Health Physics Society
59th Annual Meeting
Baltimore, Maryland

Baltimore Convention Center
Baltimore, Maryland ◆ 13-17 July 2014

Final Program

An application to CAMPEP for MPCECs has been made.

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

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Registration Hours and Location

Registration at the Charles Street Lobby (CC)

Sunday, 13 July ..... 9:00 am - 6:00 pm
Monday, 14 July ..... 7:30 am - 4:00 pm
Tuesday, 15 July ..... 8:00 am - 4:00 pm
Wednesday, 16 July ..... 8:00 am - 4:00 pm
Thursday, 17 July ..... 8:00 am - Noon

Future Midyear Topical Meeting

48th	1-4 February 2015	Norfolk, VA

Future Annual Meetings

60th	12-16 July 2015	Indianapolis, IN
61st	17-21 July 2016	Spokane, WA
62nd	9-13 July 2017	Raleigh, NC

Look online for future meeting details
hps.org/meetings

Officers

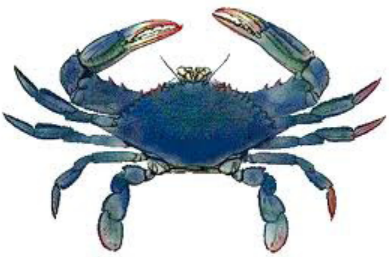
Darrell R. Fisher, President
Barbara L. Hamrick, President-Elect
Elizabeth Brackett, Secretary
Nancy M. Daugherty, Treasurer
Kathleen Shingleton, Treasurer-Elect
Armin Ansari, Past President
Brett J. Burk, Executive Director

Board of Directors

Tracy A. Ikenberry
Samuel L. Keith
Steve King
John Lanza
Mark A. “Andy” Miller
Cheryl L. Olson
Sarah J. Roberts
David R. Simpson
Mike Stabin

Advisory Panel to the Board

Kelly L. Classic, Outreach Editor
Howard W. Dickson, Web Operations
Matt Moeller, Parliamentarian/Rules Chair
Craig A. Little, *Operational Radiation Safety* Editor-in-Chief
Tim Kirkham, Program Committee Chair
Genevieve S. Roessler, Ask the Experts Editor
Michael T. Ryan, Journal Editor-in-Chief
Richard J. Vetter, Congressional & Agency Liaison
Charles Wilson, Student Support Committee



Local Arrangements Committee

Director: Andy Miller
Co-Chairs: Jack Patterson, Janna Shupe
Sean Austin
Dan Blumenthal
Cari Borras
Michele Comisiak
Carlos Corredor
John Crapo
Philip Egidi
Colt Greer
Thomas P. Johnston
Jim Lewis
Brian Livingston
Paul Marshall
Kathy McLellan
Tanya Oxenberg
Kristine Patterson
Robert Philips
Victoria Potuck
Greg Smith
Matthew Spierenberg
Jeancarlo Torres
Ed Tupin
Tom Youngblood

2014 Task Force - Baltimore

Tim Kirkham, Program Committee Chair
Tim Taulbee, Task Force Chair
Harrison Agordzo
Paul Burress
Duane DeMore
Jack Kraus
Bryan Lemieux
Mike Mahathy
Latha Vasudevan

Headquarters Hotel:

Hilton Baltimore
401 West Pratt Street, Baltimore, MD 21201

Overflow Hotel:

Baltimore Marriott Inner Harbor at Camden Yards
110 South Eutaw Street, Baltimore, MD 21201

Speaker Ready Room

Baltimore Convention Center, Meeting Room 304

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.

Saturday

Saturday AAHP Courses will take place in the Baltimore Convention Center

Sunday

Sunday PEPs will take place in the Baltimore Hilton

Monday-Thursday

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

HPS 2014 Sponsors

Meeting Sponsor
Dan Caulk Memorial Fund
RSO, Inc.

Welcome Reception Sponsors:
Dade Moeller
The MJW Companies
Oak Ridge Associated Universities

Conference Tote Bag Sponsor:
Ludlum Measurements

Lounge & Charging Station Sponsor:
Landauer

Lanyard Sponsor:
Eckert & Ziegler

5K Run/Walk Sponsor:
Ecology Services, Inc

Technical Tour Sponsor:
RSO, Inc.

Important Events

Welcome Reception

Please plan on stopping in at the Hilton Baltimore, Holiday Ballroom 4-6, Sunday, 13 July, from 6:00-7:30 pm. There will be an opportunity to meet friends to start your evening in Baltimore. Cash bar and light snacks will be available. Reception is sponsored by ***Dade Moeller, MJW Technical Services, and Oak Ridge Associated Universities.***

Exhibits

Free Lunch! Free Lunch! – 12:20 pm, Monday, 14 July. All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.

Landauer welcomes you to share in celebrating 60 years of providing dosimetry services worldwide. Thank you for helping us attain this milestone! *Please join an informal cocktail reception during the afternoon break until close of the exhibitor hours Monday, June 14th.* Cocktails and appetizers will be served in the lounge next to the Landauer booth.

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

AAHP Exam

Monday, 14 July
Hilton, Holiday Ballroom 1-3
Part 1 - 8:00-11:00 am
Part 2 - 12:30-6:30 pm

Sessions/Course Locations

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

AAHP Awards Luncheon

Baltimore Convention Center, Room 315
Tuesday 15 July , Noon-2:00 pm
To purchase tickets, stop by the
HPS Registration Desk

HPS Awards Banquet

Spend an enjoyable evening with members of the Health Physics Society. This event will be held on Tuesday, 15 July, in the Hilton Baltimore Holiday Ballroom 4-6, 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 7:00-10:00 pm. This event is included in Member, Non-Member, Emeritus, Past President, and Student Registrations.

HPS Business Meeting

Baltimore Convention Center, Rm 302-303
Wednesday, 16 July, 5:30-6:30 pm

Monday, 12:20 PM

Complimentary Lunch in Exhibit Hall

featuring a debate on:

Is There a Dose of Radiation That is Not Dangerous?

Moderated by: William F. Morgan; Speakers: Jerome Puskin, Antone Brooks

Come listen while you dine

Monday - Wednesday

Health Physics Topical Movies in the Exhibit Hall

Movies will be running all week long in the Hall

Popcorn provided and sponsored by The MJW Companies

Important Events

New this YEAR!
Get ready for the
1st Annual Health Physics Society Team Quiz Bowl!

You and your friends can test your knowledge against other HPS members (members are encouraged to group with students and young professionals).

Wednesday at the Hilton Rooms Poe A/B, 4:00-6:00 pm

Debate and Movies in the Exhibit Hall

See pages 5 and 14 for more details!

Special Demonstration - Tuesday and Wednesday
NNSA Demonstration of Radiological Emergency Response Assets

DOE's National Nuclear Security Administration will coordinate a static demonstration of federal and state radiological emergency response assets available within the National Capital Region. Come to Booth 723 in Exhibit Hall A/B for a guided walk to the Baltimore Raven's parking lot to see the DOE/NNSA AMS Helicopter and other vehicle-based assets.

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 50 for course information

Things to Remember!

All speakers are required to check in at the **Speaker Ready Room 304** Baltimore Convention Center at least a half day 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

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

AAHP Awards Luncheon

The AAHP is sponsoring an Awards Luncheon on Tuesday, 15 July, Noon-2:00 pm, in the Baltimore Convention Center, Room 315. You may purchase tickets at the Registration Desk.

Make Plans to Attend the
2015 Midyear Meeting
Sunday 1 February-Wednesday 4 February
Norfolk, Virginia

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 the Hilton Baltimore Holiday Ballroom 4-6, on Tuesday, 15 July from 7:00 - 10:00 pm.

The following awards are to be presented:

Distinguished Scientific Achievement Award
Wesley E. Bolch

Distinguished Public Service Award
Robert L. Brent

Robley D. Evans Medal
George D. Kerr

Founders Awards
William (Jack) Beck
James E. Turner (Memorialization)

Geoffrey Eichholz Outstanding Science Teacher Award
Brenda Hallbauer
Joshua Mocherman

Honor Roll Award
Donald Jacobs
Michael Davidson

Fellows
John D. Boice
Donald A. Cool
Debbie B. Gilley
Jerry W. Hiatt
Thomas Johnson
Cheryl L. Olson

Tuesday Evening Awards Menu

Steakhouse Salad -
Crisp Iceberg, Pancetta Bacon, Tomatoes, Bleu Cheese, Cabernet Vinaigrette

Duet of Pesto Brushed Rockfish & Mustard-Basil Crusted Breast of Chicken

Roasted Shallots Bordelaise with Mushroom and Peas Risotto,
Haricot Vert, Carrots, Red Pepper

Dessert Trio - Chocolate Amaretto Mousse Cone, Mango Dome & Macaroon

General Information

Registration Fees:

	Pre	On-Site
PDS	$450	$550
HPS Member	$430	$530
HPS Dues Renewal	$170	$170
Non-Member	$550	$650
Student	$ 70	$ 70
Emeritus Member	$215	$265
One-Day Registration	$275	$300
HPS PEP Lecturer	$130	$230
HPS CEL Lecturer	$280	$380
Companion	$110	$110
Emeritus Companion	$ 55	$ 55

Badge Color Code:

White=HPS Member, NonMember, Student
Blue=Companion
Green=Exhibition Only
Salmon=Exhibitor

Session Location

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

Local Arrangements Committee Room

Baltimore Convention Center
Sunday-Thursday Room 305

PEP Ready Room

Baltimore Convention Center
Sunday Peale C (Hilton)
Monday-Thursday Room 304 (CC)

Activities and Tours

Note: Tickets still available for sale; they can be purchased at the HPS Registration Desk.

Monday 14 July

Fort McHenry National Monument and Historic Shrine 2:00 pm

Open Mike Night 8:00 pm

Tuesday 15 July

5K Run/2K Walk 6:30 am

Annapolis - Maryland's Capital and the US Naval Academy 9:00 am

Tech Tour - NS Savannah 9:00 am

NNSA Demonstration of Radiological Emergency Response Assets Come to Booth 723 at 10:00 am or 2:00 pm.

Wednesday 16 July

Walters Art Museum 10:00 am

Pub Crawl 6:30 pm

Tech Tour - NIST Center for Neutron Research (NCNR) 8:00 am

NNSA Demonstration of Radiological Emergency Response Assets Come to Booth 723 at 10:00 am or 2:00 pm.

Thursday 17 July

Night Out - Hard Rock Cafe 7:30 pm

OPEN MIKE NIGHT

dedicated to Mike Davidson, founder of Open Mic Night

The 2014 (9th Annual) HPS Open Mike (Mic) Night will be held on Monday, 14 July in the Baltimore Hilton Hotel – in Holiday Ballroom 6.

The doors open at 8:30 PM with the band "Mutual Fun."

A special thanks to the Sponsors of this event:

Chase Environmental Group, Inc.
Radiation Safety Associates, Inc.
Radiation Safety and Control Services, Inc.
SE International, Inc.
Tidewater, Inc.

We hope to see you all there. The event will be limited to ages 21 and older. Photo identification will be required.

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 304) will be open Sunday from 2-5 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
Thursday pm	11 am Thursday

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

PEP/CEL Ready Room

The PEP Ready Room (Peale C) in the Hilton Baltimore on Sunday, and Room 304 in Baltimore Convention Center Monday-Thursday, will have hours posted on the door Sunday-Thursday.

Resumes/Job Postings

Find a job or post a job at Booth 720 in the Exhibit Hall.

Companion Hospitality Program

Again this year for Registered Companions

There will not be a Hospitality Room this year

Companion Registration includes Monday-Thursday breakfast buffet at the Urban Tavern, in the Hilton Baltimore, 8:00-9:00 am, featuring a pleasing selection of hot and cold items and your choice of beverage at the Hilton Baltimore, and the Welcome Reception, held at the Hilton Baltimore, Holiday Ballroom 4-6, on Sunday, 13 July, from 6:00-7:30 pm.

The Welcome to Baltimore Companion Orientation takes place Monday, 14 July, at 9:00 am in the Hilton Baltimore at the Fitness Patio, 4th Floor. After that, the registered companions can take a no fee Inner Harbor Walking Tour at 9:30 am, meeting in the Hilton Baltimore Lobby. All other tours can be purchased at the HPS Registration Desk.

Companions are welcome to come to the Exhibitor lunch, reception and breaks.

Hospitality Breakfast for Registered Companions
Monday-Thursday
Urban Tavern
Hilton Baltimore

Student Events

Student Orientation - *Saturday* – 5:45 PM (318, CC)
Welcome Reception - *Sunday* – 6:00-7:30 PM (Holiday Ballroom 4-6, Hilton)
Exhibitor Opening Luncheon - *Monday* – 12:20-1:30 PM (Exhibit Hall)
Student/Mentor Reception - *Monday* - 5:30-7:00 PM (Paca, Hilton)
Awards Dinner - *Tuesday* – 7:00-10:00 PM (Holiday Ballroom 4-6, Hilton)

Committee Meetings

Hilton Baltimore (H), Convention Center (CC)

Saturday, 12 July 2014

FINANCE COMMITTEE
8:00 am-Noon — Room 312 (CC)

NCRP
8:00 am-5:00 pm — Room 323 (CC)

NRRPT
8:30 am-4:30 pm — Stadium 1-2 (Marriott)

ABHP BOARD MEETING
8:30 am-5:00 pm — Room 324 (CC)

WEB OPERATIONS
9:00 am-Noon — Room 313 (CC)

HPS EXECUTIVE COMMITTEE
12:30-4:00 pm — President's Suite (H)

HP JOURNAL EDITORIAL BOARD
3:00-5:00 pm — Room 316 (CC)

Sunday, 13 July 2014

HPS BOARD OF DIRECTORS
8:00 am-5:00 pm — Paca (H)

NRRPT
8:30 am-4:30 pm — Stadium 1-2 (Marriott)

AAHP EXECUTIVE COMMITTEE
8:30 am-5:00 pm — Douglass (H)

PROGRAM COMMITTEE
11:00 am-2:00 pm — Room 304 (CC)

HPS BOARD LUNCH
Noon-1:30 pm — Brent (H)

ACCELERATOR SECTION AWARDS COMMITTEE
4:30-6:30 pm — Peale A (H)

Monday, 14 July 2014

INTERNATIONAL VISITOR RECEPTION (HOSTED BY ICC)
7:30-8:15 am — Room 313 (CC)

ACCELERATOR SECTION BOARD MEETING
7:30-8:45 am — Douglass (H)

HP JOURNAL EDITORS MEETING
8:00-9:30 am — Marshall (H)

NRRPT
8:30 am-4:30 pm — Stadium 1-2 (Marriott)

ANSI N13.65 COMMITTEE
9:00 am-Noon — Calloway (H)

HISTORY COMMITTEE INTERVIEWS
9:00 am-3:00 pm — Stone (H)

PROFESSIONAL DEVELOPMENT SCHOOL COMMITTEE
10:30 am-Noon — Marshall (H)

PUBLIC INFORMATION COMMITTEE
12:30-1:30 pm — Blake (H)

MEDICAL HP SECTION BOARD MEETING
12:30-2:00 pm — Hopkins (H)

INTERSOCIETY RELATIONS COMMITTEE
1:30-2:30 pm — Douglass (H)

CHAPTER COUNCIL MEETING
1:30-2:30 pm — Room 307 (CC)

ANSI N42.37
2:00-4:00 pm — Paca (H)

HISTORY COMMITTEE
2:00-4:00 pm — Calloway (H)

NOMINATING COMMITTEE
2:00-4:00 pm — Blake (H)

SECTION COUNCIL MEETING
2:30-3:30 pm — Room 306 (CC)

N13.64 MANAGEMENT OF RADIOLOGICALLY CONTAMINATED WOUNDS
4:00-5:30 pm — Brent Room (H)

HPS/AAPM JOINT MEETING
5:00-6:00 pm — Poe (H)

STUDENT/MENTOR RECEPTION
5:30-7:00 pm — Paca (H)

OSU RECEPTION
6:00-7:30 pm — Hopkins (H)

HPS INSTRUMENTATION COMMITTEE
6:00-8:00 pm — Blake (H)

Tuesday, 15 July 2014

PURDUE ALUMNI BREAKFAST
7:00-9:00 am — Douglass (H)

COMMITTEE CHAIR BREAKFAST
7:30-8:30 am — Holiday 1 (H)

NRRPT
8:30 am-4:30 pm — Stadium 1-2 (Marriott)

Committee Meetings

HISTORY COMMITTEE INTERVIEWS
9:00 am-3:00 pm Stone (H)

PRESIDENT'S MEETING WITH COMMITTEE CHAIRS
9:00 am-5:00 pm VIP Lounge (CC)

ACADEMIC EDUCATION COMMITTEE (AEC) MEETING/PROGRAM DIRECTORS MEETING
Noon-2:00 pm Paca (H)

INTERNATIONAL COLLABORATION COMMITTEE
Noon-2:00 pm Tilghman (H)

SCIENCE SUPPORT COMMITTEE
Noon-2:00 pm Hopkins (H)

STUDENT SUPPORT COMMITTEE
1:30-2:30 pm Brent (H)

DOE WORKSHOP
2:00-5:00 pm Holiday 3 (H)

ANSI N13.8
2:15-3:15 pm Room 306 (CC)

GOVERNANCE TASK FORCE
2:15-4:15 pm Hopkins (H)

NCRP MEETING
2:15-6:00 pm Tilghman (H)

NIR MEETING
3:00-4:00 pm Paca (H)

ANSI N42.54 COMMITTEE
3:00-6:00 pm Brent (H)

CSU RECEPTION - ALL ARE WELCOME
6:00-7:30 pm Holiday 1 (H)

Wednesday, 16 July 2014

ANSI N13.1 REVISION
9:00 am-Noon Douglass (H)

ANSI N42.17 A AND C COMMITTEE
8:15-11:45 am Tilghman (H)

HISTORY COMMITTEE INTERVIEWS
9:00 am-3:00 pm Stone (H)

DOE WORKSHOP
9:00 am-5:00 pm Holiday 3 (H)

LEADERSHIP MEETING
11:00 am-Noon VIP Lounge (CC)

AEC/STUDENT BRANCH MEETING
Noon-1:00 pm Paca (H)

SOCIETY SUPPORT COMMITTEE
Noon-2:00 pm Douglass (H)

STANDARDS COMMITTEE
Noon-3:30 pm Tilghman (H)

CONTINUING EDUCATION COMMITTEE
1:00-2:00 pm Marshall (H)

MEMBERSHIP COMMITTEE MEETING
1:00-2:00 pm Hopkins (H)

PRESIDENT'S MEETING WITH SECTION CHAIRS
1:00-5:00 pm VIP Lounge (CC)

AEC/ACADEMIC EDUCATION COMMITTEE MEETING
2:00-4:00 pm Paca (H)

SCIENTIFIC AND PUBLIC ISSUES COMMITTEE
2:30-4:00 pm Hopkins (H)

ASK THE EXPERTS EDITORS MEETING
2:45-4:30 pm Marshall (H)

Thursday, 17 July 2014

HP MILITARY SECTION BOARD MEETING
7:00-8:30 am Tilghman (H)

HPS FINANCE AND EXECUTIVE COMMITTEES
8:00-10:00 am Stadium 4 (Marriott)

LOCAL ARRANGEMENTS COMMITTEE
9:00-10:00 am Room 305 (CC)

HISTORY COMMITTEE INTERVIEWS
9:00 am-3:00 pm Stone (H)

ANSI N13.1 REVISION
9:00 am-4:00 pm Douglass (H)

HPS BOARD OF DIRECTORS MEETING/ LUNCH
11:45-2:15 pm Stadium 1 (Marriott)

PROGRAM COMMITTEE LUNCH
12:30-2:00 pm Room 304 (CC)

IRPA
1:00-5:00 pm Key Ballroom 3 (H)

Friday, 18 July 2014

IRPA GENERAL SESSION
8:00 am-5:00 pm Key Ballroom 1-3 (H)

Business Meetings

Hilton Baltimore (H), Convention Center (CC)

Tuesday, 15 July 2014

11:00 AM **Room 302 (CC)**
Accelerator Section Business Meeting

12:15 PM **Room 310 (CC)**
Medical Health Physics Section Business Meeting

5:15 PM **Room 307 (CC)**
AAHP Open Meeting

Wednesday, 16 July 2014

11:45 AM **Rooms 302-303 (CC)**
Power Reactor Section Business Meeting

5:30 PM **Rooms 302-303 (CC)**
HPS Business Meeting

Thursday, 17 July 2014

10:45 AM **Room 310 (CC)**
Decommissioning Section Business Meeting

11:45 AM **Rooms 302-303 (CC)**
Military Section Business Meeting

11:45 AM **Rooms 309 (CC)**
Environmental Radon Section Business Meeting

4:30 PM **Room 307 (CC)**
RSO Section Business Meeting

4:45 PM **Rooms 302-303 (CC)**
Homeland Security Business Meeting

There will be a Concession Stand
in the Exhibit Hall
for Cash & Carry food options
Tuesday, 9:30 am-3:00 pm
Wednesday 9:30 am-Noon

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.

MONDAY

7:00-8:00 AM **Room 301**
CEL1 The 1976 Hanford Americium Accident – Then and Now
Eugene H. Carbaugh, CHP

7:00-8:00 AM **Room 308**
CEL2 ANSI N43.1, Radiation Safety for the Design and Operation of Particle Accelerators
L. Scott Walker

8:15 AM - 12:20 PM **Ballroom II**

MAM-A: Plenary Session

Chair: Darrell Fisher

8:15 AM **MAM-A.1**
Introduction and Welcome
Fisher, D.
President, Health Physics Society

8:25 AM **MAM-A.2**
Welcome to Baltimore
Baltimore Official

8:35 AM **MAM-A.3**
Regulatory Perspectives on Radiation Protection
Macfarlane, A.
NRC

9:30 AM **MAM-A.4**
Power Reactor Radiation Safety: The First 50 Years and Beyond
Andersen, R.L. (Landauer Lecturer)
Nuclear Energy Institute

10:15 AM **BREAK**

10:45 AM **MAM-A.5**
Low Dose Radiobiology Studies and Radiation Dose Limits: Is the Knowledge Gap Narrowing?
Zimbrick, J.D. (Dade Moeller Lecturer)
Colorado State University

11:15 AM **MAM-A.6**
What Kind of Lessons of Radiation Protection Have We Learned from Serious Radiation and Nuclear Accidents? - Fukushima Daiichi NPP Accident and Other Disasters
Kosako, T. (G. WIlliam Morgan Lecturer)
The University of Tokyo

Noon **MAM-A.7**
Implementing the Radiation Protection System - IRPA's Role and Perspective
Czarwinski, R.
IRPA

12:20 - 1:30 PM **Exhibit Hall**

Complimentary Lunch in Exhibit Hall

featuring:

Is There a Dose of Radiation That is Not Dangerous?

Debate moderated by:
William F. Morgan

Speakers:
Jerome Puskin (Negative)
Antone Brooks (Affirmative)

Come listen while you dine

1:00 PM - 3:00 PM **Exhibit Hall**

P: Poster Session

Academic Institutions

P.1 An Improved Cabinet X-ray Unit Design for use by Rutgers University School of Dental Medicine Students
Thelin, L., Polhemus, D., Neti, V., McIntosh, J., McDermott, P.
Rutgers University, Newark

Accelerator Health Physics

P.2 Technetium-99 Contamination Event at Lujan Center, LA-UR-14-20794
Duran, M., Hoover, P., Gonzalez, D., Lovato, L.
LANS LLC, LANL

P.3 Radiation Field in Therapy Room of Heavy Ion Medical Machine
*Youwu, S., Junkui, X., Wuyuan, L.**
Institute of Modern Physics, Chinese Academy of Sciences

P.4 Production of Cu-67 Using Linear Accelerator
KC, B., Starovoitova, V., Wells, D.
Idaho Accelerator Center, Idaho State University

P.5 Radiation Shielding Analysis of the IEC Fusion Reactor at Virginia Commonwealth University
Harper, P., Sinha, V., Massey, C., Giffen, M., Torres, W., Miller, J., Bilbao y León, S.
Virginia Commonwealth University

Department of Energy Facilities

P.7 The LANL Electronic Radiological Access Control System
*Thompson, K., George, G., Lee, M., Costigan, S.**
Los Alamos National Laboratory

P.8 The Los Alamos National Laboratory Radioactive Sealed Source Database Management System
Mounir, M., Estrada, G., Lebya, V., Rowlison, K.
Los Alamos National Laboratory

Environmental Monitoring

P.9 Radioactivity Studies on Farm Raised and Mississippi River Catfish
Dorsey, L., Green, I., Reese, M., Billa, J., Han, F., Ankrah, M., Adzanu, S.
Alcorn State University, Jackson State University, St. Catherine College

P.10 Qualitative Analysis of NORM Activity Levels in Sludge Samples Collected from a Paper Mill
Laing, R., Mensah, C., Billa, J., Adzanu, S., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

P.11 Characteristics of Airborne Particulates Containing Naturally Occurring Radioactive Materials in Coal-Fired Power Plants
Kim, S., Lim, H., Choi, C., Choi, W., Kim, K.
KyungHee University, Korea Institute of Nuclear Safety

P.12 Residential Radon Concentration Study: Assessment of Spring and Summer Radon Concentration in Rural Mississippi
Tsorxe, I., Brempong, O., Thompson, C., Billa, J., Adzanu, S., Han, F., Ankrah, M.
Alcorn State University, Jackson State University, St. Catherine College

P.13 Assessment of Radon Levels in Water Wells on Alcorn State University Campus
Dordor, M., Pitman, J., Billa, J., Adzanu, S., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

P.14 Concentrations of Radioactive Cesium and Strontium in Wild Animal Meat and Bone
Nabeshi, H., Tsutsumi, T., Hachisuka, A., Matsuda, R., Teshima, R.
National Institute of Health Sciences, Japan

P.15 The Development of a New Groundwater Monitoring CARH
Umezawa, K., Kato, M., Tanabe, T., Wada, T., Yamaguchi, K.
Fukushima University, Japan Atomic Energy Agency

P.16 Relating Radiation Dose to Effect: The Importance of Accurate Dosimetry in Assessing the Impact of Radioactivity on Non-Human Biota
Caffrey, E., Higley, K., Ruedig, E.
Oregon State University, Colorado State University

P.17 Investigating Photon Propagation from Extractive Scintillating Resin in Flow Cell Detectors to Optimize Light Collection Efficiency
Meldrum, A., Seliman, A., Bliznyuk, V., DeVol, T., Husson, S.
Clemson University

P.18 Time Series Analysis of Indoor Radon Concentrations along Fault Line of Muzaffarabad
Shafique, B., Rafique, M., Kearfott, K.
University of Azad Jammu & Kashmir, University of Michigan, Ann Arbor

P.19 Appraisal and Risk Analysis of Soil Radon Gas in Geohazard Zones of Muzaffarabad
Tareen, A., Rafique, M., Kearfott, K.
University of Azad Jammu & Kashmir, University of Michigan, Ann Arbor

P.21 A Comparison of Environmental Modelling Approaches on the Case-study of the Chalk River Laboratories Site
Tzivaki, M., Graham, H., Waller, E.
University of Ontario Institute of Technology

P.22 Evaluation of the Re-readability Characteristic of the Optically Simulated Luminescence Dosimeters
Poudel, D., Brey, R., Guilmette, R.A., Krage, E.
Idaho State University

P.23 A Comprehensive Study of Phosphorus Slag Exposure Rates in Eastern Idaho
Krage, E., Tabatadze, G., Gesell, T., Brey, R.
Idaho State University

