HEALTH PHYSICS SOCIETY

FINAL PROGRAM

62nd Annual Meeting

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

AAHP NRRPT ABHP

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62nd Annual Meeting

HEALTH PHYSICS SOCIETY

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

Registration Hours and Location

Raleigh Convention Center, Exhibit Hall A

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

Monday, 10 July
7:30 am - 5:00 pm

Tuesday, 11 July
7:30 am - 4:00 pm

Wednesday, 12 July
7:30 am - 4:00 pm

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

Future Midyear Meeting

51st Midyear Meeting
4-7 February 2018, Denver, CO

Future Annual Meetings

63rd Annual Meeting
15-19 July 2018, Cleveland, OH

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

Look online for future meeting details
hps.org/meetings

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Officers

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Secretary - Eric Goldin
Secretary Elect - Karen Langley
Treasurer - Micheal Lewandowski
President Elect - Eric Abelquist
Executive Director - Brett Burk

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Raleigh Marriott City Center

500 Fayetteville St., Raleigh, NC 27601; Direct Phone 919-833-1120

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

The Sheraton is directly across the street from the Convention Center.

Speaker Ready Room

Raleigh Convention Center, Room 202

Sunday, 2:00-5:00 pm

Monday-Wednesday, 7:30 am-5:00 pm

Thursday, 7:30 am-12:30 pm

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

See page 9 for more information.

Note For CHPs

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

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

Student Events

Student Orientation
Saturday, 5:45-6:45 PM
Room 306A, Convention Center

Quiz Bowl
Sunday, 4:00-5:00 PM
Room 306C, Convention Center

Student/Mentor Reception
Sunday, 6:30-7:30 PM
Room 402, Convention Center

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

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

Awards Dinner
Tuesday, 7:00-9:00 PM
Ballroom B, Convention Center

Sunday-Thursday

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

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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, 4:00-5:00 pm, at the Raleigh Convention Center in Room 306C.

Welcome Reception

Sponsored by PerkinElmer

The Welcome Reception this year will be held on Monday, 10 July from 5:30-7:00 pm in Exhibit Hall A. Join fellow attendees for a time to socialize and renew old acquaintances. A cash bar will be available with appetizers.

Exhibits

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

Breaks Tuesday Morning-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

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.

Reception for Women and Minorities in Radiation Protection

New at this year's annual Health Physics Society meeting is a reception focused on women and minorities. Come celebrate your accomplishments over the past year Wednesday afternoon from 1:15-2:15 pm in room 201 at the convetion center. Hosted by Nicole Martinez (Clemson University, nmarti3@clemson.edu) and Elizabeth Gillenwalters (Siemens Molecular Imaging, elizabeth.gillenwalters@siemens.com) this reception is part of an informal grassroots effort aimed at supporting and promoting women and minorities in radiation protection. Anyone and everyone is welcome to attend! If you have any questions please feel free to contact the hosts above.

HPS Business Meeting

Raleigh Convention Center, 301 AB
Wednesday, 12 July, 5:30-6:30 pm

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 53 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.

All posters up
Monday–Wednesday in Exhibit Hall

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

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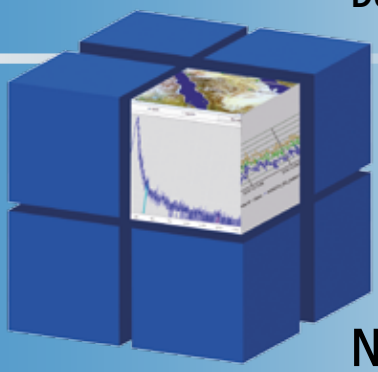

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HPS AWARDS DINNER

Tuesday Evening Awards Reception & Banquet

Join your peers in honoring the following awardees while enjoying a delicious meal. Brief award presentations will immediately follow the dinner. All attendees are strongly encouraged to stay and show support for the award recipients.

This event will take place in Ballroom B at the Raleigh Convention Center on Tuesday, 11 July from 7:00pm – 9:00pm.

The following awards are to be presented:

Founders Awards
George E. Chabot

Elda E. Anderson
Jason Davis

Distinguished Public Service Award
Michael T. Ryan

Distinguished Scientific Achievement Award
John D. Zimbrick

Honor Roll Award
David P. Alberth
Kenneth Eger
Jeffrey A. Leavey

Fellows
Bruce A. Busby
Kelly L. Classic
Lawrence T. Dauer
Jacob Kamen
Kyle Kleinhans
Kenneth Krieger
Edward Lazo
William J. Morris
Joseph J. Shonka

Banquet Menu

SEARED BREAST OF CHICKEN WITH PESTO CRUSTED SALMON

GOURMET GREENS SALAD
goat cheese mousse, dried figs, toasted almonds, cider vinaigrette

HERBED ORZO & SEASONAL VEGETABLES

DECADENT CHOCOLATE TRIO
opera cake, chocolate creme brulee, sacher cake

breads, coffee, tea and decaf, iced tea

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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 thrilled to welcome you to the City of Raleigh, North Carolina, for the 62nd HPS Annual Meeting.

Session Location

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

Local Arrangements Committee Room

Raleigh Convention Center, Sunday-Thursday Room 203

PEP/CEL Ready Room

The PEP/CEL Ready Room will combined with the Speaker Ready Room in Meeting Room 202 in the Raleigh Convention Center from Sunday-Thursday

Speaker Information

Technical Sessions Speaker Instructions

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

The Ready Room (Meeting Room 202) will be open Sunday from 2:00-5:00 PM, Monday through Wednesday from 7:30 AM-5:00 PM, and Thursday 7:30 AM-12:30 PM. You must check in at the Ready Room (even if you have already submitted your presentation) no later than the following times:

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

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

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

SAVE THE DATE

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

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

The Health Physics Society Presents

HPS OPEN "MIKE" NIGHT

62st ANNUAL MEETING OF HPS

07 . 10 . 2017 @ 8:30PM

The Pour House Music Hall @ 224 S Blount St, Raleigh, NC 27601

Sign up to play and sing with the band, Bigfoot Groove, or just sit back with a drink and enjoy the amazing musical talent your friends in the industry have to offer. There will be bar food and a cash/credit bar available to make getting up in front of a room full of Health Physicists far less terrifying.

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TOURS & EVENTS

Monday, 10 July

Historic Raleigh City Walking Tour

9:30 am–11:00 am Onsite: $31

Registration can be made thru the HPS meeting page.

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 Tour

7:30 pm–9:00 pm Adult (15 and over): $16.01
Child (8 - 14 years old): $10.66
FAM Pack (2 Adult & 2 Children): $53.35

Uncover North Carolina's ghostly and paranormal past – a history riddled with tales of century-old spirits and folklore passed down over generations. Do you believe in ghosts and creature of the night? Whether your answer is yes or no, almost everyone enjoys a ghost story or an inexplicable tale of the unusual. On this 1½ hour family-friendly walking tour, you will see the site of the Capitol phantoms, hear stories of the peg-legged ghost, sneak a peak of the Yarborough House ghosts, visit the Raleigh City Cemetery and end the tour at Moore Square, one of Raleigh's two remaining green spaces/parks established in 1792. This walking tour is great for families looking to experience the spookier side of downtown Raleigh! Please note gratuity is not included in the ticket price. While not mandatory, our guides appreciate gratuities or tips where earned. Meeting Location Fayetteville Street, Downtown. (Exact meeting location details will be provided immediately upon purchase of tickets.)

Tuesday, 11 July

HPS Raleigh 5K Run

7:00 am Onsite: $30

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 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 en 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 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. Register for this event with your meeting registration.

Wednesday, 12 July

Historic Raleigh City Walking Tour

9:30 am–11:00 am Onsite: $31

Registration can be made thru the HPS meeting page.

See Monday's description.

Wednesday, 12 July *(continued)*

Night Out

6:00 pm 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.

Note: Event takes place on the 2nd Floor and there is no elevator access (stairs only).

Raleigh 2017 HPS Pub Crawl

6:30 pm Onsite: $25

Commemorative shirt included!

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 St.
- Trophy Tap and Table, 225 S. Wilmington St.
- Tir Na Nog, 108 E Hargett St.

Raleigh Haunted Footsteps Ghost Tour

7:30 pm–9:00 pm Adult (15 and over): $16.01
Child (8 - 14 years old): $10.66
FAM Pack (2 Adult & 2 Children): $53.35

See Monday's description.

Thursday, 13 July

Raleigh NCSU Tour

10:00 am–2:00 pm Onsite: $20

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 nanocharacterization 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.

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 lunches on Monday and Tuesday and breaks in the Exhibition Hall. There will not be a separate Hospitality Room, however the Local Arrangements Committee staff in Convention Center Room 203 will be happy to answer your questions or assist in finding the answer.

