Health Physics Society

60th Annual Meeting

Indianapolis, Indiana

Indiana Convention Center
Indianapolis, Indiana ◆ 12-16 July 2015

Final Program

AAHP

USA CAN NRRPT

ABHP

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Siemens answers help doctors detect diseases earlier, saving costs and extending lives.

When diseases are caught early, they make less of an impact on everyone. That's because a large majority of today's healthcare costs go toward treating the late stages of diseases like cancer and heart disease. With Siemens advanced diagnostic technology, doctors can accurately identify these killers earlier. So patients get the treatment they need sooner. Which helps save lives and cuts costs. Wherever there are tough health-care questions, we're answering them.

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Registration Hours and Location

Hall D Foyer, Indiana Convention Center

Saturday, 11 July	2:00 pm - 5:00 pm
Sunday, 12 July	7:30 am - 5:00 pm
Monday, 13 July	7:30 am - 4:00 pm
Tuesday, 14 July	8:00 am - 4:00 pm
Wednesday, 15 July	8:00 am - 4:00 pm
Thursday, 16 July	8:00 am - 11:00 am

Future Midyear Topical Meeting

49th	31 January-3 February 2016	Austin, TX

Future Annual Meetings

61st	17-21 July 2016	Spokane, WA
62nd	9-13 July 2017	Raleigh, NC

Look online for future meeting details
hps.org/meetings

Officers

Barbara Hamrick, President
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Elizabeth Brackett, Secretary
Kathleen Shingleton, Treasurer
Eric Goldin, Secretary-Elect
Darrell R. Fisher, Past President
Brett J. Burk, Executive Director

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Tim Kirkham, Program Committee Chair
Genevieve S. Roessler, Ask the Experts Editor
Michael T. Ryan, Journal Editor-in-Chief
David Connolly, Congressional & Agency Liaison
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Local Arrangements Committee

Chair: Jeff Mason

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Andy Edwards
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Tim Kleyn
Trent Mays
Vicki Morris
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2015 Task Force - Indianapolis

Tim Kirkham, Program Committee Chair
Mike Mahathy, Task Force Chair
Harrison Agordzo
Corrin Chlebowy
Jack Kraus
Bryan Lemieux
Chris Shaw
Zack Tribbit
Latha Vasudevan

Headquarters Hotel:

Westin Indianapolis Hotel
301 W Washington Street, Indianapolis, Indiana 46204, 888.627.8414

Overflow Hotel:

Hyatt Regency Indianapolis
One South Capitol Avenue, Indianapolis, Indiana 46204, 888.591.1234

Speaker Ready Room

Indiana Convention Center, Room 111

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 Westin Indianapolis

Sunday

Sunday PEPs will take place in the Westin Indianapolis

Monday-Thursday

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

HPS 2015 Sponsors

Meeting Sponsors

Dan Caulk Memorial Fund
RSO, Inc.

Silver Sponsors

PerkinElmer
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Important Events

2nd Annual Quiz Bowl

You and your friends can test your knowledge against other HPS members (members are encouraged to group with students and young professionals). Join us, 5:00-6:00 pm on Sunday 12 July, at the Westin Indianapolis, Grand Ballroom 3.

Welcome Reception

Please plan on stopping in at the Westin Indianapolis Grand Ballroom 4-5, Sunday, 12 July, from 6:00-7:30 pm. There will be an opportunity to meet friends to start your evening in Indianapolis. Cash bar and light snacks will be available.

Exhibits

Free Lunch! Free Lunch! – 12:15 pm, Monday, 13 July. All registered attendees are invited to attend a complimentary lunch in the Exhibit Hall.

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

AAHP Exam

Monday, 13 July
Westin Indianapolis, Capitol 2
Part 1 - 8:00-11:00 am
Part 2 - 12:30-6:30 pm

Sessions and Course Locations

AAHP Courses on Saturday and PEP courses on Sunday are at the Westin Indianapolis; PEPs, CELs, and all sessions Monday through Thursday will take place at the Indiana Convention Center.

AAHP Awards Luncheon

Indiana Convention Center
Wabash Ballroom
Tuesday 14 July
Noon-2:00 pm

HPS Awards Banquet

Spend an enjoyable evening with members of the Health Physics Society. This event will be held on Tuesday, 14 July, in the Westin Indianapolis Grand Ballroom 4-5, and is an excellent opportunity to show your support for the award recipients as well as the Society. The awards will be presented after the dinner and the event will last from 7:00-9:00 pm. Included in Member, Non-Member, Emeritus, Past President, and Student Registrations.

HPS Business Meeting

Indiana Convention Center, Room 107
Wednesday, 15 July, 5:30-6:30 pm

Student Events

Student Orientation-*Saturday*, Westin Capitol 1, 5:45-6:45 PM
Quiz Bowl-*Sunday*, Westin Grand Ballroom 3, 5:00-6:00 PM
Welcome Reception-*Sunday*, Westin Grand Ballroom 4-5, 6:00-7:30 PM
Exhibitor Opening Luncheon-*Monday*, Exhibit Hall D, 12:15-1:30 PM
Student/Mentor Reception-*Monday*, Westin, Grand Ballroom 3, 5:30-6:30 PM
Awards Dinner-*Tuesday*, Westin Grand Ballroom 4-5, 7:00-9:00 PM

Important Events

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 51 for course information

Things to Remember!

All speakers are required to check in at the **Speaker Ready Room 111** Indiana 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, 14 July, Noon-2:00 pm, in the Indiana Convention Center, Wabash Ballroom. You may purchase tickets at the Registration Desk.

Make Plans to Attend the
2016 Midyear Meeting
31 January - 3 February
Austin, Texas

60th HPS Annual Meeting

The Hoosier Chapter of the Health Physics Society is happy to welcome everyone to the City of Indianapolis for the 60th Annual Meeting. From that organizational meeting in June 1955, at Ohio State University, to the first meeting in June 1956, at the University of Michigan, the Health Physics Society has had strong Midwestern ties. Now, HPS calls Indianapolis "home" during this special anniversary meeting.

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 Westin Indianapolis Grand Ballroom 4-5 on Tuesday, 14 July from 7:00 - 9:00 pm.

The following awards are to be presented:

Robley D. Evans Medal
Raymond A. Guilmette

Founders Awards
John Taschner

Elda E. Anderson
Elizabeth Gillenwalters

Distinguished Public Service Award
Charles Ferrell

Geoffrey Eichholz Outstanding Science Teacher Award
James Kofskie

Honor Roll Award
James Thompson
Rainier Farmer
Stanley Waligora

Fellows

John Bliss
Elizabeth Brackett
Jerrold Bushberg
Ralph Johnson
Kimberly Kearfott
John Lanza
Mark “Andy” Miller
Edward L. Nickoloff
Glenn Sturchio
Wei-Hsung Wang

Tuesday Evening Awards Menu

New York strip loin and ancho chicken breast topped with chipotle steak butter
cheddar smashed potatoes
fresh green beans
romaine wedge salad with focaccia crostini and caesar dressing
warm rolls and butter
fresh fruit tart
Starbucks coffee, decaffeinated coffee, hot and iced tea

General Information

Registration Fees:

	Pre	On-Site
PDS	$650	$750
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 Indiana Convention Center unless noted otherwise.

Local Arrangements Committee Room

Indiana Convention Center
Sunday-Thursday Room 112

Activities and Tours

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

Sunday 12 July

Get Acquainted Downtown Indy 2:00 pm

Monday 13 July

Active Indy Walking Tour of Indianapolis Monuments 9:15 am

Open Mike Night 8:30 pm

Tuesday 14 July

5K Run/2K Walk 6:30 am

Special 60th Anniversary Tour - Dallara Indycar Factory and Indianapolis Motor Speedway 8:45 am

Wednesday 15 July

Eiteljorg Museum of American Indians and Western Art 10:00 am

Pub Crawl 6:30 pm

Thursday 16 July

Night Out - Animals and All That Jazz 5:00 pm

Inaugural HPS Science Camp

In honor of the 60th anniversary of the Health Physics Society, we will host a charitable event, the first annual HPS Science Camp. This event will be held, Tuesday, July 14th in Exhibit Hall D. Volunteers are giving back to their annual meeting host community. As part of this event, we will be honoring the HPS Mission Statement and important aspects of the HPS 2020 Strategic Plan. The purpose of the camp is:

- A chance to "give back" to the communities we visit during our annual meetings
- A mechanism to bring science to students from all walks of life—free of charge
- A stage to provide teachers "real" science in the form of labs, information and items—free of charge
- An opportunity for students and teachers to interact with professionals from around the United States and the World
- A platform to interest students in atomic science, in particular health physics and other radiological science fields

It is the hope this will become an annual event when we gather during the annual meeting.

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 111) 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 in the Westin Indianapolis Senate 2 Room on Sunday, and Room 113 in the Indiana Convention Center from 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

Companion Registration includes Monday-Thursday breakfast buffet at the Shula's Restaurant, in the Westin Indianapolis, 7:30-9:00 am. You will be treated to a delicious breakfast buffet which consists of made-to-order omelettes, a daily frittata, scrambled eggs, breakfast quesadilla, breakfast meats (sausage and bacon), French toast, hot oatmeal, assorted pastries and fresh fruit.

Registered companions are welcome to join us for the Welcome Reception, held at the Westin Indianapolis Grand Ballroom 4-5, on Sunday, 12 July, from 6:00-7:30 pm.

The Welcome to Indianapolis Companion Orientation takes place Monday, 13 July, from 8:00-9:00 am at Shula's Restaurant in the Westin Indianapolis.

Registered companions are welcome to come to the Exhibitor lunch and breaks.

Hospitality Breakfast for Registered Companions
Monday-Thursday
Shula's Restaurant
Westin Indianapolis

Student Events

Student Orientation-*Saturday*, Westin Capitol 1, 5:45-6:45 PM
Quiz Bowl-*Sunday*, Westin Grand Ballroom 3, 5:00-6:00 PM
Welcome Reception-*Sunday*, Westin Grand Ballroom 4-5, 6:00-7:30 PM
Exhibitor Opening Luncheon-*Monday*, Exhibit Hall D, 12:15-1:30 PM
Student/Mentor Reception-*Monday*, Westin, Grand Ballroom 3, 5:30-6:30 PM
Awards Dinner-*Tuesday*, Westin Grand Ballroom 4-5, 7:00-9:00 PM

Committee Meetings

Westin Indianapolis (W), Convention Center (CC)

Saturday, 11 July 2015

ABHP PART II PANEL
8:00 am-5:00 pm — Chamber (W)

NRRPT
8:30 am-4:30 pm — Congress (W)

ABHP BOARD MEETING
8:30 am-5:00 pm — Council (W)

WEB OPERATIONS
9:00 am-Noon — Senate 3 (W)

HPS FINANCE/EXECUTIVE COMMITTEE
11:30 am-4:00 pm — Board Room (W)

HP JOURNAL EDITORIAL BOARD
3:00-5:00 pm — Grand 2 (W)

Sunday, 12 July 2015

ABHP PART II PANEL
8:00 am-5:00 pm — Chamber (W)

NRRPT COMMITTEE
8:30 am-4:30 pm — Congress (W)

HPS BOARD OF DIRECTORS
8:30 am-5:00 pm — Grand 1 (W)

AAHP EXECUTIVE COMMITTEE
8:30 am-5:00 pm — House (W)

ACCELERATOR SECTION AWARDS COMMITTEE
4:30-6:30 pm — Capitol 1 (W)

Monday, 13 July 2015

ELDA ANDERSON BREAKFAST
6:45-8:00 am — Caucus (W)

ACCELERATOR SECTION BOARD MEETING
7:00-8:00 am — 114 (CC)

ICC WELCOME BREAKFAST FOR INTERNATIONAL ATTENDEES
7:30-8:00 am — Grand 3 (W)

NRRPT COMMITTEE
8:30 am-4:30 pm — Congress (W)

MEDICAL HP SECTION BOARD MEETING
Noon-1:30 pm — Chamber (W)

DECOMMISSIONING SECTION BOARD MEETING
11:30 am-12:30 pm — 114 (CC)

NOMINATING COMMITTEE
1:00-1:45 pm — 114 (CC)

INTERSOCIETY RELATIONS COMMITTEE
1:00-3:00 pm — 115 (CC)

CHAPTER COUNCIL MEETING
1:30-2:30 pm — 105/106 (CC)

MEMBERSHIP COMMITTEE
2:00-3:00 pm — 114 (CC)

HISTORY COMMITTEE
2:00-4:00 pm — Cabinet (W)

ANSI N42.33/N42.37 COMMITTEE
2:00-5:00 pm — Chamber (W)

SECTION COUNCIL MEETING
2:30-3:30 pm — 101 (CC)

PROFESSIONAL DEVELOPMENT SCHOOL COMMITTEE
3:00-4:30 pm — 115 (CC)

NCRP PROGRAM COMMITTEE
3:00-5:00 pm — Council (W)

STUDENT/MENTOR RECEPTION
5:30-6:30 pm — Grand 3 (W)

PURDUE ALUMNI RECEPTION
6:00-7:30 pm — Chamber (W)

INSTRUMENTATION COMMITTEE
7:00-8:00 pm — Congress (W)

Tuesday, 14 July 2015

COMMITTEE CHAIR BREAKFAST
7:30-8:30 am — Caucus (W)

EXHIBITOR BREAKFAST
8:00-9:00 am — Capitol 3 (W)

HP JOURNAL EDITORS MEETING
8:00-9:30 am — 114 (CC)

ANSI N13.11 WORKING GROUP
8:00 am-Noon — Chamber (W)

ASK THE EXPERTS TOPIC EDITORS
8:30-10:30 am — Council (W)

NRRPT
8:30 am-4:30 pm — Congress (W)

ANSI N13.38 WORKING GROUP
9:00 am-Noon — Cabinet (W)

Committee Meetings

Westin Indianapolis (W), Convention Center (CC)

ANSI N13.61
9:00 am-Noon House (W)

PRESIDENT'S MEETING WITH COMMITTEE CHAIRS
9:00 am-5:00 pm 115 (CC)

SOCIETY SUPPORT COMMITTEE
Noon-1:30 pm Council (W)

ACADEMIC EDUCATION COMMITTEE (AEC) MEETING/PROGRAM DIRECTORS MEETING
Noon-1:30 pm Grand 1 (W)

INTERNATIONAL COLLABORATION COMMITTEE
Noon-2:00 pm 114 (CC)

STUDENT SUPPORT COMMITTEE
1:00-2:00 pm Cabinet (W)

ANSI N13.65 WORKING GROUP
1:00-4:00 pm House (W)

CSU RECEPTION - ALL ARE WELCOME
6:00-7:00 pm Grand Ballroom Foyer (W)

Wednesday, 15 July 2015

ANSI N42.17 REWRITE
8:00-11:00 am 114 (CC)

AAHP TITLE PROTECTION & PROFESSIONAL RECOGNITION COMMITTEE
8:30-9:00 am 115 (CC)