P.24 Radiological Assessment of Soils and Water Collected Near a Coal Mining Facility
Didla, S., Atkins, M., Billa, J., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

P.25 Mobility of Isotopes from the Terrestrial Environment to Vegetation
Carradine, M., Dimpah, J., Billa, J., Adzanu, S., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

External Dosimetry

P.26 The Influence of Wearing Method of the Personal Dosimeter in the Measurement of Individual Dose from Environmental Radiation
Ohba, T., Miyazaki, M., Hasegawa, A., Yusa, T., Ohtsuru, A.
Fukushima Medical University, Japan, Fukushima Medical University Hospital, Japan

P.27 VARSKIN 5: A Computer Code for Skin Contamination Dosimetry
Saba, M.
US NRC

P.28 Occupational Exposure of Radiation Workers
*Oh, S., Kim, M., Lee, S., Seo, K., Kim, K.**
Kyung Hee University, Korea Institute of Nuclear Safety

Instrumentation

P.29 Techniques for Leak Measurement of the Medical Diagnostic X-Ray Machine
Yeh, C., Yuan, M., Fang, H.
Associate Reserarcher

P.30 A Novel Monte Carlo Algorithm for Solving the True Coincident Counting Issues in Monte Carlo Simulations for Gamma Spectroscopy
Guan, F., Johns, J., Vasudevan, L., Zhang, G., Poston, Sr., J., Braby, L., Mohan, R.*
The University of Texas MD Anderson Cancer Center, Texas A&M University, Shanghai Institute of Applied Physics

Internal Dosimetry

P.31 Evaluation of Sr-90 Intravenously Injected Non-Human Primate Using ICRP 78 Model
Krage, E., Brey, R., Poudel, D.
Idaho State University

P.33 Plutonium Retention in Liver and Skeleton: Differences between ICRP Model and Non-human Primate Data
Poudel, D., Brey, R., Guilmette, R.
Idaho State University

P.34 A Small-Scale Dosimetry Model for the Testicles and its Application in Radiobiology and Radiation Protection
Meerkhan, S., Larsson, E., Sjögreen-Gleisner, K., Strand, S., Jönsson, B.
Department of Medical Radiation Physics, Sweden

Medical Dosimetry

P.35 A Novel Correction Method for Effective Dose in the Point Dose Method: A Case Study - Parathyroid CT Scans
Januzis, N., Nguyen, G., Hoang, J., Lowry, C., Yoshizumi, T.
Duke University

P.36 Radiation Doses from Intraoral Dental Radiography Calculated by Monte Carlo Simulations
Kim, K., Park, I., Kim, K.
Kyung Hee University

P.37 Calculation of Radiation Dose in Adults undergoing Abdominal Computed Tomography for Diagnosing Acute Appendicitis
*Park, I., Park, J., Kim, K.**
Kyung Hee University

P.38 Use of Optically Stimulated Luminescent Dosimeters for Experimental Validation of a Fluoroscopic Skin Dose Mapping Software
Tran, T., Borrego, D., Siragusa, D., Bolch, W.
University of Florida

Medical Health Physics

P.39 Radiation Shielding Design of Heavy Ion Medical Machine
Li, W., Su, Y., Xu, J., Xu, C., Pang, C., Mao, W., Yan, W., Yuan, J.
Institute of Modern Physics,Chinese Academy of Sciences

Radiation Effects

P.41 Assessment of Indoor Gamma Radiation Dose in Saudi Arabia
Allehyani, S.
Umm Al-Qura University

P.42 Radiation Effect on the Cathode Morphology of Lithium-Ion Battery
*He, D., Qiu, J., Cao, L.**
Ohio State University

P.43 The Frequency of Erythrocytes with Micronuclei and Morphological Anomalies of the Nucleus in the Peripheral Blood of Fish Inhabiting Radioactively Contaminated Techa River
Shaposhnikova, I., Tryapitsyna, G., Styazhkina, E., Osipov, D., Rudolfsen, G., Pryakhin, E., Akleyev, A.
Urals Research Center for Radiation Medicine, Chelyabinsk, Russia, 3NRPA, Norway

P.44 The Effect of Radiation Exposure on the Number of the Peripheral Blood Cells in Fish of the Techa River
Tryapitsyna, G., Osipov, D., Pryakhin, E., Rudolfsen, G., Akleyev, A.*
Urals Research Center for Radiation Medicine and Chelyabinsk State University, Norwegian Radiation Protection Authority and University of Tromsø

P.45 Cerebrovascular Diseases in the Extended Mayak Workers Cohort 1948 – 1982
Azizova, T., Haylock, R., Moseeva, M., Bannikova, M., Grigoryeva, E.*
Southern Urals Biophysics Institute, Public Health England

P.46 The Effect of Radiation Dose in the Germination of Seeds
Gautam, B., Kunze, J.
Idaho State University

Radiobiology (Biological Response)

P.47 Effect of Radiation and Non-Radiation Factors on the Sex Ratio in Offspring of the Population Exposed at the Techa River
Pastukhova, E., Shalaginov, S., Akleyev, A.
Urals Research Center for Radiation Medicine, Russia

P.48 The Study of Association of Interleukin Gene Polymorphisms with Cancer in People Exposed to Chronic Irradiation
Donov, P., Urzhumov, P., Blinova, E., Akleyev, A.
Urals Research Center For Radiation Medicine, Chelyabinsk State University

Risk Assessment

P.49 Radiological Implications of Road Construction Materials to Workers
Asowata, D., Dotson, K., Billa, J., Tsorxe, I., Adzanu, S., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

P.50 Radioactivity Studies on Selected Tobacco Products Commonly used in the US
Quaye, D., Antwi-Boasiako, A., Billa, J., Adzanu, S., Ankrah, M., Han, F.
Alcorn State University, St. Catherine College, Jackson State University

P.51 Radioactivity Studies on Local and Imported Food Products
Moore, D., White, A., Tsorxe, I., Billa, J., Adzanu, S.
Alcorn State University

Waste Management

P.52 Radiological Safety Aspects of Spallation Target in Designed China Accelerator Driven Systems
Luo, P.
Institute of Modern Physics, Chinese Academy of Sciences

Works-In-Progress

P.53 Extension of Past Work on Precision of Measurements in Paired Counting
Potter, W.E., Strzelczyk, J.
Independent Researcher, Independent Consultant

P.54 Electron Paramagnetic Study of Fingernails Exposed to Ultraviolet Light
Sholom, S., McKeever, S.W.S.
Oklahoma State University

P.55 A Comparison of the RESRAD Code and the EPA PRG Calculator for Cancer Risk Calculations for Radionuclides
Cheng, J-J., Yu, C., Picel, M.H.
Argonne National Laboratory

P.56 Enhanced Capability of the RESRAD-BIOTA Code Used for the IAEA MODARIA Biota Working Group's Fukushima Dynamic Modeling Scenario
Kamboj, S., LePoire, D., Wang, C., Cheng, J.-J., Yu, C.
Argonne National Laboratory

P.57 Environmental Data Sharing During Radiological Emergencies: A Collaboration Effort between Local, State and Federal Radiation Programs
Salame-Alfie, A., Fordham, E.W., Day, J., Mulligan, P.I., Foster, K., DeCair, S.
Conference of Radiation Control Program Directors (CRCPD), State of Washington, Los Angeles County, California, State of New Jersey, State of Illinois, US Environmental Protection Agency

P.58 Microdosimetry of Iodine-124 in Thyroid Using a Three-Dimensional Voxelized Human Phantom: A Monte Carlo Study
Tabriz, M., Chelikani, S., Zubal, G., French, C.
University of Massachusetts, Lowell, Yale University

P.59 Recently Added Capabilities to the RESRAD-OFFSITE Code
Gnanapragasam, E.K., Yu, C., Abu-Eid, B., McKenney, C.I., Schwartzman, A.
Argonne National Laboratory, Nuclear Regulatory Commission

P.60 P-32 Radiobioassay and Internal Dose Assessment
Yoon, S.W., Pak, M.J., Park, S.Y., Yoo, J.R., Ha, W.H., Jang, H.K.
Korea Institute of Radiological and Medical Sciences, Korean Association for Radiation Application

3:00 - 5:00 PM Ballroom II

MPM-A: NRC - Revisions to NRC Regulations for Radiation Protection, 10CFR Part 20 and 10CFR Part 50 Appendix A Special Session

Co-Chairs: Donald Cool, Cindy Flannery

3:00 PM MPM-A.1
Issues for Revision of NRC Radiation Protection Regulations
Cool, D.A.
NRC

3:15 PM MPM-A.2
Is It Time to Update NRC's Regulations for Radioactive Effluents?
Conatser, R.L.
NRC

3:30 PM MPM-A.3
Industry Response to USNRC 10CFR20 Advanced Notice of Proposed Rulemaking
Anderson, E.
NEI

3:45 PM MPM-A.4
AAPM Comments on the Revisions to the U.S. Nuclear Regulatory Commission's Radiation Protection Regulations (10 CFR Part 20)
Fairobent, L.
AAPM

4:00 PM MPM-A.5
Q&As - Facilitated Discussion
NRC

3:00 - 5:00 PM Room 307

MPM-B: Risk Assessment

Co-Chairs: Jason Harris, LaVon Rutherford

3:00 PM MPM-B.1
The Foundation of Radiation Safety Standards and a Look to the Future
Raabe, O.
University of California, Davis

3:15 PM **MPM-B.2**
Development of a Nuclear Power Plant Potential Risk Index (NPP PRI)
*Kyne, D., Harris, J.**
Arizona State University, Idaho State University

3:30 PM **MPM-B.3**
MILDOS-AREA Verification
Biwer, B., LePoire, D., Kamboj, S., Chang, Y., Giebel, S., Watson, B.
Argonne National Laboratory, US Nuclear Regulatory Commission

3:45 PM **MPM-B.4**
A Review of Radiation Doses at Oil Extraction Sites
Shatila, O., Johnson, T.
Colorado State University

4:00 PM **MPM-B.5**
Model-Model Intercomparison of Risk Assessment at an In Situ Recovery Uranium Mine Located in Wyoming, USA
Ruedig, E., Borch, T., Bhattacharyya, A., Johnson, T.
Colorado State University

4:15 PM **MPM-B.6**
Comparison of the MACCS2 Atmospheric Transport Model with Lagrangian Puff Models as Applied to Deterministic and Probabilistic Safety Analysis
Till, J., Rood, A., Garzon, C., Lagdon, Jr., R.*
Risk Assessment Corporation, K-Spar Inc., US Department of Energy

4:30 PM **MPM-B.7**
Assessing Risk Factors in Choosing Options for Blood Irradiators
Moore, G.
Monterey Institute of International Studies, James Martin Center for Nonproliferation Studies

4:45 PM **MPM-B.8**
Radiological Risks Connected with Remediation of Nuclear Legacy Site at NWC SevRAO (Andreeva Bay STS)
Shandala, N., Kiselev, S., Aladova, R., Kruchkov, V., Bobrov, A., Bogdanov, L., Sneve, M., Grachev, M.
FMBC of A.I. Burnozyana FMBA of Russia, NRPA

3:00 - 5:00 PM **Room 315**

MPM-C: Special Session: Science Support Committee

Co-Chairs: Elaine Marshall, Jan Braun

3:00 PM **MPM-C.1**
Nuts and Bolts of Science Teacher Workshops, and More! Presented by the Science Support Committee
Marshall, E., Braun, J.
Science Support Committee

3:15 PM **MPM-C.2**
Science Teacher Workshop: North Central Chapter Experience
Lewandowski, M.
3M

3:30 PM **MPM-C.3**
Science Teacher Workshop: Cincinnati Radiation Society (Chapter) Experience
Draper, D.
Dade Moeller & Associates

3:45 PM **MPM-C.4**
Science Teacher Workshop: South Texas Chapter Experience
Krieger, K.
Radiation Technology, Inc.

4:00 PM **MPM-C.5**
Science Teacher Workshop: Teacher Experience
Cole, R.
2011 Eichholz Award Winner

4:30 PM **MPM-C.6**

A Simple Method for Interfacing CDV-700 Civil Defense Meters to Computers for Classroom Use

Cole, R.

2011 Eichholz Award Winner

4:45 PM **MPM-C.7**

A Simulated Decay Lab Utilizing Toothpicks and Floor Tiles

Cole, R.

2011 Eichholz Award Winner

3:00 - 5:00 PM **Room 309**

MPM-D: Nanotechnology Special Session

Co-Chairs: Lorraine Day, Mark Hoover

Nanotechnology and Radiation Protection

Marceau-Day, M.L., Hoover, M., Cash, L., Walker, L.S., Sajo, E.

Louisiana State University, National Institute for Occupational Safety and Health, Los Alamos National Laboratory, Brookhaven National Laboratory, University of Massachusetts at Lowell

3:00 - 4:15 PM **Room 310**

MPM-E: Air Monitoring

Co-Chairs: Tony Mason, John Glissmeyer

3:00 PM **MPM-E.1**

Integrating Modeling and Physical Testing for Assessing Filtered Exhaust Stack Sampling Probe Location

Yu, X., Recknagle, K., Glissmeyer, J., Barnett, J.M.*

Pacific Northwest National Laboratory

3:15 PM **MPM-E.2**

Forty Years Experience Monitoring Ar-41 and H-3 Gaseous Effluents at the National Bureau of Standards Research Reactor

Barvitskie, T., Brown, D., Tracy, J., Johnston, T., Clement, R.

National Institutes of Standards and Technology

3:30 PM **MPM-E.3**

Chemical Integrated Modules for Bioassay Analysis - A New Software Tool for Bioassay Monitoring of Workers Exposed to Nanophase Aerosols

Godwin, W., Jenkins, C., Birchall, A., Bolch, W.

University of Florida, Air Force Research Laboratory, Public Health England

3:45 PM **MPM-E.4**

Improvements in On-Site Radionuclide Characterization Using High Resolution Detector Technologies

Cunningham, S., Duff, C., Pym, A.*

eV Products, Kromek

4:00 PM **MPM-E.5**

Estimation of Environmental Outdoor Gamma Dose Rates Using Thermoluminescent Dosimeters in Poonch Division of Azad Kashmir

Rafique, M., Akhtar, J., Ahmad, K., Khan, A., Saeed, R., Rahman, S., Kearfott, K.

University of Azad Jammu & Kashmir, PINSTECH, NORI Hospital, University of Michigan Ann Arbor

3:00 - 5:20 PM Room 314

MPM-F: Special Session: Non-Intrusive Inspection Systems for Homeland Security

Chair: Siraj Khan

3:00 PM MPM-F.1

Dose Determinations in Unusual Situations: NIST Radiation Dosimetry Efforts in Homeland Security Applications

Bergstrom, P., Bateman, F., Cerra, F., Glover, J., Hudson, L., Minniti, R., Mitch, M., Seltzer, S., Tosh, R.

NIST

3:20 PM MPM-F.2

Radiation Safety Aspects for Photon-Based Cargo Inspections

Jones, J.L., Cuff, T., Norman, D., (presented by Sandvig, M.)

J.L. Jones Consulting, Consultant, Idaho National Laboratory

3:40 PM MPM-F.3

Non-Intrusive Inspection Techniques using Continuous Wave Bremstrahlung

Korbly, S., Bertozzi, W., Costales, J., Danagoulian, A., Franklin, W., Ledoux, R., Niyazov, R., Wilson, C.

Passport Systems

4:00 PM MPM-F.4

Application of Intense, Single-Pulse Bremsstrahlung to the Problem of Finding Fissile Material

*Commisso, R., Apruzese, J., Copperstein, G., Hinshelwood, D., Jackson, S., Mosher, D., Phlips, B., Hutcheson, A., Hunt, A., Larsen, Z., Zier, J.C.**

Naval Research Laboratory, Idaho State University

4:20 PM MPM-F.5

Scoping Study for Intense, Single-Pulse, Neutron-Based Active Interrogation

Jackson, S., Apruzese, J., Commisso, R., Schumer, J., Zier, J.

Naval Research Laboratory

4:40 PM MPM-F.6

SNM, Explosives and Other Contraband Detection in NII Systems Utilizing Fast Neutrons

*King, M., Strellis, D.**

Rapiscan Laboratories, Inc.

5:00 PM MPM-F.7

Active Interrogation and Material Discrimination in NII Systems at X-Ray Source Energies above 10 MV

*Langeveld, W., Strellis, D.**

Rapiscan Laboratories, Inc.

3:00 - 4:00 PM Rooms 302-303

MPM-G: Dose Reconstruction

Co-Chairs: Brant Ulsh, Grady Calhoun

3:00 PM MPM-G.1

Investigation of Crew Member Postures for Space Radiation Dosimetry

Zieb, K., Gao, Y., Caracappa, P., Xu, G., Lee, K.

Rensselaer Polytechnic Institute, NASA

3:15 PM MPM-G.2

Thyroid Doses Due to Iodine-131 Intakes among Chernobyl Clean-up Workers

Drozdovitch, V., Kryuchkov, V., Chumak, V., Bakhanova, E., Bouville, A.

National Cancer Institute, Burnasyan Federal Medical Biophysical Centre, Russia, National Research Centre for Radiation Medicine, Ukraine, National Cancer Institute, USA (retired)

3:30 PM MPM-G.3

Aviation Crewmembers and a Consequence of Radiation Work

Shonka, J., Bramlitt, E.

SRA

3:45 PM MPM-G.4

Aviation Crewmembers and Unrecognized Sources of Radiation Exposure

*Bramlitt, E., Shonka, J.**

SRA

TUESDAY

7:00-8:00 AM **Room 301**

CEL3 Radiation Safety's Role in Mitigating the "Insider Threat" Risk
Robert Emery
University of Texas School of Public Health

7:00-8:00 AM **Room 308**

CEL4 Working with the Media on Radiation-Related Stories
Andrew Karam

8:30 -11:00 AM **Room 302**

TAM-A: Accelerator Health Physics Part I

Co-Chairs: Michael Sandvig, L. Scott Walker

8:30 AM **TAM-A.1**

Crafting Fault Studies for Accelerator Shielding Validation
Walker, L.S., Benmerrouche, M.
Brookhaven National Laboratory

8:45 AM **TAM-A.2**

Radiation Transport Through Beam Enclosure Penetrations
Degtiarenko, P., Hamlette, D., Jefferson, J., Kharashvili, G., Vylet, V., Washington, M., Welch, K.*
Jefferson Lab

9:00 AM **TAM-A.3**

Ionizing Radiation from Lasers at SLAC
Bauer, J., Liu, J., Sayed, R., Liang, T.
SLAC National Accelerator Laboratory, Georgia Institute of Technology

9:15 AM **TAM-A.4**

Comparison of Booster Fault Study Result with FLUKA Monte Carlo Simulation
Xia, Z., Job, P., Ghosh, V., Popescu, R., Kramer, S., Benmerrouche, M., Lee, R.
Brookhaven National Lab

9:30 AM **TAM-A.5**

NSLS-II Booster Commissioning Fault Studies
Walker, L.S., Benmerrouche, M., Zafonte, F., Lee, R.
Brookhaven National Laboratory

9:45 AM **TAM-A.6**

Predictions of Dose Rates from Accelerator Operations Using Reaccelerated Rare Isotope Beams
Ronningen, R.
Michigan State University

10:00 AM **BREAK**

10:30 AM **TAM-A.7**

Extension of ARCHER Monte Carlo Code to Health Physics Dosimetry and Shielding Design: Preliminary Results
Du, X., Liu, T., Su, L., Caracappa, P., Xu, G.
RPI

Again this Year!

Tuesday, 10:00-11:30 am ***Room 301 (CC)***

Workshop: Publishing in Health Physics and Operational Radiation Safety

Speakers: Mike Ryan, Deanna Baker, Craig Little, MaryGene Ryan

A workshop geared towards first-time authors who are interested in publishing but are uncertain of the process. There will be a tutorial as well as presentations from both Editors-in-Chief. This workshop will answer many questions regarding the flow of a manuscript from submission to publication. This is also a good refresher for authors who have already published with HPJ or ORS but would like to have a better understanding of the process.

10:45 AM **TAM-A.8**
Measurement of Radiation Doses along Linac Coherent Light Source Undulators
Cimeno, M., Field, R.C., Mao, S., Tran, H., Liu, J., Nunh, H.
SLAC

11:00 AM **Accelerator Section Business Meeting**

8:30 - 11:30 AM **Room 303**

TAM-B: International Collaboration Committee (ICC) Special Session: Recovery from Large Scale Nuclear Contamination - What Have We Learned? Part I

Co-Chairs: Mike Boyd, Masood Inayat

8:30 AM **Keynote**
The ICRP's Experience with Long-Term Recovery Efforts
Lochard, J.
ICRP Main Commission

9:00 AM **Welcome**
Welcome and Introduction of Professor Liu
HPS President Darrell Fisher

9:05 AM **Presentation**
Liu, K.
Chinese Society of Radiation Protection (CSRP)

9:30 AM **TAM-B.1**
The NEA's Experience Assisting with Long Term Recovery Efforts in Japan
Lazo, T.
OECD/Nuclear Energy Agency

10:00 AM **BREAK**

10:30 AM **TAM-B.2**
From TMI and Chernobyl to Fukushima: What Have We Learned about Recovery?
Boyd, M.
US Environmental Protection Agency

11:00 AM **TAM-B.3**
Experiences from the Fukushima Ambassador Program – A Presentation and Discussion by Colorado State University Students who Visited Fukushima in 2014
Martinez, N., Gillis, J.
Colorado State University

8:30 - 11:45 AM **Room 307**

TAM-C: AAHP Special Session: New Frontiers in Radiation Risk Communication

Co-Chairs: Ray Johnson, Steven M. Becker

8:30 AM **Introduction**
Johnson, R., Becker, S.

8:45 AM **TAM-C.1**
Social Neuroscience Insights for Building Relationships During Radiation Risk Communications
Petcovic, L.
3rd Order Communications LLC

9:15 AM **TAM-C.2**
Deficiencies in Counseling Education and Methodology
Brent, R.
Alfred I. duPont Hospital for Children

9:45 AM **TAM-C.3**
The Memetics of Radiation Protection
Toohey, R.
M.H. Chew & Assoc.

10:15 AM **BREAK**

10:45 AM **TAM-C.4**
Risk Communication and the Nuclear Safety Culture
Locke, P.
Johns Hopkins Bloomberg School of Public Health

11:15 AM **TAM-C.5**
Public Information and Radiation Emergency Risk Communication: Continuing Lessons from Fukushima Dai-ichi
Becker, S.
Old Dominion University

8:30 AM - Noon **Room 308**

TAM-D: Special Session: Atomic Bomb Survivors—Review of Dose-Related Factors for the Evaluation of Residual Exposures at Hiroshima and Nagasaki

Co-Chairs: Isaf Al-Nabulsi, Masaharu Hoshi

8:30 AM **TAM-D.1**

Overview of Residual Radiation Exposures to Neutron Activation Products at Hiroshima and Nagasaki

Kerr, G.

Kerr Consulting

8:45 AM **TAM-D.2**

The Time-Dependent Exposure Rate Conversion Factor for the Neutron Activation Fallout at Hiroshima

Spriggs, G.

Lawrence Livermore National Laboratory

9:00 AM **TAM-D.3**

Identification of Dosimetry Issues for Resolving or Bounding Residual Radiation Doses Using a Similar Approach as the Atomic-Bomb Dosimetry System's Success with Initial Radiation

Egbert, S.

LEIDOS Corporation

9:15 AM **TAM-D.4**

The Hiroshima and Nagasaki Samples and Analysis for the Dose Calculation from Residual Radioactivities

Hoshi, M., Sakaguchi, A., Takatsuji, T., Ohtaki, M.

Hiroshima University, Japan, Nagasaki University, Japan

9:30 AM **TAM-D.5**

Reconstruction of Beta-Particle and Gamma-Ray Doses from Neutron-Activated Soil at Hiroshima and Nagasaki

Weitz, R.

LEIDOS Corporation

9:45 AM **TAM-D.6**

Evaluation of Residual Exposure at Hiroshima and Nagasaki: Possibility of the Measurements of Beta-Particle Dose Using the Retrospective Luminescence Dosimetry Technique

Stepanenko, V., Kolyzshenkov, T.V., Dubov, D.V., Ohtaki, M., Hoshi, M.

Federal State Institution (Medical Radiological Research Center) Ministry of Health of Russian Federation, Hiroshima University, Japan

10:00 AM **BREAK**

10:30 AM **TAM-D.7**

Calculation of Contact Beta-Particle Exposure of Biological Tissue from the Residual Radionuclides in Hiroshima

Orlov, M., Stepanenko, V.F., Belukha, I.G., Ohtaki, M., Hoshi, M.*

Federal State Institution (Medical Radiological Research Center) Ministry of Health of Russian Federation, Russian Federation, Hiroshima University, Japan

10:45 AM **TAM-D.8**

Physical and Biological Parameters Governing Contribution of Residual Radiations from Neutron-Activated Radionuclides to Dose Received by Atomic-Bomb Survivors

Eckerman, K.

Oak Ridge National Laboratory

11:00 AM **TAM-D.9**

Effects of Fallout Rain on Mortality and Cancer Incidence among the Life Span Study of Atomic-Bomb Survivors

Grant, E., Sakata, R., Cullings, H., Ozasa, K.

Radiation Effects Research Foundation, Japan

11:15 AM **TAM-D.10**

Effect of Distance from Hypocenter at Exposure on Solid Cancer Mortality among Hiroshima Atomic-Bomb Survivors with Very Low Initial Radiation Dose in the Dosimetry System 1986 (DS86)

Ohtaki, M., Otani, K., Tonda, T., Sato, Y., Hara, N., Imori, S., Matsui, C., Kawakami, H., Tashiro, S., Aihara, K.

Hiroshima University, Prefectural University of Hiroshima, University of Tokyo

11:30 AM **Panel Discussion**

8:30 - 11:15 AM **Room 309**

TAM-E: Radiobiology/Radiation Effects

Co-Chairs: Allen Brodsky, John Hageman

8:30 AM **TAM-E.1**

Internal Emitter Thresholds Supported by Data on Chemical Carcinogenesis

Brodsky, A.

Georgetown University

8:45 AM **TAM-E.2**

Evaluations of Dose from Solar Particle Events Using Monte Carlo and Deterministic Transport Codes

Sriprisan, S., Aghara, S., Singleterry, R.

University of Massachusetts, NASA Langley Research Center

9:00 AM **TAM-E.3**

Updates to the Validation of OLTARIS for Deep Space Dose Analyses Using MCNP6

Baunach, J., Stabin, M., Singleterry, R.

Vanderbilt University, Langley Research Center

9:15 AM **TAM-E.4**

Incorrect Analyses of Radiation and Mesothelioma in the US Transuranium and Uranium Registries

Zhou, J.

US DOE

9:30 AM **TAM-E.5**

Are Radiation Cataracts Tissue Reactions, Stochastic Effects, or Both?

Fujimichi, Y., Hamada, N.

Central Research Institute of Electric Power Industry (CRIEPI), Japan

9:45 AM **TAM-E.6**

Comparison Study of DNA Double-Strand Break Formation in Human Peripheral Blood Lymphocytes Exposed to High versus Low Dose-Rate γ-radiation

Pustovalova, M., Vorobyeva, N., Arkhangelskaya, E., Smetanina, N., Guryev, D., Osipov, A.