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 11-12 for the HPS sponsored events.

Monday, 10 July

Welcome Reception

5:30-7:00 pm, Exhibit Hall A, Raleigh Convention Center
Come see old friends and make new ones! Enjoy hors d'oeuvres with a cash bar, 5:30-7:00 pm.

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COMMITTEE MEETINGS

Meetings take place at the Raleigh Convention Center (CC) or the Raleigh Marriott (M)

Friday, 7 July 2017

ABHP Board Meeting
8:30 AM – 5:00 PM — University BC (M)

Saturday, 8 July 2017

ABHP Part II Panel
8:00 AM – 5:00 PM — 402 (CC)

ABHP Board Meeting
8:30 AM – 12:00 PM — 307 (CC)

Finance Committee
8:30 AM – 12:00 PM — 203 (CC)

NRRPT
8:30 AM – 4:30 PM — 201 (CC)

Web Ops
9:00 AM – 12:00 PM — 204 (CC)

HP Journal Editorial Board
3:00 PM – 5:00 PM — 203 (CC)

Sunday, 9 July 2017

ABMP Written Exam
8:00 AM – 1:00 PM — 204 (CC)

ABHP Part II Panel
8:00 AM – 5:00 PM — 402 (CC)

NRRPT
8:30 AM – 4:30 PM — 201 (CC)

AAHP Executive Committee
8:30 AM – 5:00 PM — 205 (CC)

HPS Board of Directors
9:00 AM – 5:00 PM — State AB (M)

Program Committee Meeting
12:00 PM – 1:00 PM — 202 (CC)

Accelerator Section Awards Meeting
4:30 PM – 6:30 PM — 302A (CC)

Student/Mentor Reception
6:30 PM – 7:30 PM — 402 (CC)

Monday, 10 July 2017

Elda Anderson Breakfast
6:45 AM – 8:00 AM — 307 (CC)

ICC Welcome Breakfast for Int'l Attendees
7:30 AM – 8:00 AM — 306C (CC)

NRRPT
8:30 AM – 4:30 PM — 201 (CC)

AAHP Nominating Committee
12:30 PM – 2:00 PM — Business Office (CC)

Medical Section Board Meeting
12:30 PM – 2:00 PM — 306C (CC)

S&PIC Committee
1:00 PM – 2:30 PM — 307 (CC)

Membership Committee
1:00 PM – 3:00 PM — 204 (CC)

Nominating Committee
1:00 PM – 3:00 PM — 402 (CC)

Chapter Council Meeting
1:30 PM – 2:30 PM — 306AB (CC)

Section Council Meeting
2:30 PM – 3:30 PM — 206 (CC)

Academic Education Committee
2:30 PM – 4:30 PM — 306C (CC)

ANSI N13.8
2:30 PM – 5:00 PM — 307 (CC)

Ask the Experts Meeting
3:00 PM – 4:30 PM — 402 (CC)

Professional Development Committee
4:00 PM – 5:00 PM — 204 (CC)

Tuesday, 11 July 2017

Exhibitor Breakfast
8:00 AM – 9:00 AM — 402 (CC)

AEC/Student Branch Society Support Committee
8:00 AM – 10:00 AM — 306C (CC)

ANSI 42.17AC
8:00 AM – 11:00 AM — 304 (CC)

NRRPT
8:30 AM – 4:30 PM — 201 (CC)

ANSI N13.38 Working Group
9:00 AM – 11:00 AM — 204 (CC)

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

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ANSI N13.11 Working Group
9:00 AM – 12:00 PM 307 (CC)

President's Meeting with Committee Chairs
9:00 AM – 5:00 PM Business Office (CC)

International Collaboration Committee
12:00 PM – 2:00 PM 402 (CC)

ANSI N13.65
1:00 PM – 3:00 PM 307 (CC)

HPS Governance – Proposed By-Laws Changes
2:15 PM – 3:15 PM 306C (CC)

ANSI N13.32
2:15 PM – 4:15 PM 402 (CC)

ANSI N42.33
3:00 PM – 5:00 PM 307 (CC)

Purdue Alumni Reception
6:00 PM – 7:00 PM 304 (CC)

CSU Alumni Reception
6:00 PM – 7:00 PM 402 (CC)

Instrumentation Committee
7:00 PM – 9:00 PM 201 (CC)

Wednesday, 12 July 2017

AAHP Title Protection/Professional Recognition Committee
8:00 AM – 9:00 AM 204 (CC)

Continuing Education Committee
12:00 PM – 1:00 PM 201 (CC)

AEC/Program Directors Meeting
12:00 PM – 2:00 PM 306C (CC)

Science Support Committee
12:00 PM – 2:00 PM 402 (CC)

Standards Committee
12:30 PM – 2:30 PM 204 (CC)

President Mtg with Section Presidents
1:00 PM – 5:00 PM 307 (CC)

Women and Minorities in RP *(all are welcome)*
1:15 PM – 2:15 PM 201 (CC)

Government Relations Committee
3:00 PM – 4:30 PM 402 (CC)

Student Support Committee
3:00 PM – 5:00 PM 204 (CC)

Thursday, 13 July 2017

Local Arrangements Committee Meeting
7:30 AM – 9:30 AM 202 (CC)

HPS Finance & Executive Committees
8:00 AM – 10:00 AM 201 (CC)

ANSI N13 Revision Writing Group
9:00 AM – 4:00 PM Chancellor (M)

HPS Board of Directors
11:45 AM – 2:15 PM 201 (CC)

NCRP PAC-2
12:00 PM – 5:00 PM 204 (CC)

Program Committee Meeting
12:30 PM – 2:00 PM 402 (CC)

Friday, 14 July 2017

ANSI N13 Revision Writing Group
9:00 AM – 4:00 PM Chancellor (M)

Business Meetings

MONDAY

Military Section Business Meeting
4:30 PM 301 AB

Decommissioning Section Business Meeting
5:00 PM 305 AB

Instrumentation Section Business Meeting
5:30 PM 303

TUESDAY

Environmental/Radon Section Business Meeting
11:00 AM 302 BC

Medical Section Business Meeting
11:30 AM 305 AB

Accelerator Section Business Meeting
11:15 AM 301 AB

Homeland Security Section Business Meeting
11:45 AM 303

Nonionizing Radiation Section Business Meeting
1:00 PM 305 AB

AIRRS Section Business Meeting
4:30 PM 301 AB

AAHP Business Meeting
4:30 PM 306 AB

WEDNESDAY

Power Reactor Section Business Meeting
10:30 AM 303

Nanotechnology Section Business Meeting
12:15 PM 302 BC

HPS Business Meeting
5:30 PM 301 AB

LECTURESHIP TRUST FUNDS

Landauer Memorial Lectureship

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

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

Dade W. Moeller Lectureship

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

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

Dr. Moeller (1927-2011) was very active in the Society, serving as New England Chapter President in 1966 and national President in 1971-1972. He served on and chaired many committees for the NRC, EPA, NCRP, ICRP, NAS, and AAEES. He was a consultant to the WHO for 15 years, and following 16 years on the NRC's Congressionally-appointed Advisory Committee on Reactor Safeguards became in 1988 the founding Chairman of the agency's Advisory Committee on Nuclear Waste, on which he served for 5 years.

