face of uncertainty. Individuals planning to attend the lecture are invited to read the entertaining and informative collection of Prof. Feynman's writings The Pleasure of Finding Things Out.

CEL-4 Radiation in Flight

Joseph Shonka
Shonka Research Associates

In 2014, measurements of a extreme solar flare that missed earth by 7 days, along with analysis that showed such an event had a 10% probability of occurrence per decade led the US and UK science and technology advisors to recommend a course of action should such an event occur. Unlike the US, carriers in the EU and UK are regulated, and the doses that would have been received exceeded allowable limits. There are no radiation dose limits for US aircrew and passengers. This CEL will summarize the conclusions of those meetings and address both routine and extreme events from radiation that occur in flight. The CEL will also address methods that are being considered to control that radiation routinely and during space weather events. Recent efforts by the ISO to develop standards for measurement of radiation in flight will also be summarized.

Wednesday

CEL-5 What Happened to an HPS Position on Air Crew Dose?

Nancy Kirner

In 2016, the HPS was asked by two of its members to adopt a position that would strengthen regulations concerning radiation doses that were being received by commercial air crew. This request was referred to the Scientific and Public Issues Committee for further consideration. This course briefly summarizes the sources of radiation encountered during commercial air travel, with reference to characterizations and recommendations of ICRP Publication #132. The current regulatory scheme in the United States concerning the radiological safety of aircrew as it pertains to the request for an HPS position is also discussed.

CEL-6 A First Time Hot Cell Window Replacement at the Idaho National Laboratories Hot Fuel Examination Facility

Patrick Bragg

In October 2016 the Hot Fuel Examination Facility (HFEF) located at the Materials and Fuels Complex (MFC) on the Idaho National Laboratory (INL) completed a first time replacement of a 1975 era hot cell window without incident. HFEF is a unique world class hot cell facility for Post Irradiation Examination (PIE) of nuclear fuels and materials. The window replacement involved multiple health and safety disciplines and required months of planning and a phased approach. The result of which was a like for like removal and replacement of a 14000 lbs window tank unit with zero detectable airborne radioactivity generation, contamination spread and minimal radiation exposure. This complex and mutli-disciplined task was accomplished by following the fundamental radiation protection principals of time, distance, shielding, and source minimization. The As Low As Reasonably Achievable (ALARA) philosophy in conjunction with the lesser referenced Keep It Simple (KIS) method led to another in a long line of firsts in the history of the INL. The success of this project will serve as the blueprint for additional window replacements to ensure the continued success of the INL's PIE program.

CEL-7 Proceedings of the Annual Core Research Reactor Characterization

Alexandra Robinson
Sandia National Laboratory

CEL-8 Safety Culture in Research: Anticipating Danger Where No One Has Gone Before