ANSI N13.1 REVISION
9:00 am-4:00 pm Congress 1 (W)

LEADERSHIP MEETING
11:00 am-Noon 115 (CC)

SCIENCE SUPPORT COMMITTEE
11:00 am-1:00 pm 114 (CC)

AEC/STUDENT BRANCH MEETING
Noon-2:00 pm Grand 3 (W)

LOCAL ARRANGEMENTS COMMITTEE LUNCH
Noon-2:00 pm 112 (CC)

PUBLIC INFORMATION COMMITTEE
Noon-2:00 pm Cabinet (W)

STANDARDS COMMITTEE
12:30-2:30 pm Council (W)

NCRP MEETING
12:30-5:30 pm Senate (W)

CONTINUING EDUCATION COMMITTEE
1:00-2:00 pm 113 (C)

PRESIDENT'S MEETING WITH SECTION CHAIRS
1:00-5:00 pm 115 (CC)

AEC/ACADEMIC EDUCATION COMMITTEE MEETING
2:00-4:00 pm Grand 3 (W)

GOVERNMENT RELATIONS COMMITTEE
3:00-4:00 pm 114 (CC)

HPS BUSINESS MEETING
5:30-6:30 pm 107 (CC)

Thursday, 16 July 2015

HPS FINANCE AND EXECUTIVE COMMITTEES
8:00-10:00 am Board Room (W)

ANSI N13.1 REVISION
9:00 am-4:00 pm Cameral (W)

HPS BOARD OF DIRECTORS MEETING
11:45-2:15 pm Capitol 3 (W)

Business Meetings

Indiana Convention Center (CC)

Monday, 13 July 2015

4:30 PM **Room 108 (CC)**
Decommissioning Section Business Meeting

4:30 PM **Room 110 (CC)**
Military Section Business Meeting

5:45 PM **Room 109 (CC)**
Power Reactor Section Business Meeting

Tuesday, 14 July 2015

10:30 AM **Room 108 (CC)**
Accelerator Section Business Meeting

11:15 AM **Room 105/106 (CC)**
Medical Section Business Meeting

5:00 PM **Room 104 (CC)**
AAHP Business Meeting

5:15 PM **Room 116 (CC)**
NIR Section Business Meeting

Wednesday, 15 July 2015

4:30 PM **Room 108 (CC)**
Homeland Security Section Business Meeting

5:30 PM **Room 107 (CC)**
HPS Business Meeting

Thursday, 16 July 2015

10:45 AM **Room 105/106 (CC)**
AIRRS/RSO Section Business Meeting

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The Health Physics Society Presents

OPEN "MIKE" NIGHT

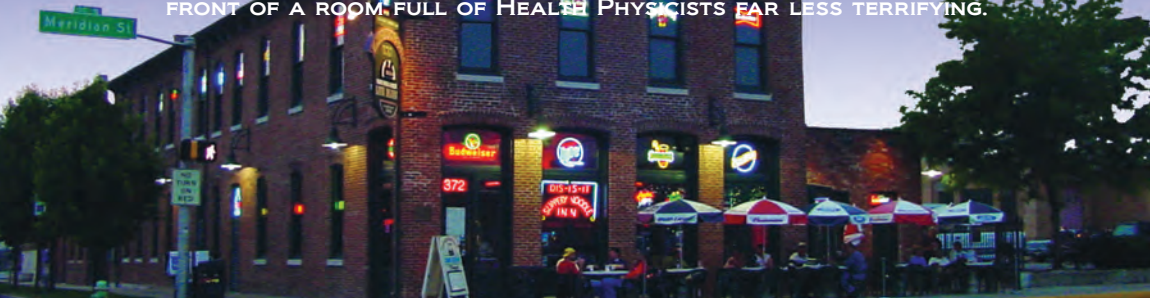
07 . 13 . 2015 @ 8:30PM

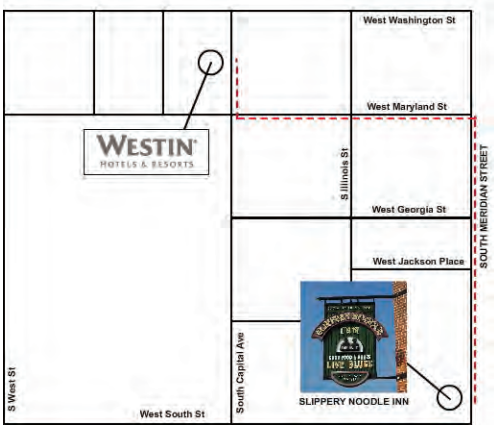
SLIPPERY NOODLE INN @ 372 S. MERIDIAN STREET

60th ANNUAL MEETING OF HPS

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

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





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RSCS
Radiation Safety & Control Services

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.

MIRA Envinet

Innovative Solution for Online Radiation

ENVINET

Applications:

- Nationwide monitoring networks
- NPP environmental monitoring
- Emergency response systems
- Perimeter monitoring

Features:

- Rugged and self-contained single device
- Redundant data communication (LAN, GPRS and RADIO)
- Autonomous solar and battery operation
- Integrated rain sensor

SARA Envinet

Applications:

- Ring monitoring systems around nuclear facilities
- Nationwide monitoring networks
- Area monitoring
- Sea and fresh water monitoring

Features:

- Isotope-based alarm management
- Gamma and nuclide specific dose rate determination
- Designed for use in extreme weather conditions
- Operation depth for water detector up to 500 m

www.envinet.com, Envinet GmbH, Germany

MONA Envinet

Ultrafast Detection and Localisation of Radioactive Contamination

Applications:

- Survey and detection of gamma contamination in the environment
- Vehicle and airborne acquisition of surface contamination profiles (screening of areas)
- Support during nuclear emergencies for civil defense, fire brigades and radiation protection
- Oil and Gas industry

Features:

- Real time detection and directional localization of very low artificial contamination because of spectrum measurements and analysis
- Integrated GPS receiver
- Map server with preinstalled Open Street maps
- Extendable with additional detectors (option)

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A leader in Radiation detection and monitoring

More than 100 unique automated Environmental Radiation Monitoring systems with 3 000 autonomously operating sensors in worldwide operation - also at US EPA, DoE, CNL a.o.

Spectroscopy system now at Bruce Power NPP!

SpectroTRACER

Implementation of a world class remote monitoring spectroscopy system, 59 fixed and mobile stations, automated spectroscopic air samplers

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- Compact, robust, low-power
- Different detector options
- Diverse integrated communication options

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Rockville, MD - Phone: 301-339-8103 - Toll free 1-844-7-BERTIN

MONDAY

7:00-8:00 AM Room 103
CEL1 Why Telling the Truth about Radiation is NOT Working?
Johnson, R.
Radiation Safety Counseling Institute

7:00-8:00 AM Room 117
CEL2 Radiation Effects on Humans and Organisms, and Reasons for the Fear
Cuttler, J.
Fox Chase Cancer Center

8:15 AM-NOON Room 500

MAM-A: Plenary Session

Chair: Barbara Hamrick

8:15 AM Introduction & Welcome
Barbara Hamrick
President, Health Physics Society

8:30 AM MAM-A.1
Welcome
Representative of City of Indianapolis

8:45 AM MAM-A.2
Evolution of the RP System and its Implications
*Lazo, E. (**Landauer Memorial Lecturer**)*
Nuclear Energy Agency (NEA)

9:30 AM MAM-A.3
How Science and Technology will Change the Practice of Health Physics
Marceau Day, L.
*LSU-CAMD (**Dade Moeller Lecturer**)*

10:15 AM BREAK

10:45 AM MAM-A.4
Future of the Medical Health Physics Profession in Georgia
Chelidze, L.
President, HPS Republic of Georgia
(G William Morgan Lecturer)

11:15 AM MAM-A.5
Studies of DDREF from Large-Scale Animal Experiments
Woloschak, G.E., Haley, B., Paunesku, T.
Northwestern University School of Medicine

12:15 PM Exhibit Hall

Complimentary Lunch in Exhibit Hall

1:00-3:00 PM Exhibit Hall

P: Poster Session

Accelerator

P.1 Reassessment of the Shielding Design Calculations for an Existing LINAC Vault
Quaye, D.
Alcorn State University

Decontamination and Decommissioning

P.2 The Radioactive Boy Scout: A Retrospective Radiation Safety Case Study for a Health Physics Course
Mitschelen, G., Heisinger, B., Cipriani, S., Miller, C., Kearfott, K.
University of Michigan

P.3 A System for Continuous Monitoring of Radon Gas for Earthquake Detection and Landfill Monitoring
Frank, S., Rafique, M., Kearfott, K.
University of Michigan, Pakistan Institute of Engineering and Applied Science

Dose Reconstruction

P.4 Uranium Exposure in a Large Pooled Cohort of Uranium Enrichment Workers

Anderson, J., Apostoaei, A., Yiin, J., Fleming, D., Tseng, C., Chen, P.

National Institute for Occupational Safety and Health, Oak Ridge Center for Risk Analysis, Inc.

P.5 Room Dose Ratios in Comparison to FGR 12 Dose Coefficients

Finklea, L., Hertel, N., Dolislager, F., Bellamy, M.

Georgia Institute of Technology, University of Tennessee, Oak Ridge National Laboratory

Environmental Monitoring

P.6 Surveillance of Strontium-90 in Foods after the Fukushima Daiichi Nuclear Power Plant Accident

Nabeshi, H., Tsutsumi, T., Uekusa, Y., Hachisuka, A., Matsuda, R., Teshima, R.

National Institute of Health Sciences

P.7 Radioactivity Studies on Soils Collected Around a Phosphate Fertilizer Facility

Atkins, M., Carroll, J., Billa, J., Ankrah, M., Adzanu, S.

Alcorn State University

P.8 Statistical Comparison of Estimated and Experimental Radioactivity Values of Selected Fertilizers

Gibson, K., Mensah, C., Billa, J., Moore, D., Ankrah, M., Adzanu, S.

Alcorn State University, St. Catherine College

P.9 Radiological Evaluation of Soils in the Vicinity of a Nuclear Power Plant

Dimpah, J., Burell, C., Bailey, J., Moore, D., Billa, J., Adzanu, S., Ankrah, M.

Alcorn State University, St. Catherine University

P.10 Radiation Dose to Individuals in Southwest Mississippi Region from One Meter Above the Ground Level

Gidi, M., January, R., Thompson, C., Billa, J., Adzanu, S.

Alcorn State University

P.11 Procreative Radiocesium Transfer by the Pale Grass Blue Butterfly, *Zizeeria Maha*

Napier, J., Gomez Fernandez, M., Neville, D., Higley, K.*

Oregon State University

P.12 Radiological Implications of Domestic Fish

Didla, S., Queen, K., Billa, J., Ankrah, M., Adzanu, S.

Alcorn State University, St. Catherine College

P.13 Mobility of Isotopes from the Soils to Selected Vegetation

Dorsey, L., Jones, I., Ankrah, M., Billa, J., Adzanu, S.

Alcorn State University, St. Catherine College

P.14 Use of an Autonomous Device to Measure Photon Dose Rates at a Molybdenum Processing Facility

Paudel, K., Dunker, R., Harris, J.

Idaho State University

P.15 Estimation of Excessive Life-Time Cancer Risk Due to Indoor and Outdoor Gamma Doses in Upper and Lower Parts of Neelum Valley, Azad Kashmir, Pakistan

Shafique, B., Rafique, M., Arif, R., Shoaib, K.

University of Azad Jammu & Kashmir, Muzaffarabad, Pakistan

P.16 Influence of Plant Exudates on Technetium-99 Mobility Through the Vadose Zone Soils

Montgomery, D., Martinez, N., Powell, B.

Clemson University

P.17 Determination of Uranium Concentrations in Drinking Water Samples of Muzaffarabad City Area Using Solid State Nuclear Track Detection Technique

Tareen, A., Iqbal, M., Zaffar, M., Akram, M.
University of Azad Jammu & Kashmir, Pakistan, PINSTECH, Pakistan

P.18 A Theoretical Model for the Radon Exhalation Rate of Cavity Walls

*Tan, Y., Liu, C., Zhou, Q., Dan, J., Tan, Q., Kearfott, K.**
Hengyang Normal University, University of South China, University of Michigan

External Dosimetry

P.19 Design Studies for a New Neutron Reference Source

Mozhayev, A., Piper, R., Rathbone, B., McDonald, J.
Pacific Northwest National Laboratory

P.20 Neutron Irradiation Test Stand

Behrends, T., McTaggart, R.
South Dakota State University

P.21 Rapid Measurement Method of Natural Occurring Radioactive Materials in Industrial Products

Yoo, J., Pak, M., Park, S., Yoon, S., Ha, W., Lee, J., Kim, K.
Korea Institute of Radiological & Medical Sciences (KIRAMS), Korea Institute of Nuclear Safety (KINS), Kyung Hee University

Internal Dosimetry

P.22 A Simple Estimation Method of Thyroid Equivalent Dose from the Surface Contamination Counts in Radiological Screening

Ohba, T., Hasegawa, A., Yusa, T., Suzuki, G., Ohtsuru, A.
Fukushima Medical University, Japan, International University of Health and Welfare, Japan

P.23 Doses to Infants from Ingestion of Radio-Thallium in Mothers' Milk

Williams, M.
Oak Ridge National Laboratory

P.24 A Comparative Study Between Monte Carlo Codes GEANT4 and MCNP on Neutron Dose Calculations

Geng, C., Tang, X., Guan, F., Johns, J., Vasudevan, L., Gong, C., Shu, D., Chen, D.*
Massachusetts General Hospital, Harvard Medical School, Nanjing University of Aeronautics and Astronautics, China, UT MD Anderson Cancer Center, Nimbus Innovations, LLC, Texas A&M University

P.25 Inhalation Dose Coefficients for Intakes of Airborne Particulates at Mineral Processing Industries

Choi, C., Kim, S., Kim, Y., Lee, J., Kim, K.
Kyung Hee University, Korea Institute of Nuclear Safety

P.26-A Monte Carlo Modeling of the Fastscan Whole Body Counter Response

Graham, H., Waller, E.
University of Ontario Institute of Technology

P.26 Development and Evaluation of Stand for Bottle Manikin Absorber Phantoms

Yoo, J., Park, M., Park, S., Yoon, S., Ha, W., Lee, S., Kim, K.
Korea Institute of Radiological & Medical Sciences, Kyung Hee University

Medical Physics and Dosimetry

P.27 Evaluation of Radiation Doses from CT Scan by Considering Dose Modulation Techniques Along Patient Z-Axis Direction

Park, I., Oh, S., Kim, K., Kim, K.*
Kyung Hee University

P.28 Effective Dose Normalized to Dose Length Product for Adults in Computed Tomography Examination in Korea

Kim, K., Kim, M., Park, I., Kim, K.*
Kyung Hee University

P.29 Developing a Neck-Thyroid Phantom for Medical Calibration and Dosimetry

Mehdizadeh Naderi, S., Sina, S., Karimipoorfard, M., Lotfalizadeh, F., Entezarmahdi, M., Haghighat Afshar, M., Parishan, M., Faghihi, R.
Shiraz University, Iran