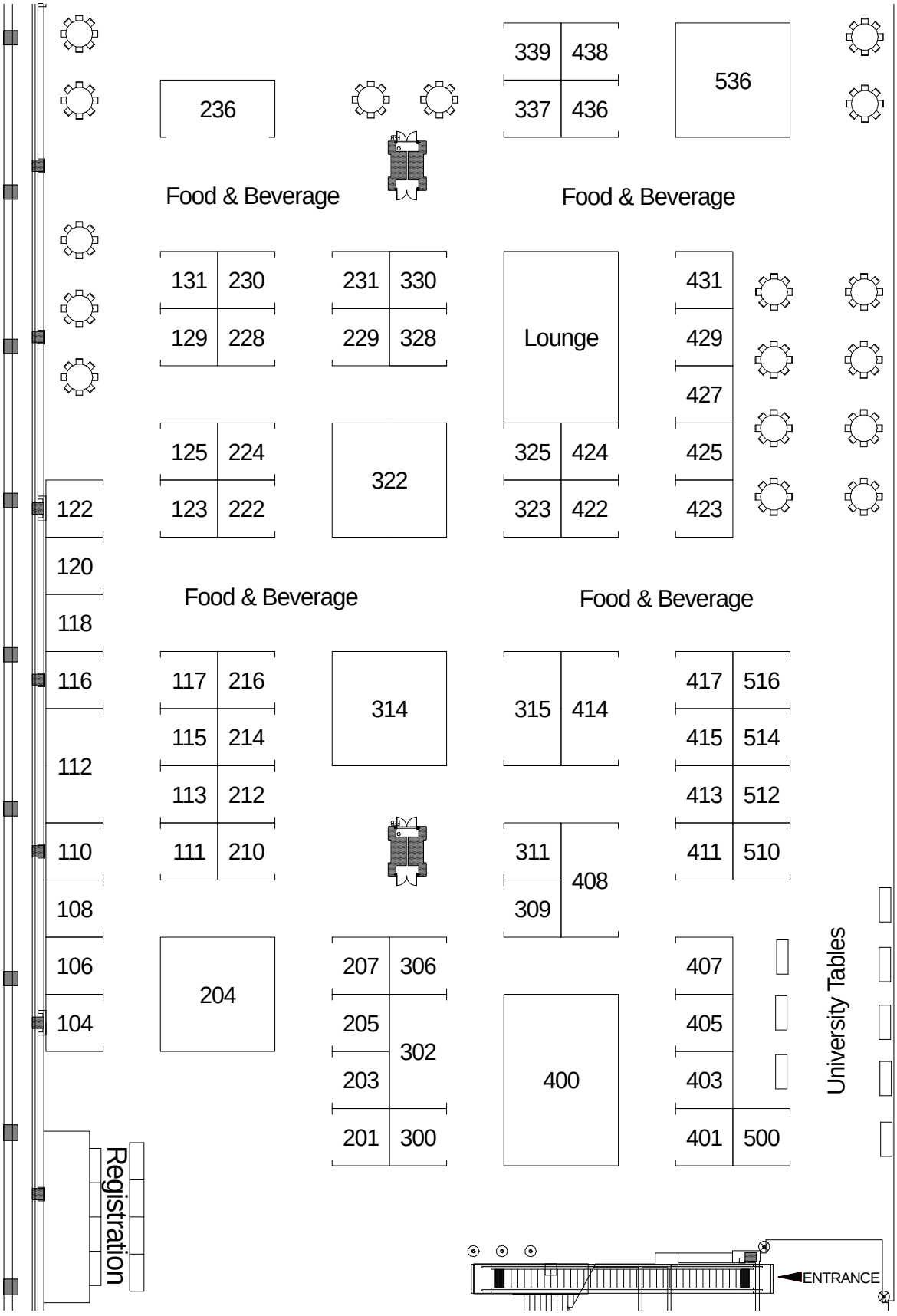
Dr. Moeller is remembered for his practicality, humility, thoughtfulness, gentle nature, generosity, and humor. Despite his multitude of awards and accomplishments including induction in the National Academy of Engineering, he remained genuinely humble, always able to explain complex technical issues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

G. William Morgan Lectureship

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

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

2017 EXHIBIT HALL FLOOR PLAN



EXHIBITOR LISTING

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2018 Midyear Meeting-Denver, Colorado ..... Booth: 514
AAHP/ABHP ..... Booth: 125
Ameriphysics, LLC ..... Booth: 222
Army Medical Recruiting ..... Booth: 408
Arrow-Tec ..... Booth: 516
Bayer ..... Booth: 510
Berkeley Nucleonics Corporation ..... Booth: 330
Bertin Instruments ..... Booth: 224
Best Dosimetry Services ..... Booth: 422
BIC Technology Ltd ..... Booth: 436
Bionomics ..... Booth: 300
Bladewerx ..... Booth: 417
CAEN SYS srl ..... Booth: 203
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ChemStaff ..... Booth: 403
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Conference of Radiation Control Program Directors, Inc. ..... Booth: 113
Eagle Integrated Services ..... Booth: 405
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Ultra Electronics ..... Booth: 104
US Nuclear Corp - Technical Associates ..... Booth: 500
Versant Medical Physics and Radiation Safety ..... Booth: 236

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

Lunches
Monday – Tuesday, 12:00pm
All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.

Welcome Reception
Sponsored by PerkinElmer
Monday, 5:30-7:00pm
Join fellow attendees in Exhibit Hall A for a time to socialize and renew old acquaintances.

2017 EXHIBITORS

EXHIBIT HALL HOURS

Monday, 10 July	Tuesday, 11 July	Wednesday, 12 July
Noon – 7:00pm	9:30am – 5:00pm	9:30am – Noon

2018 Annual Meeting Cleveland, Ohio — Booth: 512

www.hps.org/meetings

2018 Midyear Meeting Denver, Colorado — Booth: 514

www.hps.org/meetings

AAHP/ABHP — Booth: 125

www.hps1.org/aahp

Ameriphysics, LLC — Booth: 222

9111 Cross Park Drive, Suite D200
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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

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Arrow-Tec — Booth: 516

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701-477-6461
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862-404-3000
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San Rafael, CA 94901
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www.berkeleynucleonics.com

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301-339-8103
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866-492-8058
www.bestdosimetry.com/

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BIC Technology Ltd — Booth: 436

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44(0)151 321 2073
www.bictechnology.co.uk

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Bionomics — Booth: 300

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505-892-5144
www.bladewerx.com

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

CAEN SYS srl — Booth: 203

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Italy
39-0584-388398
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.

Chase Environmental Group, Inc. — Booth: 207

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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 a consulting company for the global power industry with core expertise in 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, Radiation Protection, Laboratory and Environmental, and Source term reduction/dose control.

CHP Consultants — Booth: 229

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www.chpconsultants.com

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Conference of Radiation Control Program Directors, Inc. — Booth: 113

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Frankfort, KY 40601
502-227-4543
www.crcpd.org

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

Eagle Integrated Services — Booth: 405

17400 Lafayette Drive
Olney, MD 20832
808-351-5078
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Eagle Integrated Services specializes in the installation of sustainable security systems at radiological sites. EIS has extensive experience in project management, network/IT services, and Sentry/TISH programming and installation. EIS is currently the prime security contractor in support of the DOE ORS program at many radiological facilities nationwide.

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Japan
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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 decon supplies.

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Silver Sponsor

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

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805-964-3615
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Health Physics Instruments manufactures and calibrates instruments and detectors that measure gamma, neutron, beta, and alpha radiation. The product line includes portable neutron survey meters, Geiger-counters, sophisticated fixed monitors, rem meters, dosimeters, multichannel analyzers and custom solutions. HPI has been serving the Health Physics community for over 40 years.

Hi-Q Environmental Products Co.

Booth: 201

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858-549-2820
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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.

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Booth: 228

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

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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.

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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.

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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.

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www.nats-usa.com

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702-236-8528
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NRRPT — Booth: 115

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www.nrrpt.org

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

NSSI — Booth: 302

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713-641-0391
www.nssihouston.com

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

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509-946-0410
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NV5 provides specialists 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.

Off-Site Source Recovery Program — Booth: 429

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osrp.lanl.gov

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ORAU — Booth: 112

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www.orau.org

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ORTEC — Booth: 414

801 S. Illinois Avenue
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Knoxville, TN 37830
865-285-3004
www.philotechnics.com

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

Qal-Tek — Booth: 407

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

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

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

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

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

Radiation Solutions Inc. — Booth: 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: 110

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

SafetyStratus is a cloud-based EHS software platform. Our Radioactie Management System manages the process of purchasing through disposal of radioactie materials across the campus for the purposes of tracking, safety and compliance. The key components are: Orders, 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.

Spectral Labs Incorporated — Booth: 427

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

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

Spectrum Techniques — Booth: 108

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

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

Symetrica Inc. — Booth: 106

Silver Sponsor

63 Great Road, Suite 106
Maynard, MA 01754
508-718-5610
www.symetrica.com

Symetrica is a global leader in the design, manufacture, and algorithm development of radiation detection and identification systems. Our products include handheld and hands-free devices, mobile solutions, and portal monitors. Symetrica's unique Discovery Technology® architecture and range of 3He-free neutron detectors set new performance standards with best in class accuracy, low lifecycle costs, and continuous stabilization and auto-calibration that provides real-time system health monitoring and eliminates scheduled maintenance.

Thermo Fisher Scientific — Booth: 111

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

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

Thomas Gray & Associates, Inc. — Booth: 425

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

Thomas Gray and Associates, Inc. (TGA) 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.

U.S. Nuclear Regulatory Commission (NRC) — Booth: 131

OCHCO/MS 03A44M
Washington, DC 20555
301-287-0711
www.nrc.gov

The mission of the U.S. Nuclear Regulatory Commission is to license and regulate the nation's civilian use of byproduct, source, and special nuclear materials in order to ensure the adequate protection of public health and safety, promote the common defense and security, and to protect the environment.

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. Products 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.