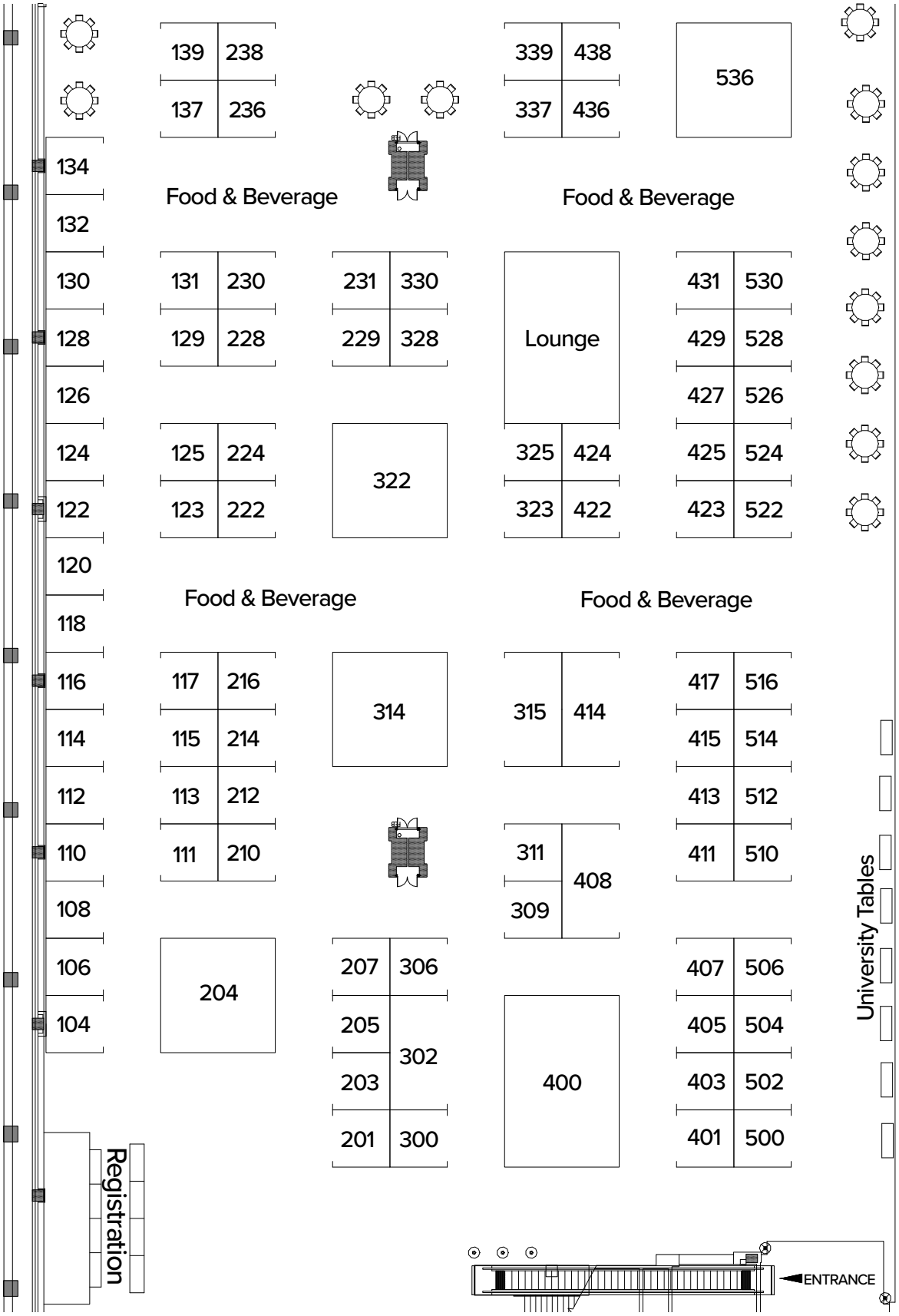
Alice Dale
University of Kansas

Implementing or improving Safety Culture can often seem like an uphill battle, and in a research setting even more so as discovery processes bring about increased pressures on the culture. This dynamic environment provides unique challenges when trying to balance constantly changing projects, facilities, researchers, radioisotope and use of other materials of risk.

The author will identify the spectrum of cultures, share the needed values for Safety Culture's foundation, discuss the ways that radiation safety staff must wear multiple hats when addressing and strengthening Safety Culture, and demonstrate how to get support from administration and researchers. Also included in this course are some examples of Safety Culture in action, ways to determine if you are on the right track, and strategies to encourage and lead a positive culture from the perspective of a researcher turned radiation safety professional.

The ability to champion safety culture into the next generation is directly related to how we are viewed as safety professionals, understanding the fundamentals of the particular material of risk, and the realization that campus culture mimics how safety and health professionals interact with regulators.

2017 EXHIBIT HALL FLOOR PLAN



EXHIBITOR LISTING

Ameriphysics, LLC ..... Booth: 222
Army Medical Recruiting ..... Booth: 408
Arrow-Tec ..... Booth: 522
Bayer ..... Booth: 510
Bertin Instruments ..... Booth: 224
Best Dosimetry Services ..... Booth: 422
Bionomics ..... Booth: 300
Bladewerx ..... Booth: 417
CAEN SYS srl ..... Booth: 203
Centronic LLC ..... Booth: 118
Chase Environmental Group, Inc. ..... Booth: 207
ChemStaff ..... Booth: 403
Dade Moeller ..... Booth: 314
Eckert & Ziegler ..... Booth: 315
Energy Solutions ..... Booth: 123
Envinet GmbH ..... Booth: 120
F&J Specialty Products ..... Booth: 325
FLIR Systems ..... Booth: 116
Fuji Electric Co., Ltd ..... Booth: 323
G/O Corporation ..... Booth: 424
Gamma Products, Inc. ..... Booth: 117
H3D, Inc. ..... Booth: 214
Health Physics Instruments ..... Booth: 212
Hi-Q Environmental Products Co. ..... Booth: 201
Hitachi Ltd ..... Booth: 411
Hopewell Designs, Inc. ..... Booth: 210
Illinois Institute of Technology ..... Booth: 230
J.L. Shepherd & Associates ..... Booth: 231
K & S Associates ..... Booth: 228
LabLogic Systems, Inc ..... Booth: 311
Landauer ..... Booth: 322
LND, Inc. ..... Booth: 309
Ludlum Measurements, Inc ..... Booth: 204
Mazur Instruments ..... Booth: 306
Mirion ..... Booth: 400
NATS Incorporated ..... Booth: 328
NSSI ..... Booth: 302
Ortec ..... Booth: 414
Qal-Tek ..... Booth: 407
Radiation Safety & Control Services Inc (RSCS) ..... Booth: 401
Radiation Solutions ..... Booth: 216
SafetyStratus ..... Booth: 415
SE International ..... Booth: 423
Spectrum Techniques ..... Booth: 108
Technical Associates ..... Booth: 500
Thermo Fisher Scientific ..... Booth: 111
Thomas Gray & Associates, Inc. ..... Booth: 425
Ultra Electronics ..... Booth: 104