P.30 Developing a New Method for Determining the I-131 Concentration in Thyroid Glands of Nuclear Medicine Staff

Mehdizadeh Naderi, S., Sina, S., Karimipoorfard, M., Lotfalizadeh, F., Zamani, E., Sadeghi, M., Entezarmahdi, M., Faghihi, R.
Shiraz University, Iran

P.31 Trends of Computed Tomography Usages in Korea

Oh, S., Kim, K., Park, I., Kim, K.
Kyung Hee University

Nuclear Power Plants

P.32 Monte Carlo Simulation of Offline Core Dose in CANDU Reactors

Gilbert, J., Waller, E., Nokleby, S.
University of Ontario Institute of Technology

P.33 Further Discussion of Past Work on Precision of Measurements in Paired Counting

Potter, W., Strzelczyk, J.
Independent Researcher, Independent Consultant

Radiation Effects

P.35 The Radiation Carcinogenesis Paradox

Raabe, O.
University of California, Davis

P.36 Improvement of the Computational Approach to Neutron Flux Estimation at the Ex-core Neutron Facility in Hanaro

Cho, D., Kearfott, K.
Korea Atomic Energy Research Institute, University of Michigan

P.37 An Assessment of Radiation Effects to American Flagfish

Tzivaki, M., Waller, E.
UOIT

P.38 Creation and Application of Voxelized Dosimetric Models: An Evaluation of Absorbed Fractions in Apis Mellifera

Gomez, M.
OSU

Radiobiology/Biological Response

P.39 The Link Between Oxidative Status Gene Polymorphisms and the Level of Malonic Dialdehyde with Cancer in Individuals Chronically Exposed to Irradiation on Techa River

Donov, P., Kadyrova, N., Varfolomeyeva, T., Akleyev, A.*
Urals Research Center for Radiation Medicine, Chelyabinsk

P.40 Analysis of Morphometric Parameters of Perch (*Perca fluviatilis*) of Radioactively Contaminated Flow - Techa River

Egoreychenkov, E., Osipov, D., Pryakhin, E., Rudolfsen, G., Sneve, M., Akleyev, A.
The Urals Research Center for Radiation Medicine, Russia, University of Troms, Norway, Norwegian Radiation Protection Authority, Norway

P.41 Status of Peripheral Blood of Herring Gull Embryos and Chicks (*Larus argentatus*), Inhabit the Radioactively Contaminated Reservoirs

Mogilnikova, N., Lamekhov, Y., Pryakhin, E.
Urals Research Center of Radiation Medicine, Russia, Chelyabinsk Pedagogical State University, Russia

P.42 Medical-Dosimetric Database of Urals Research Center for Radiation Medicine as a Tool for Estimating the Risk of Chronic Radiation Exposure of Humans

Triapitcyna, S., Startsev, N., Akleyev, A.

Urals Research Center for Radiation Medicine, Russia

P.43 Protective Effects of CeO2 Nanoparticles on MC3T3-E1 Cells Exposed to X-ray Radiation

Wang, C., Blough, E., Arvapalli, R., Driscoll, H., Leidy, J., July, M., Triest, W., Wu, M.

Marshall University, Huntington Veterans Affairs Medical Center

P.44 Whole Body X-Ray Irradiation-Induced Skeletal Muscle Atrophy and the Protective Effects of Acetaminophen

Wu, M., Wang, C., Arvapalli, R., Olajide, O., Winston, N., Casden, C., Lucas, A., Gebremariam, A., Abraham, M., Blough, E.

Marshall University

Risk Assessment

P.45 Investigation of the Ratio of the Radiation Level in the Air at Duhok City

Ahmed, F., Kareem, I., Meerkhan, S.

University of Duhok, Iraq

P.46 Radioactive Assessment of Coal Samples from a Selected Coal Mine

Brempong, O., Kumari, M., Reese, M., Billa, J., Ankrah, M., Adzanu, S.

Alcorn State University, St. Catherine College

P.47 Radiological Assessment of Dose from Usage of Selected Tobacco Leaves

Dordor, M., Harris, E., Billa, J., Ankrah, M., Adzanu, S.

Alcorn State University, St. Catherine College

P.48 Lifetime Risk of Lung Cancer Death as a Measure of the Reliability of Radiation Safety Standards for Inhalation Intake of Plutonium-239

*Sokolnikov, M., Vostrotin, V., Efimov, A., Vasilenko, E., Romanov, S., Yurkin, A.**

Southern Urals Biophysics Institute, Ozyorsk

P.49 Investigation of the Level of Conservatism Associated with the Soil Screening Limits (SSLs) Derived by the EPA PRG Calculator

Cheng, J., Yu, C., Kamboj, S., Favret, D., Regnier, E.

Argonne National Laboratory, Department of Energy

Works-in-Progress

P.50 Integrated Waste Screening System for TENORM Waste

Akers, D., Roybal, L.

Prototype Systems Development, Idaho National Laboratory

P.51 A Philatelic Look at Health Physics History - Pitchblende

Johnston, T.P.

NIST

P.52 How to Fool Yourself with a Continuous Air Monitor

Strom, D.J.

Pacific Northwest National Laboratory

P.53 Assessment of Radiological Impact of Oil Refineries in Korea

*Kim, Y.G., Choi, C.K., Kim, S.Y., Kim, K.P.**

Kyung Hee University

P.54 Major Input Parameters Influencing Radiation Dose to the Public in Contaminated Areas after Nuclear Power Plant Accident

*Go, A.R., Kim, M.J., Kim, S.Y., Kim, K.P.**

Kyung Hee University

3:00-5:00 PM Room 105/106

MPM-A: Medical Dosimetry

Co-Chairs: Dave Medich, Tara Medich

3:00 PM MPM-A.1

Intensity-Modulated Radiosurgery Treatments Derived by Optimizing Delivery of Sphere Packing Plans

Hermansen, M., Chan, B., St. John, T., Bova, F.

University of Florida

3:15 PM MPM-A.2

Characterization of Metal-Oxide Semiconductor Field-Effect Transistor Dosimeter Angular Response Using a Spherical Phantom for Fluoroscopic Dosimetry

Wang, C., Hill, K., Yoshizumi, T.

Duke University Medical Center

3:30 PM MPM-A.3

Organ Dose Comparison in Orthopedic Lumbar Spinal Surgery in Multiple Intraoperative Imaging Devices

Womack II, K., Moore, B., Nguyen, G., Foster, N., Richardson, W., Yoshizumi, T.

Duke University, Duke Radiation Dosimetry Laboratory, Duke University Medical Center

3:45 PM MPM-A.4

Real-Time, In-Vivo, Small Animal Therapy Dosimetry Performed using an Inorganic Nano-Crystalline Scintillator Based Fiber Optic Detector

Belley, M., Stanton, I., Langloss, B., Nguyen, G., Wang, C., Kirsch, D., Dewhirst, M., Therien, M., Yoshizumi, T.

Duke University

4:00 PM MPM-A.5

Realization of Air Kerma at NIST by Free Air Chambers

Bergstrom, P.

NIST

4:15 PM MPM-A.6

Assessment of Individual Variations in Skeletal S Values for Beta Particle and Alpha Particle Emitters in Radionuclide Therapy

Schwarz, B., Geyer, A., Bolch, W.

University of Florida

4:30 PM MPM-A.7

Recent Improvement of VirtualDose Software for Reporting Organ Doses from CT

Gao, Y., Lin, H., Caracappa, P., Xu, X.*

Rensselaer Polytechnic Institute

4:45 PM MPM-A.8

A Novel Method to Estimate Radiation Dose to the Lens of the Eye from the Computed Tomography Dose Index for Imaging of the Head in Pediatric Patients

Januzis, N., Nguyen, G., Frush, D., Hoang, J., Lowry, C., Yoshizumi, T.

Duke University

3:00-4:45 PM Room 104

MPM-B: Academic Institutions

Co-Chairs: Michael Ford, Kim Kearfott

3:00 PM MPM-B.1

HealthPhysics.com - "A New Home for the Radiation Safety Professional"

Ford, M.

Ford ES&H Solutions, L.L.C.

3:15 PM MPM-B.2

The Wide Applicability of the Log-Normal (Log-Gaussian) Distribution in Radiation Protection

Brodsky, A.

Georgetown Univeristy

3:30 PM MPM-B.3

University of California Online Radiation Safety Training

MacKenzie, C.

University of California, Berkeley

3:45 PM **MPM-B.4**
Practical Application of an Imaging Spectrometer in a University Teaching Environment
Kearfott, K., Jawad, A., Frank, S., Liu, K., Kearfott, K.
University of Michigan

4:00 PM **MPM-B.5**
A Unifying Team Project for Teaching Health Physics: A Hypothetical Radiological Dispersive Device
Kearfott, K.
University of Michigan

4:15 PM **MPM-B.6**
Improved Nuclear Security and Radiation Protection at University Facilities
Krage, E., Poudel, D., Morrell, S., Harris, J.
Idaho State University, Idaho National Lab

4:30 PM **MPM-B.7**
Developing an Improved Laser Safety Program
Root, C., Povod, K., Martinez, N.
Clemson University

3:00-5:15 PM **Room 107**

MPM-C: Emergency Response/ Homeland Security

Chair: Craig Marianno

3:00 PM **MPM-C.1**
Evaluation of Polyvinyl Toluene Plastic Detectors to Distinguish Man-Made Sources from NORM
*Alsalman, A., Marianno, C.**
Nuclear Safety, Security & Emergency Directorate, Amman Jordan, Texas A&M University

3:15 PM **MPM-C.2**
Development of Novel Algorithms for Improved Source Detection Using Bayesian and Classical Statistics
Mann, J., Brandl, A.
Colorado State University

3:30 PM **MPM-C.3**
Detection of Nuclear Material below Counting Threshold
LaBrake, M., Brandl, A.
Colorado State University

3:45 PM **MPM-C.4**
A Path Forward to Long-Term Recovery from Major Nuclear Incidents
Chen, S.
Illinois Institute of Technology

4:00 PM **MPM-C.5**
Shelter/Evacuation Assessment for Radiological Terrorism
Buddemeier, B., Musolino, S.
Lawrence Livermore National Laboratory, Brookhaven National Laboratory

4:15 PM **MPM-C.7**
Post RDD-Scenario Dosimetry of Search and Rescue Dogs
Trevino, J., Marianno, C., Poston Sr., J., Ford, J., Bissett, W.
Texas A&M University

4:30 PM **MPM-C.8**
A Novel Device for Preventing Acute Radiation Syndrome and Reducing Cumulative Marrow Dose
Milstein, O., Orion, I., Waterman, G., Broisman, A., Schlesinger, T.
StemRad Ltd, Israel, University of Ben Gurion, Israel, Weizmann Institute of Science, Israel

4:45 PM **MPM-C.9**
Estimated Skin-Dose from Beta Emitters in Descending Fallout
Dant, J., Stricklin, D., Millage, K.
Applied Research Associates

5:00 PM **MPM-C.10**
The On-Call Manual: A Tool for After-Hours Dosimetry Responders
Carbaugh, E.
Dade Moeller

3:15-4:30 PM **Room 108**

MPM-D: Decontamination and Decommissioning

Chair: Jason Davis

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

Effect of Composition on Laser Scabbling of Cementitious Materials in Nuclear Decommissioning

Peach, B., Petkovski, M., Blackburn, J., Engelberg, D.

University of Sheffield, TWI Ltd, University of Manchester

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

Radiation Measurement Systems and Experiences in Japan after the Fukushima Accident

Bronson, F.

Canberra

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

ASTM Standard Guides for Radiological D&D

Walker, E.

Consultant

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

Texas Low-Level Radioactive Waste Disposal Compact Commission: Past, Present, Future

Morris, L.

TX Low-Level Radioactive Waste Disposal Compact Commission

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

Nanomaterials for Nuclear Waste Remediation

Dua, S., Lagos, L.

FIU

4:30 PM Decommissioning Section Business Meeting

3:00-5:45 PM **Room 109**

MPM-E: Power Reactor Health Physics

Co-Chairs: Tom Voss, Lara Hughes

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

Applications of the H3D Cadmium Zinc Telluride Gamma Camera in Commercial Nuclear Power

Jackson, H., Magenis, M., Comolli, M.*

Arizona Public Service

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

Update on Potential Regulatory Changes

Hiatt, J.

NEI

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

Advances in Radiation Instrumentation to Achieve Enhanced Characterization of Source Term Reduction Results

Miller, D.

American Electric Power

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

Improving Radiation Worker Safety and Performance with Immersive Simulation Training Tools

Winso, J., Rolando, J.

Spectral Labs Incorporated

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

Overview of Small Modular Reactors

Maisler, J., Hawkinson, J.

ENERCON

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

Radiation Monitoring Systems for Nuclear Power Plants

Goldstein, R.

Technical Associates

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

Will the Implementation of Small Modular Reactors Affect Our Response Protocols to Nuclear and Radiological Threats

*Goldstein, R., Voss, J., Embry, I.**

Technical Associates, Voss Associates, Overhoff Technology

4:45 PM **MPM-E.8**
ANPR for Revising Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet ALARA for Nuclear Power Reactor Effluents-10 CFR PART 50, APPENDIX I.
Clement, R., Dehmel, J., McCoppin, M.
NRC

5:00 PM **MPM-E.9**
Dose Calculations and Verification in Nuclear Power Plants: Tips, Tricks, and Traps
Lake, I., Litman, R.
Illinois Institute of Technology, ChemStaff

5:15 PM **MPM-E.10**
Portable Real-Time Air Sampling During Outages
Baltz, D.
Bladewerx LLC

5:30 PM **MPM-E.11**
Applying MDA Calculations to Nuclear Power Plant Radiation Monitors
Voss, J.
Voss Associates

5:45 PM Power Reactor Section Business Meeting

3:00-4:15 PM **Room 110**

MPM-F: Regulatory/Licensing

Co-Chairs: Luis Benevides, Alan Fellman

3:00 PM **MPM-F.1**
The NRC's Allegation Follow-Up Program as it Applies to the Nuclear Materials World
Bermudez, H.
US NRC

3:15 PM **MPM-F.2**
What is Radiation Safety if Safety Left Town?
Fellman, A.
Dade Moeller & Associates, Inc.

3:30 PM **MPM-F.3**
Estimation of Radon Dose from Uranium Recovery Operations
Giebel, S., Schmidt, D., Watson, B., Biwer, B., Lepoire, D., Kamboj, S.
USNRC, ANL

3:45 PM **MPM-F.4**
ALARA Implementation WTP Over the Extended and Construction Duration
Woolfolk, S.
Bechtel

4:00 PM **MPM-F.5**
Development of Parameters for Screening NORM at the Survey and Analysis of Actual Conditions of Safety Control of Radioactive Rays around Living Environment
Lee, J., Yoon, K., Kim, K.
Korea Institute of Nuclear Safety, Kyung Hee University

4:30 PM Military Section Business Meeting

3:00-6:00 PM **Room 116**

MPM-G: Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

See page 27 for details

Thank you

Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

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Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation - *Monday, Room 116, Tuesday, Room 107*

MONDAY

3:00-6:00 PM **Room 116**

MPM-G: Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

3:00 PM **Introduction**
Feinendegen, L.
Brookhaven National Laboratory

3:15-5:15 PM

Session 1: Responses of Biological Systems to Low Doses. Where are We Today?