US Nuclear Corp – Technical Associates — Booth: 500

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

US Nuclear Corp features Tritium monitors with outstanding quality & longevity, drone mounted radiation detectors for Alpha, Beta & Gamma, & real-time continuous liquid/effluent monitors. Aerial Radiation Detection includes plume detection, search/location tools, anti-smuggling, using FlyCamUAVs Zoe & Neo Copters. US Nuclear Corp (UCLE) & its subsidiaries are publicly traded.

Versant Medical Physics and Radiation Safety — Booth: 236

GOLD SPONSOR

116 S. Riverview Drive
Kalamazoo, MI 49004
888-316-3644
www.versantphysics.com

Versant Medical Physics and Radiation Safety provides professionals in the sub-specialties of medical and health physics. This includes medical radiation safety, program design and management, license/registration support, audits, training, shielding, and clinical coverage. Our software suite will assist with radiation safety duties, training, dosimetry badge management and regulatory compliance.

UNIVERSITY TABLES

Colorado State University

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

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

Duke University

DUMC 2729
2424 Erwin Rd, Suite 101
Durham, NC 27705
919-684-1400
www.medicalphysics.duke.edu/programs

The Duke Health Physics forms one of the most comprehensive health physics groups in the world consisting of academic, research, and clinical branches. As such, students receive unprecedented educational opportunities and broad real-world experiences. Our goal is to educate future HP leaders for universities, government agencies, and industries world-wide.

East Carolina University

Mailstop 563
Greenville, NC 27858
252-328-6739
www.ecu.edu/physics

East Carolina University is part of the University of North Carolina System and located in Greenville, NC. The Physics Department offers a MS in Physics with concentrations in Applied Physics, Medical Physics (CAMPEP accredited) and Health Physics and a PhD in Biomedical Physics.

NC State University, Department of Nuclear Engineering

2500 Stinson Drive, Room 3150
Burlington Engineering Labs
Raleigh, NC 27695
919-757-2289
www.ne.ncsu.edu

NC State's Nuclear Engineering specializes in fission engineering, radiation detection & applications, plasma science & engineering, nuclear materials and nuclear computational science. Undergraduate (BS), graduate (MS, MNE, PhD) degrees including an online Master of Nuclear Engineering (MNE) and pre-college student & teacher programs available. Contact lisa.marshall@ncsu.edu for details.

Oregon State University School of Nuclear Science and Engineering

100 Radiation Center
Corvallis, OR 97331
541-737-7063
www.ne.oregonstate.edu

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

Purdue University

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

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

University of Alabama at Birmingham

1705 University Blvd.
Birmingham, AL 35294
205-934-3427
www.uab.edu/shp/cds/health-physics

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PROFESSIONAL ENRICHMENT PROGRAM (PEP)

All sessions take place in the Raleigh Convention Center

SUNDAY

8:00 AM – 10:00 AM

PEP 1-A Room 301AB
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, Mauritius 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
Benson Davis
ORTEC

10:30 AM – 12:30 PM

PEP 2-A Room 301AB
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, Mauritius Hiller
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
Benson Davis
ORTEC

2:00 PM – 4:00 PM

PEP 3-A 301AB
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
ASTM Standards That Influence or Are Directly Applicable to Radiation Protection
Ed Walker
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

FINAL SCIENTIFIC PROGRAM

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

MONDAY

6:45 AM – 7:45 AM

CEL-1 Room 301AB
Air Crew Dose Controls
Nancy Kirner

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

8:15 AM – 12:15 PM Ballroom C

MAM-A: Plenary Session
Chair: Robert Cherry

8:15 AM **MAM-A.1**
Retiring Editor: Honoring Mike Ryan
Little CA
Operational Rad Safety

8:45 AM **MAM-A.2**
LIFE After LNT
Ulsh BA
M.H. Chew & Associates

9:15 AM **MAM-A.3**
Adventures and Milestones in Personal Monitoring
Yoder RC
Retired

9:45 AM **MAM-A.4**
Radon – Past and Now
Schoenhofer F
E/R Section Guest

10:15 AM **Exhibit Hall**
Break

10:45 AM **MAM-A.5**
Adopting the International System of Units for Radiation Measurements in the United States: Proceedings of a Workshop
Kosti O
National Academies of Sciences, Engineering, and Medicine

11:15 AM **MAM-A.6**
Accept No Substitutes – Brand Identity, Academic Programs and the Survival of Health Physics
Higley KA
Oregon State University

11:45 AM **MAM-A.7**
Review of a Radiation Protection Needs Workshop
Hertel NE, Abelquist E, Dewji S, Davis J
Georgia Institute of Technology, ORNL Center for Radiation Protection Knowledge, Oak Ridge Associated Universities

12:15 PM Exhibit Hall A

Complimentary Lunch

12:15 PM – 2:15 PM

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
Deirdre 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.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

P.20.5 Monte Carlo Simulations of Tritium and Strontium-90 for Various Siliciclastic Sand Compositions
Graham HR, Waller EJ
University of Ontario Institute of Technology

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.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.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 Dosimetry 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 University, 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

NORM/TENORM

P.43 Radiation Dose Level and Radiation Protection in Potassium Handling Industries
Jaekook L, Boncheol K, Jaeho J, Hassan N, Seungwoo J, Kwang Pyo K
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 p53 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

Works-in-Progress

P.55 Conception of a Numerical Simulation Tool for the Deployable Expert Team CReDO (Operational Dose Reconstruction Cell)
Entine F, Dondey M, Huet C, Michel X, Gagna G, Clairand I, Queinnec F, Aigueperse J, Amabile JC
French Defense Radiation Protection Service, Institute for Radiation Protection and Nuclear Safety

P.57 Application of the ICRP 67 and NCRP 156 Biokinetic Models to Americium- 241 Wound Data from Nonhuman Primates
Alomairy NA, Brey RR, Guilmette RA
Dept. of Nuclear Engineering & Health Physics, Idaho State University, Lovelace Respiratory Research Institute, Ray Guilmette and Associates LLC

P.58 NRC's Radium Oversight Efforts
Chang RI
US NRC

P.59 An Emergency Radiobioassay Method for Sequential Determination of Sr-90, Am-241, and Pu-239,240 in a Spot Urine Sample
Sadi BB, Rinaldo C, Spencer N, Li C
Radiation Protection Bureau, Health Canada, University of Waterloo

P.60 Investigating Artefacts Associated with Beta Particle Interactions in Charge Coupled Devices
Newton R, Scott MJ, Joyce MJ
Lancaster University, BIC Technology Ltd

P.61 Pitchblende - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.62 Ships and Subs - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.63 Physicians and Radiologists, and other Contributors to the Health Sciences - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.64 World List of Early Nuclear Reactors, Africa and Asia - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.65 World List of Early Nuclear Reactors, Europe - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.66 World List of Early Nuclear Reactors, the Americas and Antarctica - A Philatelic Look at Health Physics History
Johnston TP
NIST

P.67 Quantification of Aqueous Plutonium using Hybrid Extractive Scintillating Resin
Pujari AB, Bliznyuk V, Seliman A, Duval C, Powell BA, Husson SM, DeVol TA
Clemson University

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**
Determination of Dose to the Lens of Eye of Fukushima Prefecture Wild Mice
Perri B
Colorado State University

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)

5:00 PM **MPM-A.9**
Decommissiong Section Business Meeting

3:15 PM – 4:00 PM 302 BC

MPM-B1: Waste Management
Chair: John McCormick

3:15 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

3:30 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-B1.5**
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 Dosimetry and Statistics in the Million Worker Study and the Mallinckrodt Chemical Works (MCWL) Cohort

Chair: Ashley Golden

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

3:20 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

3:50 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

4:20 PM **MPM-C.4**
Statistical Consequences: Choice of Model and Adjustment Factors Matter
Golden AP, Cohen SS, Chen CL
ORAU, EpidStat Institute, Vanderbilt University

4:50 PM **MPM-C.5**
Panel Discussion

3:00 PM – 5:00 PM 301 AB

MPM-D: Military Health Physics

Chair: Ken Groves

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

5:30 PM – 7:00 PM Exhibit Hall A

Welcome Reception

Sponsored by PerkinElmer

TUESDAY

7:00 AM – 8:00 AM

CEL-3 Room 301AB
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 ^{222}Rn 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
Lambert K

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

Registration Required

8:45 AM – 9:30 AM 301 AB

TAM-D1: Homeland Security Monitoring

Chair: Ronald Benke

8:45 AM **TAM-D1.2**
Detection of a Weak Radiological Source in Ambient Background Using Spectral Analysis
Meengs MR
Colorado State University

9:00 AM **TAM-D1.3**
Determination of Resuspension Properties of Am-241
Potter CA, Marshall S, Medich DC
Sandia National Laboratories, Worcester Polytechnic Institute