Breaks
Monday PM, Wednesday AM

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

2017 EXHIBITORS

EXHIBIT HALL HOURS

Monday 10 July
Noon – 5:00pm

Tuesday 11 July
9:30am – 5:00pm

Wednesday 12 July
9:30am – Noon

Ameriphysics, LLC — Booth: 222

9111 Cross Park Drive, Suite D200
Knoxville, TN 37923
865-470-4176
www.ameriphysics.com

Ameriphysics, LLC is a full service radiological and waste solutions provider. Our personnel exhibit a wide range of expertise in radiation protection, waste management and health physics consulting. From simple laboratory surveys to complex cyclotron removals and MARSSIM-based decommissioning projects; Ameriphysics has the knowledge and experience to complete a variety of projects in an economical and timely manner. Ameriphysics is a SDVOSB.

Army Medical Recruiting — Booth: 408

185 9th Calvary Regiment ave, Bld. 206
Fort Knox, KY 40121
888-550-ARMY
www.goarmy.com

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Arrow-Tec — Booth: 522

417 Main Avenue West, PO Box 1420
Rolla, ND 58367
701-477-6461
www.dosimeter.com

Arrow-Tech, Inc. manufactures the Direct-Reading Dosimeter and offers a full-line of radiation detection equipment. Arrow-Tech maintains a world wide 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.

Bayer — Booth: 510

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Bayer is a global enterprise with core competencies in the Life Science fields of health care and agriculture. Its products and services are designed to benefit people and improve their quality of life. At the same time, the Group aims to create value through innovation, growth and high earning power.

Bertin Instruments — Booth: 224

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www.bertin-instruments.com

Based on Saphymo's strong expertise, 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: 422

865 Easthagan Drive
Nashville, TN 37217
866-492-8058
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.

Bionomics — Booth: 300

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

Bionomics continues to be the leading service provider to generators of low level and mixed waste across the country. With a commitment to supporting their clients and the use of only the top tier processing and disposal facilities, Bionomics remains the top broker. Bionomics has been the leading voice for small waste generators during the development of regulations and polices surrounding the new burial site in Texas. We are the first company other than WCS to be approved to ship into the Andrews facility and are currently accepting sources for disposal at this facility. In addition to waste disposal services we provide assistance in other related field including surveys and site closures.

Bladewerx — Booth: 417

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Rio Rancho, NM 87124
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CAEN SYS srl — Booth: 203

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390584388398
www.caensys.com

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

Centronic LLC — Booth: 118

16203 Park Row , Suite 110
Houston, TX 77084
281-578-7900
www.Centronic.us

Centronic LLC is the leading manufacturer and distributor of gas filled radiation detectors in North America. Centronic's product lines include numerous styles of Geiger Mueller tubes, X-ray proportional counters, He-3 and BF3 neutron proportional counters and Gamma Ion Chambers.

Chase Environmental Group, Inc. — Booth: 207

200 Sam Rayburn Parkway
Lenoir City, TN 37771
865-816-8015
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: 403

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

ChemStaff is an Engineering consulting company for the global power industry with core expertise in Power Plant Chemistry, Engineering, Environmental, and Health Physics Programs. ChemStaff's is comprised of 40+ full-time and contract employees with over 800 years of power plant experience. Expertise areas include Chemistry/Radiochemistry, Engineering, Thermal efficiency improvement, Laboratory and Environmental, and Source term reduction/dose control. As industry leaders, ChemStaff incorporates deep nuclear plant knowledge and process implementation skills into their chemistry program solutions.