State Research Center-Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

10:00 AM **BREAK**

10:30 AM **TAM-E.7**

The Changes of Fragile Histidine Triad Gene in Hematological System of Mice in the Process of Radiation Carcinogenesis

*Qin, Y., Lin, Y., Cai, J., Sun, D., Gao, F., Li, B., Pan, Z., Han, L.**

Second Military Medical University, Shanghai

10:45 AM **TAM-E.8**

Inhibition of TBK1 Attenuates Radiation-Induced Epithelial-Mesenchymal Transition of A549 Human Lung Cancer Cells Via Activation of GSK-3 and Repression of ZEB

*Liu, W., Li, B.**

Second Military Medical University

11:00 AM **TAM-E.9**

Risk of Solid Cancer Mortality at Sites Other than Organs of the Main Plutonium Deposition in Cohort of Mayak Workers

*Sokolnikov, M., Preston, D., Martinenko, I.**

Southern Urals Biophysics Institute, Russia, Hirosoft International Corp.

8:30 AM - 12:15 PM Room 310

TAM-F: Medical Health Physics, Part I

Co-Chairs: William Maguire, Steven Grimm

8:30 AM TAM-F.1
Patient Safety in Radiation Oncology
Gilley, D.
AAPM

8:45 AM TAM-F.2
Estimation of Eye Lens Exposure from Temple and Collar Dose Measurements of Operators Wearing Leaded Glasses during Fluoroscopic Procedures
Grimm, S., Nye, J.
Emory University

9:00 AM TAM-F.3
Standardizing MR Safety in a Large Rural Health System
Quinton, A.
Geisinger Health System

9:15 AM TAM-F.4
Development of an Accelerator Health Physics Program for Medical Physics/ Health Physics Graduate Programs
Woehr, W., Zhang, F., Gunasingha, R., Yoshizumi, T.
Duke University Medical Center

9:30 AM TAM-F.5
Administrative Policies for Managing High Dose Procedures and Tissue Reaction from Fluoroscopically-Guided Interventional Procedures (FGIP)
Bushberg, J., Balter, S., Chambers, C., Leidholdt, Jr., E., Miller, D., Winston, J., Kroger, L.
UC Davis School of Medicine, Columbia University, US Dept of Veterans Affairs, USFDA, PA Bureau of Radiation Protection, UC Davis Health System

9:45 AM BREAK

10:15 AM TAM-F.6
Health Physics Lessons Learned From 15 Years of Clinical Use of Rb-82 Generators
Grimm, S., Kane, D., Streeter, J.
Emory University, Associates in Medical Physics, Emory Healthcare

10:30 AM TAM-F.7
When Dialysis Patients Need Radioiodine Therapy
Erdman, M., King, S., Hix, J., Achey, B., Lorah, B.
Penn State Hershey Medical Ctr

10:45 AM TAM-F.8
Patient Dose Assessment after an ^{125}I Brachytherapy Seed was not Recovered following Radioactive Seed Localization Procedure for Excision of Non-Palpable Breast Lesions
Harvey, R.
Roswell Park Cancer Institute, University of Buffalo

11:00 AM TAM-F.9
New US Radiation Protection Guidance for Diagnostic and Interventional X-Ray Procedures
Keith, L.S., Sears, S.T., Bower, M.W., Boyd, M.A., Hamdy, R.C., Elmore, C.L., Fletcher, D.W., Hill, D.G., Miller, D.L., Paunovich, E.D.
CDC, US EPA, US Air Force

11:15 AM TAM-F.10
The Joint Commission Dose Reduction Initiative: Lessons Learned
Maguire, W.
Methodist Hospital

11:30 AM TAM-F.11
The Joint Commission: Recent Revisions of Requirements for Diagnostic Imaging Services
Kroger, L., Bushberg, J.
University of California, Davis Health System

11:45 AM **TAM-F.12**
Technetium-99m, Global Supply, and Nuclear Security
Suleiman, O.
Food and Drug Admininstration

Noon **TAM-F.13**
MRI Safety Needs Medical Health Physics
Och, J.
Geisinger Health System

12:15 PM **Medical Health Physics Business Meeting**

8:30 - 11:15 AM **Room 314**

TAM-G: Instrumentation, Part I

Co-Chairs: J. Stewart Bland, Milan Gadd

8:30 AM **TAM-G.1**
Android Applications for Field Gamma Spectroscopy and Data Analyses
Bland, J.S., Malafeew, V., Steinmeyer, P.
Chesapeake Nuclear Services, Radiation Safety Associates

8:45 AM **TAM-G.2**
Performance Evaluation of a Fukushima Response Multi-Detector Persimmon Counter
Oginni, B., Bronson, F., Ilie, G., Jaderstrom, H., Mueller, W., Russ, W.
Canberra Industries Inc.

9:00 AM **TAM-G.3**
Impact of Next-Generation Gamma-Ray Imagers on Radiation Safety
Kaye, W., Wang, W., Jaworski, J., Wahl, C., King, A., Zhang, F., He, Z.
H3D, Inc., University of Michigan

9:15 AM **TAM-G.4**
Numerical Technique to Calculate the Full Energy-Peak Efficiency of HPGe Well-Type Detectors Based on the Effective Solid Angle Ratio
Badawi, M., Gouda, M., El-Khatib, A., Abbas, M., Thabet, A.
Alexandria University, Egypt, Pharos University in Alexandria, Egypt

9:30 AM **TAM-G.5**
Identification of an Unknown: Analysis of Samples Following a Radiological Incident
Gadd, M., Vigil, M.
LANL

9:45 AM **TAM-G.6**
Radiation Detection Using Integrated Circuits
Shah, M., Marianno, C., Khatri, S.
Texas A&M University College Station

10:00 AM **TAM-G.7**
iPIX: An Advanced Gamma Camera Technology for Rapid and Precise Localization of Radioactive Hotspots
Handley, J., Paradiso, V., Patoz, A., Bonnet, F., Rothan, D., Amgarou, K., Menaa, N.
CANBERRA France

10:15 AM **BREAK**

10:45 AM **TAM-G.8**
Impacts of Recently Published ANSI Standards on Calibration Techniques
Voss, J.
Los Alamos National Lab

11:00 AM **TAM-G.9**
Advanced Radiation Detection for the Modern Sailor
*Morton, A., Mavrogianis, S., DiNezza, M.**
NSWCCD

Noon - 2:00 PM **Room 315**

AAHP Awards Lunch

2:30 - 4:45 PM **Room 302**

TPM-A: Accelerator Health Physics, Part II

Co-Chairs: Michael Sandvig, L. Scott Walker

2:30 PM **TPM-A.1**
Prospective Evaluation of Activated Powder and Liquid Samples for Contamination Control Practices
Schwahn, S.
Oak Ridge National Laboratory

2:45 PM **TPM-A.2**
Solving CARIBU Open Source Contamination Problems
Baker, S., Greene, J., Levand, A., Pardo, R., Savard, G.
Argonne National Laboratory

3:00 PM **BREAK**

3:30 PM **TPM-A.3**
Implementing an Alternative to Conduct of Operations in Non-Nuclear Research at Idaho National Laboratory
Sandvig, M.
Idaho National Laboratory

3:45 PM **TPM-A.4**
Radiolytic Hydrogen Production in Water Cooled Electron Beam Dump
May, R.
JSA, Jefferson Lab

4:00 PM **TPM-A.5**
Radiation Dose Distribution Inside a Synchrotron Ring with a New Insertion Device
Marceau-Day, L., Wang, W., Robinson, J., Hamideh, A.
CAMD/LSU, RSO/LSU

4:15 PM **TPM-A.6**
Star Party Wormholes to Accelerator Health Physics
Frey, S.
Penn Ray Solutions

4:30 PM **TPM-A.8**
Progress at the National Ignition Facility
Kasper, K.
LLNL

2:30 - 5:00 PM **Rooms 303**

TPM-B: International Collaboration Committee (ICC) Special Session: Recovery from Large Scale Nuclear Contamination - What Have We Learned? Part II

Co-Chairs: Karen Barcal, Scott Kirk

2:30 PM **TPM-B.1**
Impacts of Fukushima Accident on the Nuclear Industry in Taiwan
Lee, M.
National Tsing-Hua University, Taiwan

3:00 PM **TPM-B.2**
Radiation Exposures in the Marshall Islands: Still Learning after 60 Years
Simon, S.
National Cancer Institute

3:30 PM **TPM-B.3**
Report on the Ongoing Role of the Red Cross in the Fukushima Recovery (Beyond Radiological Mitigation)
Mascelli, A.

4:00 PM **BREAK**

4:30 PM **Panel Discussion**
Panel Discussion – Effects from the Fukushima Accident in Neighboring Countries
Wu, C.
ES&H Solutions, Inc.

2:30 - 5:15 PM **Room 307**

TPM-C: AAHP Special Session: New Frontiers in Radiation Risk Communication

Co-Chairs: Ray Johnson, Steven M. Becker

2:30 PM **TPM-C.1**
Emotional Consequences of Nuclear Power Plant Disasters
Bromet, E.
Stony Brook University

3:00 PM **TPM-C.2**
Radiation Safety Decisions - How We are Prone to Errors
Johnson, R.
Radiation Safety Counseling Institute

3:30 PM **BREAK**

4:00 PM **TPM-C.3**
Strategies for Correcting Misinformation about Radiation
Emery, R.
University of Texas Houston

4:30 PM **Panel Discussion**

5:15-6:15 PM **Room 307**

AAHP Open Meeting

2:30 - 5:30 PM **Room 308**

TPM-D: Special Session: Transitioning from Dose Guidance to Health Risk for Radiological Emergency Decision Making

Chair: Eric Daxon

2:30 PM **TPM-D.1**
A Brief History of Emergency Responder Dose Recommendations
Johnson, T., Daxon, E., Ruedig, E.
Colorado State University, Battelle San Antonio Operations

3:00 PM **TPM-D.2**
An Argument for Using Health Risk in Place of Dose Guidance in Operational Decision Making in Radiological Emergencies
Daxon, E., Johnson, T., Ruedig, E.
Battelle Memorial Institute, Colorado State University

3:30 PM **BREAK**

4:00 PM **TPM-D.3**
2013 Revision of the Protective Action Guides Manual
DeCair, S.
US EPA

4:30 PM **TPM-D.4**
How Do We Combine Science and Regulations for Decision Making?
Poston, Sr., J., Ford, Jr., J.
Texas A&M University

5:00 PM **TPM-D.5**
Military Risk Management for Radiation Scenarios
Cuellar, J.
US Army

2:30 - 5:00 PM **Room 309**

TPM-E: Special Session: How the NRRPT Works

Chair: Danny McClung

2:30 PM **TPM-E.1**
History of the National Registry of Radiation Protection Technologists (NRRPT)
Benfield, E.
NRRPT

2:45 PM **TPM-E.2**
Examination Process of the NRRPT
*McClung, D., Rasmussen, R.**
NRRPT

3:00 PM **TPM-E.3**
ACE Accreditation of NRRPT Examination
McClung, D., Gallion, K., Neal, K.*
NRRPT

3:15 PM **TPM-E.4**
Planned Launch of the International Version of the National Registry of Radiation Protection Technologists Examination
Tucker, D.
McMaster University

3:30 PM **BREAK**

4:00 PM **TPM-E.5**
NRRPT Registration Maintenance Program
*McClung, D., Bayless, M., Lafreniere, T.L.**
NRRPT

4:15 PM **TPM-E.6**

Role Delineation and Task Analysis for Development of NRRPT Examination Rubrics

*McClung, D., Biela, D.**

NRRPT

4:30 PM **TPM-E.7**

NRRPT Newsletter

Brown, D.

NRRPT

4:45 PM **TPM-E.8**

Practical Aspects of the Radiation Protection Program for a Research Reactor with Isotope Production

Tucker, D., Lambert, D., McClung, W.G.

McMaster University

2:30 - 3:15 PM **Room 310**

TPM-F1: Medical Health Physics, Part II

Co-Chairs: William Maguire, Steven Grimm

2:30 PM **TPM-F1.1**

Homeland Security and the Nuclear Medicine Department

Maguire, W., Mohaupt, T., Lemieux, B., Loveless, V., Hassel, T.

Methodist Hospital, St. Jude Children's Research Hospital, University of Tennessee Health Science Center, FBI

2:45 PM **TPM-F1.2**

Evaluation of Room Shielding - A Case Report of a Bronchoscopy Treatment Room

Zhang, F., Woehr, W., Chung, Y., Yoshizumi, T.

Duke University Medical Center

3:00 PM **TPM-F1.3**

Metro Medical Cyclotron Design

Quinn, B., Dauer, L.

MSKCC

3:15 PM **BREAK**

3:45 - 5:00 PM **Room 310**

TPM-F2: Nonpatient Dose from Nuclear Medicine Procedures

Co-Chairs: Chris Martel, Tara Medich

3:45 PM **TPM-F2.1**

Estimated Doses to Members of the Public from Exposure to Patients with ^{131}I Thyroid Treatment. Part I: Comparison to Point Source Methods

Dewji, S., Bellamy, M., Hertel, N., Leggett, R., Eckerman, K., Sherbini, S., Saba, M.*

Oak Ridge National Laboratory, Oak Ridge National Laboratory/Georgia Institute of Technology, United States Nuclear Regulatory Commission

4:00 PM **TPM-F2.2**

Estimated Doses to Members of the Public from Exposure to Patients with ^{131}I Thyroid Treatment. Part II: Dose to the Persons Riding Public Transportation

Dewji, S., Bellamy, M., Hertel, N., Leggett, R., Eckerman, K., Sherbini, S., Saba, M.

Oak Ridge National Laboratory, Oak Ridge National Laboratory/Georgia Institute of Technology, United States Nuclear Regulatory Commission

4:15 PM **TPM-F2.3**

Estimated Doses to Members of the Public from Exposure to Patients with 131I Thyroid Treatment. Part III: Dose to the Occupants in Nursing Homes and Hotels

Dewji, S., Bellamy, M., Hertel, N., Leggett, R., Eckerman, K., Sherbini, S., Saba, M.

Oak Ridge National Laboratory, Oak Ridge National Laboratory/Georgia Institute of Technology, United States Nuclear Regulatory Commission

4:30 PM **TPM-F2.4**

Some Estimates of Internal Doses due to I-131 Patients

Hertel, N., Bellamy, M., Dewji, S., Leggett, R., Eckerman, K., Sherbini, S., Saba, M.

Oak Ridge National Laboratory/Georgia Institute of Technology, Oak Ridge National Laboratory, United States Nuclear Regulatory Commission

4:45 PM **TPM-F2.5**

Patient, Family, Hospital Staff, and RSO Doses Associated with the Tc-99m Procedure

Voss, J.

Los Alamos National Lab

2:30 - 5:00 PM **Room 314**

TPM-G: Instrumentation, Part II

Co-Chairs: Tom Voss, Richard Clement

2:30 PM **TPM-G.1**

Comparisons of the Performance of Canberra's BE6530 vs ACT-II detectors in a Lung Counter

Oginni, B., Bronson, F., Field, M., Venkataraman, R., Mueller, W.

Canberra Industries Inc.

2:45 PM **TPM-G.2**

Determining Location of a Radiation Source in a Box

Smith, M., Marianno, C., Coles, T., Custead, D., Horowitz, S., Lancon, T., Mendoza, P., Smith, M.**

Texas A&M University

3:00 PM **TPM-G.3**

Reactor Health Physics Operations at the National Institute of Standards and Technology Center for Neutron Research

Johnston, T.

National Institute of Standards and Technology

3:15 PM **BREAK**

3:45 PM **TPM-G.4**

Is Your Radiation Instrument Telling You What You Think It Is?

Johnson, R.

Dade Moeller Training Academy

4:00 PM **TPM-G.5**

Radiation Protection Considerations Involving Shim Safety Arm Replacement and Shim Cavity Work at the National Bureau of Standards Reactor

Clement, R., Brown, D., Barvitskie, T., Tracy, J., Consani, K., Johnston, T., Kelkay, M.

NIST

4:15 PM **TPM-G.6**

Upgrade of a Calibration Facility: Increased Source Strength Transfer, Modification of Shielding to Reduce Skyshine, and Quality Assurance of Calibration

Morris, A., Day, K., Pope, M., Byington, S.

Idaho State University, Qal-Tek

4:30 PM **TPM-G.7**

Managing Radiation Safety Instrumentation in a Comprehensive Cancer Center

Chiappetta, D.

Memorial Sloan Kettering Cancer Center

4:45 PM **TPM-G.8**

An Approach to the Design of the LANL "Nkosoo" Alpha and Beta Sandwich Detector

Osei, G., Voss, T., McLean, T., Justus, A., Bland, J., Tapia, P.

Alcorn State University, Los Alamos National Laboratory

WEDNESDAY

7:00-8:00 AM **301**
CEL5 Safety (Mis)Communications – How to Say What You Mean and Mean What You Say
James Tarpinian, SLAC National Accelerator Laboratory

7:00-8:00 AM **308**
CEL6 An Informatics Mindset for Managing the Relevance and Reliability of Modern Measurements: Understanding and Meeting Current Challenges
Mark D. Hoover, National Institute for Occupational Safety and Health; Leigh J. Cash, Los Alamos National Laboratory

8:30 - 11:45 AM **Rooms 302-303**

WAM-A: Special Session: Power Reactor, Part I

Co-Chairs: Eric Goldin, Tom Voss

8:30 AM **WAM-A.1**
Industry Response-EPA 40CFR190 ANPR
Hiatt, J.
Nuclear Energy Institute

8:50 AM **WAM-A.2**
Industry Response to USNRC 10CFR20 Advanced Notice of Proposed Rulemaking
Anderson, E., Hiatt, J.
Nuclear Energy Institute

9:10 AM **WAM-A.3**
NRC Regulatory Approach to Address the Threat of Hostile Actions at a Commercial Nuclear Power Plant
Kahler, R.
Nuclear Regulatory Commission

9:30 AM **WAM-A.4**
Reactor Decommissioning Emergency Planning
Anderson, J.
Nuclear Regulatory Commission

9:45 AM **WAM-A.5**
Price-Anderson Act
Purdie, M.
US Nuclear Regulatory Commission

10:00 AM **BREAK**

10:30 AM **WAM-A.6**
Update on Fukushima Daiichi Nuclear Power Station
Tateiwa, K.
Tokyo Electric Power Company

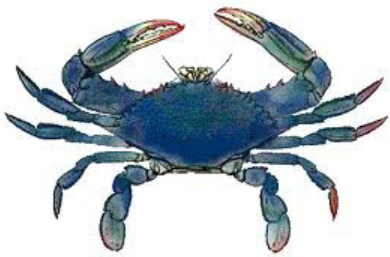
10:45 AM **WAM-A.7**
Implementing Lessons Learned from Fukushima Daiichi
Reckley, W.
US Nuclear Regulatory Commission

11:00 AM **WAM-A.8**
Updating the US Nuclear Regulatory Commission's Cost-Benefit Guidance
Bone, A.
United States Nuclear Regulatory Commission

11:15 AM **WAM-A.9**
EPRI ALARA Assessment Program - The First 15 Years
Quinn, D., Saunders, P., Tran, P.
DAQ, Inc., Suncoast Solutions, Inc., Electric Power Research Institute

11:30 AM **WAM-A.10**
EPRI Project for Effective Dose Equivalent, External (EDEX)
Tran, P., Quinn, D.
Electric Power Research Institute, DAQ, Inc.

11:45 AM **Power Reactor Business Meeting**



8:30 AM - Noon **Room 307**

WAM-B: Special Session: Current Issues in Radiation Protection and Radioactive Waste Management and Implementation at the Department of Energy, Part I

Chair: Kathy McLellan

8:30 AM **WAM-B.1**

Enhancing RESRAD-OFFSITE for Low Level Waste Disposal Facility Performance Assessment

Yu, C., Gnanapragasam, E., Corredor, C., Williams, W.A.

Argonne National Laboratory, US Department of Energy

8:45 AM **WAM-B.2**

Recent Developments in Field Response for Mitigation of Radiological Incidents

Corredor, C., Yu, C.

DOE, Argonne

9:05 AM **WAM-B.3**

Upgrading RESRAD-RDD and Planning for Improvised Nuclear Device Incidents—The RESRAD-RDD&IND

Yu, C., Corredor, C., Cheng, J., Kamboj, S., LePoire, D., Flood, P.

Argonne National Laboratory, US Department of Energy

9:30 AM **WAM-B.4**

Unified Resolve 2014: A Proof of Concept for Radiological Support to Incident Commanders

Blumenthal, D., Crapo, J., Vavrina, G., McLellan, K., Gresalfi, M.

US Department of Energy, Oak Ridge Institute for Science and Education, Oak Ridge National Laboratory

9:45 AM **WAM-B.5**

Radioactive Waste Issues in Major Nuclear Incidents

Chen, S.Y.

Illinois Institute of Technology

10:15 AM **BREAK**

10:45 AM **WAM-B.6**

Occupational Radiation Exposures at the Department of Energy

Rao, N., Hagemeyer, D.

U.S. Department of Energy, Oak Ridge Institute for Science and Education

11:15 AM **WAM-B.7**

Optimizing Radiation Protection of the Public and the Environment at the Department of Energy

Favret, D., Regnier, E., Wallo, A.

US Department of Energy

11:30 AM **WAM-B.8**

What's New with Independent Verification at Department of Energy Sites

Roberts, S., Regnier, E., Vitkus, T., Williams, A.

Oak Ridge Associated Universities, US Department of Energy

8:30 - 11:45 AM **Room 308**

WAM-C: Special Session: Explosive Radiological Dispersion Devices Field Trials

Chair: Lorne Erhardt

8:30 AM **WAM-C.1**

Overview of the Full-Scale Radiological Dispersion Device Field Trials

Erhardt, L., Green, A., White, D., Quayle, D.

Defence Research and Development Canada, Health Canada

9:00 AM **WAM-C.2**

Sampling and Analysis of Airborne Radioactivity at the Explosive Radiological Dispersal Device Field Trials

Okada, C., Sorom, R., Van Etten, D.

National Security Technologies

9:15 AM **WAM-C.3**

Far Field Air Sampling for DRDC Particle Release Trial

Kernan, W., Keillor, M., Kirkham, R.

Pacific Northwest National Laboratory

9:30 AM **WAM-C.4**
Truckborne and Aerial Mobile Radiation Survey following Detonation of a Radiological Dispersal Device
Sinclair, L., Fortin, R., Seywerd, H., Marshall, F., Buckle, J.
Natural Resources Canada, Carleton University

9:45 AM **WAM-C.5**
Fixed Point and Handheld Survey Results from the Full-Scale RDD Field Trials
Erhardt, L., Roy, G., Korpach, E., Berg, R.
Defence Research and Development Canada, Health Canada

10:15 AM **BREAK**

10:45 AM **WAM-C.6**
Dispersion Modelling of the Full Scale Radiological Dispersion Device Trials Campaign
Purves, M., Parkes, D.
AWE

11:00 AM **WAM-C.7**
National Atmospheric Release Advisory Center Dispersion Modeling of the Explosive Radiological Dispersal Device Field Trials
*Neuscamman, S., Yu, K.**
Lawrence Livermore National Laboratory

11:15 AM **WAM-C.8**
Atmospheric Dispersion Modeling of the DRDC Suffield Live RDD Experiments with Operational Codes in Canada
Lebel, L., Bourgouin, P., Bensimon, D., Chouhan, S., Ek, N., Korolevych, V., Malo, A., Erhardt, L.
Atomic Energy of Canada Limited, Environment Canada, Defence Research and Development Canada

11:30 AM **WAM-C.9**
Wrap-up/Synthesis: Interoperability and Emergency Response Implications of the Full-Scale Radiological Dispersal Device Trials
Quayle, D., Erhardt, L., Nsengiyumva, D.
Health Canada, Defence Research and Development Canada

8:30 AM - 12:30 PM **Room 309**

WAM-D: Special Session: Medical Health Physics Patient Dose Tracking

Chair: Chris Martel

8:30 AM **WAM-D.1**
Expectations for Patient Dose Tracking
Miller, D.
FDA

9:00 AM **WAM-D.2**
American College of Radiology Dose Index Registry
Bhargavan-Chatfield, M.
American College of Radiology

9:30 AM **BREAK**

10:00 AM **WAM-D.3**
Standardized Radiopharmaceutical Dose Estimates and Uncertainties
Stabin, M.
Vanderbilt University

10:30 AM **WAM-D.4**
Evaluation of Computed Tomography Dose Using a Family of Virtual Patients
Caracappa, P., Gao, Y., Ding, A., Xu, X.G.
Rensselaer Polytechnic Institute, Stanford University

11:30 AM **WAM-D.6**
An Effective Method of Patient Dose Assessment
King, S., Brown, K.
Penn State Hershey Medical Center

Noon **WAM-D.7**
Choosing a Dose Tracking and Management Software Solution for Your Institution
Martel, C.
Unfors RaySafe

8:30 AM - Noon **Room 310**

WAM-E: Environmental Monitoring

Co-Chairs: Gerald Jannik, Jeffrey Whicker

8:30 AM **WAM-E.1**
Particle Size, Radon and Equilibrium Factor Measurements on the 1.5 TBq Radium Storage Silos at Fernald
Harley, N., Chittaporn, P., Fisenne, I.
NYU School of Medicine, NYU Medical School Retired, USDOE Retired

8:45 AM **WAM-E.2**
Evaluation of Radioactive Air Emission and Off-Site Doses at SLAC
Chan, I.
SLAC National Accelerator Lab

9:00 AM **WAM-E.3**
Radionuclide Concentrations in Dust Collected at the Nellis Dunes Recreational Area
Bensen, M., Buck, B., Goosens, D., Sudowe, R.
University of Nevada Las Vegas

9:15 AM **WAM-E.4**
Comparison of the US Environmental Protection Agency's CAP88 PC Versions 3.0 and 4.0 (beta)
Sailors, C., Johnson, L., Gussio, E., Newton, J., O'Meara, J., Jannik, G., Farfan, E.*
Georgia Regents University, Savannah River National Laboratory

9:30 AM **WAM-E.5**
Proposal for a Voxel Phantom Model of a Pine Tree
Condon, C., Higley, K.
Oregon State University

9:45 AM **WAM-E.6**
Biological Remediation Strategy for Immobilizing Ag-110m and Cs-134 in Soils
Whitlow, J., Higley, K., Gomez-Fernandez, M., Condon, C., Jia, J., Deyhle, R.
Oregon State University

10:00 AM **BREAK**

10:30 AM **WAM-E.7**
Determining the Depth Profile for ^{90}Sr Around Fukushima
Ball, J.
Colorado State University

10:45 AM **WAM-E.8**
Updated Derived Intervention Levels and Derived Response Levels for Emergency Response at the Savannah River Site
Lee, P., Jannik, G., Hunter, C., Whitney, G.*
Savannah River National Laboratory, US DOE - Savannah River

11:00 AM **WAM-E.9**
Low Level ^{226}Ra Analysis Using a 4πNaI(Tl) Spectrometer
Chandani, Z., Byun, S., Prestwich, W.
McMaster University

11:15 AM **WAM-E.10**
Effective Dose Evaluation of NORM Added Consumer Products Using ICRP Reference Phantom
Lee, H., Yoo, D., Shin, W., Choi, H., Ha, W., Yoo, J., Yoon, S., Lee, J., Choi, W., Min, C.
Yonsei University, Korea, Korea Institute of Radiological and Medical Science, Korea Institute of Nuclear Safety, Korea

11:30 AM **WAM-E.11**
Radioecological Impacts of Direct Application of Phosphate Rock
Khater, A.
King Saud University

11:45 AM **WAM-E.12**
Uranium in Phosphate Fertilizers: Concentrations and Hazardous Impacts
Khater, A.
King Saud University

2:30 - 3:45 PM **Rooms 302-303**

WPM-A: Special Session: Power Reactor, Part II

Co-Chairs: Eric Goldin, Tom Voss

2:30 PM **WPM-A.1**
Future of Existing Nuclear Power Plants - License Renewal or D&D?
Wu, C., Goff, T.
ES&H Solutions, Inc.