9:15 AM **TAM-D1.4**
Source in a Box: First Use of a Website to Quantify Threats of Concealed Radioactive Material
Benke RR
Atom Consulting

9:30 AM **Exhibit Hall**
Break

10:00 AM – 11:30 AM 301 AB

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

Chair: Lorraine Marceau-Day

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 Section Business Meeting

12:15 PM – 2:15 PM

PEP T-1 Room 301AB
The Case Against LNT
Alan Fellman
Dade Moeller and Associates

PEP T-2 Room 205
Radiological Operation Support Specialist Reference 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
Littleton B, 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 – 4:50 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 – 5:30 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.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 Nanoparticle 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

2:15 PM – 3:15 PM 306 C

TPM-E: HPS Governance – Proposed By-laws Changes

4:30 PM – 5:30 PM 301 AB

AIRRS Section Business Meeting

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 302A
How Expectations Fuel Decisions for Radiation Safety
Ray Johnson
Radiation Safety Counseling Institute

CEL-6 Room 205
A First Time Hot Cell Window Replacement at the Idaho National Laboratories Hot Fuel Examination Facility
Patrick B. Bragg, Lawrence L. Burke, John S. Caudle
Idaho National Laboratory

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 – 12:30 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 N CRP 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

12:15 PM **WAM-B.9**
Nanotechnology Section Business Meeting

8:30 AM – 12:00 PM 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

11:30 AM **WAM-C.5**
Case Study: Y-12 Criticality Accident (1958)
Iddins CJ
ORAU

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 US
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

10:30 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 – 11:00 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 Section Business Meeting

12:15 PM – 2:15 PM

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)
William Irwin
Vermont Department of Health

PEP W-5 Room 303
Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions
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 MW, Ruedig E, Fuehne DP
LANL

3:30 PM 300 Foyer
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, Liz Brackett

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
US 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 **300 Foyer**
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**
Interpretation of Urinary Excretion Data from Plutonium Wound Cases Treated with DTPA
Poudel D, Klumpp JA, Bertelli L, Waters TL
Radiation Protection Division, Los Alamos National Laboratory

4:30 PM **WPM-C.7**
^{90}Sr 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 at 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 **300 Foyer**
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 302A
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 – 11:15 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 ^{99m}Tc
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, Centers 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

9:15 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

9:30 AM **THAM-A.7**
Tailored Decision Aids for Use in Radiological Emergencies
Bowman DR
Department of Energy

9:45 AM **300 Foyer**
Break

10:15 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

10:30 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

10:45 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

11:00 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

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 **300 Foyer**
Break

9:45 AM **THAM-B.4**
Modeling Minimum Detectable Activity as Function of Detector Velocity
Falkner JT, Marianno CM
Texas A&M University

10:00 AM **THAM-B.5**
A Collimated CZT Detector for Quantitative Gamma Assays
Bronson FL, Herman C, Muller W, Zickefoose J
Mirion Technologies [Canberra]

10:15 AM **THAM-B.6**
A Prototype Flexible Continuous Quantitative On-line Gamma Spectroscopy Acquisition System
Bronson FL, Anderson T
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

11:15 AM **THAM-B.10**
Optimizing Decision Thresholds for Low-Signal Detection at Varying Distances Amid Elevated Background
Fischer JC
Colorado State University

8:45 AM – 11:30 AM 306 AB

THAM-C: Risk Assessment
Chair: Ray Johnson

8:45 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

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 **300 Foyer**
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 305AB**
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-4 **Room 302A**
Neutrons: Discovery, Detection Application and Health Physics
Jeff Chapman
Oak Ridge National Laboratory

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 22 courses will be offered between 8:00 am - 4:00 pm.

In addition to the above-mentioned sessions for Sunday, 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.

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 MBTI 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 stand-alone radiation safety programs. Resource constraints and workplace complexities have served as a catalyst for the creation of comprehensive environmental health & safety (EH&S) or risk management (RM) programs, which include, among other health and safety aspects, radiation safety programs. But many of these consolidations were not inclusive of staff training to instill an understanding of the areas now aligned with the radiation safety function. This situation is unfortunate because when armed with a basic understanding of the other safety programs, the radiation safety staff can provide improved customer service and address many simple issues before they become major problems. This 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 Radiological

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, Mauritius 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

John 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 1 March, 1954, the Bravo detonated and many outcomes were unexpected. Since then, all northern atolls of RMI were never the same – farmlands and the populations. The unexpected event is catastrophic resulting (1) from unpredicted weapon yields; (2) by the nuclear debris and fallout that 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 was investigated.

BNL scientists and physicians played 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 lessons learned that could be implied and implemented to up-to-date emergency planning and accident preparedness.

PEP 1-H Fundamentals of Gamma Spectroscopy

Benson Davis
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 MBTI 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 1-B 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, Mauritius Hiller
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 to 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

Benson Davis
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 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 latter 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 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 PEP 1-B for description.

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

Doug Van Cleef
Mirion Technologies, Inc.

This course presents a quick review 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.

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 procedures are presented.
- Calibration equipment is provided to demonstrate how the air samplers and monitors are calibrated.
- Air sample filters are counted and airborne concentrations are calculated.
- The uncertainties and limitations in the completed air sampling report are explored.

PEP 3-E Introduction to Stack Sampling

John 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-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-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.

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-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)

William Irwin
Vermont Department of Health

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 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-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-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.

CONTINUING EDUCATION LECTURES (CELs)

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

Monday

CEL-1 Air Crew Dose Controls

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

Patrick B. Bragg, Lawrence L. Burke, John S. Caudle
Idaho National Laboratory

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 14,000 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.

P.55 Conception of a Numerical Simulation Tool for the Deployable Expert Team CReDO (Operational Dose Reconstruction Cell)

Entine F, Dondey M, Huet C, Michel X, Gagna G, Clairand I, Queinnec F, Aigueperse J, Amabile JC
French Defense Radiation Protection Service, Institute for Radiation Protection and Nuclear Safety

In the context of a nuclear or radiological accident involving high doses of ionizing radiation, the treatment of the victims faces two different situations:

For contaminated patients, the priority goes to the treatment, which can often be "blindly" administered to reduce the committed dose as the main molecules don't engage any harmful side effects. This therapeutic must take place early, before and during a precise assessment of the involved radionuclide;

For irradiated patients, priority goes to the diagnosis because it is essential to know how the dose is distributed among the organs in order to sort the victims according to the severity of the exposure. The victims can consequently be lead to the most appropriate health structures.

At present there is yet only very few field techniques that are capable of rapidly characterizing an external radiation exposure in case of an accident involving a large amount of victims. Nevertheless scientific, industrial and military applications as well as terrorist menace generate a significant probability of such an event.

The dosimetric reconstruction tool currently in development uses the Geant4 and the GATE Monte Carlo codes to provide dose maps in the area of an irradiation accident. An important feature of the simulation device is to be able to operate in highly degraded situations. As it is integrated in a militarized and hardened case, it can be freed from any link to a remote computer cluster thanks to a powerful multi-core calculator that allows performing dose simulations with total autonomy. Using a simple and intuitive graphical user interface, trained users will be able to quickly design the whole scene of the accident using mostly the mouse and navigate in this 3D virtual world with a first person camera. This simulation tool is also compatible to work with libraries of sources, voxel phantoms and shielding materials that can be quickly integrated into the modeled scene of the radiation accident. Numerical filters are currently in development to target the most exposed areas to help medical teams to guide victims through appropriate medical care management solutions.

This numerical simulation tool based on modern technologies for dose calculation is aimed to strengthen the current diagnostic arsenal by meeting the need of on-field dosimetric triage for radiation-exposed victims. Through a validation phase on standardized scenarios the relevance of this dosimetric solution is currently being tested for different type of possible external exposure situations.