Dade Moeller — Booth: 314

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

Dade Moeller, an NV5 Company, specializes in radiation protection, worker safety, industrial hygiene, environmental protection, and safety training. In addition to Certified Industrial Hygienists, Certified Safety Professionals, Professional Engineers, and others with certifications and licenses, we employ more CHPs than any other private entity. We joined NV5 in May 2016.

Eckert & Ziegler — Booth: 315

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

Eckert & Ziegler Analytics supplies high quality, NIST traceable radioactive calibration sources and solutions. We operate 4 ISO17025 accredited calibration laboratories, three in the USA and one in Germany. Radiochemical performance evaluation samples are provided quarterly for effluent and environmental monitoring programs.

Energy Solutions — Booth: 123

299 S. Main Street, Suite 1700
Salt Lake City, UT 84111
801-649-2000
www.energyolutions.com

EnergySolutions is an international nuclear services company headquartered in Salt Lake City, Utah with operations across the United States, Canada and Asia. EnergySolutions is a global leader in the safe recycling, processing and disposal of nuclear material. We provide integrated services and solutions to the nuclear industry, which includes the United States Government, Nuclear Utilities, the Gas and Oil industry, Research Facilities and laboratories. EnergySolutions offers a full range of services for the decommissioning and remediation of nuclear power plants and facilities, management of spent nuclear fuel, the transportation of nuclear material and the environmental cleanup of nuclear legacy sites. EnergySolutions operates processing facilities which volume reduce and package nuclear material for disposal. EnergySolutions also owns and operates the largest Class A waste and NORM Waste disposal facility in the United States.

Envinet GmbH — Booth: 120

Hans-Pinsel-Strasse 4
Haar, Bavaria 85540
Germany
4.98946E+12
www.envinet.com

For over 30 years, our customers have been relying on ENVINET's solutions in monitoring environmental parameters. With more than 4,500 online detectors, we are the leading manufacturer of networks for monitoring of environmental radiation. We provide:

- Nationwide Early Warning Systems
- Ring and Area Monitoring Systems
- Water Monitoring Systems
- Mobile Solutions

F&J Specialty Products — Booth: 325

404 Cypress Road
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 systems for the 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.

FLIR Systems — Booth: 116

27700 SW Parkway Avenue
Wilsonville, OR 97070
317-316-6827
www.flir.com

FLIR identiFINDER R-Series products help emergency responders detect, locate and identify radioactive materials. We offer a complete line of handheld systems ranging from small belt-worn spectroscopic pagers to large highly sensitive devices capable of rapidly locating and precisely identifying radioactive material. NEW in 2016: identiFINDER R200 super-pager capable of identification.

Fuji Electric Co., Ltd — Booth: 323

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome
Shinagawa-ku, Tokyo 141-0032
Japan
81-3-5435-7276
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 Corporation — Booth: 424

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 D.O.E., weapon sites, shipyards, various industrial and pharmaceutical accounts. Our distribution facility is located in Abita Springs, Louisiana. For over 28 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: 117

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.

H3D, Inc. — Booth: 214

3250 Plymouth Road
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 1.0% FWHM at 662 keV and omnidirectional isotope-specific images, all in a portable package. Polaris-H is used in nuclear power plants globally, and we have products for defense, security and medical applications.

Health Physics Instruments Booth: 212

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

Health Physics Instruments manufactures instruments and detectors that measure gamma, neutron, beta, and alpha radiation. The product line includes portable neutron survey meters and 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: 201

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

HI-Q Environmental Products Company is an ISO 9001:2008 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 capability to test ducts and vent stacks as required by ANSI N13.1-1999/2011.

Hitachi Ltd Booth: 411

2-16-1, Higashi-Ueno
Taito-ku, Toyko 110-0015
Japan
81-3-6284-3673
www.hitachi.com/businesses/healthcare

Hitachi, Ltd provides a wide variety of radiation measuring instruments in many fields. Our products play important roles in safety management and research with radiation. Having much experience of R&D for radiation measurement, we are pleased to introduce our products to customers in health physics all over the world.

Hopewell Designs, Inc. Booth: 210

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.