2:45 PM **WPM-A.2**
Age-Dependent Frisker Efficiency, Implications for Decommissioning
Goldin, E.
Alpha-Nuclear LLC

3:00 PM **WPM-A.3**
Field Testing of New CZT In-Plant Survey System at Cook Nuclear Plant
Miller, D.
Cook Nuclear Plant

3:15 PM **WPM-A.4**
Small Modular Reactors
Voss, J.
Los Alamos National Lab

3:30 PM **WPM-A.5**
India's Thorium Reactor Progress
Voss, J.
Los Alamos National Lab

Get ready for the 1st Annual Health Physics Society Team Quiz Bowl!

You and your friends can test your knowledge against other HPS members (members are encouraged to group with students and young professionals).

Wednesday at the Hilton, Poe A/B
4:00-6:00 pm

2:30 - 5:30 PM **Room 307**

WPM-B: Special Session: Current Issues in Radiation Protection and Radioactive Waste Management and Implementation at the Department of Energy, Part II

Chair: Kathy McLellan

2:30 PM **WPM-B.1**
Introduction to DOE Order 435.1 Low Level Radioactive Waste Disposal Requirements
Gelles, C., Regnier, E., Wallo, A.
U.S. Department of Energy

2:45 PM **WPM-B.2**
Defense-in-Depth, How Department of Energy Implements Radiation Protection in Low Level Waste Disposal
Suttora, L., Wallo, A.
US Department of Energy

3:15 PM **WPM-B.3**
Time of Compliance for Disposal of Low-Level Radioactive Waste
Seitz, R., Wallo, A.
Savannah River National Laboratory, US Department of Energy

3:45 PM **BREAK**

4:15 PM **WPM-B.4**
Use of Authorized Limits During Decontamination and Demolition Phase
Dihel, D., Cypret, O., Vazquez, G., Williams, W.A.*
US Department of Energy

4:45 PM **WPM-B.5**
Idaho Cleanup Project Clearance Limits for Personal Property
Konzen, K., Nesshoefer, C.
CH2M-WG Idaho, LLC, Idaho Cleanup Project

5:00 PM **WPM-B.6**

DOE Order 458.1 Property Clearance Requirements and Factors Considered to Update Its Clearance Limits

Corredor, C., Vasquez, G., Favret, D.

US Department of Energy

5:15 PM **WPM-B.7**

Proposed Revision to 10 CFR Part 835 Appendix D, Surface Contamination Values

Zobel, S., Foulke, J.

US Department of Energy

2:30 - 5:30 PM **Room 308**

WPM-C: Emergency Response

Co-Chairs: Ron Goans, Jason Davis

2:30 PM **WPM-C.1**

A Radiation Contamination Exercise for Urban Search and Rescue Teams

Marianno, C., Smith, M., Trevino, J., Erchinger, J., Marianno, C.

Texas A&M

2:45 PM **WPM-C.2**

Tools for Placing the Radiological Health Hazard in Perspective Following a Severe Emergency at a Light Water Reactor or its Spent Fuel Pool

McKenna, T., Vilar Welter, P., Callen, J., Martincic, R., Dodd, B., Kutkov, V., Buglova, E.

IAEA, BDConsulting

3:00 PM **WPM-C.3**

Utilizing RadResponder in Emergency Response Instruction

Erchinger, J., Marianno, C.

Texas A&M University

3:15 PM **BREAK**

3:45 PM **WPM-C.4**

Overview of the United States Nuclear Regulatory Commission's Radiological Assessment System for Consequence AnaLysis (RASCAL) Code Version 4.3

Huffert, A., Tomon, J., Kowalczik, J.

USNRC

4:00 PM **WPM-C.5**

Discussion on One Algorithm for Mapping the Radiation Distribution on Contaminated Ground

Liu, R., Higley, K., Liu, X.

Oregon State University, China Institute of Atomic Energy

4:15 PM **WPM-C.6**

The Neutrophil-Lymphocyte Ratio as a Triage Tool - The Human Criticality Experience

Goans, R.

MJW Corporation

4:30 PM **WPM-C.7**

Babyscan - Whole Body Counter for Infants and Small Children

Oginni, B., Bronson, F., Ilie, G., Jaderstrom, H., Mueller, W.

Canberra Industries Inc.

4:45 PM **WPM-C.8**

HemoDose: A Set of Multi-Parameter Biodosimetry Tools

Hu, S., Blakely, W., Cucinotta, F.

Universities Space Research Association, NASA, Lyndon B. Johnson Space Center, Uniformed Services University of the Health Sciences, Armed Forces Radiobiology Research Institute, University of Nevada, Las Vegas

5:00 PM **WPM-C.9**

Is Telling the Truth About Radiation the Answer to Risk Communication?

Johnson, R.

Radiation Safety Counseling Institute

5:15 PM **WPM-C.10**

Experimental Shielding Evaluation of the Radiation Protection Provided by Residential Structures

Dickson, E., Hamby, D.

US Nuclear Regulatory Comission, Oregon State University

2:30 - 5:30 PM **Room 309**

WPM-D: Medical Dosimetry

Co-Chairs: Michael Stabin, Wesley Bolch

2:30 PM **WPM-D.1**

Hybrid Computational Phantoms of the Labrador and Beagle to Support Preclinical Dosimetry for Radionuclide Therapy of Osteosarcoma

Sands, M., Shang, M., Milner, R., Bolch, W.

University of Florida

2:45 PM **WPM-D.2**

Comparison of Body Size-Specific Organ Doses Between PCXMC and Hybrid Phantom-Based Calculations for Patients Undergoing Radiography Examination

Lowe, E., Lee, C.

National Cancer Institute

3:00 PM **WPM-D.3**

Development of a Size-Specific Dose Length Product-to-Effective Dose Conversion Factor for Computed Tomography Patients and its Clinical Application

Romanyukha, A., Derderian, V., Folio, L., Lamart, S., Lee, C.

National Cancer Institute, National Institutes of Health

3:15 PM **WPM-D.4**

Formation of Computational Phantoms from CT Numbers for Use in the ARCHER Monte Carlo Code

Lin, H., Liu, T., Su, L., Du, X., Gao, Y., Caracappa, P., Xu, X.

Rensselaer Polytechnic Institute

3:30 PM **BREAK**

4:00 PM **WPM-D.5**

Radiation Dose to Pediatric Patients of Different Body Stature from CT Exams Using Deformable Realistic Phantoms

Stabin, M., Kost, S., Carver, D., Pickens, D., Price, R., Case, S., Fraser, N.

Vanderbilt University

4:15 PM **WPM-D.6**

Development of a Computational Adult Brain Model for Use in CT Dosimetry

Long, N., Egan, K., Bolch, W.

University of Florida, Moffitt Cancer Center

4:30 PM **WPM-D.7**

Implementation and Utilization of Patient Dose Tracking Software for Computed Tomography in a Multi-Site Hospital System

Yorks, P.

Geisinger Health System

4:45 PM **WPM-D.8**

How to Use VirtualDose to Track Patient Organ Doses?

Gao, Y., Caracappa, P., Xu, G.

Rensselaer Polytechnic Institute

5:00 PM **WPM-D.9**

Novel Approach for Effective Dose Measurements in Dual-Energy Computed Tomography

Mattison, B., Nguyen, G., Januzis, N., Boll, D., Lowry, C., Yoshizumi, T.

Duke University Medical Center, Durham

5:15 PM **WPM-D.10**

Use of IAEA Phase-Space Database in MCNP6 for Monte Carlo Simulation of Radiotherapy Accelerator

Jung, J., Pelletier, C., Lee, C., Lee, C.

East Carolina University, University of Michigan, National Cancer Institute

2:30 - 5:00 PM **Room 310**

WPM-E: Special Session: NESHAPS

Co-Chairs: Gustavo Vazquez, Matthew Barnett

HPS Business Meeting

Baltimore Convention Center, Room 302-303

Wednesday 16 July, 5:30-6:30 pm

THURSDAY

7:00-8:00 AM **301**

CEL7 Interpretation of Radiation Measurements

Ray Johnson, Radiation Safety Counseling Institute

7:00-8:00 AM **308**

CEL8 ABHP Exam Fundamentals – Tips for Successfully Completing the Certification Process

Patrick J. LaFrate, Charles "Gus" Potter

8:45 - 11:45 AM **Room 302-303**

THAM-A: Military Health Physics

Co-Chairs: John Cuellar, Chad McKee

8:45 AM **THAM-A.1**

Probabilistic Analysis of Radiation Doses for Potentially Exposed Shore-Based Individuals during Operation Tomodachi

Chehata, M., Dunavant, J., Mason, C., McKenzie-Carter, M., Singer, H., Weitz, R.*

Leidos Inc., Georgetown University, George Mason University

9:00 AM **THAM-A.2**

A Novel Approach to Harmonize the US Federal Protective Action Guide System and the US Military Operational Exposure Guidance System for Response to Radiological Emergencies

Daxon, E., Miller, R., Anastasio, M.

Battelle Memorial Institute

9:15 AM **THAM-A.3**

An Algorithm for Rapid Estimation of Building Attenuation for Prompt Radiation from a Nuclear Detonation

Kramer, K., Blake, P., Millage, K., Sanchez, B.

Applied Research Associates, Inc., Defense Threat Reduction Agency

9:30 AM **THAM-A.4**

Use of Military Handheld Radiation Detectors for Estimating Internal Contamination

Smith, D., Anigstein, R., Daxon, E., Miller, R., Anastasio, M., Frey, J.

Battelle, S. Cohen & Associates, Army Institute of Public Health

9:45 AM **THAM-A.5**

Next Generation Optically Stimulated Luminescent Field Dosimetry System

Koskelo, M., Yoder, R.C., Akselrod, M., Johnson, D., Beckes, B.

AQUILA, Landauer Inc.

10:00 AM **BREAK**

10:30 AM **THAM-A.6**

Using Physiologically-Based Modeling Tools to Inform Operational Recommendations

Stricklin, D., Oldson, D., Sanchez, B., Wentz, J., Millage, K.

Applied Research Associates, Inc.

10:45 AM **THAM-A.7**

Mentorship in Health Physics and the Military

VanHorne-Sealy, J.

Uniformed Services University of the Health Sciences

11:00 AM **THAM-A.8**

Radiation Dose Assessments for the Embryo, Fetus, and Nursing Infant during Operation Tomodachi

Falo, G., Cassata, J., Rademacher, S., Marro, R., Case, D., Chehata, M., McKenzie-Carter, M., Dunavant, J., Blake, P.

Army Institute of Public Health, US Army Public Health Command, National Council on Radiation Protection and Measurements, HQ Air Force Safety Center, Armed Forces Radiobiology Research Institute, Uniformed Services University of the Health Sciences, Leidos, Georgetown University, Defense Threat Reduction Agency

11:15 AM **THAM-A.10**
Insturmentation Response to Pulsed X-Ray Devices
*Mathur, V., Torres, J., Spierenburg, M.**
Naval Surface Warfare Center Carderock Division (NSWCCD)

11:30 AM **THAM-A.11**
Radiation Dose Assessments for Fleet-Based Individuals in Operation Tomodachi
Marro, R.J., McKenzie-Carter, M., Rademacher, S., Knappmiller, K., Ranellone, R., Dunavant, J., Case, D., Miles, T.*
Uniformed University of Health Sciences, Leidos, Air Force Safety Center, Engility, Inc., Georgetown University, Navy and Marine Corps Public Health Center

11:45 AM **Military Section Business Meeting**

8:30 -11:15 AM **Room 307**

THAM-B: Internal Dosimetry

Co-Chairs: Jim Neton, Liz Brackett

8:30 AM **THAM-B.1**
Tritium Bioassay Program at the National Bureau of Standards Reactor
Clement, R., Tracy, J., Hall, H., Brown, D., Johnston, T., Barvitskie, T.
NIST

8:45 AM **THAM-B.2**
Excreta Sampling as an Alternative to In Vivo Measurements
Carbaugh, E.
Mission Support Alliance/Dade Moeller & Associates

9:00 AM **THAM-B.3**
Design, Development, and Initial Operation of BabyScan, an In-Vivo Counter for Children around Fukushima
Bronson, F., Oginni, B., Ile, G., Jaderstrom, H., Mueller, W.
Canberra

9:15 AM **THAM-B.5**
Assessment of the Monte Carlo Code RITRACKS and Applications for Micro-Dosimetry of High Energy Heavy Ions
Brogan, J., Plante, I., Borak, T.
Colorado State University, NASA Johnson Space Center; Universities Space Research Association

9:30 AM **THAM-B.6**
Systemic Biokinetic Model for Americium in Rats
Melo, D., Miller, G., Weber, W., Doyle-Eisele, M., Guilmette, R.
Lovelace Respiratory Research Institute

9:45 AM **BREAK**

10:15 AM **THAM-B.7**
Iodine-131 Thyroid Residual Activity In-Vivo Measurement Seventeen Hours after Radioactive Inhalation at Tamura in Fukushima Prefecture at 15 March 2011
Uchiyama, K., Miyashita, M., Sato, H., Tanishima, Y., Maeda, S., Yoshikawa, J., Kimura, S.
Dokkyo Medical University and Anzai Medical Co., Ltd., Fukui Prefectural Hospital, Ibaraki Prefectural University of Health Sciences

10:30 AM **THAM-B.8**
USTUR Whole-Body Case 0212: Testing NCRP Wound Model
Avtandilashvili, M., McComish, S., Tolmachev, S.
Washington State University

10:45 AM **THAM-B.9**
Estimation of the Daily Effective Dose from the Intake of Some Food Items in Lagos, Nigeria
Ajayi, I.
Adekunle Ajasin University, Akoko-Akoko, Ondo State, Nigeria

11:00 AM **THAM-B.10**

Neutron-Induced Track Analysis of Plutonium Dioxide Nanoparticles, Presented in the Alveolar-Interstitial Part of Respiratory Tract of Professional Mayak PA Workers

*Khokhryakov, V.V., Vvedensky, V.E., Sypko, S.A., Bobov, G.N.**

Southern Urals Biophysics Institute, Russia

8:30 - 11:45 AM **Room 308**

THAM-C: External Dosimetry

Co-Chairs: Brant Ulsh, Nolan Hertel

8:30 AM **THAM-C.1**

Doses Near Jupiter's Moon Europa Using the GIRE Model of Proton Spectra

Moussa, H., Townsend, L.

Texas Tech University, University of Tennessee at Knoxville

8:45 AM **THAM-C.2**

Developing Low Dose Rate Neutron Irradiation Capabilities for Experimental Research

Wasiolek, M., Franco, M., Hanson, D.

Sandia National Laboratories

9:00 AM **THAM-C.3**

Photon/Neutron Spectra and Radiation Field Characterization Utilizing Multiple Techniques

Franco Jr., M., Wasiolek, M., Hanson, D.

Sandia National Laboratories

9:15 AM **THAM-C.4**

ICRU Review of Operational Quantities for External Radiation Exposure: What Will the Future Hold?

Hertel, N., Bartlett, D., Dietze, G., Bordy, J., Endo, A., Gualdrini, G., Pelliccioni, M., Ambrosi, P., Siebert, B., Veinot, K.

Georgia Institute of Technology, ORNL Center for Radiation Protection Knowledge, Retired, CEA, Japan Atomic Energy Agency, INFN, Laboratori Nazionali di Frascati, Physikalisch-Technische Bundesanstalt, Y-12 National Security Complex

9:30 AM **THAM-C.5**

Organ Dose Coefficients for Asian-Scaled Phantoms from External Exposures at the Techa River

Schwarz, B., Maynard, M., Degteva, M., Napier, B., Bolch, W.

University of Florida, Urals Research Center for Radiation Medicine, Russia, Battelle Pacific Northwest National Laboratory

9:45 AM **THAM-C.6**

Organ Dose Conversion Coefficients for Pediatric Reference Computational Phantoms Exposed to External Photon Radiation Fields

Chang, L., Lee, C.

National Cancer Institute/Georgetown University, National Cancer Institute

10:00 AM **BREAK**

10:30 AM **THAM-C.8**

Effect of Radiation Dosimeter Issue Period Increase on Lower Limit of Detection of Occupational Radiation Dose

Romanyukha, A., Falkner, J., Grypp, M., Morgan, B., King, D., Williams, A.

Naval Dosimetry Center

10:45 AM **THAM-C.9**

Spectroscopic Dosimetry for Accurate Dose Calculation in Typical Radiation Workers

Stapels, C., Podolsky, M., Vogel, S., Whitney, C., Johnson, E., Chen, X., Fernandez, D., Christian, J.

Radiation Monitoring Devices, Inc.

11:00 AM **THAM-C.10**

Testing of a New Active Extremity Dosimeter - ED3

Rotunda, J., Caunt, O., Jenkins, R.

Rotunda Scientific Technologies, John Caunt Scientific, RMT Ltd.

11:15 AM **THAM-C.11**
Comparison of Accuracy and Speed of ARCHER with MCNP for Organ Dose Calculations from External Photon Beams Under Standard Irradiation Geometries
Liu, T., Su, L., Du, X., Caracappa, P., Xu, X.G.
Rensselaer Polytechnic Institute

11:30 AM **THAM-C.12**
Radiation Dose from Consumer Products Containing Naturally Occurring Radioactive Materials
Lee, J., Yoon, K., Yi, H., Park, Y., Lee, J., Choi, W., Kim, K.
Korea Institute of Nuclear Safety, Kyung Hee University

8:30 - 11:40 AM **Room 309**

THAM-D: Special Session: Health Environmental Impacts of Various Energy Sources

Chair: Craig Little

8:30 AM **THAM-D.2**
Life Cycle Health Effect of Energy Sources: From Global Consumption to Particulate Matter Impacts
Jolliet, O.
University of Michigan, School of Public Health

8:50 AM **THAM-D.3**
Superfund Action and Cleanup Criteria on the Navajo Reservation
Terry, R.W.
US EPA Region 9 Superfund Division

9:20 AM **THAM-D.4**
Evaluating the Collective Radiation Dose to Workers from the US Once-Through Nuclear Fuel Cycle
Krahn, S.L., Croff, G.A., Smith, L.B., Clarke, H.J., Sowder, G.A., Machiels, J.A.
Vanderbilt University, EPRI

9:40 AM **BREAK**

10:15 AM **THAM-D.5**
Pennsylvania's Oil and Gas Industry TE-NORM Study Update
Allard, D.
PA Bureau of Radiation Protection

10:40 AM **THAM-D.6**
Nuclear Accidents - Understanding the Consequences and Context
Cameron, R.
OECD/NEA, Nuclear Development Division

11:05 AM **THAM-D.7**
Radiological and Toxicological Aspects of Coal Ash Spills
Johnson, J.
Sopris Environmental

11:45 AM **Environmental Section Business Meeting**

8:30 - 10:45 AM **Room 310**

THAM-E: Decontamination and Decommissioning

Co-Chairs: Wayne Gaul, Tony Mason

8:30 AM **THAM-E.1**
Sr-90 Soil Contamination Legacy in Burris Park
DeZetter, J., MacKenzie, C.
University of California, Berkeley

8:45 AM **THAM-E.2**
Decontaminating Dr. Glenn Seaborg's Chemistry Laboratory - an Historical Landmark
MacKenzie, C., DeZetter, J.
University of California, Berkeley

9:00 AM **THAM-E.3**
University of Buffalo Research Reactor Decommissioning Summary
DeWitt, C.
ENERCON Services, Inc.

9:15 AM **THAM-E.4**
The New York City Department of Health Initiative for Urban Radiation Remediation in the Aftermath of a Radiation Incident
Finkelstein, E., Harvin, D., Tedla, H., Prud'homme, J.*
New York City Department of Health

9:30 AM **THAM-E.5**
Stanford Linear Accelerator Center (SLAC) Metal Release Program: Progress to Date
Ford, R., Liu, J., Rokni, S., (presented by Torres, M.)
SLAC

9:45 AM **BREAK**

10:15 AM **THAM-E.6**
Novel Biopolymers and their Uses as Remediation Agents and Ion Exchange Resins
Leonard, M., Higley, K.
Oregon State University

10:30 AM **THAM-E.7**
Correlating Counts per Minute to pCi/g in a Walkover Soil Survey
Gaul, W., Carver, T., Reyes, A.
Tidewater, DOE LANL

10:45 AM **Decommissioning Business Meeting**

2:30 - 4:45 PM **Rooms 302-303**

THPM-A: Homeland Security Monitoring

Chair: Warnick Kernan

2:30 PM **THPM-A.1**
State of Florida Preventative Radiological/Nuclear Detection Program Update
Lanza, J.
Florida Department of Health

2:45 PM **THPM-A.2**
Evidence-Preserving Methods for Very Low-Level Background and Environmental Monitoring
Zeissler, C.
National Institute of Standards and Technology

3:00 PM **THPM-A.3**
Dose to Cargo in High-Energy NII Screening Systems
Bergstrom, P.
National Institute of Standards and Technology

3:15 PM **BREAK**

3:45 PM **THPM-A.4**
Particle Release Experiment
Keillor, M., Kernan, W., Arrigo, L., Baciak, J., Detwiler, R., Kirkham, R., Milbrath, B., Rishel, J., Seifert, A., Seifert, C.*
Pacific Northwest National Laboratory, University of Florida

4:00 PM **THPM-A.5**
Scenario Generation with Synthetic Data for an Aerial Gamma-Ray System
Kernan, W., DaBruzzi, B., Kulisek, J., McConn Jr., R., Miller, E., Myjak, M., Schweppe, J., Seifert, C., Stave, S., Wittman, R.
Pacific Northwest National Laboratory

4:15 PM **THPM-A.6**
Reporting of Laser Strikes to Military Aircraft
Mikulski, H.T.
US Army

4:30 PM **THPM-A.7**
The Role of the Health Physicist in Nuclear Security
Waller, E.
University of Ontario Institute of Technology

4:45 PM **Homeland Security Section Business Meeting**

2:30 - 4:30 PM **Room 307**

THPM-B: Radiation Safety Officer

Co-Chairs: Richard Harvey, Ron Reif

2:30 PM **THPM-B.1**

WHOI's Radiation Safety Program - Achieving Compliance with a Small Staff and Budget

Reif, R., Liffers, A.

Woods Hole Oceanographic Institution, Around The Clock Compliance, Inc.

2:45 PM **THPM-B.2**

Radiation Protection Staff Benchmarking in Academic and Medical Institutions

Harvey, R.

Roswell Park Cancer Institute, University of Buffalo

3:00 PM **THPM-B.3**

A Broad Scope Licensee's Experience with a Leaking Cs-137 Irradiator Source

Harvey, R.

Roswell Park Cancer Institute, University of Buffalo

3:15 PM **THPM-B.4**

AAPM Survey Results on X-ray vs. Cs-137 Irradiators

Lorenzen, W., (presented by McDermott, P.)

Boston Children's Hospital

3:30 PM **BREAK**

4:00 PM **THPM-B.5**

Security Buy-In for an Irradiator Program

Ribaudo, C.

National Institutes of Health

4:15 PM **THPM-B.6**

Radiation Protection Management in Malaysian Nuclear Agency

Muhd Sarowi, S., Ahmad, A., Idris, H.N., Abul Razalim, F.A., Khairuddin, M.K., Ali, N.

Malaysian Nuclear Agency

4:30 PM **RSO Section Business Meeting**

2:30 - 5:00 PM **Room 308**

THPM-C: Academic Institutions

Co-Chairs: John Jacobus, Charles Wilson

2:30 PM **THPM-C.1**

Creating Online Training; An Easy Way?

Snay, S.

University of Massachusetts, Lowell

2:45 PM **THPM-C.2**

Overview of the Operations and Decommissioning of the Cobalt-60 Irradiation Facility at the National Institutes of Health

Jacobus, J.

National Institutes of Health

3:00 PM **THPM-C.3**

Occupational Exposure Mitigation from Veterinary Teaching Facility Large Animal Radiography

Orders, A., Garner, B., Moyle, L.

North Carolina State University

3:15 PM **BREAK**

3:45 PM **THPM-C.4**

An Analysis of 23 Years of Radiation-Related Incidents at a Research and Academic Institution

Savely, S., Ford, C.

Baylor College of Medicine

4:00 PM **THPM-C.5**

Entering and Expanding the Health Physics Bubble: Where the Introverts Stare at their Shoes and the Extroverts Stare at your Shoes

Gillenwalters, E., Wilson, C.

Ameriphysics, Louisiana State University

4:30 PM **THPM-C.6**

Development of Radiation Safety Course and Lab in a New Nuclear Engineering Program

Hinderliter, B., Petrella, V.

University of Minnesota - Duluth, Virginia Commonwealth University

4:45 PM **THPM-C.7**
Development and Evolution of Radiation Detection Laboratories in a New Nuclear Program
Hinderliter, B.
University of Minnesota -Duluth

2:30 - 4:45 PM **Room 309**

THPM-D: Regulatory/Licensing

Co-Chairs: Steve Brown, Harold Peterson

2:30 PM **THPM-D.1**
Technical Basis to Define Soluble Uranium for Regulatory Compliance Demonstrations
Benke, R., Oxenberg, T., Webb, J.
Center for Nuclear Waste Regulatory Analyses (CNWRA), US Nuclear Regulatory Commission

2:45 PM **THPM-D.2**
The Need for Transparency in Policy Decisions: Application to Nuclear Power, Nuclear Medicine, and Related Areas
Moghissi, A., Swetnam, M., Schiller Wurster, K., McBride, D.
Institute for Regulatory Science, Potomac Institute for Policy Studies, George Mason University

3:00 PM **THPM-D.3**
The United States Nuclear Regulatory Commission, Radiation Protection Research
Brock, T.
US Nuclear Regulatory Commission

3:15 PM **THPM-D.4**
The United States Nuclear Regulatory Commission, Radiation Protection Code Analysis and Maintenance Program
Bush-Goddard, S., Tomon, J.
US Nuclear Regulatory Commission

3:30 PM **BREAK**

4:00 PM **THPM-D.6**
Radioactive Material Transport Overview
Williams, J.
US DOT

4:15 PM **THPM-D.7**
A Citizens Guide to Uranium - Methods and Recent Experiences in Presentations to the Public and Public Officials on New Uranium Recovery Projects
Brown, S.
SENES Consultants

4:30 PM **THPM-D.8**
Regulation after the Collapse of the International System for Radiological Protection
Peterson, Jr., H.
Independent Consultant

2:30 - 4:15 PM **Room 310**

THPM-E: Waste Management

Chair: Matt Moeller

2:30 PM **THPM-E.1**
Technetium and High Level Waste Management
Poppiti, J., Shrader, T., Rhoderick, J., Shultz, J., Moon, J.
Department of Energy

2:45 PM **THPM-E.2**
Energy, Economics & Health Physicists
Moeller, M.
Dade Moeller

3:00 PM **THPM-E.3**
Current Issues in Waste Confidence: A Student Prospective
Toomire, B.
Illinois Institute of Technology

3:15 PM **BREAK**

3:45 PM **THPM-E.4**
Nanomaterials for Radioactive Waste Clean-Up
Dua, S., Youngblut, W., Riddlemoser, R.
Florida International University

4:00 PM **THPM-E.5**
Waste Minimization is Waste Management: Conveyor-Based Waste Measurement Systems Save Time & Money
McDonald, M., Lopoez, A.
AMEC

AAHP 1 Nuclear Security for the Health Physicist

Ed Waller, Jason Harris, Craig Marianno; UOIT, ISU, TAMU

Health physics is an essential function in most nuclear facilities and the primary responsibility is a safety function. Nuclear security is, however, extremely important in the post-9/11 environment for all nuclear facilities. The role of the health physicist in nuclear security matters is not clearly defined despite the fact that a fundamental understanding of radiological hazards of adversary target material is required for understanding the total risk to the facility and/or material. Health physics can be integrated into nuclear security culture during design basis threat definition, through risk management exercises, participation in response force activities, developing dose guidance criteria, radiological training and in communicating hazard and risk to security personnel, facility operators and regulatory bodies.