P.57 Application of the ICRP 67 and NCRP 156 Biokinetic Models to Americium- 241 Wound Data from Nonhuman Primates

Alomairy NA, Brey RR, Guilmette RA
Dept. of Nuclear Engineering & Health Physics, Idaho State University, Lovelace Respiratory Research Institute, Ray Guilmette and Associates LLC

Distribution, retention, and excretion of intramuscularly injected 241Am citrate have been investigated in cynomolgus and rhesus nonhuman primates. Bioassay and retention data, obtained from experiments done by Patricia Durbin and her colleagues at Lawrence Berkley National Laboratory were evaluated against the International Commission on Radiological Protection (ICRP 67) 241Am systemic model coupled with to the National Council on Radiation Protection and Measurement wound model (NCRP 156). The default transfer rates suggested in these models were compared with the urine and feces excretion data as well as liver and skeleton tissue contents at the time of death. The default models produced adequate fits using urine bioassay data, but the injected activities were overpredicted by as much as 3.84 times and underpredicted by as much as 4.41 times. Poor prediction has been observed in all cases using fecal excretion. The retained activity in the liver and skeleton were investigated using the same approach. It appears that the models accurately predict the amount of the activity retention in the skeleton more than in the liver. The fraction of predicted to measured activity at the time of death in the skeleton was over 1.0 in most cases and accurate predictions were obtained in 7 cases. The predicted activity in skeleton for these cases ranged from 2.7 to 17% overestimated activity and from 9 to 14% underestimated activity. NHPs urine data and organ retention were compared with data from previously modeled baboons and beagle dogs. About six percent of the injected activity in baboons and beagle dog was excreted in urine and approximately 0.1% in feces in the first 24h. The results from NHP are not different from excreta analysis in these other species. Urinary excretion in the cynomolgus, rhesus, and baboon NHP is the dominate pathway of Am-241 clearance, however, the fecal excretions are considered dominant in beagle dogs. The comparison between NHP and human is difficult due to the differences in the amount of activities translocated or deposited in the liver tissue and nonliver tissues (primarily skeleton), in addition to the physiological differences between the NHP and human.

(Work performed with partial support from funding from the National Institute of Allergy and Infectious Diseases under contract HHSN272201000046C).

P.58 NRC's Radium Oversight Efforts

Chang RI
US NRC

Before the Energy Policy Act of 2005 (EPAct), the U.S. Nuclear Regulatory Commission (NRC) did not have authority over naturally- occurring radioactive material such as radium. The EPAct gave the NRC authority over radium and some other materials in a category known as naturally-occurring and accelerator produced radioactive material, or NARM. The NRC's first step in implementing that new authority was to put in place regulations. These regulations, known as the NARM rule, became effective November 30, 2007. NRC and the U.S. Department of Defense (DOD) subsequently began discussions on military uses of radium shortly after the NARM Rule was finalized. The NRC and the DOD finalized a Memorandum of Understanding (MOU) on April 28, 2016, describing roles in the cleanup of radium and other unlicensed radioactive materials at military sites. The MOU provides two ways the NRC will be involved in military cleanup projects. The first way is to stay informed of remediation activities at sites where the U.S. Environmental Protection Agency (EPA) has oversight under Superfund. The second way is to monitor remediation activities at sites without EPA oversight. This monitoring would provide independent federal oversight to confirm the remediation adequately protects public health and safety and the environment. NRC has also begun to plan for a systematic effort to identify sites where radium was used. Our goal is to find out how much, if any, cleanup was done and ensure that these sites do not pose a risk. For the sites that are found under NRC jurisdiction, we are working with the States to get more information. We have also been reaching out to site owners. The NRC's goal is to assure that these sites do not pose a risk to public health and safety and the environment.

P.59 An Emergency Radiobioassay Method for Sequential Determination of Sr-90, Am-241, and Pu-239,240 in a Spot Urine Sample

Sadi BB, Rinaldo C, Spencer N, Li C
Radiation Protection Bureau, Health Canada, University of Waterloo

Strontium-90 (Sr-90) and actinides such as americium and plutonium radioisotopes (Am-241, and Pu-239,240) have been identified as some of the high priority radionuclides likely to be involved in a radiological/nuclear (R/N) accident. Following an R/N accident, a large number of people may need to be screened for internal contamination. As a result, development of rapid and efficient methods for determination of these radionuclides in bioassay samples (for example, urine and feces) continues to be a priority research area for internal radiological dose assessment. This presentation describes a newly developed radiobioassay method for sequential determination of Sr-90, Am-241 and Pu-239,240 in a spot urine sample. The method is based on a matrix removal procedure to purify the target radionuclides from urine followed by an ion chromatographic separation and radiometric detection. Radiometric measurement of Sr-90 was carried out by a liquid scintillation counter. Measurement of Am-241 and Pu-239,240 was carried out by alpha spectrometry. The method meets the bioassay performance criteria for relative bias and relative precision as recommended by the ANSI/HPS N13.30-2011. When compared to the reference levels derived from the clinical decision guide (CDG) for medical intervention, the detection limits for Sr-90 (0.3 Bq/L) and Am-241 (4 mBq/L) in a spot urine sample (100 mL) are found to be satisfactory for up to 90 days after a 1 CDG intake in case of an accidental exposure scenario. For Pu-239,240 bioassay, the detection limit (5 mBq/L) is satisfactory up to 3 days after a 1 CDG intake. Sample preparation time is less than 11 hours. The sample turnaround time for the measurement of Sr-90 is less than 12 hours. However, due to longer counting time (72 hours) used for the alpha spectrometric measurement, sample turnaround time for Am-241 and Pu-239,240 bioassay is 83 hours.

P.60 Investigating Artefacts Associated with Beta Particle Interactions in Charge Coupled Devices

Newton R, Scott MJ, Joyce MJ
Lancaster University, BIC Technology Ltd

Charge coupled devices (CCDs) have been shown in literature and previous research to have potential for detecting charged particles and ionising radiation. In particular, the clusters in the pixel images produced are distinctive for alpha and beta radiation with beta particles giving long, curved tracks and alpha particles causing large symmetrical clusters or vertical streaks. The sizes and shapes of the clusters are also related to the energy of the incident radiation. This gives potential for these devices to be used for dosimetry and spectroscopy of radioactive contamination, incorporated into a hand-held device for use in-situ. This work investigates CCD exposure to two beta radiation sources, Co-60 and Cs-137, and compares the artefacts seen with simulations produced in the modelling software CASINO (monte carlo simulation of electron trajectory in solids). The two sources were used to compare different energies: 310 keV and 512 keV for the maximum beta particle energies of Co-60 and Cs-137 respectively. In both cases 10,000 electrons were simulated passing through a pixel grid. The number of pixels each electron passed through was recorded in a histogram. The 310 keV electrons peaked at a cluster size of 4 pixels and the 512 keV electrons peaked at 3 pixels. The lower

energy electrons produce longer tracks as expected due to the higher scattering cross section. A similar trend is seen in the experimental data, that a greater portion of the lower energy beta particles have longer clusters than those of a higher energy. However, the peaks are at 1 pixel in both cases. The significantly greater number of 1- and 2- pixel clusters is thought to be due to the additional gamma radiation from these sources. Gamma radiation produces only small clusters, and these can be difficult to distinguish from the smaller beta radiation tracks. Further work will be done to use these simulations and experimental data to attempt to distinguish between beta and gamma radiation.

P.61 Pitchblende - A Philatelic Look at Health Physics History

Johnston TP
NIST

Pitchblende is also known as uraninite. The word comes from pitch or pech, meaning black or bad luck because of its black color, and blende. As health physicists we know about pitchblende and the work of Marie Skłodowska Curie and Pierre Curie in 1903. This poster will review the known uses of Uranium over time and the story is told with a graphical accompaniment of philatelic material (postage stamps). The story featuring Uranium begins with: the work of the Curie's, highlights the natural reactor in Gabon, a discovery of the first use of Uranium in Rome, miner's lung disease in the 1500's, a tie-in with President Herbert Hoover, a coloring agent for the ceramic and glass industries, silver mines and the U.S. dollar, more connections to the Curies and Becquerel, revelation of where those Coleman lantern mantles came from, a link to respiratory protection, spas in Jáchymov and the finish courtesy of Fiestaware.

P.62 Ships and Subs - A Philatelic Look at Health Physics History

Johnston TP
NIST

The story begins by way of fascination with science and adventure and enjoyment gained through reading. Introduction to this topic came via discovery of Jules Verne's Twenty Thousand Leagues Under the Seas. This classic described Captain Nemo's wonderful existence aboard the Nautilus and the undersea adventures capable with an electric powered submarine. The youngster next experienced a close encounter with Nemo's Nautilus on 7 December 1972 during a visit to Disneyworld and a ride on Walt Disney's version. This date is memorable since that evening our family witnessed firsthand the night launch of Apollo 17 at Cape Canaveral. Apollo 17 was also the last Apollo mission to land men on the moon. An interesting note: NASA was concerned about and protection measures were initiated with respect to radiation dose. Not only the cosmic radiation, but also exposure to the 147Pm used to illuminate switches and control panels, and from the 3H (tritium) used for radioluminescent lighting.