Physical Considerations
Moderator: Steve Musolino
Speakers:
Braby, L., Howell, R.
Texas A&M University, Rutgers University Cancer Research Center

Biological Considerations
Moderator: Ludwig Feinendegen
Speakers:
Hei, T., Wilson, P.
Columbia University Medical Center, Brookhaven National Lab

5:15-6:00 PM

Session 2: Low-Dose Induced Responses: Harm vs. Benefit Induction & Propagation of Harm
Moderator: Gayle Woloschak
Speakers:
Morgan, W., Cucinotta, F.
Pacific Northwest National Laboratory, University of Nevada, Las Vegas

TUESDAY

8:30 AM-12:00 PM **Room 107**

TAM-C: Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

8:30-9:15 AM

Session 2: Low-Dose Induced Responses: Harm vs. Benefit Adaptive Protection
Moderator: Doug Boreham
Speakers:
Azzam, E., Rithidech, N.
UMDNJ – New Jersey Medical School, Stony Brook University

9:15-10:00 AM

Panel Discussion of Sessions 1 & 2

10:30 AM-Noon

Session 3: Medical and Regulatory Implications. To Scan or Not to Scan
Moderator: Ron Neumann
Speakers:
McCollough, C., Zanzonico, P.
Mayo Clinic, Memorial Sloan-Kettering Cancer Center

2:30-3:30 PM

TPM-C Session 4: Risk Modeling, Opportunities for the Future
Moderator: Tony Brooks
Speakers:
Calabrese, E., Dainiak, N.
University of Massachusetts, Canadian Nuclear Laboratories, Radiation Emergency Assistance Center/Training Site

4:00-5:00 PM

Session 5: Future of Radiation Protection Regulations
Moderator: Don Cool
Speakers:
Cuttler, J., Doss, M.
Fox Chase Cancer Center

5:00-5:30 PM

General Discussion

TUESDAY

7:00-8:00 AM **Room 103**

CEL3 Problem Formulation: Ensuring that Numbers Can Be Turned into Knowledge

Hoover, M., Cash, L.
NIOSH, LANL

7:00-8:00 AM **Room 117**

CEL4 WIPP

Stafford, H.J.
URS

8:30-11:15 AM **Room 105/106**

TAM-A: Medical Health Physics Special Session

Co-Chairs: Tom Mohaupt, Mike Stabin

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

CT Scans, ALARA and Image Gently: Why the Fear of Cancer?

Cohen, M.
Indiana University School of Medicine, Indianapolis

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

Dose Tracking and Reduction in Pediatric Congenital Cardiac Catheterization Procedures

Marshall, E., Borrego, D., Fudge, J., Bolch, W.
University of Florida, UF Health

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

Changes in Occupational Radiation Exposures after Incorporation of a Real-Time Interventional Suite Dosimetry System

Poudel, S., Weir, L., Dowling, D., Medich, D.
Worcester Polytechnic Institute, Lawrence General Hospital

9:30 AM **BREAK**

10:00 AM **TAM-A.5**

Occupational Radiation Dose during the TAVR Procedure

Shatila, O., Johnson, T., Elder, D., McBeth, R.
Colorado State University, University of Colorado Health

10:15 AM **TAM-A.6**

The Effects of Scattered Radiation on Medical Personnel Wearing Lead Aprons.

Olson, A., Simpson, D., King, S.
Bloomsburg University of Pennsylvania, Milton S Hershey Medical Center

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

A Novel Calibration Method for Commercial Hand-Held Thyroid Counting Meters

Szendy, S., Yoshizumi, T.
Duke University Medical Center

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

New Standardized Radiopharmaceutical Dose Estimates

Stabin, M., Siegel, J.
Vanderbilt University, Nuclear Physics Enterprises

Workshop: Publishing in *Health Physics* and *Operational Radiation Safety*

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

Tuesday, 10:00-11:30 am ***Room 103 (CC)***

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.

11:00 AM **TAM-A.9**
Radiation Hazard Assessment for a Hypothetical Xofigo Spill
Stabin, M., Siegel, J.
Vanderbilt University, Nuclear Physics Enterprises

11:15 AM **Medical Section Business Meeting**

8:30-11:45 AM **Room 104**

TAM-B: AAHP Special Session: Professional Ethics and Health Physics

Chair: Ed Bailey

8:30 AM **TAM-B.1**
Welcome and Session Introduction
Bailey, E.
President, AAHP

8:45 AM **TAM-B.2**
PERP 101 - Professional Ethics in RP
Brandl, A.
Colorado State University

10:15 AM **BREAK**

10:45 AM **TAM-B.3**
Ethical Decision Making Tools for Enhancing Radiation Safety Culture
Emery, R.
University of Texas HSC -Houston

11:15 AM **TAM-B.4**
Professional Ethics and Truth in Radiation Risk Communications
Johnson, R.
Radiation Safety Counseling Institute

8:30 AM-NOON **Room 107**

TAM-C: Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

See page 27 for details

8:30 AM-NOON **Room 108**

TAM-D: Special Session: Advancements in Accelerator Radiation Safety

Co-Chairs: J. Donald Cossairt, Elaine Marshall

8:30 AM **TAM-D.1**
Environmental and Workplace Radiation Monitoring Systems for High Power Electron Beam Operations at SLAC National Accelerator Laboratory
Cimeno, M., Liu, J., Tran, H.
SLAC National Accelerator Laboratory

8:45 AM **TAM-D.2**
Shielding Verification after Occupancy Changes Near a Linear Accelerator
Brassard, R., Johnson, T., LaRue, S.
Colorado State University, Colorado State University Veterinary Medical Center

9:00 AM **TAM-D.3**
Development of a Database to Track and Authorize Radioactive Material in Experimental Beamlines at SSRL
Campos Torres, M., Padilla, M.
SLAC

9:15 AM **BREAK**

9:45 AM **TAM-D.4**
Measurements of Ionizing Radiation Doses from High-Intensity Lasers at SLAC
Rokni, S., Liang, T., Bauer, J., Cimeno, M., Ferrari, A., Liu, J., Prinz, A., Tran, H., Woods, M.
SLAC National Accelerator Laboratory, Institute of Radiation Physics, Dresden, Germany

10:00 AM **TAM-D.5**
Characterization of Long-Lived Cyclotron Produced Activation Metal Impurities Retained in FASTlab FDG Cassettes during Synthesis of Radiolabeled 2-[18F] fluoro-2-deoxy-D-glucose (FDG)
Swearingen, P., Banghart, D., Shen, B., Montoya, G., Chin, F.
Stanford University

10:15 AM **TAM-D.6**
Radiation Protection for the Post-Synthesis Radiochemistry, Transport, and Administration of Oxygen-15 Water
Samaan, D., Swearingen, P., Fan, A., Holley, D., Hoehne, A., Shen, B., Chin, F.
Stanford University, Stanford University School of Medicine

10:30 AM **TAM-D.7**
Accelerator Section Business Meeting

11:00 AM **TAM-D.8**
Air Activation Analysis for the First Korean Heavy-Ion Treatment Facility
Kum, O., Heo, S.
Korea Institute of Radiological and Medical Sciences

11:15 AM **TAM-D.9**
Simulation Study of Long-lived Radionuclides Induced by 250 MeV Protons in Spallation Target
Luo, P.
Institute of Modern Physics, CAS

11:30 AM **TAM-D.11**
A Review of Radioactive Materials Management at Fermilab
Cossairt, J.
Fermi National Accelerator Laboratory

11:45 AM **TAM-D.12**
Doppelganger Radionuclides and Mono-Energetic Electrons: Operational HP Issues at Sandia's RITS-6 Accelerator
Mickey, W., Green, K., Duran, G.
Sandia National Laboratory

8:00-11:45 AM **Room 109**

TAM-E: Special Session: TENORM

Co-Chairs: Brant Ulsh, Craig Little

8:00 AM **TAM-E.1**
Summary of a Study Performed on TENORM Associated with Oil and Gas Operations in Pennsylvania
Allard, D., Lewis, R., Husted, D., Berry, J., Upadhay, T., Lombardo, A., Hubler, J., Gumbert, A., Mason, T.
Pennsylvania Department of Environmental Protection, Pennsylvania Bureau of Laboratories, Perma-Fix Environmental Services, Inc.

9:00 AM **TAM-E.2**
Michigan TENORM Waste Disposal Guidelines
DeMore, D.
Chesapeake Nuclear Services

9:30 AM **BREAK**

10:00 AM **TAM-E.3**
State Regulatory Issues and Activities Involving Technologically Enhanced Naturally Occurring Radioactive Material
McBurney, R.
Conference of Radiation Control Program Directors

10:30 AM **TAM-E.4**
Overview of TENORM Sectors at the Federal Level - Regulatory Approaches Over Time
Egidi, P.
EPA

11:00 AM **TAM-E.5**
Naturally Occurring Radioactive Material in Oil and Gas Production - Legal Issues
McKay, L.
King & Spalding

11:30 AM **TAM-E.6**
Indoor Radon in Pennsylvania - An Update
Allard, D., Lewis, R., Smith, R., Bleiler, D., Shields, M., Taverna, A.
PA DEP-BRP

8:30-11:30 AM Room 110

TAM-F: Internal Dosimetry

Co-Chairs: Elizabeth Brackett, Stuart Hinnefeld

8:30 AM TAM-F.1

Using VIP-Man Phantom to Improve WBC Results Accuracy

Abraham, A., Pelled, O., Liu, T., Xu, J.
Rensselaer Polytechnic Institute, NRC-Negev, Israel

8:45 AM TAM-F.2

How Many Phantoms Do We Need for Radiation Protection?

Hertel, N.
Georgia Institute of Technology

9:00 AM TAM-F.3

Extension of a GPU/MIC based Monte Carlo Code, ARCHER, to Internal Radiation Dose Calculations

Liu, T., Lin, H., Caracappa, P., Xu, X.*
Rensselaer Polytechnic Institute

9:15 AM TAM-F.4

Monte Carlo Based Internal Dosimetry of Canine Cancer Patients Treated With 64Cu-ATSM

Bell, J., Mann, K., Kraft, S., Brandl, A.
Colorado State University

9:30 AM TAM-F.5

The Confirmatory Alpha Dosimetry Program at Bruce Power

Romanowich, L.
Bruce Power

9:45 AM TAM-F.6

Modeling Uranium Hexafluoride Inhalation

Avtandilashvili, M., Puncher, M., McComish, S., Tolmachev, S.
Washington State University, Public Health England, UK

10:00 AM BREAK

10:30 AM TAM-F.7

Heavy Smoking, 210Po and Radon Risk

Harley, N.
NYU School of Medicine

10:45 AM TAM-F.8

A Comparison of Two Methods for Handling the Biological Distribution of Radionuclides in Decay Chains

Jokisch, D., Leggett, R.
Francis Marion University, Oak Ridge National Laboratory

11:00 AM TAM-F.9

Radionuclide Distribution Measurement within Anatomical Bone Structures using Digital Autoradiography

Tabatadze, G., Miller, B., Tolmachev, S.
Washington State University, Pacific Northwest National Laboratory, Richland, WA. University of Arizona

11:15 AM TAM-F.10

Study of Physicochemical Property of Industrial Alpha-Emitting Aerosols

Khokhryakov, I., Sypko, S., Khokhryakov, V.
South Ural Biophysics Institute, Ozersk

8:15 AM-12:15 PM Room 116

TAM-G: Special Session: Non-Ionizing Radiation

Co-Chairs: Drew Thatcher, Kenneth Foster

8:15 AM TAM-G.1

Introduction and General Announcements

Thatcher, D.
Lisa Thatcher, Inc.

8:20 AM TAM-G.2

A “Weight of the Evidence” Approach to Identifying Possible Adverse Health Effects of Exposure to Radiofrequency Fields Generated by Wireless Communications Devices

McCormick, D.
IIT Research Institute

9:05 AM **TAM-G.3**

Electric Pulse Manipulation of Biological Cells: From Theory to Applications

Garner, A., Neculaes, V., Deminsky, M., Torres, A., Robinson, V., Vadlamani, A., Maciejewski, J., Whitmer, T., Fairbanks, A., Wyatt, S.

Purdue University, GE Global Research, Kintech LTD and NRC Kurchatov Institute

9:45 AM **TAM-G.4**

A Comparison of Radiofrequency Safety Standards and Guidelines at Frequencies Above 1 GHz; Inconsistencies and Gaps

Petersen, R.

Institute of Electrical and Electronics Engineers

10:15 AM **BREAK**

10:45 AM **TAM-G.5**

Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields

Foster, K., Rubin, G.

University of Pennsylvania, King's College London

11:05 AM **TAM-G.6**

Are There Age Related Differences in Exposure and Sensitivity to Radiofrequency Energy?

Thatcher, A.

Lisa Thatcher, Inc.

11:25 AM **TAM-G.7**

A Review of Laser Pointer Incidents and Safety Considerations for the Aviation Environment

Murphy, P., Seeley, D.

International Laser Display Association, Rockwell Laser Industries

11:45 AM **TAM-G.8**

Getting UV and/or IR LEDs in House

Haes, D.

Radiation Safety Specialist

Noon **Panel Discussion**

2:30-5:15 PM **Room 105/106**

TPM-A: Medical Health Physics

Co-Chairs: Deirdre Elder, Sam Keith

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

IOMP/IRPA Book Effort: Radiation Protection in Medical Imaging and Radiation Oncology

Stoeva, M., Vetter, R., Cheung, K., Czarwinski, R., McGowan, F.*

Medical University - Bulgaria, Mayo Clinic, International Organization of Medical Physics and Hong Kong Sanatorium & Hospital, International Radiation Protection Association and German Federal Office of Radiation Protection, CRC Press, Taylor & Francis Group, London

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

Radiation Therapy for a Developmentally Delayed Patient: A Case Study

Hall, M.

Emory University EHSO

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

Impact of Proposed 10CFR35 Regulations on Permanent Implant Brachytherapy

Leinwander, P., Kroger, L.

University of California, Davis Health System

3:15 PM **BREAK**

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

Overhaul of Provider Laser Privileges and Credentialing

Elder, D.

University of Colorado Hospital

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

Publication of FGR-14: Radiation Protection Guidance for Diagnostic and Interventional X-Ray Procedures

Keith, L.S., Bower, M.W., Boyd, M.A., Elmore, C.L., Hamdy, R.C., Leidholdt, E.M., Miller, D.L., Paunovich, E.D., Sears, S.T., Winston, J.P.