When integrating health physics into nuclear security culture, it is important that health physics management or the responsible/senior health physicist establish dialogue early with nuclear security personnel in generating the design basis threat. The dialogue must include the advantages of considering radiological hazard as part of the comprehensive response plan. Health physicists are multi-capable scientists, engineers and systems integrators that can contribute greatly at multiple levels for effective and efficient nuclear security. To be an effective partner in the nuclear security objective, health physicists must embrace the nuclear security culture. As such, this course serves as an introduction to the basic elements of nuclear security, with specific emphasis on prevention, detection, and response.

The following key elements will be covered in this course:

1. Prevention is the first strategy used for nuclear security and it consists of all such security measures that may serve as deterrence or prevent an unauthorised access to a protected nuclear facility or nuclear material. These preventive security measures could be adopted or implemented at facility level or at state level

2.Detection is the second strategy used for nuclear security and consists of measures that may help in detection of an unauthorised access by someone to a protected nuclear facility or nuclear material. These detection measures could be implemented at facility level or at State level.

3.Response is the third security strategy used to defeat an adversary by preventing it from accomplishing its tasks either by containment or neutralization. These response measures can also be implemented at facility level and at state level.

Two very important areas of nuclear security are discussed in detail:

(i) physical protection system (PPS), and (ii) IT/cybersecurity. Physical protection can be defined as ensuring the detection, delay and response to the malicious acts against nuclear materials and nuclear facilities through an integrated system of people, technology and procedures. Physical protection systems discussion will include concepts, approaches, design and evaluation methodologies for physical protection delay (i.e. barriers), detect (i.e. sensors), and response

(i.e. guards). IT/cybersecurity will be discussed in terms of IT security domains for nuclear operations, and hardware (instrumentation & control) implications. The STUXNET virus will be generally discussed to demonstrate threats to I&C systems that may be part of nuclear operations.

At the end of this course, the participant should have a high level overview of nuclear security, and be able to formulate possible roles of the health physicist in security functions.

AAHP 2 FRMAC Dose Assessment Methodology as it Relates to the Revised EPA PAG Manual

Thomas Laiche, Daniel Blumenthal; Sandia National Labs, DNDO

The Department of Energy's Federal Radiological Monitoring and Assessment Center (FRMAC) is an asset comprised of representatives of multiple federal agencies that are available on request to support a response to nuclear/radiological accidents and/or emergencies. The FRMAC works with multiple agencies such as the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) to establish consistent radiological dose assessment methods to support public protection guidance provided by the EPA's and FDA's Protective Action Guides (PAGs). The revised EPA PAG Manual references the FRMAC Assessment Manual (FAM) for radiological dose assessment methods in support of protective action decisions. This presentation provides an overview of the FRMAC Assessment Manual, describes the default methods for radiological dose assessment, and introduces the Turbo FRMAC software tool that automates these assessment methods.

Part 1: Introduces the Federal Radiological Monitoring and Assessment Center function and organization, the EPA and FDA Protective Action Guides, the FRMAC Assessment Manual format and tables; presents several mathematical concepts used in the dose assessment methods; introduces the software tool, Turbo FRMAC.

Part 2: Presents an overview of the dose assessment methods and mathematical calculations used for public protection; demonstrates the use of the software tool Turbo FRMAC to generate public protection dose assessments.

Part 3: Provides a series of calculations that can be used in a public protection application responding to the detonation of an improvised nuclear device (IND). The methods presented detail the Power Function (X Factor) calculation and the use of multiple dose/exposure rate measurements to determine whether EPA Protective Action Guides are exceeded.

Part 4: Presents an overview of the dose assessment methods and mathematical calculations used for the ingestion pathway; demonstrates the use of the software tool Turbo FRMAC to generate ingestion dose assessments.

Part 5: Addresses various methods for worker protection calculations. This session begins with basic worker protection such as stay times and turn-back limits and introduces an advanced worker protection calculation that allows the user to predict total dose (external + inhalation) from an external dose reading.

AAHP 3 Measurement Uncertainty and Characteristic Limits in Radiobioassay

Thomas LaBone, Nancy Chalmers; MJW Corporation

The Guide to the Expression of Uncertainty in Measurement (GUM) is an international standard that gives guidance on how to calculate and report the uncertainty in measurements. In the first part of this lecture we will work through a toy example (the density of a plastic cube) in detail to help illustrate the concepts. This discussion of uncertainty provides background to help explain characteristic limits, which is the general term for what we in health physics refer to as the detection level (DL), minimum detectable amount (MDA), and minimum quantifiable value (MQV). The DL and MDA are concerned with our ability to detect an analyte in a sample, whereas the MQV is concerned with our ability to quantify an analyte rather than just detect it. In the second part of the lecture we will discuss how to calculate the DL, MDA, and MQV for an analytical process. This discussion is presented in terms of the reported result (e.g., mBq/L) rather than the signal (e.g., number of counts in the sample and background), and the use of replicate measurements is covered. The last part of the lecture covers the sample-specific DL, which is used to make decisions about detection for a particular analysis. It will be derived using the combined standard uncertainty (csu) for the analysis that is reported by the analytical laboratory and coverage intervals constructed from this csu (both of which are obtained via the GUM). Time permitting, we will discuss advanced topics like the problem of multiple comparisons and empirical verification of characteristic limits.

Professional Enrichment Program (PEP)
Sunday 13 July through Thursday 17 July

The Professional Enrichment Program (PEP) provides a continuing education opportunity for those attending the Health Physics Society Annual Meeting. The two hours allotted each course ensure that the subjects can be discussed in greater depth than is possible in the shorter programs offered elsewhere in the meeting.

On Sunday, 7 July, a series of 18 courses will be offered between 8:00 am - 4:00 pm.

In addition to the above-mentioned sessions for Sunday, five PEP lectures are scheduled on Monday - Thursday afternoons from 12:15 - 2:15 pm. Registration for each two-hour course is $90 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 - 10:00 am

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

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 retained 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

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. Ample time will be allotted for questions, answers, and discussion, and each segment will be supplemented with key reference information.

1-B Status of ANSI N42 Standards for Radiation Protection Instrumentation

Morgan Cox, Co-chair ANSI N42.RPI

We suggest taking both ANSI N42 standards PEP courses for maximum understanding.

This PEP course includes the discussion of some eighteen 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; 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 in ANSI N42.17B, ANSI N42.18, ANSI 323C and ANSI N42.30, with a comprehensive title of "Instrumentation and systems for monitoring airborne radioactivity."

1-C Where Did This Come From? Lessons Learned from Bioassay Investigations

Eugene H. Carbaugh, Dade Moeller and Associates

This PEP class provides actual case studies of high-routine bioassay measurements and discusses the investigation process, resolution, and lessons learned from each. High-routine bioassay results can come from several sources, including normal statistical fluctuation of the measurement process, interference from non-occupational sources, and previous occupational intakes, as well as new intakes. A good worker monitoring program will include an investigation process that addresses

these alternatives and comes to a reasonable conclusion regarding which is most likely. A subtle nuance to these investigations is the possibility that a newly detected high-routine measurement might represent an old intake that has only now become detectable. This can result from the worker being placed on a different bioassay measurement protocol, a change in analytical sensitivity, unusual biokinetics associated with highly insoluble inhalations, or lack of a clear work history. As sites close down, the detailed dosimetry records of specific worker exposures are archived, becoming relatively inaccessible, with only summary dose information available. Likewise, the "tribal knowledge" of the site becomes lost or seriously diluted as knowledgeable employees retire or move on. Therefore, it is incumbent upon the site performing a potential intake investigation to thoroughly address the possible alternatives or face the consequence of accepting responsibility for a new intake. The presenter has encountered all of the foregoing issues in the course of investigating high-routine bioassay measurements at the U.S. Department of Energy Hanford Site. The important lessons learned include 1) have good measurement verification protocols, 2) confirm intakes by more than one bioassay measurement, 3) conduct interviews with workers concerning their specific circumstances and recollections, 4) have good retrievable site records for work history reviews, 5) exercise good professional judgment in putting the pieces together to form a conclusion, and 6) clearly communicate the conclusions to the worker, the employer, and the regulatory agency.

1-D Calibration of Alpha and Beta Surface Contamination Monitors

J.T. Voss, Los Alamos National Laboratory

The objective of this PEP lecture is to explore the calibration methodology of alpha and beta surface contamination monitors. Six individual calibration stations are provided with a simple alpha-beta surface contamination monitor, a DVM, and a range of alpha and beta sources sufficient to cover a range of count rates in the monitor. The alpha and beta sources used are commonly available to the public and with activities below NRC, DOE, and DOT levels of concern but have their activities traceable to NIST. Detector types, GM, gas proportional, scintillator, etc. will be discussed. Examples of various types of detectors will be provided. Various calibration methods will be discussed. The question of beta surface emission rate as a calibration parameter will be discussed. Methods of the preparation of radioactive sources and their traceability to NIST or NMI will be discussed. The range of source efficiencies and detector backgrounds and interferences will be explored.

1-E Medical Health Physics Refresher

Michael A. Charlton, University of Texas Health Science Center at San Antonio

The dynamic medical health physics setting mandates continual review of current practices. The medical health physics environment has drastically changed over the recent past with new applications, new imaging modalities, and a new regulatory structure. This continual evolution makes it challenging for the practicing medical health

physicist to remain abreast of current issues. This continuing education session will review recent regulatory changes, highlight commonly observed radiation-producing device deficiencies, operator doses from portable x-ray imaging, CT imaging dose considerations, and discuss proposed device operator training requirements in Texas. Ideas for improving medical health physics programs focusing on training, example shielding calculations, medical health physics safety surveys, and commonly observed medical health physics issues are provided. Attendees will have the opportunity to ask medical health physics questions and exchange key successes that worked in their environment with the speaker.

1-F Emergency Response Training for First Responders Made Simple; the Department of Energy's MERRTT Train-the-Trainer Program – Part 1

Tom Clawson, Mark Linsley; Technical Resources Group, Inc.

Excellent materials exist for training first responders (firefighters, HAZMAT, law enforcement, emergency medical technicians, etc.) on how to respond to a transportation incident involving radioactive material. Participants who successfully complete the PEP 1-F, 2-F, and 3-F sessions will be certified to teach materials contained in the Department of Energy's Transportation Emergency Preparedness Program's Modular Emergency Response Radiological Transportation Training (MERRTT).

The full MERRTT is a 16-hour program consisting of multimedia rich training material that includes PowerPoint presentations, videos, practical exercises, student guides, instructor guides, test material, and regionally available training aids. MERRTT takes the complex topic of a radiological accident response and breaks it down into 16 easily understood modules and hands-on practical exercises. Attendees of a MERRTT program are presented with information that simplifies the topic while developing a comprehensive understanding of radioactive material, radiological survey instruments, and decontamination techniques for handling radiologically contaminated victims and resources available to responders during a response. An important element of the training is detailed information on the types of packages used to transport radioactive material. The course includes use of exempt-level radiation sources in the practical exercises to reinforce learning. Upon successful completion of the MERRTT course, students receive a certificate from the Department of Energy's Transportation Emergency Preparedness Program, including up to 10.5 hours of continuing education hours (CEH) for medical response personnel. MERRTT also meets the Waste Isolation Project Plant (WIPP) Land Withdrawal Act training requirements and is listed on the Department of Homeland Security's federally approved courses listing.

This session will be a summary of the program and an initial review of the Power-Point presentations. Attendees will need to complete all three sessions (1-F, 2-F, and 3-F) to receive their Instructor certification and DVD of the course material.

Sunday - 10:30 AM – 12:30 PM

2-A EH&S "Boot Camp" for Radiation Safety Professionals – Part 2
Robert Emery, Janet Gutierrez; University of Texas Health Science Center at Houston

See description for PEP 1-A. 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 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, and monitoring and control strategies will also be discussed

2-B Status of ANSI N42 Standards for Homeland Security Instruments
Morgan Cox, Co-chair ANSI N42.HSI

This PEP course includes the discussion of nineteen 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 in revision; portable radiation detectors in ANSI N42.33 in revision; portable detection and identification of radionuclides in ANSI N42.34; all types of portal radiation monitors in ANSI N42.35; training requirements for homeland security personnel in ANSI N42.37 in revision; spectroscopy-based portal monitors in ANSI N42.38; performance criteria for neutron detectors in ANSI N42.39; neutron detectors for detection of contraband in ANSI N42.40; 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.

2-C Radionuclide Therapies
Ninni Jacob, Rhode Island Hospital

This course provides an overview of radionuclide therapies that are used in both nuclear medicine and radiation therapy departments. This will include radioactive materials, microspheres, radioactive seeds, and radioactive nanoparticles. The following topics will be addressed:

*Dose calibrator calibration and set-up
*Dose measurement, written directives
*Patient preparation, release of patients, and instructions to patients
*The regulations governing written directives and medical events and training requirements for authorized users
*Existing therapies, outdated thera-

pies and new technologies
Any other relevant topics

2-D Calibration Techniques for Gamma Survey Instruments
J.T. Voss, Los Alamos National Laboratory

The objective of this PEP lecture is to provide calibration techniques for gamma survey instruments using a surrogate photon source and a modified vented air ionization chamber. The effects of geometry, distance, and scattering will be explored. Calculations of chamber current flow and correction factors for barometric pressure, temperature, and humidity will be presented. Interferences such as geotropism, EMF, relative humidity, and interfering radiations will be discussed. The methodology for quantifying current flow in ion chambers using techniques from ANSI N42.30 – American National Standard for Performance Specification for Tritium Monitors will be explored. The performance of vented air ionization chambers will be compared to various other types of gamma survey instruments including: pressurized ion chambers, energy compensated GM detectors, and scintillation detectors. Field survey techniques with the vented air ionization chamber will be discussed. A discussion of calibration techniques for personnel dosimeters versus hand-held radiation survey instruments will be included.

2-E Operational Accelerator Health Physics, Part I
L. Scott Walker, Los Alamos National Laboratory; Robert May, Thomas Jefferson National Accelerator Facility

The Operational Accelerator Health Physics, Part I class covers an overview of medium and high energy accelerators, electron accelerator configuration, electron accelerator radiation production, electron accelerator shielding, electron accelerator radioactive material production, and electron accelerator environmental impacts. The class then begins to focus on proton accelerator configuration, proton accelerator radiation production, accelerator produced isotopes, accelerator interlock systems, general health physics practices at accelerators, general accelerator health physics rules of thumb, high energy radiation physics for the health physicist, and useful references.

2-F Emergency Response Training for First Responders Made Simple; the Department of Energy's MERRTT Train-the-Trainer Program – Part 2
Tom Clawson, Mark Linsley; Technical Resources Group, Inc.

See description for PEP 1-F for a full description of this 3-part program.

This session will be a continuation of the Power-Point presentations and a review of three of the five hands-on practical exercises included in the MERRTT program. Attendees will need to complete all three sessions (1-F, 2-F, and 3-F) to receive their Instructor certification and DVD of the course material.

Sunday - 2:00 – 4:00 PM

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

See description for PEP 1-A. Part 3 will focus on "Measuring and Displaying Radiation Protection Program Metrics That Matter to Management." Radiation protection programs typically accumu-

late 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.

3-B Training First Responders on Radiological Dispersal Device (RDDs) and Improvised Nuclear Device (INDs) Events

K.L. "Ken" Groves, S2-Sevorg Services, LLC

This PEP will present an overview of the current training the author is presenting to first responders (firefighters, emergency medical technicians, law enforcement personnel, and others) who may encounter either a radiological dispersal device (RDD or dirty bomb) or an improvised nuclear device (IND) as a part of their emergency response activities. The emphasis of the training is putting the radiological/nuclear material in perspective as compared with other weapons of mass destruction (WMD) materials such as chemical and/or biological weapon agents. A goal of the training is to help this first responder community understand that under almost all conditions, they can perform their primary mission of "putting out fires, rescuing and treating injured persons, and chasing bad guys" even in the presence of relatively large amounts of radiological/nuclear contamination. The rare cases of high-activity unshielded sources will be reviewed and explained. Current national/international guidance on dose "limits" will be discussed. The use of information contained in NCRP Report No. 165 entitled, "Response to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers," NCRP Commentary No. 19, "Key Elements of Preparing Emergency Responder for Nuclear and Radiological Terrorism," and the CRCPD "First Responders Handbook" will be used extensively in the presentation.

A discussion of the use of time, distance and shielding as well as appropriate personal protective clothing and how it will provide the needed protection while immediate actions take place early in an RDD/IND event will be reviewed. The use of appropriate radiation detection instrumentation, documented standard operating procedures along with realistic training, drills, and exercises are the key to a successful response to an RDD/IND event for this community of critical emergency responders.

This presentation will also include an example of the effects of an IND on a

large metropolitan area and the value of sheltering vs. evacuation as a method of saving lives.

3-C A Critical Assessment of Radiation Folklore

Bruce Heinmiller, Atomic Energy of Canada Ltd., Chalk River, Canada

It is a common practice among some nuclear energy proponents to benchmark ionizing radiation doses received by the public and attributable to nuclear energy production against purported increments in natural background radiation doses attributed to one's sleeping arrangements (with a partner vs. alone) or to one's eating habits (food also being variably radioactive).

Dose benchmarking is a laudable end-point objective, as it entirely avoids the universally unsatisfactory attempts to quantify absolute risk (or lack thereof) from low doses of ionizing radiation. However, with it comes the responsibility for ensuring that the doses are correct, and the dose comparisons meaningful. For many years there has been widespread propagation of purported facts of dubious or unknown provenance; this is referred to in this PEP presentation as folklore. The first half of the PEP will critically examine the folklore related to external dose received from photon radiation emitted by another person, and internal dose from ingestion of food.

There is also widespread folklore associated with cosmic radiation. In the second half of the PEP this will be critically examined for accuracy. Cosmic radiation was discovered more than 100 years ago, in 1912. The years leading up to its discovery and the years since its discovery offer some interesting historical diversions, including: some folklore (by the above definition), some pseudo-folklore, some speculation, and at least one assertion that looks inconceivable but is considered factual.

Radiation folklore and/or cosmic radiation connections will lead us to a number of events and sites, including: an astonishing event in the western Utah desert; the sinking of the Titanic; the Curie Museum in Paris; the Large Hadron Collider at CERN; and, an unresolved matter on the upper flanks of Mount Everest. Of course, folklore scrutiny will be a recurring theme.

The PEP will then undertake to discredit two errors in logic propagated by nuclear energy proponents with respect to the effects of ionizing radiation. (The anti-nuclear community gets an undeserved pass in this PEP.)

Finally, a proposed explanation of the origin and propagation of radiation folklore will be presented.

3-D Mitigating the Effects of Radon and Thoron and their Progeny in a Radiation Instrument Calibration Facility

J.T. Voss, Los Alamos National Laboratory

The objective of this PEP lecture is to present the methods of mitigating the effects of radon and thoron and their progeny. Environmental radon and thoron can have a dramatic interference in the calibration of certain types of radiation instruments. Various methods of mitigating those effects will be discussed in detail. Two facilities are evaluated in this study. One facility had more than 40 BqM^{-3} and the other facility less than 2 BqM^{-3}. Ventilation - both positive and negative, filtration using both HEPA filters and activated charcoal, impaction on a fine screen, and electrostatic precipitation are used in the study. Com-

binations of these methods are examined. Radon and thoron concentrations are measured with radon gas monitors and radon and thoron progeny are measured with continuous air monitors. Instruments and their capabilities and limitations are described. Applicable ANSI standards will be discussed. Experimental results will be presented and conclusions will be examined.

3-E Operational Accelerator Health Physics, Part II

L. Scott Walker, Los Alamos National Laboratory; Robert May, Thomas Jefferson National Accelerator Facility

Operational Accelerator Health Physics, Part II focuses on specific medium and high energy accelerator related design, control and health physics problems. The topics include: Spallation targets, handling high dose rate targets, beam dump design, isotope production, cooling water systems, shutters, radiation detection instrumentation, personnel dosimetry, high dose dosimetry (measuring radiation damage to equipment), high energy neutron spectroscopy, sky shine, releases of airborne radionuclides, accelerator related electrical hazards, and the accelerator health physics program.

3-F Emergency Response Training for First Responders Made Simple; the Department of Energy's MERRTT Train-the-Trainer Program – Part 3

Tom Clawson and Mark Linsley; Technical Resources Group, Inc.

See description for PEP 1-F for a full description of this 3-part program.

This session will include a review of the two of five remaining hands-on practical exercises, a 25-question test required for completion of the MERRTT Train-the-Trainer program, and a review of the administrative issues involved in hosting and a completing the DOE's MERRTT program. Attendees will need to complete all three sessions (1-F, 2-F, and 3-F) to receive their instructor certification and DVD of the course material

Monday - 12:15-2:15 pm

M-1 Introduction to Monte Carlo Methods for the Health Physicist, Part 1

Peter F. Caracappa, Rensselaer Polytechnic Institute

Monte Carlo techniques are extensively used in computer calculations of radiation transport in matter. Of interest to health physicists is the ability to determine values such as absorbed dose or dose equivalent distributions in a variety of applications. The more complex the problem, the greater the need for computer simulations, and it is desirable for the health physicist to have some understanding of their basis. The purpose of this course is to provide the attendees with a feel for what Monte Carlo techniques are, how they are applied in health physics work, and what their reliability and limitations may be. We will discuss the utility of Monte Carlo codes for complex shielding problems, and for dosimetry using computational models of the human body. The course will be presented in three parts.

Part 1 will provide a theoretical overview of radiation transport and methods for estimating the radiation flux or dose using Monte Carlo. We will walk through the steps of a Monte Carlo simulation history and discuss the needs in geometry, nuclear data, tallies, and variance reduction that are used.

M-2 Uses and Misuses of Dosimetric Terms in Patient Radiation Protection

C. Borrás, Radiological Physics and Health Services Consultant

According to the International Commission on Radiological Protection (ICRP), the dosimetric terms to be used in radiation protection are equivalent dose, effective dose, committed dose and collective effective dose, all based on mean absorbed dose with its distributions in time and in linear energy transfer. Since both equivalent dose and effective dose cannot be measured directly, to determine external exposure, the ICRP relies on the operational quantities, defined by the International Commission on Radiation Units and Measurements, Inc. (ICRU). Ambient dose equivalent, H*(10), and directional dose equivalent, H'(0.07, Ω), are for area monitoring, and personal dose equivalent, Hp(d), is for individual monitoring. Compliance with dose limits can be ascertained with the use of properly worn dosimeters. To link the protection and operational quantities to physical quantities that characterize the radiation field (such as tissue absorbed dose, air-kerma free-in-air and particle fluence), the ICRU computed conversion coefficients. To assess internal exposure, the ICRP recommends the use of activity quantities in combination with dose coefficients based on physiological models and 4-D computations. The unit for all the ICRP and ICRU quantities listed above is the sievert (Sv). Effective dose should be used only for occupationally exposed workers and members of the public, where doses are assumed to be well below 100 mSv, and thus, only stochastic effects are considered. At doses above about 0.5-1 Sv, where tissue reactions (deterministic effects) may occur, the dosimetric quantity to use is the absorbed dose in the irradiated tissue modified by the radiobiological effectiveness of the radiation for the biological endpoint of concern. The unit is the gray (Gy). Effective dose should not be used for retrospective evaluation of exposed populations or to assess individual risks, as is the case in medical exposures, which are not subject to dose limitations. Exposures in radiotherapy are clearly expressed in absorbed dose to the irradiated tissue. Since the irradiation conditions and the age, gender and habitus of patients are known, patient exposures from medical imaging, even those at low levels, should also be expressed as absorbed doses to the irradiated organs, as the ICRU recommends. The methods of organ dose calculations include placing external dosimeters such as TLD or OSL on the patient's skin, making measurements in physical phantoms that simulate patients and performing Monte Carlo radiation transport calculations on mathematical phantoms. BEIR VII has calculated stochastic risks for many organs/tissues exposed to low doses of low LET radiations. ICRP has published new threshold dose values for tissue reactions. With these values, risks to generic patients can be estimated. Risks to individual patients, on the other hand, have large associated uncertainties and should not be written in patient charts. However, if the goal is not to assess risk, but to reduce patient exposure, dose-related machine parameters can be easily measured and compared against previously determined diagnostic reference levels. For radiography/fluoroscopy, ICRU recommends using incident or entrance air-kerma, and for computed tomography, CT air-kerma (or dose) index, CT air-kerma (or

dose) length-product and more recently, CT size-specific dose estimate.

M-3 Calculating Required Measurement Uncertainty for Field Measurements using MARSAME Guidance and GUMCALC

Scott Hay, Cabrera Services Inc.

The Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) supplement to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) was released in 2009. Including measurement quality objectives (MQOs) in MARSAME to support survey design and selection of measurement methods marks a major step forward from MARSSIM. The required measurement uncertainty is a critical MQO that is used to support a priori selection of measurement methods, validation of new measurement methods, and a posteriori assessment of measurement methods. The calculation of the required measurement uncertainty presents a problem for many MARSAME users. This course defines required measurement uncertainty and discusses the role of MQOs in survey design using MARSAME, specifically related to selection of appropriate measurement methods. Attendees will be provided with a copy of GUMCALC software for calculating uncertainty and instructed in the use of this software. Example problems will be provided and attendees will have an opportunity to select appropriate inputs for a specific situation and calculate required measurement uncertainties using GUMCALC. The example problems will be worked through as a class, discussed, and compared with field applications. Attendees can bring a computer to the course to participate in the exercises if they choose; the GUMCALC software should be installed before arriving at the course. The 2013-09-08 version 0.99.7 of the GUMCALC software can be downloaded from the Internet for free at http://www.mccroan.com/gumcalc.htm.

M-4 Health Effects of Internally Deposited Radioactive Materials: Role of Dose, Dose-rate and Dose-Distribution

Antone L. Brooks, Retired Professor Washington State University

This PEP will be designed to discuss the major biologically relevant beta-gamma emitting radionuclides involved in nuclear accidents, weapons tests and nuclear power. The isotopes discussed will include ^{90}Sr, ^{137}Cs, ^{131}I and ^{3}H. I will provide a brief background on environmental contamination, movement in the environment, distribution and dose, and finally the biological effects of these important materials. The activity and doses used in experimental studies will be related to regulations. Finally, the presentation will provide information on the unique cell and molecular responses to low dose and dose-rate exposures.

M-5 Interpretation of Radiation Measurements – Is Your Radiation Instrument Telling You What You Think It Is?