P.63 Physicians and Radiologists, and other Contributors to the Health Sciences - A Philatelic Look at Health Physics History

Johnston TP
NIST

With almost immediate certainty and in all likelihood, these physicians, radiologists, and other contributors to the health sciences depicted here were unknown to most people today. Yet these individuals were selected by the particular country's postal authority to be commemorated on a postage stamp. An objective to strive for when writing about people from the past who have had an influence or impact on medical science, society and our lives is to bring to the forefront, perhaps remove from obscurity those individuals that until now have been unheralded. Let us begin with a brief introduction on the format for this month's column. This author thought a good and equitable approach would be simple: alphabetical order by country of notoriety and perhaps birthplace. For oftentimes, the country of birth does not always depict the accomplishments of the people that achieve fame or recognition. Sometimes the country that realizes and benefits from the individual's success or achievements will highlight and recognize this by the issuance of a commemorative postage stamp.

P.64 World List of Early Nuclear Reactors, Africa and Asia - A Philatelic Look at Health Physics History

Johnston TP
NIST

Presented here we have a review of the early days of nuclear reactors worldwide. This poster will briefly cover the commemorative postal stamps of the countries that chose to honor the first operational nuclear reactor in their nation. In particular, a summary of some of the countries in Africa and Asia with reactors featured on their postal issues. These early reactors were generally of the research and test reactor type. Note: TRIGA reactor ' Training, Research, Isotope production, General Atomics.

P.65 World List of Early Nuclear Reactors, Europe - A Philatelic Look at Health Physics History

Johnston TP
NIST

Presented here we have a review of the early days of nuclear reactors worldwide. We continue with a review of initial examples of nuclear reactors in Europe. This poster will briefly cover the commemorative postal stamps of the countries that elected to honor the first operational nuclear reactor in their nation. In particular, a brief review of the countries of the European continent with reactors featured on their postal issues.

P.66 World List of Early Nuclear Reactors, the Americas and Antarctica - A Philatelic Look at Health Physics History

Johnston TP
NIST

Presented here we have a review of the early days of nuclear reactors worldwide. We continue and finish with a final review of nuclear reactors featured on the postal issues of countries in the Americas and a special cancel from Antarctica. Several of the commemorative stamps feature the atomic or nuclear energy commission of the respective country, or the IAEA. There are a few stamps that highlight nuclear reactors. In general, after a mention of the United States and Puerto Rico, followed by Antarctica, we will cover the countries of the Americas in alphabetical order.

P.67 Quantification of Aqueous Plutonium using Hybrid Extractive Scintillating Resin

Pujari AB, Bliznyuk V, Seliman A, Duval C, Powell BA, Husson SM, DeVol TA
Clemson University

Hybrid extractive scintillating resins beads are used for uptake and quantification of aqueous plutonium in ground water. The hybrid extractive scintillating resin beads consist of inorganic compounds such as titanium dioxide with or without halloysites, which are responsible for plutonium uptake, incorporated into a scintillating polymer matrix, which serves as the radiation transducer. The scintillating resin emits light of short wavelength when excited by alpha radiation from bound plutonium. Hybrid resin beads can be prepared by adding the inorganic compounds during suspension polymerization (pre-polymerization method) or after polymerization (post-polymerization method). Batch uptake measurements for aqueous plutonium-238 (+5 oxidation state) were performed on the hybrid extractive scintillating resin beads to measure the distribution coefficient, KD, as well as the plutonium detection efficiency. Physical characterization of the beads was done using thermogravimetric analysis to measure the loading of inorganic particles in the extractive scintillating resin beads, scanning electron microscopy and focus ion beam to observe the surface morphology of the beads, and energy-dispersive X-ray spectroscopy for the elemental analysis of the beads. The highest distribution coefficient for plutonium uptake by the post polymerization beads was 6431 mL/g and pre-polymerization beads was 195 mL/g. To date the absolute detection efficiency that was measured for these materials was 8%. The hybrid extractive scintillating resins beads are designed for real time detection of plutonium contamination in ground water.

AUTHOR INDEX

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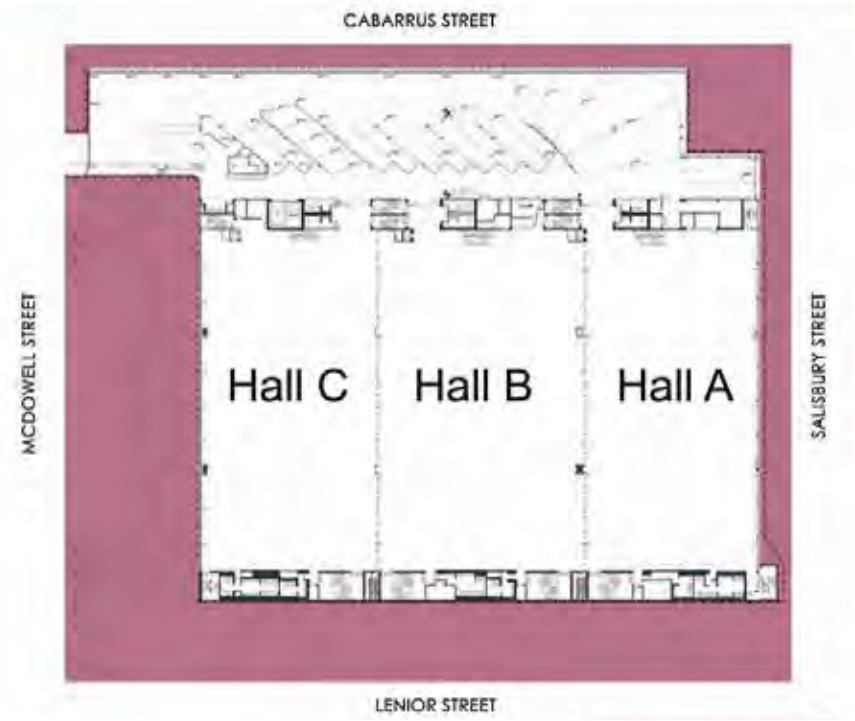
RALEIGH CONVENTION CENTER FLOOR PLAN