DHHS, Retired, US EPA, USAF, US FDA, USN, Retired, Commonwealth of PA

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

A Pathway to Compliance with New Fluoroscopy & CT Regulations in Texas

Savely, S., Wylie, M., Archer, B.

Baylor College of Medicine

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

Comparison of Shield Measurements with Analytical and Monte Carlo Calculations for a Proton Therapy Center

Mohaupt, T., Moyers, M., Van Riper, K., Farley, D., Thuo, K., Farr, J.

St. Jude Childrens Research Hospital, Shanghai Proton Center, White Rock Science, Medical and Health Physics Consulting

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

Air, Coolant, Beam Block, and Concrete Shield Activation Monitoring in a Proton Therapy Center

Mohaupt, T., Thuo, K., Mangini, C., Farr, J.

St. Jude Children's Research Hospital

5:00 PM **TPM-A.9**

Development of High Throughput Radiological Bioassays Screening Method

Poudel, S., Kannan, R., Hu, A., Marter, C., Medich, D.

Worcester Polytechnic Institute, Faulkner Hospital, Brookline, Holy Cross College, Philips Healthcare, Andover

2:30-5:00 PM **Room 104**

TPM-B: AAHP Special Session: Professional Ethics and Health Physics

Chair: Ed Bailey

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

A University Perspective on Ethics Training for Engineers and Health Physicists

Poston, J.

Texas A&M University

3:30 PM **BREAK**

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

Ethical Basis of Radiation Protection

Toohey, R.

M.H. Chew & Assoc.

4:30 PM **TPM-B.3**

Ethical Issues and Radiation Protection Culture - Challenges and Views from the Professionals

Czarwinski, R., Toohey, R., LeGuen, B.

International Radiation Protection Association (IRPA)

5:00-5:30 PM **Room 104**

AAHP Business Meeting

2:30-5:30 PM **Room 107**

TPM-C: Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation

See page 27 for details

2:30-5:30 PM **Room 108**

TPM-D: Radiological Operatives Support Specialist (ROSS): Integrating Health Physics into Emergency Response

Co-Chairs: Brooke Buddemeir, J.D. Rogers

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

FEMA Introduction to ROSS Program/ Concept

Blizzard, J., Rogers, J., McClafferty, R.

FEMA, Gryphon Scientific

3:00 PM **TPM-D.2**

ROSS Skills, Knowledge, and Abilities and Establishing a Tiered Capability

Buddemeier, B., McClafferty, R.

LLNL, Gryphon Scientific

3:45 PM **BREAK**

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

Lessons Learned from Piloting the ROSS in Exercises

Blumenthal, D., Irwin, W.

NNSA, VDH/CRCPD

4:45 PM **TPM-D.4**
Training and Tool Development for the ROSS Position
Stevenson, B.
DHS-S&T

5:15 PM **TPM-D.5**
ROSS Panel Discussion and Audience Q&A
Stevenson, B., Blizzard, J.
DHS-S&T, FEMA

2:30-5:30 PM **Room 109**

TPM-E: Special Session: TENORM

Co-Chairs: Brant Ulsh, Craig Little

2:30 PM **TPM-E.1**
Interesting Findings of a Comparison of Real Time Versus Passive Radon Thoron Monitoring in a Rare Earth Mine
Inayat, M.
Molycorp

3:00 PM **TPM-E.2**
Converting Thorium from a Radiological Nuisance to a Resource
Kutsch, J.
Thorium Energy Alliance

3:30 PM **BREAK**

4:00 PM **TPM-E.3**
Changes in Dose from Radium and Uranium in Groundwater before ISR Uranium Mining and after Remediation
Johnson, T., Ruedig, E.
Colorado State University

4:30 PM **TPM-E.4**
Common Errors in NORM Measurements
Johnson, R.
Radiation Safety Counseling Institute

5:00 PM **TPM-E.5**
How to Deal with Worker Concerns for NORM
Johnson, R.
Radiation Safety Counseling Institute

2:30-4:45 PM **Room 110**

TPM-F: NESHAPS

Co-Chairs: Matthew Barnett, Gustavo Vasquez

2:30 PM **TPM-F.1**
EPA Overview of Subpart H Radioactive Air Emissions
Rosnick, R.
US Environmental Protection Agency

2:45 PM **TPM-F.2**
US Department of Energy Subpart H Report
Regnier, E., Snyder, S.
US DOE, PNNL

3:00 PM **TPM-F.3**
Update on Standards, Guides and Directives for Monitoring Radioactive Air Emissions
Glissmeyer, J., Blunt, B.
Pacific Northwest National Laboratory, Blunt Consulting LLC

3:15 PM **BREAK**

3:45 PM **TPM-F.4**
Stack Air Sample Conditioner for Reducing Temperature and Humidity
Flaherty, J., Glissmeyer, J., Pekour, M.*
Pacific Northwest National Laboratory

4:00 PM **TPM-F.5**
Estimation of Individual Doses at Ambient Air Monitoring Stations Using Dose-to-Air Concentration Ratios
Stuenkel, D., Scofield, P.
Trinity Engineering Associates, UT-Battelle, Oak Ridge National Laboratory

4:15 PM **TPM-F.6**
Seasonal Variability and Content of On-Site Ambient Air Monitoring, with Lessons Learned
Baker, C., Cannon, C., Ikenberry, T., Grondin, R.*
Perma-Fix Northwest, Dade Moeller

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

Establishment of a Background Environmental Monitoring Station - Criteria and Application

Barnett, J., Fritz, B., Snyder, S., Bisping, L., Rishel, J.

PNNL

2:30-5:15 PM **Room 116**

TPM-G: Special Session: WIPP

Co-Chairs: Robert Hayes, Mitch Findley

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

Introduction to the Waste Isolation Pilot Plant (WIPP)

Hayes, R.

NWP/WIPP

3:00 PM **TPM-G.2**

The Past, Present, and Future of Implementing the Subpart A Public Dose Standards at the Waste Isolation Pilot Plant (WIPP)

Walsh, J.

US Environmental Protection Agency

3:15 PM **TPM-G.3**

Waste Isolation Pilot Plant Status

Stafford, H.

AECOM URS-PS

3:30 PM **BREAK**

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

Internal Dosimetry Challenges of the 2014 Waste Isolation Pilot Plant Radioactive Material Release Event

Findley, W., Britain, B., Kirkes, B., Acosta, S.

MJW Corporation, Nuclear Waste Partnership - WIPP

4:15 PM **TPM-G.5**

Sweating the 'ESS' in NESHAP

Picazo, E.

Waste Isolation Pilot Plant

4:30 PM **TPM-G.6**

Atmospheric Dispersion Modeling of the February 2014 Waste Isolation Pilot Plant Release

Nasstrom, J., Piggott, W., Simpson, M., Lobaugh, M., Tai, L., Pobanz, B., Yu, K.*

Lawrence Livermore National Laboratory

4:45 PM **TPM-G.7**

An Independent Assessment of the 2014 Radiation Release at the Nation's only Deep Geological Repository in New Mexico, USA

Thakur, P., Lemons, B.G., Ballard, S., Hardy, R.

Carlsbad Environmental Monitoring & Research Center

5:15 PM **NIR Section Business Meeting**

WEDNESDAY

7:00-8:00 AM **Room 103**

CEL5 Back to the Future. Determining the Presence/Absence of Contamination from a Special-Compound Tritium Experiment Performed in an Open Air Environment

Miltenberger, R.P., Miller, M.L., Simmons, T.N., Green, K.A.
Sandia National Laboratory

7:00-8:00 AM **Room 117**

CEL6 Hiring a "New" Health Physicist: How to Identify the Ideal Candidate Before the Search

Johnson, T.
Colorado State University

8:15 AM-12:15 PM **Room 105/106**

WAM-A: Celebrating our Past - Looking to the Future

Co-Chairs: Bryce Rich, Charles Wilson

8:15 AM **WAM-A.1**

Reflections About the Health Physics Society - from Student to Senior Citizen

Roessler, C.
Retired

8:30 AM **WAM-A.2**

Impact of Early Health Physicists on Worldwide Development of Nuclear Energy

Bradley, F.
HP Consultant

8:45 AM **WAM-A.3**

A Brief History of Health Physics Education and Training

Ziemer, P.
Purdue University

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

The Birth of the Health Physics Journal

Auxier, J.
Auxier & Associates, Inc

9:30 AM **BREAK**

10:00 AM **WAM-A.5**

Mission of the Health Physics Society According to a 62 Year Practitioner

Rich, B.
MHChew&Assoc

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

Watershed Moments for the Society

Poston, J.
Texas A&M University

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

HPS: A Community of Boosters

Waite, D.
Retired

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

It Was the Best of Times

Roessler, G.
Retired

11:15 AM **WAM-A.9**

Future Qualifications of Medical Health Physicists

Vetter, R.
Mayo Clinic

11:30 AM **WAM-A.10**

Concerning Radiation Science and Radiation Safety

Raabe, O.
University of California, Davis

Noon **WAM-A.11**

Health Physics Research - Are We Done Yet?

Guilmette, R.
Ray Guilmette & Associates LLC

8:30-11:15 AM **Room 104**

WAM-B: Special Session: Simple Language Communication

Chair: Edward Lazo

8:30 AM **Introduction**

Hamrick, B.
HPS President

8:40 AM **WAM-B.1**
Plain Language We Can All Actually Understand?
Lazo, E.
OECD/NEA

9:00 AM **WAM-B.2**
Simple Language for Complex ICRP Concepts
Cool, D.
NRC

9:15 AM **WAM-B.3**
Experience from the HPS - "Fact Sheets, and Ask-the-Expert"
Classic, K.
Mayo Clinic

9:30 AM **WAM-B.4**
Experience from the NEA Working Group on Public Communication of Nuclear Regulatory Organisations
Brenner, E.
NRC Working Group

9:45 AM **WAM-B.5**
Keep it Plain - How to Make Yourself Understood in an Emergency. Putting Radiological Health Hazards in Perspective using Plain Language
Madjunarova, M., Meschenmoser, P.
International Atomic Energy Agency (IAEA)

10:00 AM **BREAK**

10:30 AM **WAM-B.6**
NRC Thoughts on Post-Accident Communications
Milligan, P.
NRC

10:45 AM **WAM-B.7**
Plain Language use in a Federal Radiation Workers Compensation Program
Hinnefeld, S., Kinman, J.
CDC, NIOSH

11:00 AM **Discussion**

8:30 AM-Noon **Room 107**

WAM-C: Special Session: Nanotechnology

Chair: Lorraine Day

Nanotechnology and Radiation Protection
Marceau-Day, L., Hoover, M., Cash, L., Hay, T., Walker, L., Sajo, E.
LSU

8:30 AM-Noon **Room 108**

WAM-D: Special Session: Homeland Security

Co-Chairs: Peter Darnell, Adela Salame-Alfie

8:30 AM **WAM-D.1**
A Brief History of the Health Physics Society Homeland Security Committee/ Section
Lanza, J.
Florida Department of Health

9:00 AM **WAM-D.2**
The First 100 Minutes after an Outdoor Explosive RDD: A Concept for a Successful Tactical Response
Musolino, S., Harper, F.T.
Brookhaven National Laboratory, Sandia National Laboratories

9:30 AM **WAM-D.3**
Review of the Final Report to CDC on the Joint CDC/NCRP IND Workshop/Table Top Exercise
Groves, K., Cassata, J.
S2-Sevorg Services, US NRC

10:00 AM **BREAK**

10:30 AM **WAM-D.4**
E-43 Task Force for Interagency Environmental Data -Past, Present and Future
Fordham, E.
WA DOH

11:00 AM **WAM-D.5**

Use of Volunteer Radiation Professionals for Population Monitoring and Shelter Assistance

McBurney, R.

CRCPD

11:30 AM **WAM-D.6**

The Advisory Team for the Environment, Food and Health

Noska, M.A.

US Food and Drug Administration

8:30 AM-12:15 PM **Room 109**

WAM-E: External Dosimetry

Co-Chairs: Nolan Hertel, Kim Kearfott

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

Photon and Neutron Organ and Effective Dose Coefficients for Cranial and Caudal Irradiation Geometries

*Veinot, K., Eckerman, K., Hertel, N.**

Y-12 National Security Complex, Oak Ridge National Laboratory Center for Radiation Protection Knowledge

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

Deuterium-Deuterium Neutron Generator for Neutron Activation Analysis In Vivo: A Dosimetry Study

Sowers, D., Liu, Y., Mostafaei, F., Nie, L.

Purdue University

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

Auto-Scaling of UF Hybrid Adult Phantoms to Astronaut Morphometry

Sands, M., Maynard, M., Bahadori, A., Bolch, W.

University of Florida, NASA Johnson Space Center

9:15 AM **BREAK**

9:45 AM **WAM-E.4**

Body-Size Dependent Dose Conversion Coefficients for Adult Males in External Photon Radiation Fields

Chang, L., Lee, C., Simon, S.

National Cancer Institute

10:00 AM **WAM-E.5**

Design of Protocol for a Commercially Available Optically Stimulated Luminescent Dosimetry System

Abraham, S., Jawad, A., Liu, K., Boria, A., Green, C., Frank, S., Rafique, M., Kearfott, K.

University of Michigan

10:15 AM **WAM-E.6**

Measurement of the Signal Loss for Repeated Readout of Al2O3:C used as an Optically Stimulated Luminescent Dosimeter

Liu, K., Jawad, A., Boria, A., Abraham, S., Green, C., Frank, S., Rafique, M., Kearfott, K.*

University of Michigan, Pakistan Institute of Engineering and Applied Sciences

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

Unusual Behavior of a Vintage Cs-137 Beam Calibrator

Jawad, A., Younge, K., Miklos, J., Kearfott, K.

University of Michigan

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

Comparative Performance Analysis of a New Tissue Equivalent Proportional Counter for Neutron Monitoring and Dosimetry

Broughton, D., Orchard, G., Waker, A.

University of Ontario Institute of Technology

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

Interventional Cardiology: Is There a Need for Extra Protection for the Operators?