Ray Johnson, Radiation Safety Counseling Institute

The interpretation of radiation measurements can be strongly affected by technical issues related to the measurements as well as attitudes and perceptions of radiation risks. People often do not know or do not take into account some of the many ways in which radiation instruments are prone to errors. Once a measurement is written down and reported, people generally interpret

the results as absolute values without any consideration of uncertainty. When uncertainties are reported they typically only account for the randomness of radiation. Seldom do they consider the uncertainty of calibration standards or the calibration process. They may not consider whether the proper instrument was selected, whether it was working properly, or whether it was used properly (according to calibration conditions). They may not consider the energy dependent response of the instrument, whether you are reading the right scale, using proper geometry, the speed of probe movement, or the thoroughness of scanning. They may not consider sample selection bias or errors associated with sample handling and processing. They may not consider that radiation is a random phenomenon and all measurements are a sample from a random distribution and thus are only "best estimates."

Even when all of the above technical issues are taken into account, misunderstandings abound when it comes to interpretation of measurements. There are two key factors governing such interpretations: 1) measurements have no meaning until interpreted and 2) measurements only have meaning in terms of how they are interpreted. The meaning of radiation measurements is in the mind of the beholder and may have as much to do with attitudes and perceptions as it does with technical understanding. There are countless anecdotes about responses to radiation meters that were not technically justified. A screaming Geiger counter may sound alarming, but radiation risks depend on many other factors, such as the type of radiation, the proximity to people, the duration of exposure, and the actual dose received. Radiation instrument readings are only one piece of information which specialists would use for assessing potential risks. Radiation safety decisions should be based on a good understanding of radiation measurements taken with a quality appropriate for defensible decisions.

Tuesday - 12:15-2:15 pm

T-1 Nuclear Medicine Internal Dosimetry: Measurements, Models, and Methods

Michael G. Stabin, Vanderbilt University

Dose estimates for radiopharmaceuticals may be established based on data from preclinical (i.e. animal species) or clinical studies (involving human patients or volunteers). This session will describe current approaches in both areas, and show examples. Traditional mathematical model-based anatomical models have now been replaced with more realistic standardized anatomical models based on patient image data and have been incorporated into the software code OLINDA/EXM 2.0. The code employs these anthropomorphic models, the new ICRP human alimentary tract (HAT) model and updated (ICRP 103) tissue weighting factors for calculation of effective dose. Adjustments to traditional dose calculations based on patient-specific measurements are routinely needed, especially in therapy calculations, for marrow activity (based on measured blood parameters or image data), organ mass (based on volumes measured by ultrasound or computed tomography (CT)), and other variables. Several new therapy agents have been introduced, including an alpha-emitting agent for treatment of bone metastases. Clinical experience, success rates, and management of normal tissue toxic-

ity with many nuclear medicine therapy agents will be reviewed.

T-2 Nanoparticle Characterization and Control Fundamentals: A Graded Approach

Mark D. Hoover, National Institute for Occupational Safety and Health

Given the considerable current interest in characterizing and controlling risks to worker health from potential exposures to engineered nanoparticles, this course will present an update on existing and emerging national and international information resources and a graded approach to sampling, characterization, and control of nanoparticles in the workplace. The graded approach begins with process knowledge, particle counting, and microscopy assessments for level 1 for initial screening; a level 2 for comprehensive characterization of detailed composition, size, concentration, and biophysical property assessments; and (ideally) an economical and efficient level 3 routine monitoring and control step involving a necessary and sufficient subset of level 1 and 2 methods for the material and situation of interest. The graded approach enables appropriate selection of handling and containment practices to match material properties and amounts. Sampling by filtration is an especially important method for collecting and evaluating any type of airborne material, including nanoparticles and other ultrafine aerosols such as radon decay products. Fundamentals will be presented for inertia (efficient collection for large particles) and diffusion (efficient collection for very small particles) that affect the efficiency and most penetrating particle size (MPPS) of filters; efficiency and MPPS for the various filter types that can be used for collection of nanoparticles; and issues for selection of filters with appropriate collection efficiency, MPPS, durability, pressure drop, and surface characteristics. Examples and nanoinformatics safety and health resources are provided.

T-3 Radiation Safety at the Scene of a Radiological Incident

Andrew Karam

As health physicists we are fairly comfortable working around radioactive materials and in radiation fields in settings that are usually fairly controlled (e.g. the laboratory or in an industrial facility), although we might lack this same level of comfort under less controlled conditions such as what we might find during a radiological emergency. At the same time, the emergency responders we might be working with are comfortable in emergency situations but they might find themselves reluctant to work under radiological conditions. As radiation safety professionals who might be present at the scene of a radiological or nuclear emergency we will need to be able to understand the radiological hazards that are present and to appreciate the non-radiological risks faced by all of the emergency response personnel. With that information, the health physicist must be able to help the emergency responders to appreciate the radiological conditions and how these conditions affect their response efforts. Ideally, this will lead to an emergency response in which everyone is rescued and triaged properly, where nobody gets hurt, and in which both radiological and non-radiological hazards are given appropriate attention. In this PEP we will discuss these issues, with a particular emphasis on how to give a proper priority to radiological risks (in the context of all risks pres-

ent at a site) and how to communicate this priority with emergency responders.

T-4 Environmental Risk Assessment

Andrew H. Thatcher

A common theme in evaluating contaminated sites regardless of the origin or type of radioactive contamination is a risk assessment developed to fully evaluate the potential impact of the contamination to surrounding environs and future residents. In order to accomplish this objective in a two-hour window we'll walk through the environmental transport and pathway analysis for a low level radioactive waste facility and address the topics related to fully completing the analysis from start to finish.

Topics will include:

- Site characterization and evaluation
- Development of scenarios to include solicitation of input from interested parties and applicable regulatory drivers
- Selection of environmental pathways for evaluation based upon the exposure scenarios and the location
- Selection of input parameters and obtaining site specific data where needed
- Performing sensitivity analysis and evaluating uncertainty for complex sites
- Validation of the model used with actual data where possible
- Presentation of results on a deterministic or probabilistic basis

This basic model for risk assessment has been applied by the presenter to a number of contaminated sites throughout the country over the years. This course is for participants interested in obtaining a greater background and details on performance assessments and the legwork involved in various aspects of the process.

T-5 Developing a Laser Safety Program – Where does a Health Physicist Begin and How do you Establish a Program from Scratch?

Richard P. Harvey, Roswell Park Cancer Institute, University of Buffalo

The health physicist has a diverse role and may engage in many different disciplines. One of those arenas may encompass non-ionizing radiation and the safe use of lasers. Health physicists have traditionally focused on radiation protection from ionizing forms of electromagnetic radiation and may have limited knowledge in laser safety. An individual in this situation may need guidance and tools to develop a laser safety program from its foundation. This course will attempt to provide guidance and methodology to establish a laser safety program at any organization.

Wednesday - 12:15-2:15 pm

W-1 Introduction to Monte Carlo Methods for the Health Physicist, Part 2

Peter F. Caracappa, Rensselaer Polytechnic Institute

This is Part 2 of a session started in M-1. Monte Carlo techniques are extensively used in computer calculations of radiation transport in matter. Of interest to health physicists is the ability to determine values such as absorbed dose or dose equivalent distributions in a variety of applications. The more complex the problem, the greater the need for computer simulations, and it is desirable for the health physicist to have some understanding of their basis. The purpose

of this course is to provide the attendees with a feel for what Monte Carlo techniques are, how they are applied in health physics work, and what their reliability and limitations may be. We will discuss the utility of Monte Carlo codes for complex shielding problems, and for dosimetry using computational models of the human body. The course will be presented in three parts.

Part 2 will cover the use of the MCNP/MCNPX radiation transport codes, including fundamental input components, code execution, and interpretation of output for a number of sample problems involving radiation shielding and dosimetry.

W-2 How to Effectively Manage Conflict without All the Drama
Jim Tarpinian, SLAC National Accelerator Laboratory

Conflict between people is inevitable in any meaningful relationship. Many of us would like to avoid conflict altogether. Conflict cannot be avoided but it can be effectively managed in a way that preserves relationships, builds teamwork and achieves sustainable solutions. Effective methods for resolving conflict are situation dependent yet most of us use only one or two approaches. This class will help you successfully resolve conflict in any situation by learning five basic conflict management styles including your preferred style. You will learn when each style is best used and what happens when it is over used. At the conclusion of the class you will be able to choose the style that is likely to be most effective for each conflict situation. Surprisingly, sometimes doing nothing is actually the best approach!

W-3 Case Study of a NORM-Contaminated Site
Andrew Karam

Naturally occurring radioactive materials (NORM) have been associated with a variety of industries – particularly in fossil fuels and mineral extraction and processing. In decades past this often resulted in sites that were contaminated with NORM nuclides but, owing to less stringent standards, were not required to be remediated. As years passed and standards tightened, some of these sites have come under greater scrutiny, requiring radiological surveys, possible dose and risk assessments, and possible dose mitigation or remediation actions. Along the way one must grapple with some of the health physics problems (e.g. developing valid dose estimates, performing proper radiological surveys, etc.) as well as grappling with some of the political and social problems (e.g. meeting with members of the community, communicating with local business owners, etc.). In this case study we will examine one such site and will discuss some of the more interesting and important issues that arose and how they were addressed (for better or for worse).

W-4 Is Telling the Truth the Answer to Effective Radiation Risk Communication?
Ray Johnson, Radiation Safety Counseling Institute

A well-known health physicist once told me, while shaking his finger in my face, “The answer to risk communication is simple, just tell people the truth!” I responded to say, “I believe in telling the truth, however, my studies show that truth has a different meaning to different people.” This HP then left in great disgust saying, “I can see that we are dia-

metrically opposed." My studies of nearly 4,000 radiation safety specialists with the Myers Briggs Type Indicator (MBTI, a trademark of Consulting Psychologists Press) show that for the majority of HPs truth is what can be defended by logical rational analysis and corroborated by peers. However, for the majority of the general public truth may be what is best for people taking into account the circumstances, feelings, and emotions. These two views of the truth can be very different and both groups will honestly believe they are right and will swear they are telling the truth in a courtroom. The question to consider today is whether telling the "technical" truth about radiation is working? Have public sentiments against radiation mellowed over the decades since the advent of nuclear weapons? I believe most will agree that the people are as concerned about radiation safety today as they were decades ago. After all, we now have proof that nuclear technology can go wrong (Three Mile Island, Chernobyl, and now Fukushima Dai-ichi).

Apparently the truth we are telling people about radiation risks is not generally accepted. This begs the question, "How do people determine the truth?" Insights on this question have been presented in a series of *Health Physics News* articles in 2012-2013. I have attempted to describe how people make decisions on truth for radiation safety based on processing information as normal functions of the subconscious mind. Our subconscious mind is wired to constantly search for signs of danger. However, since radiation does not give us any physical sensation, we have to rely on imagination to determine our safety. Our subconscious mind has been programmed by education and the media to automatically associate all radiation with "deadly radiation." Thus associations by normal subconscious functions for safety will likely lead to opinions and decisions based on images of unacceptable consequences of radiation exposures. Once a subconscious opinion is formed regarding radiation safety, people may no longer be interested in others' opinions, or technical truths, which differ from their views. People do not naturally seek out opinions that differ from theirs. In fact, people more commonly will bond together with others who share similar views. Thus, differing views may be discounted as not representing the truth.

W-5 The New and Revised Laser Safety Standards

D.H. Sliney, Johns Hopkins Bloomberg School of Public Health, Baltimore

Over the past two years, two new application-specific ("vertical") laser safety standards have been issued and the basic ("horizontal") standard has been revised and published this year as ANSI Z136.1-2014. Over the past 6 years our understanding of the biological threshold data of optical radiation—particularly with regard to short-pulse laser radiation—led to revision of long-established limits in the sub-microsecond time domain, and some limits will be reduced, but limits for picosecond lasers will actually increase. More importantly for some applications, the repetitive-pulse correction factors have been eliminated or reduced in scale. What will these changes mean for current, pulsed-laser or scanning-laser products? Fortunately, most laser products will not move to a more hazardous classification, but some previously classified Class 3R or 3B products may become Class 1 or Class 2. The changes in the maximum permis-

sible exposure (MPE) limits by two other important groups just preceded the ANSI update. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) updated their guidelines for human exposure in *Health Physics*, and these are available from the ICNIRP website. These revised guidelines are in close agreement with the earlier revised threshold limit values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH). Much of the change in ANSI Z136.1, Safe Use of Lasers, are editorial, with few significant changes. While there are some similarities with laser maximum permissible exposure (MPE) limits, the default values and some safety factors differ for the incoherent limits. Accidents and injuries from lamps are more frequent but less severe than from lasers.

Regarding vertical standards, a revision of ANZI Z136.2 - Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources was published in 2013.

Two entirely new vertical standards, ANSI Z136.8 - Safe Use of Lasers in Research, Development, or Testing, and one on ANSI Z136.9 - Safe Use of Lasers in Manufacturing Environments, were issued in the past two years. A new standard on lasers in entertainment (ANSI Z136.10) is under final development. This course will consider the key features of these new standards and how they fit with ANSI Z136.1. Many a practicing health physicist will be asked about laser safety, even if it is not their primary assignment, and this course is designed as an update on this subject.

While some knowledge of the ANSI Z136 laser standard would be helpful, both experienced and novice health physicists with laser safety interests or responsibilities will benefit from this course.

Thursday - 12:15-2:15 pm

Th-1 Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions

Richard P. 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

Th-2 CAP88 PC Version 4 Topics

Reid Rosnick, Radiation Protection Division, US Environmental Protection Agency

This lecture is an introduction to the CAP88 version 4 code, including what it does, how it does it, the models and equations used behind the scenes, how and where to download, install, and run the code, the file types and where the files would be located, etc. Also included (for more advanced users) is how to correctly interpret output reports and error logs, how to modify input files (including population files), and a more detailed explanation of the limitations of CAP88. This course would be intended for a novice or new user, although more experienced users could also benefit from the background information.

Th-3 So Now You're the RSO: Elements of an Effective Radiation Safety Program

Thomas L. Morgan, Chief Radiation Safety Officer, Columbia University, New York, NY

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 18 years' experience as an RSO at medical, university, and industrial facilities. Regardless of the type of facility, number of radiation workers, or scope, an effective radiation safety program must be driven from the top down. Senior management must embrace the goals of the program. The RSO must have the trust of senior management as well as a good working relationship with line managers and workers. These relationships are built on the integrity, knowledge, experience, and accessibility of the RSO. This talk will focus on the role of the RSO in achieving and maintaining an effective program.

Th-4 What is New in Neutron Monitoring?

Nolan E. Hertel, Georgia Institute of Technology

Although the basic nuclear reactions to detect neutrons have been known and used for years, efforts directed at neutron detection for homeland security have led to new detector designs. Many of these designs use new microelectronics and nanoparticle manufacturing techniques. This often results in small detectors that need to be used in large arrays for practical applications. The principal reactions by which neutrons are detected will be reviewed. Recent detector developments will be reviewed with an eye towards their applications in both large scale counters and uses in neutron dosimetry.

Th-5 Developing and Implementing an RF Safety Plan

Donald L. Haes, Jr.

There are many RF sources which are used in industry and research. These include both enclosed and free-radiating sources. As RSO, we need to be prepared to consider the many applicable regulations and safety standards. In this PEP the attendee will learn the about the FCC regulations regarding permanent and experimental licensing and the new laws for low power exclusions. In addition, we will cover the latest revision to C95.7 and the proposed C95.1 and C95.6 combination. The PEP will provide sample FCC submissions, safe operating procedures for RF sources, and developing and implementing an RF safety.

Continuing Education Lectures (CEL)
Monday 14 July through Thursday 17 July

Monday 7:00-8:00 AM

CEL-1 The 1976 Hanford Americium Accident – Then and Now
Eugene H. Carbaugh, Dade Moeller and Associates

The 1976 chemical explosion of an ^{241}Am ion exchange column at a Hanford Site waste management facility resulted in the extreme contamination of a worker with ^{241}Am, nitric acid and debris. The worker underwent medical treatment for acid burns, as well as wound debridement, extensive personal skin decontamination and long-term DTPA chelation therapy for decorporation of ^{241}Am. Because of the contamination levels and prolonged decontamination efforts, care was provided for the first three months at the unique Emergency Decontamination Facility with gradual transition to the patient's home occurring over another two months. The medical treatment, management, and dosimetry of the patient have been well documented in numerous reports and journal articles. The lessons learned with regard to patient treatment and effectiveness of therapy still form the underlying philosophy of treatment for contaminated injuries. Changes in infrastructure and facilities as well as societal expectations make for interesting speculation as to how responses might differ today.

CEL-2 ANSI N43.1, Radiation Safety for the Design and Operation of Particle Accelerators
L. Scott Walker, Los Alamos National Laboratory

The CEL for ANSI N43.1 is an overview of the recently approved accelerator safety document that replaces the 1985 version of the standard. Each section of the new standard is highlighted as well as the five appendixes. Several new sections were added that were not included in the old standard. These include: Radiation Safety Program, Radiation Safety System, Access Control System, Radiation Control System and Accelerator Operations. The appendixes address: Development of Safety Assessment Document (SAD), Interlocked-Type Access Control Systems, Decommissioning Program, Measurements of Radiation and Radioactivity, and Safety Standards for Commercially Available and/or Production-Type Accelerators. The last appendix is normative (not optional) and was written to summarize the requirements for small industrial accelerators.

Tuesday 7:00-8:00 AM

CEL-3 Radiation Safety's Role in Mitigating the "Insider Threat" Risk
Robert Emery, University of Texas School of Public Health

While organizations maintain many layers of controls to prevent outsiders from gaining unauthorized access to cause loss or harm, persons who have been granted legitimate access can become an "insider threat," and because they are very difficult to detect, cause over $100 billon in losses annually. Although the typical insider targets assets or data, in some cases their actions can also have significant impacts on workplace and environmental health and safety. Because much of an organization's radiation safety program activities are carried out with

the workers in their workplace, this represents a unique opportunity to assist in the possible detection of insider threats. This presentation will discuss the threats represented by insiders and will detail their recognized traits so that radiation safety professionals can enhance their situational awareness and report suspicions to the appropriate authorities.

CEL-4 Working with the Media on Radiation-Related Stories
Andrew Karam

News stories related to radiation and nuclear issues are almost always popular and the last few years have given the media a lot to write about. Virtually all of these stories include statements by non-health physicists, many of whom are anti-nuclear and anti-radiation; not enough include statements by those of us who actually understand the science. Sometimes this is because the reporter can't find a knowledgeable person but more frequently it's because the radiation safety professionals are reluctant to work with the media, and the stories are less balanced and less accurate because of this. We owe it to the public and to our profession to work with members of the media to help provide the public with accurate information about these issues – in this CEL we will discuss how you can provide solid information to the public via the media when the next story hits the news.

Wednesday 7:00-8:00 AM

CEL-5 Safety (Mis)Communications – How to Say What You Mean and Mean What You Say
James Tarpinian, SLAC National Accelerator Laboratory

This presentation explains why traditional approaches to safety communications actually work AGAINST our efforts to create a healthy nuclear safety culture.

One of the key objectives of effective communication is to avoid being misunderstood as well as to be understood. Often, as safety professionals or managers, we seek to motivate employees to work safely by communicating our key messages briefly and simply so that there is no room for confusion. However, despite our best efforts and intentions we don't get the results we were expecting – why?

In order to avoid being misunderstood, we must understand the three perspectives of what we say, what we mean when we say it, and what the intended audience actually hears. For example, a phrase that is commonly used is "Safety is a condition of employment." This overused phrase is brief and to the point but it is absolutely the wrong thing to say and almost always said at the wrong time, generally in a memo that management issues following a serious accident. This message fails because it yields exactly the opposite of what is intended. It results in a disenchanted workforce where safety is equated with punishment, rules are not respected (and, likely not questioned) and ideas for safety improvements are suppressed or not even offered.

This interactive discussion will help you avoid the pitfalls of "safety

sound bytes" and will significantly increase your ability to create positive, sustainable changes in safety culture by learning how to send the right message.

CEL-6 An Informatics Mindset for Managing the Relevance and Reliability of Modern Measurements: Understanding and Meeting Current Challenges

Mark D. Hoover, National Institute for Occupational Safety and Health; Leigh J. Cash, Los Alamos National Laboratory

Although technology is advancing, resources to anticipate, recognize, evaluate, control, and confirm successful application of emerging and existing measurement options are tightening. An informatics approach to meeting this or any other challenge can be defined and applied as the science and practice of determining which information is relevant to meeting the objectives at hand, and then developing and implementing effective mechanisms for collecting, validating, storing, sharing, analyzing, modeling, and applying the information, and then confirming that appropriate decisions were made and that desired mission outcomes were achieved. This CEL explores how success in making relevant and reliable measurements and robust decisions depends on our ability to develop and sustain leaders, cultures, and systems for safety, health, well-being, and productivity. Example flaws in decision-making are presented, along with CLEAR communication assessment criteria for a variety of stakeholders. Associated approaches are presented for assignment of the relevance and reliability of information, alignment of what we must know versus what we must show, and issues for refining perception versus reality. A pyramid version of the hierarchy of control is used to illustrate how hazards, exposures, and resulting risks can be managed through different degrees of sustainability by elimination, substitution, modification, engineering controls, warnings, life and work practices, and personal protective equipment. The key requirement is a managerial frame of mind determined to make robust decisions.

Thursday 7:00-8:00 AM

CEL-7 Interpretation of Radiation Measurements

Ray Johnson, Radiation Safety Counseling Institute

Misunderstandings abound when it comes to the interpretation of radiation measurements. There are two key factors governing such interpretations: 1) measurements have no meaning until interpreted and 2) measurements only have meaning in terms of how they are interpreted. Thus, recorded or reported radiation measurements have no inherent meaning by themselves, they are just numbers. Interpretation of radiation measurements may have as much to do with attitudes and perceptions of radiation risks as it does about technology. For example, a worker at an industrial facility observed the RSO taking readings with a Geiger counter and saw the meter go off scale. That was enough information for this worker to start an uproar that eventually involved several hundred other workers, the union, and management. Another worker at a food production facility heard a GM meter in use for surveying the installation of a new x-ray machine for product quality control. He raised

concerns and when the company manager heard there was radiation in his facility, he told the x-ray company to remove their machine. This resulted in the loss of a $4 million sale for 20 x-ray machines.

Radiation safety specialists have the advantage for interpreting radiation measurements based on knowledge of comparative readings from background and other sources. Most people without this specialized knowledge do not know that we live in a sea of radiation which surrounds us all the time. Furthermore, a screaming Geiger counter may sound alarming, but radiation risks depend on many other factors, such as the type of radiation, the proximity of people, the duration of exposure, and dose actually delivered. A Geiger counter reading is only one piece of information which specialists would use for assessing potential risks. Unfortunately, all radiation measurements have many potential sources for errors which people may not know about and may therefore assume the measurements represent the real world. For interpreting radiation measurements, how much do we rely on technical understanding and how much of our interpretation is an emotional reaction regarding safety?

CEL-8 ABHP Exam Fundamentals – Tips for Successfully Completing the Certification Process

Patrick J. LaFrate, Charles "Gus" Potter; Harris Energy and Environmental Center, Sandia National Labs

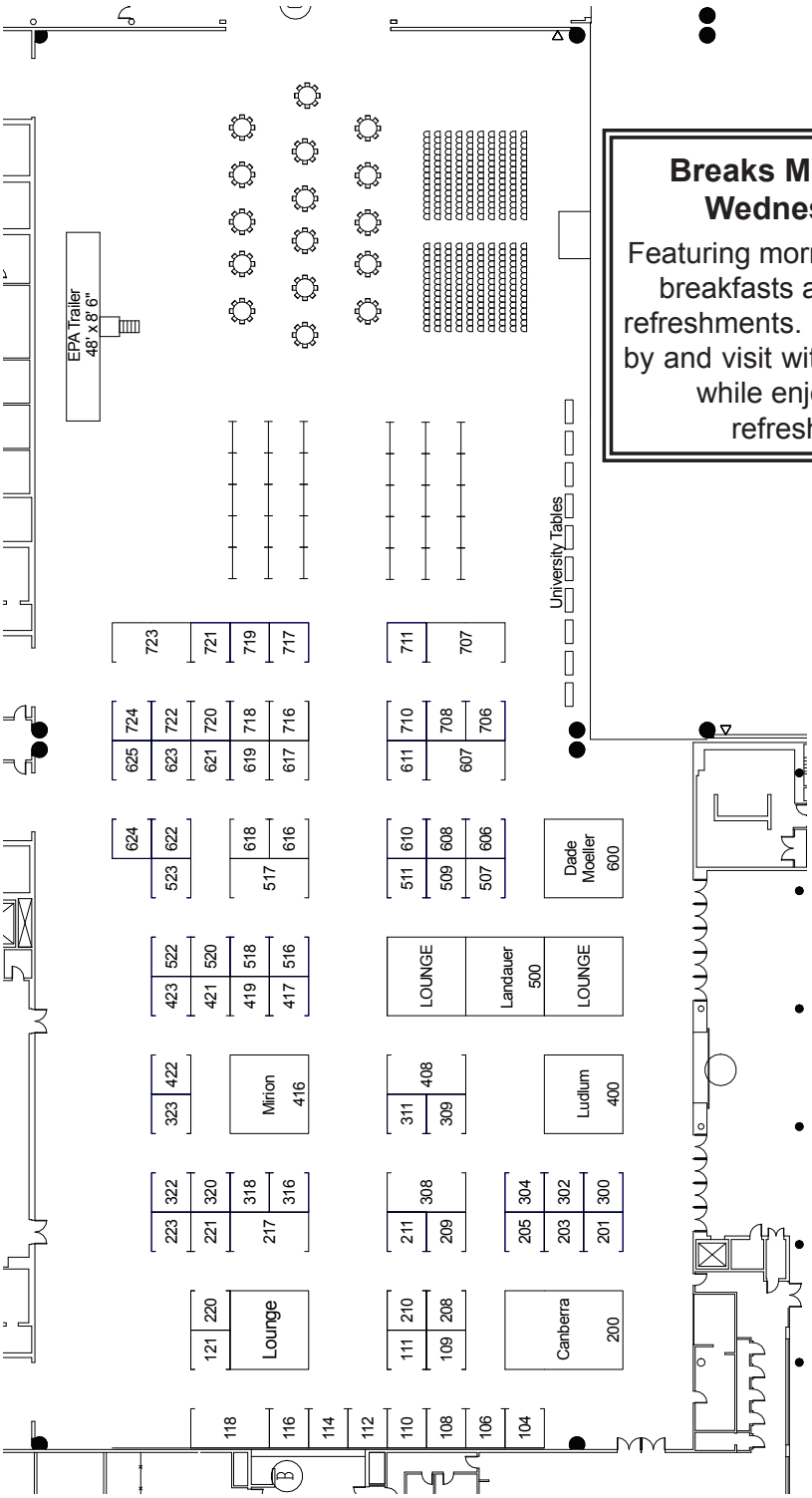
This presentation will detail the advantages of being certified and discuss the fundamentals of the ABHP exam process – from submission of the exam application to completion of the Part 2 examination.

Topics of discussion will include:

- History of the ABHP
- Meaning of certification
- Why certify?
- General requirements for certification
- Exam preparation process
- Exam strategies
- Keys to good performance
- Exam pitfalls

This presentation will help persons interested in certification to prepare an application that will accurately reflect the applicant's education and experience as well as providing tips for preparing to take the exam and answering Part 2 questions in a format that promotes awarding partial credit. Persons who are already certified may gain insight into the process and identify areas where they would be willing to assist in certification process. The material presented consolidates pertinent exam policy/procedure into an easily digestible format, offering real world examples of good and poor performance.