Illinois Institute of Technology Booth: 230

3424 S. State Street
Chicago, IL 60616
312-567-7013
www.science.iit.edu

Health Physics Master's Degree from Illinois Tech. SY Chen, PhD, CHP, program director. Expert faculty. Rigorous and relevant curriculum. Designed for working professionals. Input from premier advisory board. Doable online with one hands-on, weeklong course in instrumentation. Future radiochemistry track. Apply today! Visit iit.edu/health physics

J.L. Shepherd & Associates Booth: 231

1010 Arroyo Street
San Fernando, CA 91340
818-898-2361
www.jlshepherd.com

JLS&A's products include Cs-137 and C--60 sources, biological research, blood component, space effects, sterilization and process irradiators. Fammacell 220 Co-60 reloads and uploads. Gamma, beta and neutron instrument calibration and dosimeter irridtaion facilities. Irradiator/calibrator security upgrades, services, repair. relocation and decommissioning for current and extinct manufacturers. Hot cell windows and lead glass.

K & S Associates — Booth: 228

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

K&S Associates is a medical physics consulting organization offering accredited calibrations and TLD patient dose services. K&S is an accredited Laboratory by the AAPM offering radiation Therapy Calibrations, Brachytherapy Calibrations, and Diagnostic Equipment Calibrations. K&S is accredited by A2LA for the calibration of survey meters, kVp meters and light meters.

LabLogic Systems, Inc — Booth: 311

East Pointe Park, 1040 East Brandon Boulevard
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, radiochromatography instruments and software, microplate readers and a variety of radiation safety consumables.

Landauer — Booth: 322

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

The industry leader for more than 60 years, Landauer provides integrated radiation safety solutions, including dosimetry technology to measure radiation exposure; informatics to track and analyze radiation data; and health and medical physics consulting expertise. Landauer uniquely provides solutions to improve worker and patient safety, ensure compliance and lower costs.

LND, Inc. — Booth: 309

3230 Lawson Boulevard
Oceanside, NY 11572
516-678-6141
www.lndinc.com

Designers and manufacturers of nuclear radiation detectors. Products include GM tubes, x-ray proportional counters, He-3 and BF-3 proportional counters, ionization chambers, polymer window detectors, and custom detectors.

Ludlum Measurements, Inc — Booth: 204

501 Oak Street, PO Box 810
Sweetwater, TX 79556
325-235-5494
www.ludlums.com

Ludlum Measurements, Inc., designs, develops, and manufactures radiation detection and measurement instrumentation, offering unmatched service and support. After 55 years Ludlum has one of the largest lines of radiation detection devices available from a single company. Ludlum makes the world a safer and secure place for people.

Mazur Instruments — Booth: 306

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 — Booth: 400

830 Research Parkway
Meriden, CT 6450
203-639-2148
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.

NATS Incorporated — Booth: 328

511 Centerpoint Drive
Middletown, CT 06457
860-834-8012
www.nats-usa.com

NATS Incorporated is focused on providing advanced technological innovations in radiation detection and analysis systems. For over a decade NATS has introduced cutting edge tools in nuclear power, research, environmental measurements, homeland security, radiation monitoring systems, radiation dosimetry, nuclear educational systems and health physics. You can visit us at www.nats-usa.com or e-mail sales@nats-usa.com.

NSSI — Booth: 302

PO Box 34042
Houston, TX 77234
865-964-1152
www.nssihouston.com

NSSI has been licensed to possess, use, & process radioactive materials since 1971; obtaining its final Part B permit for hazardous, non-hazardous, & mixed waste in 1990. NSSI provides treatment options for hazardous, non-hazardous, and mixed waste. NSSI also offers Tritium Recycling as an alternative to ground disposal.

Ortec — Booth: 414

801 S. Illinois Avenue
Oak Ridge, TN 37831
865-483-2124
www.ortec-online.com

ORTEC has over fifty years of experience providing solutions for a wide variety of Nuclear Detection Applications. Our team of highly qualified scientists and engineers is dedicated to providing measurement system solutions for Homeland Security, Waste Management, Personal Monitoring, In-Situ measurements, and Radiochemistry Laboratory Applications. Visit our booth today and allow us to assist you with your Nuclear Detection needs.

Qal-Tek — Booth: 407

3998 Commerce Circle
Idaho Falls, ID 83401
208-523-5557
www.qaltek.com

"Qal-Tek is a Radiation Safety company offering a comprehensive array of solutions to assist those seeking to strengthen their radiation protection programs while ensuring regulatory compliance.