*Badawy, M., Farouque, O., U, P.L., Deb, P.**

RMIT, Australia & Austin Health, Australia

11:15 AM **WAM-E.10**
Practical Use of Graph Theory to Reduce Radiation Exposure to the Workers Involved in Activity in Areas with Increased Background Radiation Level
Mazur, I., Kudrin, I., Chizhov, K., Kryuchkov, V.
Burnasyan State Research Center

11:30 AM **WAM-E.11**
Evaluating Radiation Skin Dose From Nuclear Medicine Radionuclides
Sturchio, G., Underwood, J.K.
Mayo Clinic

11:45 AM **WAM-E.12**
Development of Monte Carlo Particles Transport Simulation Program SuperMC
Song, J.
FDS

8:30 AM-Noon **Room 110**

WAM-F: Special Session: End of Life Management of Disused Sources - A Global Problem, Part I

Co-Chairs: Mike Boyd, Sigurdur Magnusson

8:30 AM **WAM-F.1**
IAEA Activities Related to Management of Disused Sources
Mansoux, H., Kinker, M., George, C., Benitez Navarrao, J.-C., Roughan, C., Recio, M.
IAEA

9:00 AM **WAM-F.2**
Health Physics Aspects of the US-Russian Cooperative Efforts to Decommission Russian Radioisotope Thermoelectric Generators
Kahn, R.A., Porter, S.J.
Argonne National Laboratory, Lawrence Livermore National Laboratory

9:30 AM **WAM-F.3**
Office of Radiological Security- Off Site Source Recovery Solution to Reducing the Threat of Sealed Radiological Sources
*Zarling, J., Stewart, W.**
Los Alamos National Lab, National Nuclear Security Administration

10:00 AM **BREAK**

10:30 AM **WAM-F.4**
End of Life Management of Radioactive Sources - A Global Problem
Younas, M.Y., Qayyum, F.Q., Shafique, B.S., Tareen, A.D.
University of Azad Jammu & Kashmir, Islamia University Bhawalpur

11:00 AM **WAM-F.5**
NRC Byproduct Material Financial Scoping Study- Proposed Expansion
Shaffner, J.A.
US Nuclear Regulatory Commission

11:20 AM **WAM-F.6**
Alternative Technologies and Certification of New Type B Shipping Containers
Cuthbertson, A.
National Nuclear Security Administration

11:40 AM **WAM-F.7**
Texas Draft Proposed Rule re Two Year Limit on Storage of Disused Sources
Fleming, R.R.
Disused Source Working Group

2:30-5:00 PM **Room 105/106**

WPM-A: Celebrating our Past - Looking to the Future

Co-Chairs: Bryce Rich, Charles Wilson

2:30 PM **WPM-A.1**
Sixty Years of Radiation Fears Driven by Imagination and Mythology
Johnson, R.
Radiation Safety Counseling Institute

2:45 PM **WPM-A.2**
Remembrances from the 50th Year of HPS: Changes Without and Within
McBurney, R.
Conference of Radiation Control Program Directors

3:00 PM **WPM-A.3**
Communication: Effective And Otherwise
Toohey, R.
M.H. Chew & Assoc.

3:15 PM **WPM-A.4**
A Tale of Two Societies
Dickson, H.
Dickson Consulting, LLC

3:30 PM **BREAK**

3:45 PM **WPM-A.5**
Personal Reflections from Number 4 - Can We Stop Counting Now?
Pryor, K.
Pacific Northwest National Laboratory

4:00 PM **WPM-A.6**
Steering the Good Ship HPS into the Future - The President-Elect's Viewpoint
Kirner, N.
Kirner Consulting, Inc.

4:15 PM **WPM-A.7**
Sixty Years in the Making, Who Are We?
Classic, K.
Mayo Clinic

4:30 PM **WPM-A.8**
The Future of the Health Physics Society
Stabin, M.
Vanderbilt University

4:45 PM **WPM-A.9**
New Members of HPS: Finding Your Place
Miller, M.
Cleveland Clinic

2:30-5:30 PM **Room 104**

WPM-B: Special Session: Communications Workshop

Chair: Jessica Wieder

2:30-4:30 PM **Room 108**

WPM-D: Special Session: Homeland Security

Co-Chairs: Peter Darnell, Adela Salame-Alfie

2:30 PM **WPM-D.1**
The US EPA Airborne Spectral Photometric Environmental Collection Technology (ASPECT) Radiological Surveys for Environmental and Homeland Security Purposes.
Cardarelli, J., Thomas, M., Curry, T., Kudarauskas, P.
US EPA

3:00 PM **BREAK**

3:30 PM **WPM-D.2**
Radiation Risk Scale as a Tool for Communication
Ansari, A.
NCEH

4:00 PM **WPM-D.3**
Modelling the Defence of Nuclear Sites for the Prevention of the Loss of Special Nuclear Material
Waller, E., Chornoboy, N.
University of Ontario Institute of Technology, Oshawa

4:30 PM **Homeland Security Section Business Meeting**

2:30-5:00 PM **Room 110**

WPM-F: Special Session: End of Life Management of Disused Radioactive Sources - A Global Problem, Part II

Co-Chairs: Mike Boyd, Sigurdur Magnusson

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

Legacy of Radioactive Waste Management in Georgia: Trends and Current Situation

Chelidze, L.

Andronikashvili Institute of Physics, Georgia

3:00 PM **WPM-F.2**

Sustainable End-of-Life Management for Disused Sources

Trifunovic, D., Al Ameri, B.

Federal Authority for Nuclear Regulation, United Arab Emirates

3:30 PM **BREAK**

4:00 PM **WPM-F.3**

A Proposed Solution to the Challenges of Disposal of Disused Sources that are Greater than Class C

Kirk, J., Jacobi, L.

Waste Control Specialists LLC, Jacobi Consulting

4:30 PM **WPM-F.4**

Comparison of National Strategies to Address Orphan Radioactive Sources

Kahn, R., McRee, W., Miller, R., Walker, S., Taplin, T.

Argonne National Laboratory, Pacific Northwest National Laboratory, Sandia National Laboratories, US Department of Energy/National Nuclear Security Administration

HPS Business Meeting

Indiana Convention Center
Room 107
Wednesday 5 July
5:30-6:30 pm

THURSDAY

7:00-8:00 AM **Room 103**

CEL7 The 1976 Hanford Americium Accident –Then and Now

Carbaugh, E.
Dade Moeller and Associates

7:00-8:00 AM **Room 117**

CEL8 Remediation at the Boeing Michigan Aeronautical Research Center (BOMARC)

Rademacher, S.
USAF

8:15-10:45 AM **Room 105/106**

THAM-A: AIRRS/RSO

Chair: Kendall Berry

8:15 AM **THAM-A.1**

Radioiodine Patient Release Calculations: Patients Requiring Prolonged Travel Time When Returning Home.

Sturchio, G., Brunette, J.J., Durski, J.M., Nelson, K.L., Pavlicek, W.
Mayo Clinic

8:30 AM **THAM-A.2**

Changing Role of the Radiation Safety Officer as New Facilites Join with the U of R.

Mis, F.J.
University of Rochester

8:45 AM **THAM-A.3**

Industrial Applications of Sealed Sources

Krieger, K.V.
Radiation Technology Inc.

9:00 AM **THAM-A.4**

Pursuit of a Decommissioning License Amendment for the Routine Release of Buildings from Licensee Control at a Medical Academic Institution.

Lemieux, B., LaGroue, A.
UTHSC

9:15 AM **THAM-A.5**

The History of a Significant Radium Spill

Lambert, K.N.
Drexell University

9:30 AM **BREAK**

10:00 AM **THAM-A.6**

Fun Times with the Reemergence of a Radium Incident from Long Ago

Lambert, K.N.
Drexell University

10:15 AM **THAM-A.7**

Issues with Decedants

Miller, M.A., Pauer, T., Nordwig, G., Rayadurgam, S.
Cleveland Clinic

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

Field Exercises Involving Local Law Enforcement Agencies.

Jacobus, J.P., Ribaudo, C.A.
NIH

10:45 AM **AIRRS/RSO Business Meeting**

8:30-11:45 AM **Room 104**

THAM-B: Instrumentation

Chair: Ray Johnson

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

Tensioned Metastable Fluid Detectors for Neutron and Alpha Detection in Spectrometry Applications for Health Physics

Webster, J., Grimes, T., Archambault, B., Taleyarkhan, R.
Purdue University, Sagamore Adams Labs

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

A Novel Radon Detector using Centrifugally Tensioned Metastable Fluid Detectors

Archambault, B., Boyle, N., Perkins, A., Reames, R., Webster, J., Taleyarkhan, R.
Sagamore Adams Laboratories, LLC, Purdue University

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

Errors in Measurements and Safety Decisions

Johnson, R.
Radiation Safety Counseling Institute

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

An Increase in Optical Photon Collection Efficiency of a Sodium Iodide Crystal

Shah, M., Marianno, C., Khatri, S.

Texas A&M University

9:30 AM **BREAK**

10:00 AM **THAM-B.5**

PLA Polymer-Based Solid State Radiation Detector

Bakken, A., Boyle, N., Archambault, B., Taleyarkhan, R.*

Purdue University School of Health Sciences, Purdue University School of Nuclear Engineering, Sagamore Adams Laboratories, LLC

10:15 AM **THAM-B.6**

Quantitative Single-Particle Digital Autoradiography with the Ionizing-Radiation Quantum Imaging Detector

Miller, B., Tabatadze, G., Dion, M., Frost, S., Orozco, J., Press, O., Sandmaier, B., Miederer, M., Brochhausen, C., Tolmachev, S.

Pacific Northwest National Laboratory, The University of Arizona, US Transuranium and Uranium Registries, Washington State University, Fred Hutchinson Cancer Research Center, University Medical Center of the Johannes Gutenberg University Mainz, Germany

10:30 AM **THAM-B.7**

The Argos, Sirius, GEM-5 and Cronos Family of Radiation Sensors, and Applications for other Types of Measurements

Bronson, F., Bogorodzki, G., Zickefoose, J., Ilie, G.

Canberra, Canberra-Canada

10:45 AM **THAM-B.8**

Improved Resolution CeBr Scintillation Gamma Spectroscopy Detectors with LED-Gain Stabilization

Bronson, F., Nakazawa, D.

Canberra

11:00 AM **THAM-B.9**

An Investigation of Radiation Levels from the Misuse of Handheld X-ray Fluorescence Devices

Riley, R., Simpson, D., McLaurin, B., Young, L., Prutzman, T.

Bloomsburg University, Geisinger Medical

11:15 AM **THAM-B.10**

Estimation of Inhalation Intake of Complex Radioactive Gas-Aerosol Mixtures in Case of Emergency Response

Karev, A., Tsovianov, A., Shinkarev, S.

State Research Center - Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency (SRC - FMBC)

11:30 AM **THAM-B.11**

Beyond Security - Versatile Radiation Protection Applications of a Spectroscopic Pager

Iwatschenko-Borho, M.

Thermo Fisher Scientific, Erlangen

8:15-11:45 AM **Room 107**

THAM-C: Environmental Monitoring

Co-Chairs: Tim Jannik, Tracy Ikenberry

8:15 AM **THAM-C.1**

Outdoor Radon Concentrations in a Neighborhood Where Houses Have Very High Indoor Radon Concentrations

LaMastra, A.

Health Physics Associates, Inc.

8:30 AM **THAM-C.2**

Modeling Dose to Firefighters from Inhalation of Radionuclides in Wildland Fire Smoke

Viner, B., Jannik, G., Stone, D., Blake, J., Hepworth, A., Naeher, L., Eddy, T., Adetona, O.*

Savannah River National Laboratory, USDA Forest Service - SR, University of Georgia, Savannah River Nuclear Solutions

8:45 AM **THAM-C.3**
Neutron/Muon Correlation Functions to Improve Neutron Detection Capabilities outside Nuclear Facilities
Ordinario, D., Brandl, A.
Colorado State University

9:00 AM **THAM-C.4**
Neptunium: A Sentinel for Environmental Contamination by Actinides
Rosenberg, B., Steinhauser, G., Shozugawa, K.
Colorado State University, The University of Tokyo

9:15 AM **BREAK**

9:45 AM **THAM-C.5**
Compartment Modeling of Cesium Movement through Terrestrial-Aquatic Ecosystems in a Forested Headwater in Fukushima
Townsend, A., Ruedig, E., Klumpp, J., Johnson, T., Gomi, T., Sakai, M.
Colorado State University, Tokyo University of Agriculture and Technology

10:00 AM **THAM-C.6**
Beehive Model Creation for Use in Determining Radiation Dose to Bees and Bee Larvae
Jia, J., Caffrey, E., Higley, K.
Oregon State University

10:15 AM **THAM-C.7**
ANSI/HPS N13.37 Draft Regulatory Guide 4.13 "Environmental Dosimetry"
*Garry, S., Smith, M.**
US Nuclear Regulatory Commission

10:30 AM **THAM-C.8**
An Intelligent Sensor Platform for Area and Environmental Monitoring Applications
Nakazawa, D., Russ, W., Herman, C., Huckins, R.
Canberra Industries

10:45 AM **THAM-C.9**
Evaluation of Shiryaev-Roberts Procedure for On-Line Radiation Monitoring
Watson, M., Bliznyuk, V., Seliman, A., DeVol, T.
Clemson University

11:00 AM **THAM-C.10**
Competitive Uptake of Plutonium and Iron in Corn
Hoelbling, S., Molz, F., Tharayil, N., Powell, B., Martinez, N.
Clemson University

11:15 AM **THAM-C.11**
Estimation of the Daily Effective Dose from the Intake of some Food Items in Lagos, Nigeria
Ajayi, I.
Adekunle Ajasin University, Akungba-Akoko

11:30 AM **THAM-C.12**
Developing a Database of Samples of Environment Components and Living Organisms for Radioecological Studies" to more short and relevant title "Development of the Registration System for Biotic and Abiotic Samples
Usoltsev, D., Osipov, D., Shishkina, E.
Urals Research Center for Radiation Medicine, Chelyabinsk

8:30 AM-Noon **Room 108**

THAM-D: Special Session: Next Generation Challenges

Co-Chairs: John Boice, Nolan Hertel

8:30 AM **THAM-D.1**
Welcome and Opening Remarks
Hertel, N.

8:40 AM **THAM-D.2**
NCRP Initiatives and the Future of Radiation Protection
Boice, J.
NCRP

9:20 AM **THAM-D.3**
The Challenges of Today's Health Physics Academic Programs in American Universities
Brey, R.
ISU

9:40 AM **THAM-D.4**
Undergraduate Programs in Health Physics - Is There a Future?
Poston, Sr., J.
Texas A&M University

10:00 AM **BREAK**

10:20 AM **THAM-D.5**
Professional and Technical Challenges (or Opportunities) Ahead for Recent Graduates in Health Physics
Wilson IV, C.
LSU

10:40 AM **THAM-D.6**
Federal Guidance Challenges for the Next Generation
Boyd, M.
US EPA

11:00 AM **THAM-D.7**
Impact of Patient Release from Unsealed Radionuclide Procedures
Benevides, L., Saba, M., Tapp, K., Tadesse, R.
US NRC

11:20 AM **THAM-D.8**
Is The Time Right for a Radiation Protection Research and Educational Hub?
Hertel, N.
ORNL Center for Radiation Protection Knowledge

11:40 AM **THAM-D.9**
Preparing for Challenges of Tomorrow Today with HP Connect and HP Volunteer
Wang, C.
Duke University

2:15-4:00 PM **Room 105/106**

THPM-A1: Radiobiology/ Biological Response

Chair: John Flores-Mclaughlin

2:15 PM **THPM-A1.1**
An Estimation of the ED50 for Hematopoietic Injury in Children
Adams, T., Sumner, L., Casagrande, R.
Gryphon Scientific, LLC

2:30 PM **THPM-A1.2**
Progress on a Voxel Phantom Model of a Pine Tree
Condon, C., Higley, K.
Oregon State University

2:45 PM **THPM-A1.3**
The Application of Integrated Stochastic Spatial Temporal (ISST) Model in Radiation Risk Assessment: A Case Study on Radiation Induced Bystander Effect
Liu, R., Higley, K.
Oregon State University

3:00 PM **BREAK**

3:30 PM **THPM-A1.4**
Proton and Alpha-Particle Transport in Water at the Cellular Level using Monte Carlo Simulation Techniques
Harvey, M., Belal, Z.
Texas Southern University

3:45 PM **THPM-A1.5**
Cell Survivor: Modeling Radiation Biology with a Game Engine
Spencer, M., Sajo, E.
University of Massachusetts, Lowell

4:00-5:00 PM Room 105/106

THPM-A2: Radiation Effects

Chair: John Flores-Mclaughlin

4:00 PM THPM-A2.1

A Mechanistic Model of Atmospheric Oxygen Influence on the Deterministic Effects to Human Skin from Space Radiations

Flores-McLaughlin, J., Guetersloh, S., Braby, L.