2014 Exhibit Hall Floor Plan



Breaks Monday pm-Wednesday am

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

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

Bionomics Booth: 300
PO Box 817
Kingston, TN 37763
865-220-8501; FAX: 865-220-8532
www.bionomics-inc.com

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

Bladewerx LLC Booth: 203
4135 Jackie Road SE, Suite 108
Rio Rancho, NM 87124
505-892-5144; FAX: 505-890-8319
www.bladewerx.com

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

Canberra Booth: 200
800 Research Parkway
Meriden, CT 06450
203-639-2148; FAX: 203-235-1347
www.canberra.com

CANBERRA is the leading supplier of innovative and cost-effective nuclear measurement solutions and services used to maintain safety of personnel, assess the health of nuclear facilities and safeguard the public and the environment. Applications for CANBERRA offerings include health physics, nuclear power operations, Radiation Monitoring Systems (RMS), nuclear safeguards, nuclear waste management, environmental radiochemistry and other areas.

Centers for Disease Control and Prevention, Radiation Studies Branch **Booth: 109**
4770 Buford Highway
Atlanta, GA 30341
770-488-3753
www.cdc.gov

The Centers for Disease Control and Prevention, Radiation Studies Branch, has developed two Radiation Emergency Tool Kits to assist state and local officials plan for and respond to radiation emergencies. These kits provide guidance and resources for pre and post event. For more information go to: http://emergency.cdc.gov/radiation, or stop by our booth and find out how to order a free kit.

Centronic LLC **Booth: 221**
16203 Park Row Suite #110
Houston TX 77084
281-578-7900; 281-578-7902 Fax

Centronic is one of the world's leading designer and manufacturer of radiation detectors serving the nuclear power, medical, security and oil and gas industries for over 70 years.

Chase Environmental Group, Inc. **Booth: 617**
109 Flint Rd
Oak Ridge, TN 37830
865-481-8801; FAX: 865-481-8818
www.chaseenv.com

Chase Environmental Group, Inc. is a full-service, decontamination, decommissioning, remediation, and waste management firm, providing safe, high quality, practical, cost effective solutions to your environmental needs.

Chesapeake Nuclear Services, Inc. **Booth: 422**
788 Sonne Drive
Annapolis, MD 21401
410-266-9174; FAX: 410-266-5811
www.chesnuc.com

Chesapeake Nuclear (ChesNuc) specializes in radiological health and safety, with expertise in operational radiation safety, radiological environmental monitoring; environmental exposure pathway assessments, radioactive effluent dose assessment, radiological site characterization and decommissioning. Utilizing a staff of health physicists and engineers, ChesNuc provides unique, efficient solutions to complex technical radiation safety problems.

CRCPD **Booth: 718**
1030 Burlington Lane, Suite 4B
Frankfort, KY 40601
502-227-4543; FAX: 502-227-7862
www.crcpd.org

The Conference of Radiation Control Program Directors, Inc. (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.

Curie Services **Booth: 121**
4020 Vassar Drive NE, Suite D
Albuquerque, NM 87107
505-888-9392
www.CurieServices.com

Curie Environmental Services is a radioactive materials service provider protecting people and the environment from radiation and radioactive waste. Curie is based in Albuquerque, NM and was founded in 2011.

Curie is the first company in the United States to offer a recycling program, called CuriePack, for radioactive smoke alarms generated by both home owners

and industry. A CuriePack return kits consists of either a 5 or 18 gallon accumulation container, compliant DOT markings, packaging instructions, DOT training acknowledgement and prepaid UPS shipping back to our Albuquerque facility for processing.

Additional radioactive material recycling mail back programs have been developed by Curie. Return kits are also available for uranium and thorium chemical compounds, tritium containing exit signs and selected sealed radioactive sources. Curie also offers radioactive waste/materials brokerage services along with radiation surveys, DOT packaging and NORM management.

Dade Moeller Booth: 600
1835 Terminal Drive, Suite 200
Richland, WA 99354
509-946-0410
www.moellerinc.com

Dade Moeller provides a full range of professional and technical services to Federal, state and commercial clients in support of nuclear, radiological, and environmental operations. With 12 locations nationwide, our staff is recognized for expertise and proven performance in radiation/nuclear services, occupational safety, environmental protection, and safety training.

Eckert & Ziegler Booth: 217
1380 Seaboard Industrial Blvd.
Atlanta, GA 30318
404-352-8677; FAX: 404-352-2837
www.ezag.com

Eckert & Ziegler Analytics supplies high quality, NIST-traceable radioactive reference and calibration sources and standardized solutions for the calibration of radiation measurement instruments. Eckert & Ziegler Analytics provides the customer service for the complete Isotrak brand product line including all reference and calibration products manufactured at Isotope Products (IPL), Analytics and Nuclitec GmbH.

We operate 3 accredited calibration laboratories, 2 in the USA and one in Germany.

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Ecology Services Inc. Booth: 114
9135 Guilford Road, Suite 200
Columbia, MD 21046
412-596-1131
www.ecologyservices.com

Ecology Services, Inc. is a national company providing radioactive and mixed waste management/disposal and health physics services. Since 1989 ESI has serviced pharmaceutical, educational, biotech, medical and research facilities.

Energy Solutions Booth: 308
423 West 300 South, Suite 200
Salt Lake City, UT 84101
801-649-2102; FAX: 801-413-5690
www.energysolutions.com

EnergySolutions is an international nuclear services company headquartered in Salt Lake City with operations across the United States, Canada, the United Kingdom and other countries around the world. EnergySolutions is a global leader in the safe recycling, processing and disposal of nuclear material. We provide integrated services and solutions to the nuclear industry, the United States Government, and the Government of the United Kingdom. EnergySolutions offers a full range of services for the decommissioning and remediation of nuclear sites and facilities, management of spent nuclear fuel, the transportation of nuclear material and the environmental cleanup of nuclear legacy sites.

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Montgomery, AL 36115-2600
334-270-7064; FAX: 334-270-3454
www.epa.gov

An asset of the Office of Air and Radiation (OAR), Office of Radiation and Indoor Air (ORIA), the MERL System supports the national radiation emergency response framework. The focused work addresses low level radioanalytical measurements in environmental media.

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937-746-4427
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www.flir.com/gs

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Fuji Electric Corp of America **Booth: 606**

50 Northfield Avenue
Edison, NJ 08837
201-490-3932; FAX: 201-368-8258
www.americas.fujielectric.com

Fuji Electric Corp. of America – Radiation is a wholly owned subsidiary of Fuji Electric Co., Ltd., and has a sophisticated line-up of high quality Radiation Detection instrumentation, including our environmental monitors and ultra-lightweight Neutron Survey Meter. Fuji Electric radiation instrumentation has been used widely in nuclear, industrial, and medical facilities. For over 60 years, we have been committed to maintaining the safety of personnel and safeguarding the public and environment. Our goal is to continue to provide world-class radiation instrumentation solutions to meet the needs of the 21st century global market along with excellent customer and service support.

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www.gocorp.com

G/O Corporation is a supplier of both nuclear and industrial safety equipment. G/O provides health physics supplies, rad-waste reduction items, many custom signage and barrier products.

Gamma Products **Booth: 717**
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Palos Hills, IL 60465
708-974-4100; FAX: 708-974-0071
www.gammaproducts.com

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

GEL Group/ GEL Engineering **Booth: 708**
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Charleston, SC 29414
843-906-5929; FAX: 843-766-1178
www.gel.com

GEL Laboratories, LLC provides analytical chemistry, radiochemistry, bioassay, and waste disposal support throughout the world. GEL is a provider to US, Canada, UK, Japan, and Western European countries. GEL is also consulting with the UAE on these Radiological Environmental Programs.

Health Physics Instruments **Booth: 616**
330 S. Kellogg Ave, Suite D
Goleta, CA 93117
805-964-3615
www.fwt.com

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

Hi-Q Environmental Products Co. **Booth: 201**
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San Diego, CA 92121
858-549-2820; FAX: 858-549-9657
www.hi-q.net

HI-Q Environmental Products Company is an ISO 9001:2008 certified designer/manufacturer that has been providing air sampling equipment, systems and services to the nuclear and environmental monitoring industries since 1973. Our product line includes: Continuous duty high & low volume air samplers, radiation measurement instrumentation, radiation monitoring systems, air flow calibrators, radioiodine sampling cartridges, collection filter paper and both paper-only or combination style filter holders. Along with the ability to design complete, turn-key, stack and fume hood sampling system, HI-Q has the capability to test ducts and vent stacks as required by ANSI N13.1-1999/2011.

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81-422-45-6465; Fax: 81-422-45-4058
www.hitachi-aloka.co.jp/english/

Hitachi Aloka Medical's radiation measuring instruments are used in various fields including nuclear power plant, medicine, biochemistry, and pharmacology and play crucial roles in radiation (safety) management, research, and examination. As the pioneer in the field of radiation measurement, we have contributed greatly to the peaceful use of atomic energy and the development of isotope technology. We will also continue to assist the progress of medicine and energy for the new age.

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K&S currently offers the broadest range of precision calibration and dosimetry services available covering energies from 10 kVp to 250 kVp x-rays, Cesium 137, and Cobalt 60, LDR (Iodine 125, Cesium 137, Iridium 192) and Iridium 192 HDR brachytherapy. K&S offers diagnostic x-ray beam calibrations covering mammography, general radiography and CT and noninvasive kVp meter calibrations over the same range. K&S can also provide TLD dosimetry services specializing in diagnostic dose mapping for CV lab and interventional radiology patients using the Poly Dose Belt custom designed by K&S for these procedures. A new apparatus was designed in 1998 to provide the traceability for the NIST dose to water standard to support the new AAPM requirements under the AAPM Task Group 51 Protocol.

Kromek **Booth: 112**
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724-350-6302; FAX: 724-352-4435
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eV Products, Inc., a Kromek company, is a leading developer of next generation portable radiation detectors and detection networks, that find, identify, assess, quantify and visualize source of radiation for all aspects of Health Physics, Homeland Security, and Nuclear Research.

Lab Impex Systems **Booth: 516**
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866-483-2600; FAX: 865-381-1654
www.labimpex.com

Lab Impex Systems is a leader in the development and supply of radiation detection equipment and integrated nucleonic systems. Experience in the high technology needs of Defense, Nuclear, Medical and Industrial customers. We respond to our customer's needs; whether a nuclear power station (operating or decommissioning), a naval dockyard maintaining nuclear submarines, or even suppliers of radioactive materials.

LabLogic Systems, Inc **Booth: 311**
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Brandon, FL 33511
813-626-6848; FAX: 813-620-3708
www.lablogic.com

LabLogic specializes in instru-mentation and software for the measurement and analysis of radioisotopes used in environmental, pharmaceutical, nuclear medicine and research laboratories. Our products include liquid scintillation counters, radiation monitors, personal dosimeters, radio-chromatography instruments and software, microplate readers, radiation safety consumables.

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Landauer **Booth: 500**
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800-323-8830; FAX: 708-755-7016
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Orlando, FL 32826
407-985-3819; FAX: 407-380-5588
www.lia.org

The Laser Institute of America (LIA) is the professional society for laser applications and safety. Our mission is to foster lasers, laser applications, and laser safety worldwide. Serving the industrial, medical, research and government communities for over 45 years, LIA offers technical information, training and networking opportunities to laser users from around the globe. www.lia.org

Laurus **Booth: 511**
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Ellicott City, MD 21043
410-465-5558; FAX: 410-465-5257
www.laurussystems.com

LAURUS Systems, Inc. is a certified woman-owned small business corporation, located in Ellicott City, MD. LAURUS specializes in the sales, service and training of radiation, explosive, chemical and bio detection products. We offer major brand name products from: D-Tect Systems; FLIR; Thermo; Mirion; Johnson; Radeco; Morphix; 2020 BioCheck and SE International.

LND, Inc. **Booth: 322**
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Oceanside, NY 11572
516-678-6141; FAX: 516-678-6704
www.lndinc.com

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Ludlum Measurements Booth: 400
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800-622-0828; FAX: 325-235-4672
www.ludlums.com

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Mazur Instruments Booth: 611
200 South Wilcox St #448
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303-660-5247; FAX: 303-496-6000
www.MazurInstruments.com

Mazur Instruments develops and manufactures handheld survey meters used by professionals and organizations to detect, measure and monitor nuclear radiation. Made in the USA, the company's instruments are competitively priced and offer ruggedness, high reliability, outstanding battery life, autonomous data-logging, abundant I/O, inline statistics and a multi-language (English/Japanese) text interface.

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Smyrna, GA 30082
770-432-2744; FAX: 770-432-9179
www.mirion.com

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NATS, Incorporated Booth: 710
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Middletown, CT 06457
860-635-6820; FAX: 860-635-4962
www.nats-usa.com

North American Technical Services is a multi-national corporation with headquarters located in Middletown, Connecticut. We offer a comprehensive line of instruments and service solutions in the area of radiation measurement and spectroscopy instruments. The Company supports a world-wide customer base encompassing fields in health physics, environmental monitoring, research laboratories, emergency response and nuclear power generation.

NRRPT Booth: 110
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Westerly, RI 99336
401-637-4811; FAX: 401-637-4822
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.

On Site Systems Booth: 419
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O'Fallon, MO 63368
314-963-9934; FAX: 314-963-9281
www.hpassist.com

On Site Systems is a software development company with a single focus, Biological, Chemical and Radiological Safety Data Management software. The EH&S Assistant is a centralized database and safety management system providing comprehensive compliance documentation. The Health Physics Assistant helps the RSO efficiently meet federal, state and local requirements for managing the safe use of radioactive material and controlled substances.

ORAU **Booth: 423**
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www.orau.org

ORAU provides a variety of services in the radiological sciences: Training, environmental surveys, decommissioning, epidemiology, and, emergency response.

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Oak Ridge, TN 37831
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Knoxville, TN 37921
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Philotechnics **Booth: 323**
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Oak Ridge, TN 37830
865-257-2760; FAX: 865-220-0686
www.philotechnics.com

Philotechnics, Ltd. is a full-scope radiological services company headquartered in East Tennessee. We provide LLRW and Mixed Waste Management Services, D & D and HP Services. The core of our philosophy is our commitment to being the most responsive, broad-spectrum radiological services provider in the nation – dedicated to advising our customers on the most appropriate method to accomplish their objectives.

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Suwanee, GA 30024
678-765-7900
www.radsource.com

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Stratham, NH 03885
603-778-2871; FAX: 603-778-6879
www.radsafety.com

Established in 1989, RSCS, Inc. is a small business that offers expertise in all aspects of radiation safety and measurement applications. Our company specializes in operational and decommissioning services for nuclear power plants as well as for industrial, medical, and government radiological facilities. Our core services include health

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Radiation Safety Associates, Inc. **Booth: 509**
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PO Box 107
Hebron, CT 06248
860-228-0487; FAX: 860-228-4402
www.radpro.com

Radiation Safety Associates, Inc. (RSA) provides radiological services for a wide variety of commercial clients. Services include: general consulting in health physics and radiation safety; training and training materials; surveys; license amendments; audits; instrument calibration; radioanalytical services. We also design, produce, rent, and sell detection equipment and software.

Radiation Solutions **Booth: 610**
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Missauga, ON L4Z 1X2 Canada
905-890-1111; FAX: 905-890-1964
www.radiationsolutions.ca

Radiation Solutions Inc. (RSI) is a manufacturer of low level radiation detection instruments. Products include handheld nuclide identification (RIID) units, mobile systems for land vehicle, marine, airborne and stationary monitoring. Applications range from environmental, emergency response, security and geological mapping. The various systems offer Survey / Search, Nuclide 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.

Radiological Emergency Response Technical Demonstration **Booth: 723**

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Laurel, MD 20725-1450
301-953-2482; FAX: 301-498-3017
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RSO, Inc. offers a variety of radioactive waste management and disposal servies. We operate a fully permitted and licensed facility and vehicles. Our turnkey disposal services are tailored to meet the needs of both small and large generators. We offer decommissioning services for any size project.

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865-482-9937; FAX: 865-483-0473
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Spectrum Techniques, LLC is your primary source for exempt quantity radionuclides and radiation detection and measurement instrumentation. Applications include teaching and training in nuclear medicine, health physics, chemistry, biology and nuclear engineering. See our web site at SpectrumTechniques.com for MCAs, nuclear counters, ratemeters, and disk, rod, laminated and needle sources. For the best in nuclear counting, count on Spectrum Techniques!

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412-798-3636; FAX: 412-798-3633
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Richland, WA 99354
509-375-3131; FAX: 509-375-5590
www.testamericainc.com

TestAmerica has over 40 years of experience providing a full range of analyses for environmental and bioassay matrices, including urine, feces, tissue, blood, bone and other biological materials. Our goal is to deliver quality data, on time, in full compliance and in the format that best meets your needs.

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P.53 Extension of Past Work on Precision of Measurements in Paired Counting

Potter, W.E., Strzelczyk, J.; Independent Researcher, Independent Consultant

Frequently confidence intervals and detection limits are determined using the Gaussian distribution, which has a continuous, symmetric probability density distribution. Outcomes of measurements in radioactivity may be limited to an integer number of counts, so a more proper methodology to determine confidence intervals may involve discrete probability, not continuous probability. In many situations both the blank count and the sample contribution to the gross count are well approximated by Poisson distributions. Paired counting occurs when the sample count time and the blank count time are of the same duration and very efficient computer codes are applicable. Ideally, the expected blank count in the sample count time, B, can be estimated from previous measurements. In the wellknown case, the net count is taken to be the difference between the gross count, a Poisson distributed random variable, and a constant value equal to the wellknown blank count. Otherwise the observed net count is the difference between two Poisson distributed random variables and has a probability density function that is readily expressed in terms of modified Bessel functions of integer order (MBIO). In either case, MDFIO rapidly account for statistical uncertainties in the counting process. Confidence intervals are determined by mimicking a standard approach in discrete probability. An executable form of a C++ computer code computes confidence intervals for the expected net count. The uncertainty introduced by the expected blank count in the sample count time is computed. Also the uncertainty contributed by the conversion from counts in the sample count time to activity in the sample is discussed. Examples are presented.

P.54 Electron Paramagnetic Study of Fingernails Exposed to Ultraviolet Light

Sholom, S., McKeever, S.W.S.; Oklahoma State University

Fingernails are prospective materials for emergency triage dosimetry using Electron Paramagnetic Resonance (EPR). It was recently shown that only one EPR signal located at g=2.005 has acceptable stability for dose reconstruction. However, there is a question about its stability in vivo. The answer on this question is quite challenging because it is difficult to find and get fingernails samples exposed in vivo to a known ionizing radiation dose. In the present study, ultraviolet light (UV) was used as a substitute for gamma-/X-ray exposure. Four different sources of UV light were exploited. In a first experiment clipped fingernails were exposed for different times to the UV sources or to different doses of X-rays. The obtained EPR spectra could be successfully fitted using a set of three reference spectra, two singlets and one doublet. The singlet at g=2.005 demonstrated similar properties for both UV and X-ray exposed samples, which supports the concept that UV light may be used in fingernail EPR dosimetry to substitute for gamma/X-ray exposure. Thus, in a second experiment, some fingernails on an individual's right hand were exposed to 110 J/cm2 of 302

nm UV light (an equivalent of 10 Gy gamma exposure) while fingernails of the left hand were left unexposed. Fingernails from both hands were clipped two days after exposure. No difference between the EPR spectra of fingernails from left and right hands was detected. Then the clipped fingernails from the left hand were exposed in vitro to the same value of UV energy and both samples were measured again after two days; a significant increase of the g=2.005 EPR signal was observed for the left-hand sample. Finally, samples from both hands were soaked in water for about 15 minutes, which resulted in removing of UV-related EPR signals. It was concluded that just a contact with water during routine hygiene (washing of hands) was the reason for the absence of the UV-related EPR signals in the fingernails exposed in vivo. The consequences of this finding on the use of EPR dosimetry using fingernails will be discussed in the paper. *The authors would like to acknowledge funding in part from the Pilot Project Program of the Dartmouth Physically Based Center for Medical Countermeasures Against Radiation, with NIH funding from the National Institute of Allergy and Infectious Diseases (U19-AI091173).

P.55 A Comparison of the RESRAD Code and the EPA PRG Calculator for Cancer Risk Calculations for Radionuclides

Cheng, J.-J., Yu, C., Picel, M.H.; Argonne National Laboratory

The U.S. Environmental Protection Agency (EPA) developed the Preliminary Remediation Goal (PRG) Calculator as a tool for deriving remediation goals for sites contaminated with radioactive materials. This paper compares the PRG calculator with the RESRAD code that performs similar calculations. The PRGs calculated with the PRG Calculator were converted back to cancer risks per unit soil concentration and compared with those calculated with RESRAD. Results for uranium isotopes and their decay products for the following pathways were compared – external radiation, inhalation of particulates, ingestion of soil, and ingestion of produce. To estimate the exposures or intake rates of radionuclides, RESRAD tracks decay and ingrowth as well as the distributions in different environmental media of radionuclides over time. The PRG Calculator estimates the exposures or intake rates with adjusted radionuclide concentrations in soil for radiological decay. In order to compare cancer risks computed by the PRG Calculator, the RESRAD results at time 0 were used, leaching of radionuclides was suppressed, and an exposure-duration of 30 years was assumed. Differences in cancer risk results were tracked to the following aspects in calculation: (1) quantifying influence of finite source dimensions on external radiation, air dilution, and food contamination, (2) accounting for root uptake by fodder, (3) accounting for short-lived progenies, and (4) considering long-lived progenies generated during the exposure duration. While the differences associated with the first two aspects can be eliminated or minimized by manipulating exposure parameters, the differences associated with the last two aspects cannot. The PRG Calculator does not include contributions from short-lived progenies in the slope factors of Ac-227 and Pb-210, which lowers its cancer risk estimates by a factor up to 4,200 for Ac-227 and

11 for Pb-210. Without accounting for the contributions from long-lived progenies, the cancer risks estimated by the PRG Calculator are also lower by a factor of 1.34 for U-238, 64.7 for Th-230, 4.75 for Pa-231, and 1.37 for Ac-227 for the external radiation pathway, and a factor of 3 for Ra-226 for the soil ingestion pathway. This comparison demonstrates the significance of contributions to the cancer risks of radionuclides from both short-lived and long-lived progenies.

P.56 Enhanced Capability of the RESRAD-BIOTA Code Used for the IAEA MODARIA Biota Working Group's Fukushima Dynamic Modeling Scenario

Kamboj, S., LePoire, D., Wang, C., Cheng, J.-J., Yu, C.; Argonne National Laboratory

The RESRAD-BIOTA code has been updated to include the capability to accept time dependent water and sediment concentrations to model uptake and turnover of radionuclides in different aquatic species using kinetic calculations based on biological half-lives and bioaccumulation factors of stable isotopes. The new capability of the RESRAD-BIOTA code was used to analyze the Fukushima dynamic modeling scenario, as part of the modeling comparison exercise conducted by the International Atomic Energy Agency's (IAEA's) Modeling and Data for Radiological Impact Assessments (MODARIA) Biota Working Group. In this scenario, four coastal stations near Fukushima received effluent discharges containing radioactivity from the accident. The water and sediment activity concentrations changed with time. The purpose of this model comparison exercise was to assess the differences in the dynamic modeling predictions of activity concentrations in different marine biota species from the equilibrium model predictions, and how they compared to the available monitoring data. For this exercise, near-surface and near-bottom water concentrations and sediment concentrations of Cs-137, Sr-90, and I-131 for four coastal stations for the period March 11, 2011 – June 30, 2011 were provided. It was noted that for Sr-90 and I-131, sediment and water concentrations reached equilibrium quickly but for Cs-137, sediment concentration was increasing even after 100 days of discharge. The dynamic capability of RESRAD-BIOTA was used to predict the time profile of whole-body concentrations for pelagic fish, benthic fish, crustacean, mollusk, and macroalgae. The physical dimensions and occupancy factors of the aquatic species were provided in the exercise. The internal, external, total dose rate as functions of time, as well as cumulative dose for the study period were estimated.

P.57 Environmental Data Sharing During Radiological Emergencies: A Collaboration Effort between Local, State and Federal Radiation Programs

Salame-Alfie, A., Fordham, E.W., Day, J., Mulligan, P., Foster, K., DeCair, S.; Conference of Radiation Control Program Directors (CRCPD), State of Washington, Los Angeles County, California, State of New Jersey, State of Illinois, US Environmental Protection Agency*

The experience of Fukushima demonstrated the need for strategies, procedures, and tools to facilitate the collection and sharing of radiological data among a wide variety of governmental organizations for public infor-

mation and the assessment of the impact on the environment and public health. That experience also provided insight into the gaps that currently exist in the U.S. that would allow the collection of data from a variety of sources and integration into a single comprehensive repository for analysis and decision making. With support from the United States Environmental Protection Agency (EPA), and in collaboration with the Department of Energy (DOE) and the Federal Emergency Management Agency (FEMA), in early 2013 the Conference of Radiation Control Program Directors (CRCPD) formed a Task Force for Interagency Environmental Data Sharing and Communication. The Task Force is working with federal partners on a coordinated effort to identify and address the policy issues and concerns to facilitate the implementation process for data sharing and communication. Inherent in the ability to share data among local, state, and federal response agencies are a number of policy and procedural issues needing to be addressed to ensure data is quickly and effectively shared among agencies during a radiological emergency. The Task Force recently submitted a draft list of policies to our federal partners for comment and approval. Starting with the work by the New Jersey Department of Environmental Protection where they share real time data from their two nuclear power plants internally with other New Jersey response agencies, the Task Force has engaged FEMA to improve and integrate federal and state response capabilities. This new publicly accessible software system, known as RadResponder, is a set of tools to share radiological data before, during and after an event among partners and to integrate data into the federal response assets (e.g., RAMS system). The Task Force will run a nationwide environmental data upload drill in late July to test the robustness of the RadResponder system.

P.58 Microdosimetry of Iodine-124 in Thyroid Using a Three-Dimensional Voxelized Human Phantom: A Monte Carlo Study

Tabriz, M., Chelikani, S., Zubal, G., French, C.; University of Massachusetts, Lowell, Yale University

There has been a rapid increase in the development and use of radiopharmaceuticals for radiation therapy and diagnostic imaging. Many of these products are highly targeted specific creating a need for more sophisticated models than those currently available. Along with improved image quality, these radiopharmaceuticals offer the added advantage of direct quantification of activity within organ sub-structures. Internal dosimetry has traditionally been associated with estimating dose at the macroscopic level. Average tissue doses are associated with biological effects at the organ level, overlooking important information that could be revealed from the dose distribution in cellular regions. The goal of this work-in-progress is to investigate a new improved methodology for estimating internal dose for the optimization of thyroid cancer imaging and treatment with I-124. Thyroid models currently available are based on the assumption that the thyroid is a uniform solid organ and that the iodine is uniformly distributed on the surface and sub-surface regions. In fact, the human thyroid has a unique and complex structure. A voxelized 3-D thyroid model has been

created from microscopic (histologic) images and registered onto the Zubal phantom. A Monte Carlo code created with the GATE simulation toolkit was used to calculate tissue dose distributions from I-124 targeted radiotherapy and PET imaging for non-uniform activity distributions in the thyroid.