• Radiation Detection & Protection Products • Regulatory Compliance Licensing, Auditing, Procedure Writing, NOV Response • Radiation Safety Training• Instrument Calibration & Repair • Instrument Inventory Management"

Radiation Safety & Control Services Inc (RSCS) — Booth: 401

91 Portsmouth Avenue
Stratham, NH 3885
603-778-2871
www.radsafety.com

Established in 1989, RSCS, Inc. is a small business that offers expertise in all aspects of radiation safety and measurement applications. Our company specializes in operational and decommissioning services for nuclear power plants as well as for industrial, medical, and government radiological facilities. Our core services include health physics consulting, technical staffing, training, instrumentation (including sales, installation, calibration, and repair), emergency planning, and specialized radiological characterizations and measurements.

Radiation Solutions — Booth: 216

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.

SafetyStratus — Booth: 415

714 Valley Road
Brooktondale, NY 14817
607-280-6047
www.safetystratus.com

SafetyStratus is a cloud-based EHS software platform. Our Radioactive Management System manages the process of purchasing through disposal of radioactive materials across the campus for the purposes of tracking, safety and compliance. The key components are: Material Management, Permitting, Purchasing, Delivery, Waste Pickup, Shipment, Inventory, Assets, and Reporting.

SE International — Booth: 423

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, 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.

Spectrum Techniques — Booth: 108

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

Spectrum Techniques LLC is your primary source for exempt quantity radionuclides and radiation detection and measurements instrumentation. Applications include teaching and training in nuclear medicine, health physics, chemistry, biology and nuclear engineering. See our web site at Spectrumtechniques.com for MCAs, nuclear counters, ratemeters, and disk, rod, laminated and needle sources. For the best in nuclear counting, count on Spectrum Techniques!

Technical Associates — Booth: 500

7051 Eton Avenue
Canoga Park, CA 91303
818-883-7043
www.tech-associates.com

Thermo Fisher Scientific — Booth: 111

One Thermo Fisher Way
Oakwood Village, OH 44146
800-274-4212
www.thermofisher.com/us/en/home/industrial/radiation-detection-measurement.html

From routine monitoring and surveillance to emergency response situations, our advanced, integrated radiation detection instruments mitigate the threat and keep you safe. Thermo Fisher Scientific offers radiation detection solutions that provide comprehensive, real-time monitoring, early warning and complete information in the palm of your hand. Visit Booth 324 to learn more about our complete line of solutions, including the Thermo Scientific™ RadHalo™.

Thomas Gray & Associates, Inc. — Booth: 425

1205 West Barkley Avenue
Orange, CA 92868
714-997-8090
www.tgainc.com

Thomas Gray and Associates, Inc. is a licensed radioactive services company that offers a full suite of health physics consulting that includes facility decommissioning, on-site services, training, radioactive materials processing, disposal brokerage, nuclide identification, transportation, packaging, and decay-in-storage services. See www.tgainc.com for current copies of licenses, permits, and insurance certificates.

Ultra Electronics — Booth: 104

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

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

SCHEDULE AT-A-GLANCE

Saturday 8 July

All AAHP Courses take place at the Raleigh Convention Center

AAHP 1 Radioanalytical Chemistry for the Health Physicist
8:00 AM-5:00 PM 306A

AAHP 2 The Radiological Operations Support Specialist: Deeper Dives into the Latest Rad/Nuc Emergency Response Tools
8:00 AM-5:00 PM 306B

AAHP 3 Radioactive Air Sampling and Monitoring
8:00 AM-5:00 PM 306C

Sunday 9 July

All PEP Courses take place at the Raleigh Convention Center

PEP 1-A thru 1-H
8:00 AM-10:00 AM

PEP 2-A thru 2-H
10:30 AM-12:30 PM

PEP 3-A thru 3-G
2:00 PM-4:00 PM

Welcome Reception
6:00 PM-7:30 PM
Convention Center Plaza

Sunday PEP Locations

PEP A = Room 301 B
PEP B = Room 302 A
PEP C = Room 302 B
PEP D = Room 302 C
PEP E = Room 305 A
PEP F = Room 305 B
PEP G = Room 306 A
PEP H = Room 306 B

Monday-Thursday PEP Locations

1 - Room 204
2 - Room 205
3 - Room 206
4 - Room 302 A
5 - Room 303

KEY

MAM = Monday AM Session
MPM = Monday PM Session
TAM = Tuesday AM Session
TPM = Tuesday PM Session
WAM = Wed. AM Session
WPM = Wed. PM Session
THAM = Thurs. AM Session

Monday 10 July

CEL1 How MBTI Preferences Determine Our Risk Communication Habits
7:00 AM-8:00 AM 204

CEL2 The Linear Non-Threshold Model and Its Implications for Radiological Security
7:00 AM-8:00 AM 205