Texas A&M University

4:15 PM THPM-A2.2

Radiation Effects of Obesity-Associated Breast Cancer

Rashid, A., Chowdhury, K., Moustaid-Moussa, N., Gollahon, L., Moussa, H.

Texas Tech University

4:30 PM THPM-A2.3

Arterial Hypertension In Workers Occupationally Exposed To Ionizing Radiation

Kuznetsova, K., Azizova, T., Pikulina, M., Bagaeva, Y., Fotieva, N., Azizova, E.

Southern Urals Biophysics Institute

4:45 PM THPM-A2.4

An Approach to Verify Radiological Protection in an Emergency Using a Minimum Provable Dose Concept

Ogino, H., Sasaki, M., Fujimichi, Y., Hamada, N., Iwasaki, T., Yoshida, K., Hattori, T.

Central Research Institute of Electric Power Industry (CRIEPI)

2:15-5:00 PM Room 104

THPM-B: Risk Assessment

Co-Chairs: Hanna Moussa, Drew Thatcher

2:15 PM THPM-B.1

Dose to Water from Solar Particle Event (SPE)

Chowdhury, K., Rashid, A., Moussa, H., Townsend, L.

Texas Tech University, University of Tennessee

2:30 PM THPM-B.2

Dose on Europa's Orbit at '0̊ Degrees Due to Electron Spectra vs. Shield Thicknesses

Moussa, H., Townsend, L.

Texas Tech University, University of Tennessee

2:45 PM THPM-B.3

RESRAD for Radiation Risk Assessment: Comparison with the PRG Calculator

Yu, C., Cheng, J., Kamboj, S., Corredor, C., Favret, D., Regnier, E., Wallo, A.

ANL, DOE

3:00 PM THPM-B.4

Environmental Impact on Fish from Fukushima and Estimates of Potential Dose to Humans

Thatcher, A.

Lisa Thatcher, Inc.

3:15 PM THPM-B.5

Risk and Dose Calculations Using the PRG and DCC Calculators and RESRAD

Kamboj, S., Yu, C., Cheng, J., Corredor, C., Wallo, A.

Argonne National Laboratory, U.S. Department of Energy

3:30 PM BREAK

3:45 PM THPM-B.6

An Integrated Pathway Model (IMPACT) for Radio-ecological Systems for Canadian Nuclear Power Generation Facilities

Shen, J.

EcoMetrix Inc.

4:00 PM THPM-B.7

Radiation Dose Assessment of US Occupation Forces of Hiroshima and Nagasaki, Japan from August 1945 to July 1946

Murray, B.

DTRA

4:15 PM **THPM-B.8**
Investigation of the Level of Conservatism Associated with the Soil Preliminary Remediation Goals (Soil PRGs) Derived by the EPA PRG Calculator
Cheng, J., Yu, C., Kamboj, S., Corredor, C., Favret, D.
Argonne National Laboratory, Department of Energy

4:30 PM **THPM-B.9**
Radiological Dose Assessment for a TENORM Disposal Location in the State of Colorado
Manglass, L.
ARCADIS-SENES Consultants

4:45 PM **THPM-B.10**
Assessing Cancer Risk Associated With CT Dose: How Confident Are We?
Deb, P.
RMIT University, Australia

2:30-5:15 PM **Room 107**

THPM-C: Special Session: Radiation in Flight

Chair: Joseph Shonka

2:30 PM **THPM-C.1**
Overview of Inflight Ionizing Radiation
Bramlitt, E.T.

3:00 PM **THPM-C.2**
Trends in Occupational Dose of Aircrew
Shonka, J.J.
SRA

3:15 PM **THPM-C.3**
Overview of Terrestrial Gamma-ray Flashes (TGFs) from Thunderstorms
Fishman, G.J.
University of Alabama

3:30 PM **BREAK**

4:00 PM **THPM-C.4**
10 Years of Radiation Monitoring of Aircrew in Germany – Calculations and Their Agreement with Measurements
Schneider, M., O'Brien, K.
IASON GmbH, Austria, Northern Arizona University

4:15 PM **THPM-C.5**
Aircraft Crewmembers: Unregulated Radiation Workers
Bramlitt, E.T.
None

4:30 PM **THPM-C.6**
Transportation of Radioactive Materials in Cargo, A Pilots Perspective
Schwartz, S.
FedEx

4:45 PM **THPM-C.7**
Unstructured Mesh Simulation of Dose Encountered on Aircraft from Terrestrial Gamma-ray Flashes
Zieb, K., Caracappa, P.F., Xu, X.G.
Rensselaer Polytechnic Institute

5:00 PM **THPM-C.8**
The Future of Aircrew Radiation Exposure Research
Shonka, J.J.
SRA

2:30-5:00 PM **Room 108**

THPM-D: Special Session: Next Generation Challenges

Co-Chairs: Werner Ruhm, Shaheen Dewji

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

EURADOS Report on Visions for Radiation Dosimetry over the Next Two Decades - Strategic Research Agenda of the European Radiation Dosimetry Group

Rühm, W., Fantuzzi, E., Harrison, R., Schuhmacher, H., Vanhavere, F., Alves, J., Bottolier Depois, J.F., Fattibene, P., Knežević, Ž., Lopez, M.A., Mayer, S., Miljanić, S., Neumaier, S., Olko, P., Stadtmann, H., Tanner, R., Woda, C.

Helmholtz Center Munich, Germany, Radiation Protection Institute, Italy, University of Newcastle, UK, Pysikalisch Technische Bundesanstalt, Germany, Belgian Nuclear Research Center, Belgium, Instituto Superior Técnico, Portugal, Institut de Radioprotection et de Sûreté Nucléaire (IRSN), France, Istituto Superiore di Sanità (ISS), Italy, Ruđer Bošković Institute (RBI), Croatia, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT), Spain, Paul Scherer Institut (PSI), Switzerland, Instytut Fizyki Jądrowej (IFJ), Poland, Seibersdorf Labor GmbH, Seibersdorf, Austria, Public Health England, UK

3:15 PM **THPM-D.2**

Critical Issues in Knowledge Management in Domestic Radiation Protection Research Capabilities

Dewji, S., Hertel, N.

Oak Ridge National Laboratory, Georgia Institute of Technology/Oak Ridge National Laboratory

3:40 PM **THPM-D.4**

Future Challenges for Radiation Protection Professionals in a National Lab

Stephens, G.M.

Oak Ridge National Laboratory

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

Challenges in Radiation Protection Instrumentation

Chapman, J.

ORNL

4:20 PM **THPM-D.6**

Is There a Future for Medical Health Physicists?

Nelson, K.

Mayo Clinic

4:40 PM **THPM-D.7**

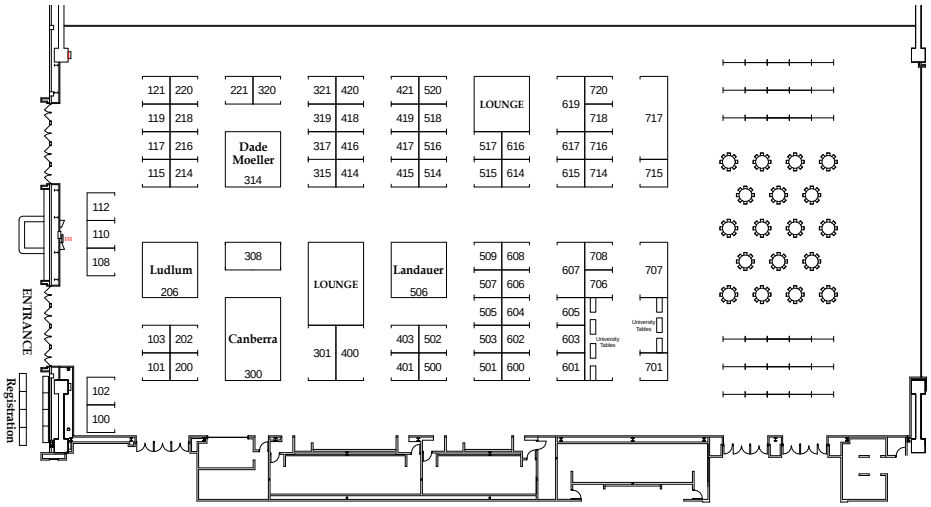
Summary

Hertel, N.E.

Georgia Institute of Technology/Oak Ridge National Laboratory

Thanks to our Exhibitors!

Be sure to stop by Exhibit Hall D in the Indiana Convention Center



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Arrow-Tech Inc.
Bayer Healthcare
Berkeley Nucleonics Corp
Best Dosimetry Services (formerly Best Medical)
Bionomics
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Capintec
CDC and Prevention, Radiation Studies Branch
Centronic LLC
Chase Environ Group, Inc.
Chesapeake Nuclear Serv, Inc
CHP Consultants
CRCPD
Curie Services
Dade Moeller
Eckert & Ziegler
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Tracerco
Ultra Electronics/Lab Impex
Unfors RaySafe, Inc/Fluke Biomed
X-Z Lab

AAHP Courses

Saturday 11 July 2015 - 8 AM-5 PM - Westin Indianapolis

AAHP1 Cavity Ionization in Theory and Experiment.

Arthur C. Lucas, CHP, Sc.D.

Herb Parker, as a mentor for many, taught one of the first Professional Enrichment Courses for the radiological profession in the mid-1950's. The course on cavity theory remained a kickoff point for dosimetry for many years.

This course will treat the basic theory of mis-matched walls and cavities, originally the gaseous cavities in solid walls. Starting from the basic theory the course will then discuss the creation of stopping power tables for compounds in the gases and walls involved.

Examples of cavities extended in both mass and dimension will be developed for x-rays, gamma rays, and neutrons. Specific emphasis will be given to the cases of tissue equivalent gases and walls for radiation detectors.

In addition to the instrumental implications of the calculational models the applications to the trabeculae in human tissue and bone will be developed along with discussion of solid radiation detectors in liquid or tissue environment.

AAHP2 The US Regulatory Basis for Radiological Effluent Monitoring

Jim Key; Key Solutions

Regulation for the control and monitoring of radiological effluents discharged by nuclear power plants in the United States is codified in Titles 10 and 40 of the Code of Federal Regulation (CFR). The relationship among the regulations and, between the regulations and guidance can be confusing and difficult to grasp. This seminar will provide an overview of the regulatory requirements, guidance and implementation of the regulations. Problems not addressed in the guidance and the resulting industry issues will be discussed.

AAHP3 Nuclear Science and Technology at the WIPP

Robert B Hayes

WIPP

This is a review of nuclear science and technology developed at the WIPP site since operations began in 1999. The focus will be to review the content of peer reviewed journal publications as well as peer reviewed conference proceedings and transactions. Content will cover, shielding design, operations, air monitoring, nuclear criticality safety, radon mitigation, numerical analysis and applied health physics. The course will begin with an overview of mining engineering applications including rock mechanics and WIPP basics to introduce the reason for the various science based solutions developed to support the site mission. Content will be appropriate for any junior level health physicist or radiological control technician in terms of the assumed audience competency and understanding.

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

In addition to the above-mentioned sessions for Sunday, 5 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 Accelerator Physics for ES&H Professionals Part 1

Cossairt, J.D.
Fermi National Accelerator Laboratory

This is Part 1 of a two-part PEP Course. Part 2 is offered in Session 2-A. The participants will maximize the benefits of their participation by attending both Parts.

The acceleration and transport of particle beams constitutes a fascinating subject that merits understanding by accelerator health physicists and other environment, safety, and health professionals. Particle accelerators continue to grow in importance; of course in medicine and also in many other areas that now reach deeply into many facets of everyday life. Members of the public now commonly encounter human-made radiation from accelerators. The goal of this course is to improve the ES&H professional's knowledge of how particle accelerators work. This should lead to more effective working relationships with those responsible for accelerator operation in common efforts to address important ES&H issues. In Part 1 of this course basic electromagnetic theory, relativistic relationships, charged particle optics, and electrostatic accelerators will be reviewed. While equations will be used, the presentation will be semi-qualitative in nature. While specific health physics topics will not be covered in detail, points of connection with hazards found at accelerators including radiological ones will be discussed. Attendance at Part 1 is nearly essential to effective participation in Part 2.

1-B Basic Science Supports a Dose Rate Effectiveness Factor Greater than One

Brooks, A.L.

One of the important questions remaining in radiation biology is the influence of dose-rate from low-LET radiation on risk, especially cancer risk in the low-dose region. There is a controversy between molecular, cellular, tissue and animal data, where there are marked decreases in damage as a function of dose rate, and some human epidemiology studies which suggest that dose rate, especially in the low dose range has little influence on risk. Such human data have led to the suggestion that the dose-rate effectiveness factor (DREF) should be one. This presentation addresses this controversy with a review of biological damage induced as a function of dose rate at all levels of biological organization from the molecular to experimental animals. This review will focus on the critical pathways following radiation exposure that result in an adverse outcome, in this case cancer. Dose-rate effectiveness factors can be derived for each key event along the critical pathway. This approach is being developed by the EPA to evaluate the risk from chemicals where there are few or no human data available. Dose-rate response relationships for these key events, in the critical pathways, help predict the influence of dose rate on cancer risk. These data demonstrate that radiation doses delivered at a low dose rate are less effective at all levels of biological organization in producing biological change than when the same total dose is delivered at a high dose rate. Animal studies, especially with internally deposited radioactive materials, extend the cell and molecular observations to high total doses delivered over months and years at very low dose rates. Internal emitters often result in non-uniform dose distribution patterns and demonstrate that low dose rates delivered to individual tissue, with much of the body not exposed, are much less effective in producing biological damage than the same dose delivered to the whole body or over a short time. These data taken as a whole make it obvious that dose-rate is an important variable in understanding radiation risk and support need for a dose-rate effectiveness factor of at least two.