P.59 Recently Added Capabilities to the RESRAD-OFFSITE Code

Gnanapragasam, E.K., Yu, C., Abu-Eid, B., McKenney, C., Schwartzman, A.; Argonne National Laboratory, Nuclear Regulatory Commission

A number of release options to ground water and the automation of the process of computing area factors for offsite exposure scenarios are among the new features included in the current version of RESRAD-OFFSITE. These new features were developed under the sponsorship of U.S. Nuclear Regulatory Commission. RESRAD-OFFSITE is a computer code to calculate the radiological consequences (exposure, risk, environmental concentrations) to a receptor located outside a contaminated area. The code considers releases to air, to ground water and to surface runoff, when computing the radiological consequences from a uniformly contaminated area of fixed dimensions. Previous versions of the code (Version 3.0 and older) considered a single release mechanism, i.e., a first order rate controlled release without the delaying effects due to transport within the primary contamination. The current version of the code (Version 3.1) provides two main mechanisms, first order rate controlled release and an instantaneous equilibrium desorption release. Both include the effects of transport over the depth of the primary contamination; namely the effects of dispersion, radiological decay and ingrowth and the staggered arrival of the initial release from different depths within the primary contamination. The code can model situations where the material is initially protected from release, e.g., waste in container or protected by a non-leachable waste form, followed by a period of time over which increasing quantities of the material become susceptible to release as the protection deteriorates. A selection of plots showing the temporal variation of the release to groundwater under the various release options are presented to show the wide range of releases that can be modeled using the recently added release options. The current version of the code also has the ability to compute the area factors for areas of elevated measurement (hot spot), under offsite exposure scenarios. The process of computing the area factors and sample plots of the peak total dose against the size of the area of elevated measurement are presented.

P.60 P-32 Radiobioassay and Internal Dose Assessment

Yoon, S.W., Pak, M.J., Park, S.Y., Yoo, J.R., Ha, W.H., Jang, H.K.; Korea Institute of Radiological and Medical Sciences, Korean Association for Radiation Application

P-32 Cherenkov radiation measurement of urine samples and internal dose assessment were conducted for workers of life science laboratories. Sample pretreatment procedure was established and the validation was performed to exclude contribution from inferences for the accurate detection of P-32. Detection conditions of Cherenkov radiation using liquid scintillation counter were discussed and the accuracy of Cherenkov radiation measure-

ment was validated according to ANSI radiobioassay performance criteria. The analysis and measurement procedure was applied to the real urine samples collected from 11 workers of life science laboratories. Most of the measurement results were very low below background level, but the results of daily urine samples of two workers were above minimum detectable activity (MDA). P-32 concentration for two workers was 24.6 ¡? 8.7 Bq/L and 15.2 ¡? 7.4 Bq/L, respectively, and intake of two workers was 634 and 514 Bq. The effective dose of two workers was 0.7 and 0.6 ¥ìSv. The overall results showed very low activity, but some cases were related to working contents. Based on measurement results, each one case of two workers was above MDA and the annual committed effective doses were below 0.1 mSv which is Level 0 of IDEAS guideline. In particular, these two workers were involved in waste management. The overall results did not show significant level but some cases which need to evaluate dose conservatively were a little high compared with background level. In the future, monitoring programs for workers of other research field should be established.

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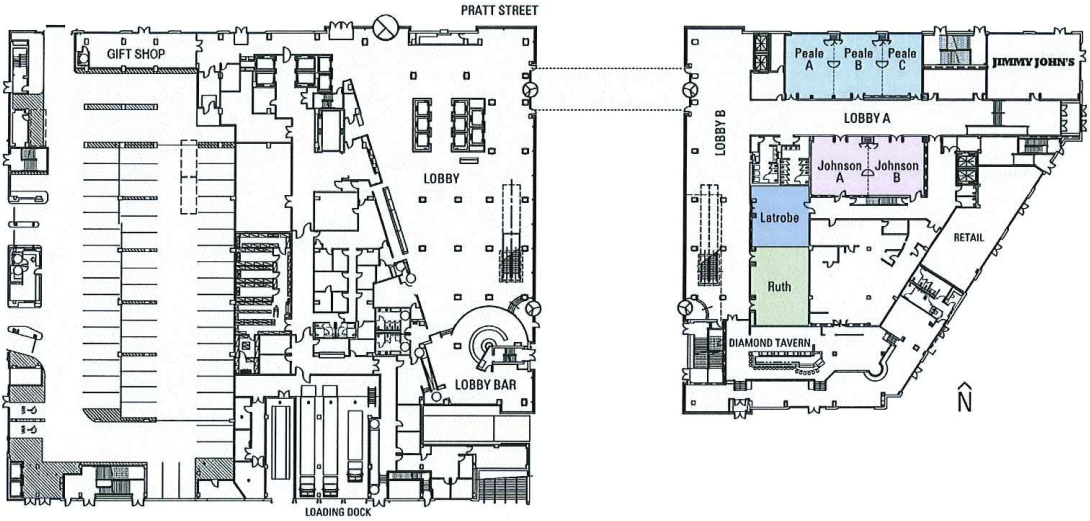
Mark your Calendar!

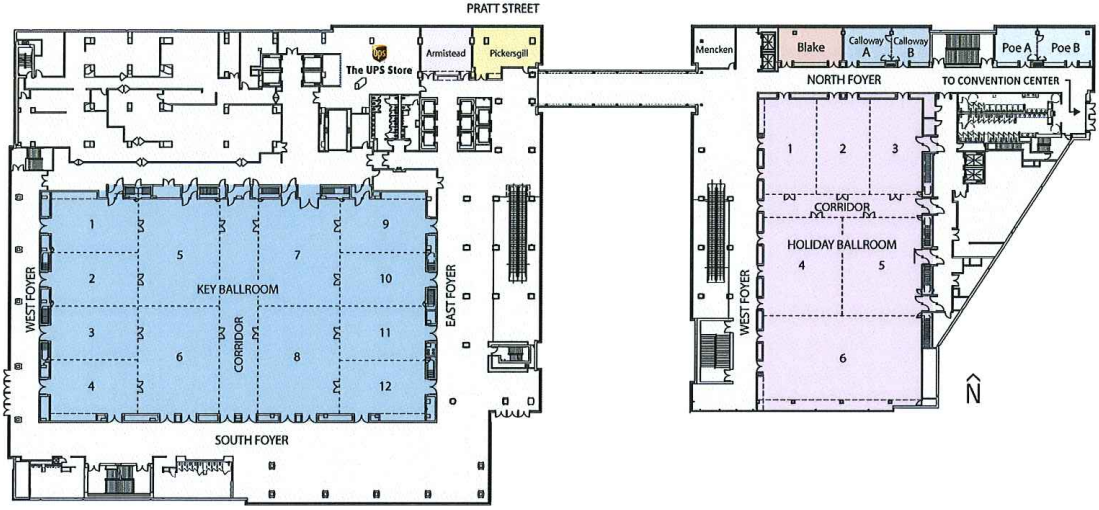
48th Midyear Meeting
1-4 February 2015
Norfolk/Virginia Beach, Virginia

60th Annual Meeting
12-16 July 2015
Indianapolis, Indiana

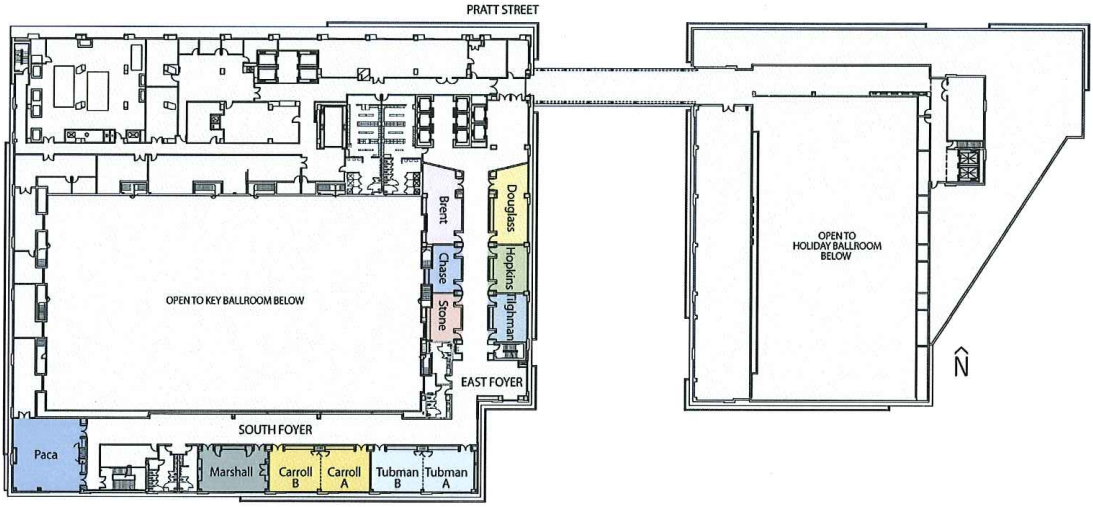
61st Annual Meeting
17-21 July 2016
Spokane, Washington



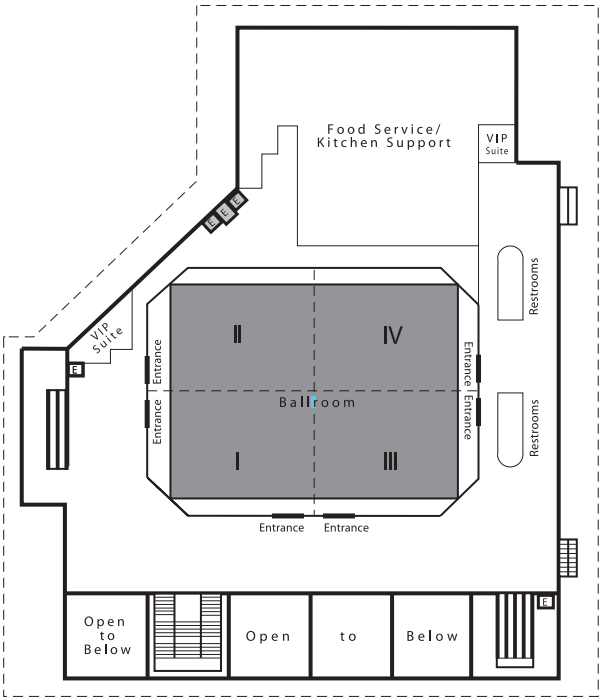
Floorplan Baltimore Hilton 1st Floor



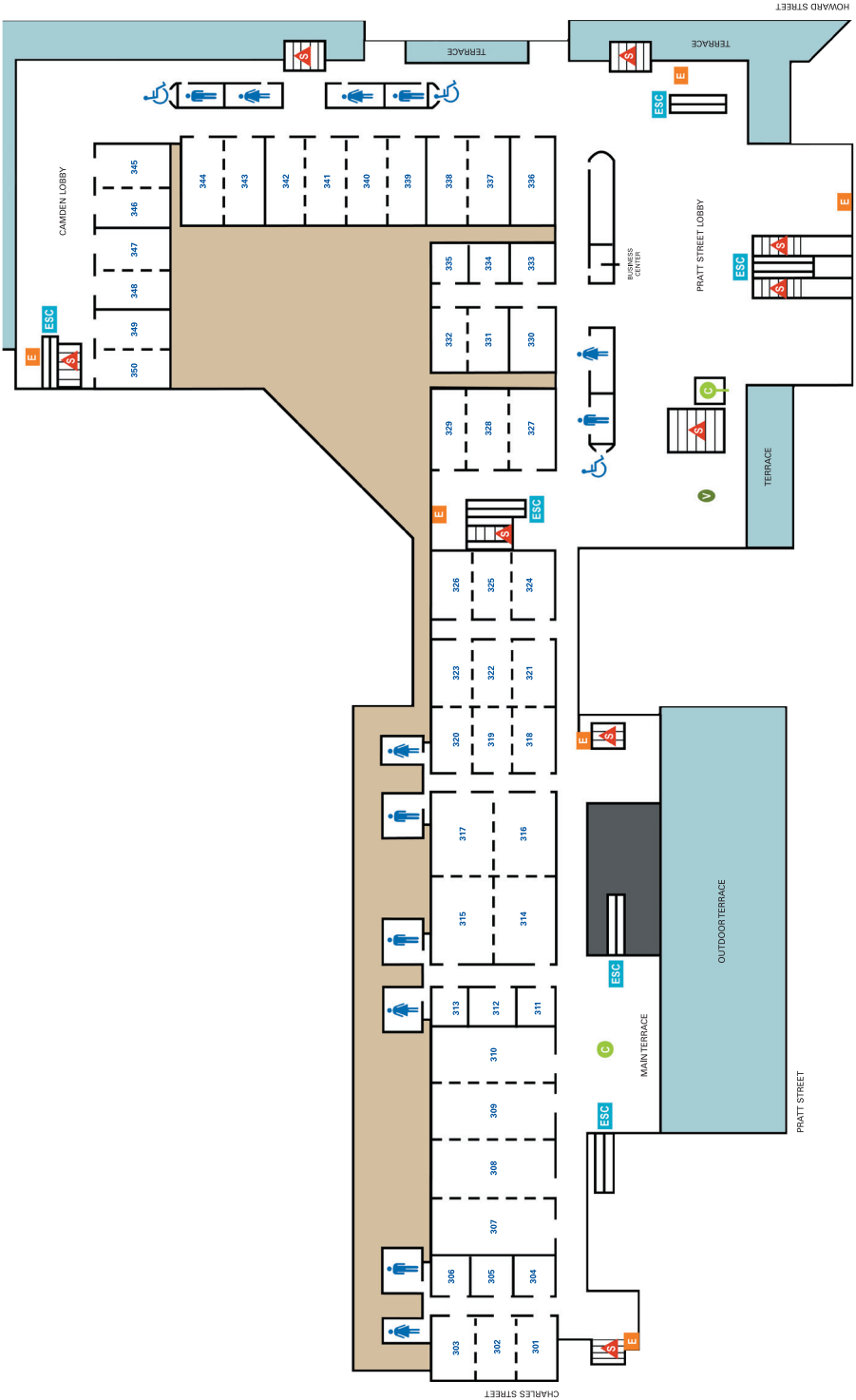
Floorplan Baltimore Hilton 2nd Floor



Floorplan Baltimore Hilton 3rd Floor



Floorplan Baltimore Convention Center 4th Floor



Floorplan Baltimore Convention Center 3rd Floor

Saturday, 12 July

All AAHP Courses take place at the Baltimore Convention Center

AAHP 1 Nuclear Security for the Health Physicist
8:00 AM-5:00 PM Room 318

AAHP 2 FRMAC Dose Assessment Methodology as it relates to the Revised EPA PAG Manual
8:00 AM-5:00 PM Room 319

AAHP 3 Measurement Uncertainty and Characteristic Limits in Radiobioassay
8:00 AM-5:00 PM Room 320

Sunday, 13 July

All Sunday PEP Courses take place at the Baltimore Hilton (Monday-Thursday PEPs take place in the Convention Center)

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

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

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

Welcome Reception
6:00-7:30 PM
Hilton Holiday Ballroom 4-6

Sunday PEP Locations
A - Peale A
B - Peale B
C - Peale C
D - Johnson A
E - Johnson B
F - Ruth

Monday-Tuesday PEP Locations
1 - Room 301
2 - Room 306
3 - Room 308
4 - Room 311
5 - Room 312

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
THPM = Thurs. PM Session

Monday, 14 July

CEL1 The 1976 Hanford Americium Accident – Then and Now
7:00-8:00 AM Room 301

CEL2 ANSI N43.1, Radiation Safety for the Design and Operation of Particle Accelerators
7:00-8:00 AM Room 308

ABHP Exam - Part 1
8:00-11:00 AM Holiday Ballrm 1-3 (H)

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

Complimentary Lunch in Exhibit Hall for all Registrants and Opening of Exhibits
12:20-1:30 PM Exhibit Hall

PEP Program - 12:15-2:15 PM

PEP M1 Introduction to Monte Carlo Methods for the Health Physicist, Part 1

PEP M2 Uses and Misuses of Dosimetric Terms in Patient Radiation Protection

PEP M3 Calculating Required Measurement Uncertainty for Field Measurements using MARSAME Guidance and GUMCALC

PEP M4 Health Effects of Internally Deposited Radioactive Materials: Role of Dose, Dose-rate and Dose-Distribution

PEP M5 Interpretation of Radiation Measurements – Is Your Radiation Instrument Telling you What You Think it is?

ABHP Exam - Part II
12:30-6:30 PM Holiday Ballrm 1-3 (H)

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

Chapter Council Meeting
1:30-2:30 PM Room 307

MPM-A NRC - Revisions to NRC Regulations for Radiation Protection, 10CFR Part 20 and 10CFR Part 50 Appendix A
3:00-5:00 PM Ballroom

MPM-B Risk Assessment
3:00-5:00 PM Room 307

MPM-C Special Session: Science Support Committee
3:00-5:00 PM Room 315

MPM-D Nanotechnology Special Session
3:00-5:00 PM Room 309

MPM-E Air Monitoring
3:00-4:15 PM Room 310

MPM-F Non-Intrusive Inspection Systems for Homeland Security
3:00-5:20 PM Room 314

MPM-G Dose Reconstruction
3:00-4:00 PM Room 302-303

Student/Mentor Reception
5:30-6:30 PM Paca (H)

Tuesday, 15 July

CEL 3 Radiation Safety's Role in Mitigating the "Insider Threat" Risk
7:00-8:00 AM Room 301

CEL4 Working with the Media on Radiation-Related Stories
7:00-8:00 AM Room 308

TAM-A Accelerator Health Physics I
8:30-11:00 AM Room 302

TAM-B ICC Special Session, Part I
8:30-11:30 AM Room 303

TAM-C AAHP Special Session: New Frontiers in Radiation Risk Communication
8:30-11:45 AM Room 307

TAM-D Special Session: Atomic Bomb Survivors-Review of Dose-Related Factors for the Eval of Residual Exposures...
8:30 AM-Noon Room 308

TAM-E Radiobiology/Radiation Effects
8:30-11:15 AM Room 309

TAM-F Medical Health Physics Part I
8:30 AM-12:15 PM Room 310

TAM-G Instrumentation I
8:30-11:15 AM Room 314

Publishing in HPS Journals
10:00-11:30 AM Room 301

AAHP Awards Luncheon
Noon-2:00 PM Room 315

PEP Program - 12:15-2:15 PM

PEP T1 Nuclear Medicine Internal Dosimetry: Measurements, Models, and Methods

PEP T2 Nanoparticle Characterization and Control Fundamentals: A Graded Approach

PEP T3 Radiation Safety at the Scene of a Radiological Incident

PEP T4 Environ Risk Assessment

PEP T5 Developing a Laser Safety Program-Where does a Health Physicist Begin and How ...

TPM-A Accelerator Health Physics II
2:30-4:45 PM Room 302

TPM-B ICC Special Session, Part II
2:30-5:00 PM Room 303

TPM-C AAHP Special Session: New Frontiers in Radiation Risk Communication
2:30-5:15 PM Room 307

TPM-D Special Session: Transitioning from Dose Guidance to Health Risk for Radiological Emergency Decision Making
2:30 - 5:30 PM Room 308

TPM-E Special Session: "How the NRRPT Works"
2:30-5:00 PM Room 309

TPM-F1 Medical Health Physics Part II
2:30-3:15 PM Room 310

TPM-F2 Non Patient Dose from Nuclear Medicine Procedures
3:45-5:00 PM Room 310

TPM-G Instrumentation II
2:30-5:00 PM Room 314

AAHP Open Meeting
5:15 PM Room 307

HPS Awards Banquet
7:00-10:00 PM Holiday Ballrm 4-6 (H)

Wednesday, 16 July

CEL5 Safety (Mis)Communications – How to Say What You Mean and Mean What You Say
7:00-8:00 AM Room 301

CEL6 An Informatics Mindset for Managing the Relevance and Reliability of Modern Measurements: Understanding and Meeting Current Challenges
7:00-8:00 AM Room 308

WAM-A Special Session: Power Reactor 1
8:30-11:45 AM Rooms 302-303

WAM-B Special Session: Current Issues in Radiation Protection and Radioactive Waste Management and Implementation at the Department of Energy, Part I
8:30 AM-Noon Room 307

WAM-C Explosive Radiological Dispersion Devices Field Trials
8:30-11:45 AM Room 308

WAM-D Special Session: Medical Health Physics Patient Dose Tracking
8:30 AM-12:30 PM Room 309

WAM-E Environmental Monitoring
8:30 AM-Noon Room 310

PEP Program - 12:15-2:15 PM

PEP W1 Introduction to Monte Carlo Methods for the Health Physicist, Part 2

PEP W2 How to Effectively Manage Conflict without All the Drama

PEP W3 Case Study of a NORM-Contaminated Site

PEP W4 Is Telling the Truth the Answer to Effective Radiation Risk Communication?

PEP W5 The New and Revised Laser Safety Standards

WPM-A Special Session: Power Reactor 2
2:30-3:45 PM Rooms 302-303

WPM-B Current Issues in Radiation Protection and Radioactive Waste Management and Implementation at the Department of Energy Part II
2:30-5:30 PM Room 307

WPM-C Emergency Response
2:30-5:30 PM Room 308

WPM-D Medical Dosimetry
2:30-5:30 PM Room 309

WPM-E Special Session: NESHAPS
2:30-5:00 PM Room 310

Quiz Bowl
4:00-6:00 PM Poe A/B

HPS Business Meeting
5:30-6:30 PM Room 302-303

Thursday, 17 July

CEL7 Interpretation of Radiation Measurements
7:00-8:00 AM Room 301

CEL8 ABHP Exam Fundamentals-Tips for Successfully Completing the Certification Process
7:00-8:00 AM Room 308

THAM-A Military Health Physics
8:45-11:45 AM Rooms 302-303

THAM-B Internal Dosimetry
8:30-11:15 AM Room 307

THAM-C External Dosimetry
8:30-11:45 AM Room 308

THAM-D Special Session: Health Environmental Impacts of Various Energy Sources
8:30-11:40 AM Room 309

THAM-E Decontamination and Decommissioning
8:30-10:45 AM Room 310

PEP Program - 12:15-2:15 PM

PEP Th1 Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions

PEP Th2 CAP88 PC Version 4 Topics

PEP Th3 So now you're the RSO: Elements of an Effective Radiation Safety Program

PEP Th4 What is New in Neutron Monitoring?

PEP Th5 Developing and implementing an RF Safety Plan

THPM-A Homeland Security Monitoring
2:30-4:45 PM Rooms 302-303

THPM-B Radiation Safety Officer
2:30-4:30 PM Room 307

THPM-C Academic Institutions
2:30-5:00 PM Room 308

THPM-D Regulatory/Licensing
2:30-4:45 PM Room 309

THPM-E Waste Management
2:30-4:15 PM Room 310

Wednesday-Thursday PEP Locations
1 - Room 301
2 - Room 306
3 - Room 307
4 - Room 308
5 - Room 310

Registration Hours

Registration at the Baltimore Convention Center Exhibit Hall A/B Foyer

Sunday	9:00 AM - 6:00 PM
Monday	8:00 AM - 4:00 PM
Tuesday	8:00 AM - 4:00 PM
Wednesday	8:00 AM - 4:00 PM
Thursday	8:00 - 11:00 AM

Exhibit Hall Hours

Exhibit Hall A/B

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

BUSINESS MEETINGS

TUESDAY

11:00 AM Room 302
Accelerator Section Business Meeting

12:15 PM Room 310
Medical Health Physics Section Business Meeting

5:15 PM Room 307
AAHP Open Meeting

WEDNESDAY

11:45 AM Room 302-303
Power Reactor Section Business Meeting

5:30 PM Room 302-303
HPS Business Meeting

THURSDAY

10:45 AM Room 310
Decommissioning Section Business Meeting

11:30 AM 302-303
Military Section Business Meeting

11:45 AM Room 309
Environmental Radon Section Business Meeting

4:30 PM Room 307
RSO Section Business Meeting

4:45 PM Room 302-303
Homeland Security 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 2 CECs per half day of attendance, up to 12 CECs;
* AAHP 8 hour courses are granted 16 CECs each;
* HPS 2 PEP courses are granted 4 CECs each;
* HPS 1 hour CELs are granted 2 CECs each.

2014 HPS Exhibitors

2015 Annual Meeting Indianapolis..... Booth: 621
AAHP/ABHP .....Booth: 522
American Industrial Hygiene Association (AIHA) .....Booth: 108
Ameriphysics, LLC.....Booth: 208
Amptek, Inc.....Booth: 211
Arrow-Tech Inc.....Booth: 618
Bayer Healthcare.....Booth: 318
Berkeley Nucleonics Corp .....Booth: 220
Best Medical .....Booth: 607
Bionomics .....Booth: 300
Bladewerx LLC .....Booth: 203
Canberra.....Booth: 200
Centers for Disease Control and Prevention, Radiation Studies Branch .....Booth: 109
Centronic LLC.....Booth: 221
Chase Environmental Group, Inc..... Booth: 617
Chesapeake Nuclear Services, Inc.... Booth: 422
CRCPD .....Booth: 718
Curie Services .....Booth: 121
Dade Moeller .....Booth: 600
Eckert & Ziegler .....Booth: 217
Ecology Services Inc. .....Booth: 114
Energy Solutions .....Booth: 308
Environmental Protection Agency (EPA) Mobile Environmental Radiation Laboratory (MERL) System .....TRAILER
femto-TECH, Inc. .....Booth: 309
F&J Specialty Products .....Booth: 417
FLIR.....Booth: 608
Fuji Electric Corp of America .....Booth: 606
G/O Corporation .....Booth: 316
Gamma Products.....Booth: 717
GEL Group/GEL Engineering .....Booth: 708
Health Physics Instruments .....Booth: 616
Hi-Q Environmental Products Co. .....Booth: 201
Hitachi Aloka Medical Ltd .....Booth: 716
Hopewell Designs.....Booth: 304
HPS Journal .....Booth: 623
HPS Web Ops/Newsletter .....Booth: 622
Illinois Inst of Tech .....Booth: 320
J.L. Shepherd .....Booth: 706
K & S Associates .....Booth: 104
Kromek .....Booth: 112
Lab Impex Systems .....Booth: 516
LabLogic Systems, Inc .....Booth: 311
Landauer .....Booth: 500
Laser Institute of America .....Booth: 209
Laurus.....Booth: 511
LND, Inc.....Booth: 322
Ludlum Measurements .....Booth: 400
Mazur Instruments.....Booth: 611
Mirion Technologies.....Booth: 416
NATS, Incorporated .....Booth: 710
NRRPT .....Booth: 110
On Site Systems.....Booth: 419
ORAU .....Booth: 423
Ortec.....Booth: 408
PHDS, Co. .....Booth: 116
Philotechnics .....Booth: 323
Rad Source Technologies, Inc. .....Booth: 106
Radiation Safety & Control Services Inc (RSCS) .....Booth: 205
Radiation Safety Associates, Inc. .....Booth: 509
Radiation Solutions.....Booth: 610
Radiological Emergency Response Technical Demonstration .....Booth: 723
RSO, Inc. .....Booth: 711
Saphymo GmbH .....Booth: 518
SE International .....Booth: 507
SNBL USA, Ltd .....Booth: 520
Spectrum Techniques .....Booth: 302
Technical Associates ..... Booth: 111
Teletrix .....Booth: 421
TestAmerica Laboratories Inc .....Booth: 223
The MJW Companies .....Booth: 707
ThermoFisher .....Booth: 517
Tracerco .....Booth: 210
Unfors RaySafe, Inc (a Fluke Biomedical Company) .....Booth: 118
Unitech Services Group.....Booth: 523
Waste Control Specialists.....Booth: 619