EXHIBIT HALL LEVEL

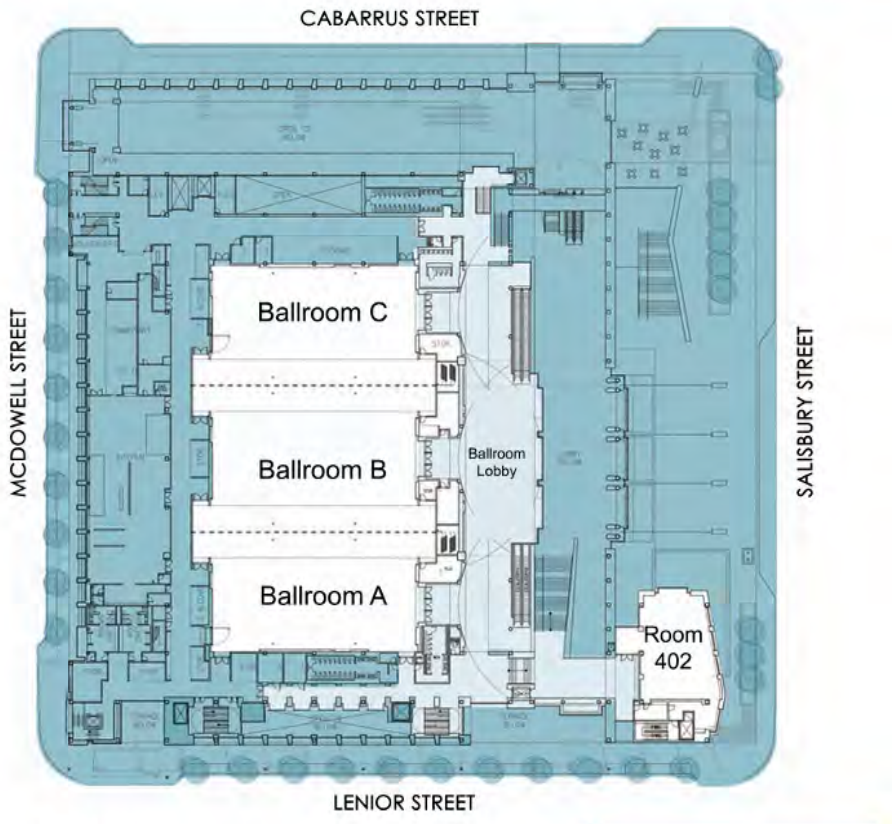


200 LEVEL

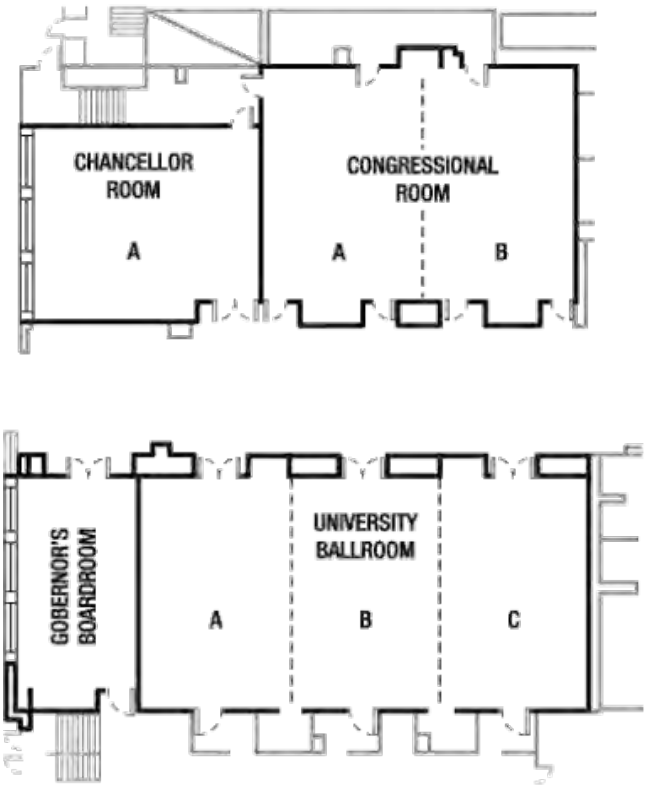
RALEIGH CONVENTION CENTER FLOOR PLAN

300 LEVEL

BALLROOM LEVEL



MARRIOTT HOTEL FLOOR PLAN



SCHEDULE AT-A-GLANCE

All events at the convention center unless otherwise noted.

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

Student/Mentor Reception
6:30 PM-7:30 PM
402

Sunday PEP Locations

PEP A = Room 301 AB
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

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 Air Crew Dose Controls
6:45 AM-745 AM 301 AB

CEL2 The Linear Non-Threshold Model and Its Implications for Radiological Security
6:45 AM-7:45 AM 205

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

MAM-A Plenary
8:15 AM-12:15 PM Ballroom C

Complimentary Lunch in Exhibit Hall for All Registrants and Opening of Exhibits
12:00 PM-1:30 PM Exhibit Hall A

PEP Program 12:15 PM-2:15 PM

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

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
3:15 PM-4:00 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 Dosimetry 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-5:00 PM 301 AB

Welcome Reception
Sponsored by PerkinElmer
5:30 PM-7:00 PM Exhibit Hall A

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 301 AB

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
8:45 AM-9:30 AM 301 AB

TAM-D2 Accelerator Section Special Session: Accelerator Health Physics
10:00 AM-11:30 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-1 301 AB
The Case Against LNT

T-2 205
Radiological Operation Support Specialist Reference 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-4:50 PM 302 BC

TPM-C AAHP Special Session: What Every Certified Health Physicist Should Know About ..., Part 2
2:00 PM-5:30 PM 306 AB

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

TPM-E HPS Governance - Proposed By-laws Changes
2:15 PM-3:15 PM 306 C

AAHP Business Meeting
4:30 PM-5:30 PM 306AB

HPS Awards Banquet
7:00 PM-9:00 PM Ballroom B

SCHEDULE AT-A-GLANCE

All events at the convention center unless otherwise noted.

Wednesday, 12 July

CEL5 How Expectations Fuel Decisions for Radiation Safety
7:00 AM-8:00 AM 302 A

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-12:30 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-11:00 AM 303

PEP Program 12:15 PM-2:15 PM

W-2 205
Decay Chain Calculations: A Primer

W-3 206
Science-based Response Planning Guidance for the First 100 Minutes of the Response to a Radiological Dispersal Device Detonation (Planning Guidance)

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

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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 301 AB

Thursday, 13 July

CEL7 Proceedings of the Annual Core Research Reactor Characterization
7:00 AM-8:00 AM 302 A

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-11:15 AM 305 AB

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

THAM-C Risk Assessment
8:45 AM-11:30 AM 306 AB

PEP Program 12:15 PM-2:15 PM

TH-1 305 AB
Potential Radiation Effects from Diagnostic and Interventional Radiological Procedures

TH-2 205
International Guidance on Radiation Emergency Management

TH-4 305 AB
Neutrons: Discovery, Detection Application and Health Physics

Registration Hours

Registration at the Raleigh Convention Center

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

Exhibit Hall Hours

Exhibit Hall A

Monday	Noon - 7:00 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

5:00 PM 305 AB
Decommissioning 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

11:15 AM 301 AB
Accelerator Section Business Meeting

11:45 AM 303
Homeland Security Section Business Meeting

1:00 PM 305 AB
Nonionizing Radiation Section Business Meeting

4:30 PM 301 AB
AIRRS Section Business Meeting

4:30 PM 306 AB
AAHP Business Meeting

WEDNESDAY

10:30 AM 303
Power Reactor Section Business Meeting

12:15 PM 302 BC
Nanotechnology Section Business Meeting

5:30 PM 301 AB
HPS Business Meeting

NOTE FOR CHPs

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

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

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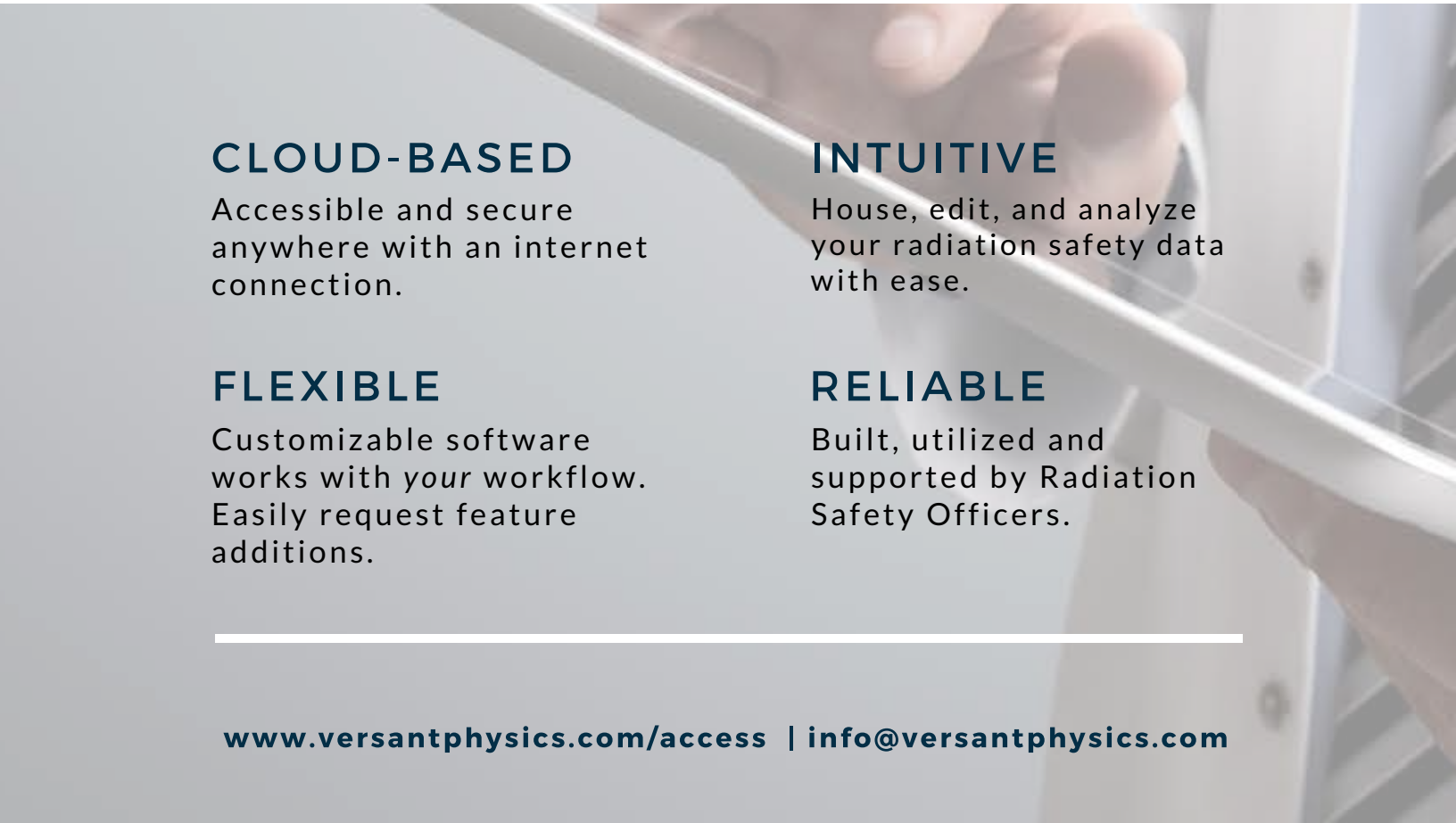

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