ABHP Exam – Part 1
8:00 AM-11:00 AM 304, Convention Center

MAM-A Plenary
8:30 AM-Noon Ballroom C

Complimentary Lunch in Exhibit Hall for all Registrants and Opening of Exhibits
12:15 PM-1:30 PM Exhibit Hall A

PEP Program 12:15 PM-2:15 PM

M-1 204
A Contemporary Approach to Managing Low-Level Radioactive and Mixed Waste at an Academic Institution

M-2 205
So Now You're the RSO: Elements of an Effective Radiation Safety Program

M-3 206
Medical Laser Safety Program – What Health Physicists Need to Know

M-4 302 A
Establishing Site Reference Criteria for Remediation of Contaminated Land

M-5 303
New Generation Models for Internal Dose Calculations

ABHP Exam – Part II
12:30 PM-6:30 PM 304, Convention Center

Poster Session
1:00 PM-3:00 PM Exhibit Hall A

MPM-A Environmental Monitoring
3:00 PM-5:00 PM 305 AB

MPM-B1 Waste Management
3:00 PM-4:15 PM 302 BC

MPM-B2 Academic
4:15 PM-5:30 PM 302 BC

MPM-C Special Session: Low Dose Occupational Epidemiology: The Importance of Domismetry and Statistics in the Million Worker Study and the Mallinckrodt Chemical Works (MCWL) Cohort
3:00 PM-5:30 PM 306 AB

MPM-D Military Health Physics
3:00 PM-4:30 PM 301 AB

Student/Mentor Reception
5:30 PM-6:30 PM 306C

Tuesday 11 July

CEL3 Channeling Richard Feynman: How Lessons from the Great 20th Century Physicist Can Inform and Inspire Great Health Physicists in the 21st Century
7:00 AM-8:00 AM 204

CEL4 Radiation in Flight
7:00 AM-8:00 AM 205

TAM-A Special Session: Medical Health Physics
8:00 AM-12:15 PM 305 AB

TAM-B Section Session: Contemporary Topics in Radon
9:00 AM-Noon 302 BC

TAM-C AAHP Special Session: What Every Certified Health Physicist Should Know About ..., Part 1
8:00 AM-Noon 306 AB

TAM-D1 Homeland Security Monitoring
8:30 AM-9:15 AM 301 AB

TAM-D2 Accelerator Section Special Session: Accelerator Health Physics
9:45 AM-11:45 AM 301 AB

TAM-E Homeland Security Special Session: Nuclear Terrorism-Real or Crying Wolf
8:00 AM-12:15 PM 303

AAHP Awards Luncheon
Noon-2:00 PM Ballroom A

Complimentary Lunch Exhibit Hall

PEP Program 12:15 PM-2:15 PM

T-1 204
The Case Against LNT

T-2 205
Radiological Operation Support Specialist Refernce Toolkit

T-3 206
NDA Systems Used for the Qualification of TRU Waste to WIPP

T-4 302 A
Nanotechnology and Radiation Safety

T-5 303
Nuclear Security

TPM-A Rad Air NESHAPs
2:30 PM-4:30 PM 305 AB

TPM-B Special Session: NORM/TENORM
2:30 PM-4:40 PM 302 BC

TPM-C AAHP Special Session: What Every Certified Health Physicist Should Know About ..., Part 2
2:00 PM-6:15 PM 306 AB

TPM-D Medical Health Physics
2:15 PM-5:00 PM 301 AB

TPM-E Academic Education Committee
Noon-2:00 PM 306 C

AAHP Open Meeting
5:00 PM 306AB

HPS Awards Banquet
7:00 PM-10:00 PM Ballroom B

SCHEDULE AT-A-GLANCE

Wednesday 12 July

CEL5 Air Crew Dose Controls
7:00 AM-8:00 AM 204

CEL6 A First Time Hot Cell Window Replacement at the Idaho National Laboratories Hot Fuel Examination Facility
7:00 AM-8:00 AM 205

WAM-A External Dosimetry
8:15 AM-Noon 305 AB

WAM-B Special Session: NCRP/ Nanotechnology
8:00 AM-12:15 PM 302 BC

WAM-C Special Session: REAC/TS
8:30 AM-11:30 AM 306 BC

WAM-D Medical Health Physics
8:00 AM-Noon 301 AB

WAM-E Special Session: Power Reactor Panel
8:30 AM-10:30 AM 303

PEP Program 12:15 PM-2:15 PM

W-1 204
Determination of Dose to the Lens of Eye of Fukushima Prefecture Wild Mice

W-2 205
Decay Chain Calculations: A Primer

W-3 203
Science-based Response Planning Guidance for the First 100 Minutes of the Response to a Radiological Dispersal Device Detonation (Planning Guidance)

W-4 302 A
Optimizing Decision Thresholds for Low-Signal Detection at Varying Distances Amid Elevated Background

W-5 303
Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesiona

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WPM-A1 Special Session: Aerosol Measurements
2:30 PM-4:30 PM 305 AB

WPM-A2 Air Monitoring
4:30 PM-5:15 PM 305 AB

WPM-C Internal Dosimetry
2:30 PM-5:00 PM 306 AB

WPM-D DOE/Decontamination and Decommissioning
2:30 PM-4:30 PM 301 AB

HPS Business Meeting
5:30 PM-6:30 PM 305 B

Thursday 13 July

CEL7 Proceedings of the Annual Core Research Reactor Characterization
7:00 AM-8:00 AM 204

CEL8 Safety Culture in Research: Anticipating Danger Where No One Has Gone Before
7:00 AM-8:00 AM 205

THAM-A Emergency Response
8:15 AM-11:45 AM 305 AB

THAM-B Instrumentation
8:30 AM-11:30 AM 302 BC

THAM-C Risk Assessment
8:30 AM-11:30 AM 306 AB

PEP Program 12:15 PM-2:15 PM

TH-1 204
Potential Radiation Effects from Diagnostic and Interventional Radiological Procedures

TH-1 205
International Guidance on Radiation Emergency Management

TH-3 206
ASTM Standards that Influence or are Directly Apllicable to Radiation Protection

TH-4 302 A
Neutrons: Discovery, Detection Application and Health Physics

TH-5 303
Point Kernel Methods for Shielding Analysis

Registration Hours

Registration at the Raleigh Convention Center

Saturday	2:00 PM - 5:00 PM
Sunday	7:30 AM - 5:00 PM
Monday	8:00 AM - 4:00 PM
Tuesday	8:00 AM - 4:00 PM
Wednesday	8:00 AM - 4:00 PM
Thursday	8:00 AM - 11:00 AM

Exhibit Hall Hours

Exhibit Hall A

Monday	Noon - 5:00 PM
Tuesday	9:30 AM - 5:00 PM
Wednesday	9:30 AM - Noon

BUSINESS MEETINGS

MONDAY

4:30 PM 301 AB
Military Section Business Meeting

5:30 PM 303
Instrumentation Section Business Meeting

TUESDAY

11:00 AM 302 BC
Environmental Radon Section Business Meeting

11:30 AM 305 AB
Medical Section Business Meeting

12:30 PM 306 C
Academic Education Committee

5:00 PM 303
Homeland Security Business Meeting

5:15 PM 306 AB
AAHP Business Meeting

WEDNESDAY

10:30 AM 303
Power Reactor 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.

Notes

HPS Secretariat
1313 Dolley Madison Blvd.
Suite 402
McLean, VA 22101
(703) 790-1745; FAX: (703) 790-2672
Email: hps@burkinc.com; Website: www.hps.org

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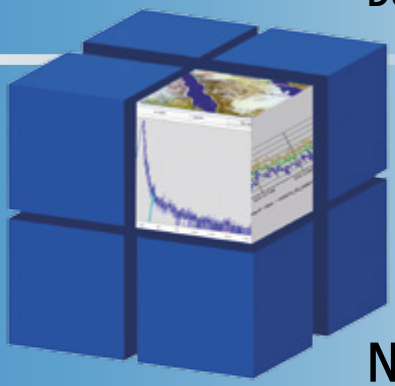

NMC
Monitoring Center

For 30 years, our customers have been relying on ENVINET's solutions in monitoring environmental parameters. With over 4,500 online detectors in operation, we are the leading manufacturer of networks for the monitoring of environmental radiation. ENVINET's products and solutions reflect the experience and innovative capacity of our team. We guarantee top quality and both extremely reliable and functional solutions.

We create turnkey integrated solutions for radiation monitoring, especially:

- Nationwide early warning systems
- Ring monitoring systems around nuclear plants
- Area monitoring systems within nuclear facilities
- Water monitoring systems for use in either sweet or salt water
- Mobile solutions for the detection and location of radioactive contamination

We offer a full range of products from detector to central control and analysis software, thereby guaranteeing optimally configured functionality.

Let us convince you of ENVINET and its products "Made in Germany".

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