1-C Non-ionizing Radiation: An Overview of Biological Effects and Exposure Limits

Edwards, B.
Vanderbilt University

This course provides a fundamental overview of non-ionizing radiation (NIR) hazards and biological effects. Course attendees will learn the basic terminology and nomenclature, spectral region designations, regulatory framework, and consensus guidance associated with NIR. The course material will begin at the edge of the ionizing part of the electromagnetic (EM) spectrum and walk participants through a tour of the optical, radiofrequency (including microwave), and extremely low frequency (ELF) portions of the EM range, finally ending with static electric and magnetic fields. The existence of a series of exposure limits covering the entire NIR spectrum forms one of the course's basic themes. This continuous line of "safe" exposure levels helps establish the concept that NIR dose response curves are at least well enough understood at all parts of the spectrum to provide a reasonably safe exposure envelope within which we can operate. After completing this course, attendees will be conversant in the major

sources and associated hazards in each part of the NIR spectrum, along with the recognized exposure limits and control measures for those sources. Armed with this information, safety professionals can better recognize, evaluate, and communicate the hazards associated with the spectrum of significant NIR sources, and address workers' concerns in a credible, fact-based, knowledgeable, and professional manner.

While some knowledge of optical, radiofrequency, ELF, and static electromagnetic field characteristics may be helpful, both experienced and novice health physicists with NIR interests or responsibilities will benefit from this course.

1-D So Now You're the RSO: Elements of an Effective Radiation Safety Program

Morgan, T.L.
Columbia University

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

1-E Significance and Use of Revised ANSI N323AB for Portable Instrument Calibration

Walker, E.

The presentation will first discuss the original bases that resulted in two separate standards and the rationale for combining the two into a single standard. Each section of the new standard will then be discussed individually with the additions, changes, and modifications that have been incorporated into the combined revision of the two original standards. These changes and additions will be described in the context of evolving technologies in radiation detection and assessment and the impacts of field conditions that are not (or can't) be duplicated in the calibration facility. The presentation will include factors to correct the calibration factor for evaluating field measurements. The uses and potential misuses of calibration factors will be illustrated for each section of the new standard with field experience and observations. The significance of the standard protocols used by the calibration facility as they relate to field measurement protocols will be presented with examples. For example, protocols that would allow a user to extend the calibration interval beyond one year with assurance that the instrument will continue to function properly will be discussed.

1-F Introduction to Nuclear and Cyber Security for the Health Physicist

Harris, J.
Idaho State University

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, including issues in cyber-security. 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. This PEP will introduce the basic concepts of nuclear security, including:

- Definitions
- Basic security elements
- National and international nuclear security guidance and regulations
- Nuclear security culture
- Safety, security and safeguards, and
- Emerging concepts of cybersecurity.

At the end of the PEP 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.

Participants are highly encouraged to consider enrollment in Sessions 2-F and 3-F as well. The three sessions combined will provide the participant a well-rounded view of nuclear and radiological security in today's environment.

1-G The Basics of Risk Management & Insurance and Fire & Life Safety for Radiation Safety Professionals

Emery, R., Gutierrez, J.
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 Professional Enrichment Program (PEP) series (see also Session 2-G and 3-G) 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 risk management & insurance portion of the session will address the issues of retrained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle), and how these aspects impact EH&S and RM operations. Included in the fire & life safety segment will be a discussion on the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will also be discussed

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. Participants are highly encouraged to enroll in Session 2-G and 3-G.

The particular topics included in the PEP series have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy". Ample time will be allotted for questions answers and discussion, and each segment will be supplemented with key reference information.

Sunday - 10:30 am - 12:30 pm

2-A Accelerator Physics for ES&H Professionals Part 2

Cossairt, J.D.
Fermi National Accelerator Laboratory

This is Part 2 of a two-part PEP Course and will be most beneficial only if preceded by participation in Part 1 (Session 1-A). The acceleration and transport of particle beams constitutes a fascinating subject that merits understanding by accelerator health physicists and other environment, safety, and health professionals. Particle accelerators continue to grow in importance; of course in medicine but also in many other areas that now reach deeply into many facets of everyday life. Members of the public now commonly encounter human-made radiation from accelerators. The goal of this course is to improve the ES&H professional's knowledge of how particle accelerators work. This should lead to more effective working relationships with those responsible for accelerator operation in common efforts to address important ES&H issues. Building upon the foundation of Part 1, particle acceleration using radio-frequency electromagnetic waves will be covered beginning with linear accelerators and radio-frequency quadrupoles (RFQs). Circular machines such as cyclotrons, betatrons, synchrotrons, and high energy colliding beam accelerators will complete the presentation. While equations will be used, the presentation will be semi-qualitative in nature. While specific health physics topics will not be covered in detail, points of connection with hazards found at accelerators including radiological ones will be discussed.

2-B Practical Demonstrations for the Classroom

Cole, R.

Keeping students interest in science throughout their academic careers is difficult and getting them interested in health physics is even more difficult. Health Physics professionals are often told that we speak a different language and we do. When we are asked to volunteer for those career days and science workshops, there is always a hesitancy: what do we say, what do the kids know, what can we present and still abide by the regulatory requirements, what can we demonstrate to spark interest in the field. Then add in the conflicts surrounding Common Core, Next Generation and No Child Left Behind and most of us run back to the comfort of our office or lab. This PEP is designed to give you some practical demonstrations utilizing those things that many of us have sitting in our offices and introduce you to some of the lesson plans have had success as well as techniques to draw the students in to the presentation and pique interest.

2-C Laser Safety for Health Physicists

Edwards, B.
Vanderbilt University

This course provides an overview of laser physics, biological effects, hazards, and control measures, as well as a concise distillation of the requirements in the ANSI Z136.1-2014 Standard for the Safe Use of Lasers. Non-beam hazards, emerging issues, and accident histories with lessons learned will also be covered. Course attendees will learn practical laser safety principles to assist in developing and conducting laser safety training, performing safety evaluations, and effectively managing an institutional laser safety program. While some knowledge

of laser hazards will be helpful, both experienced and novice health physicists with laser safety responsibilities will benefit from this course. Attendees may find it helpful to bring their own copy of ANSI Z136.1-2014.

2-D CAP88 PC Version 4 Advanced Topics

Wood, R., Stuenkel, D., Rosnick, R.J.
Trinity Engineering Associates, US EPA

The CAP88 (which stands for Clean Air Act Assessment Package - 1988) computer model is a set of computer programs, databases and associated utility programs for estimation of dose and risk from radionuclide emissions to air. It is used as a regulatory compliance tool by EPA under the National Emissions Standard for Hazardous Air Pollutants (NESHAP). The Agency has recently released Version 4.0 of CAP88. The most significant of the changes from a user perspective are the incorporation of age-dependent radionuclide dose and risk factors for ingestion and inhalation, the increase in the number of included radionuclides, and a change in the file management system used by the program.

This course is tailored for more advanced and experienced users of the code, and includes topics such as overviews of the new file structure in Version 4, differences between the current and previous versions, 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 the CAP88. It will include software demonstrations of how to use the code properly, with participants encouraged but not required to bring a laptop with CAP88 installed.

2-E Environmental Health Physics: Primer, Regulations, Data Management and Exploration of "Sticky" Issues, Part I

Miller, M.L., Whicker, J.
Sandia National Laboratories and Los Alamos National Laboratories

This PEP will be a primer on the speciality area of Environmental Health Physics and Environmental Radiation Protection in the context of background radiation exposure. It will go into the governing guidance documents, such as an overview of DOE 458.1 "Radiation Protection of the Public and the Environment" and tools, including data management ideas used to demonstrate compliance with that order. It will also address protection of biota, something that most health physicists rarely need to consider and the important of issue of property release from radiological areas (or areas undergoing remediation, something that affects many of us from time to time). Several "sticky" issues that will be discussed are low dose levels and issues of ALARA for environmental radiological protection, climate change and impacts on radiation protection for public, including the status of the metal recycling moratorium.

This PEP will be continued in Session 3-E and participants should enroll in both.

2-F Physical Protection for Nuclear and Radiological Security

Waller, E.
UOIT

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 se-

curity culture. 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). As such, this PEP serves as an introduction to the basic elements of threat assessment, design basis threat and physical protection for nuclear security. At the end of the PEP, the participant should understand the concepts of threat assessment and the design basis threat, as well as introductory concepts of physical protection and how the health physicist can collaborate in these important nuclear security requirements.

Participants are highly encouraged to consider enrollment in Sessions 2-F and 3-F as well. The three sessions combined will provide the participant a well-rounded view of nuclear and radiological security in today's environment.

2-G Security 101 and the Basics of Biological & Chemical Safety for Radiation Safety Professionals

Emery, R., Gutierrez, J.

The University of Texas Health Science Center at Houston

The first part of this session will focus on security as it is applied in the institutional settings. Various strategies employed to improve security controls will be presented. The second part of the session will address the classification of infectious agents and the various assigned biosafety levels. Aspects of chemical exposures, exposure limits, monitoring and control strategies will also be discussed.

See abstract for Session 1-G for the rationale of the course development.

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. Participants are highly encouraged to also enroll in Session 1-G and 3-G.

The particular topics included in the PEP series have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy". Ample time will be allotted for questions answers and discussion, and each segment will be supplemented with key reference information.

Sunday - 2:00 – 4:00 PM

3-A Radiological Emergency Response using Hotspot Health Physics Codes and RadResponder

Buddemeier, B., Crawford, S., Palmer, B.

Lawrence Livermore National Laboratory; Federal Emergency Management Agency; Chainbridge Technologies

The Hotspot Health Physics codes were created to provide emergency response personnel and emergency planners with a fast, field-portable set of software tools for evaluating incidents involving radioactive material. Hotspot codes are a first-order approximation of the radiation effects associated with the atmospheric release of radioactive materials using a hybrid of the well-established Gaussian plume model, widely used for initial emergency assessment or safety-analysis planning. The software can help planners understand and visualize the impact of their planning decisions through interactive tools. Local maps can

be imported into the hotspot program and interaction with the map (either through cursor movement or external GPS input) can demonstrate how the community's own instrumentation will respond to the situation as responder move in effected areas. Evaluating radiological emergency response concepts of operations through simple, interactive tools can help local response organizations visualize complex technical issues in terms of what they would actually see and measure.

Responding to nuclear and radiological emergencies requires the rapid management of data to effectively characterize the public health and environmental hazards. To manage the vast amounts of data necessary to make informed decisions could require the employment of hundreds of devices and personnel across a large geographic area to create a web of data collection. RadResponder facilitates the response by providing an interoperable system of tools to improve data quality, share and manage radiological data, and establish a common operating picture during multi-jurisdictional rad/nuc events. The RadResponder Network is comprised of 750 organizations connected by technology supporting an important mission to protect the health of the public and the quality of the environment. RadResponder allows these Federal, State, Local and Tribal entities to benefit from interconnected partnerships while applying a networked approach to the management of radiological data.

This PEP session will introduce the participant to both these tools through demonstration. Before class, participants should download and install Hotspot (https://narac.llnl.gov/HotSpot/HotSpot.html), the RadResponder App on their smartphone or tablet, and register for a RadResponder account on https://www.radresponder.net/Account/Logon

3-B Compelling Reasons for a Paradigm Shift in Radiation Safety and Revised Health Physics Goals

Doss, M.

Fox Chase Cancer Center

The current radiation safety paradigm is based on the linear no-threshold (LNT) hypothesis. The absence of threshold dose has led to fear of the smallest amount of radiation and has caused tremendous harm in multiple ways. Is the LNT hypothesis validated by the evidence? On examining the evidence for and against the LNT hypothesis, it becomes clear that considerable amount of evidence supports the concept of radiation hormesis, i.e., reduction of cancers from low-dose radiation (LDR) or a threshold dose-response, i.e. no increase in cancers from LDR. On the other hand, major flaws have led to the negation of the evidence commonly quoted in support of the LNT hypothesis. The scientific conclusion from analyzing all the evidence is that LDR reduces cancers. Thus, the radiation safety paradigm must be changed. The present health physics goals, focused as they are on radiation safety, do not address the current main health concerns of the public, i.e. the lack of progress in dealing with major diseases like cancer and Alzheimer's disease (AD). Also, the aspirations of the world population for improved living standards is increasing the use of fossil fuels resulting in increased degradation of the environment, harming public health. A change in radiation safety paradigm that recognizes the presence of a threshold dose for radiation-induced cancers would reduce the fear of LDR and enable increased use of safer nuclear power. It would also enable study of LDR for prevention of cancer and other aging-related diseases like AD, for which animal mod-

els have shown promise. A revision of health physics goals is suggested changing the focus to improving health with the safe use of radiation.

3-C Performing ANSI Z136-based Laser Hazard Calculations

Edwards, B.
Vanderbilt University

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

3-D Safety at the Convergence of Nanotechnology and Radiation-Related Activities

Hoover, M.D.
NIOSH

Nanotechnology and nanoengineered structural materials, metals, coatings, coolants, ceramics, sorbents, and sensors are increasingly being evaluated and applied in radiation-related activities. Anticipating, recognizing, evaluating, controlling, and confirming worker safety, health, well-being, and productivity and protection of the environment during these activities are essential. This course will present an update on relevant national and international resources and experience in nanotoxicology, including a graded approach to sampling, characterization, and control of nanoparticles in the workplace. Case studies of good practice as well as experience "when things have gone wrong" will be presented.

3-E Environmental Health Physics: Primer, Regulations, Data Management and Exploration of "Sticky" Issues, Part II

Miller, M.L., Whicker, J.
Sandia National Laboratories and Los Alamos National Laboratories

This PEP will be a primer on the speciality area of Environmental Health Physics and Environmental Radiation Protection in the context of background radiation exposure. It will go into the governing guidance documents, such as an overview of DOE 458.1 "Radiation Protection of the Public and the Environment" and tools, including data management ideas used to demonstrate compliance with that order. It will also address protection of biota, something that most health physicists rarely need to consider and the important of issue of property release from radiological areas (or areas undergoing remediation, something that affects many of us from time to time). Several "sticky" issues that will be discussed are low dose levels and issues of ALARA for environmental radiological protection, climate change and impacts on radiation protection for public, including the status of the metal recycling moratorium.

This PEP is a continuation of Session 2-E and participants should enroll in both.

3-F Terrorist Threat and Consequence Management in Radiological Security

Marianno, C.
Texas A&M

Health physicists can be essential contributors to risk reduction at nuclear and radiological facilities, and for materials in transport. Essential to establishing an appropriate nuclear security regime is understanding the threats to security from non-state actors, the possible consequences from a lapse in security, and the elements of response and consequence management during and after a nuclear or radiological security event. This PEP discusses the concepts of nuclear terrorism (who, what, where, when and why), elements of facility border and source security and consequence management at the local, state and national level. The PEP ends with a group-based tabletop exercise (TTX). At the end of the PEP, the participant should have a broad understanding of radiological terrorism, response and consequence management, and should be able to conceptualize the roles of the health physicist in these important areas of nuclear and radiological security.

Participants are highly encouraged to consider enrollment in Sessions 2-F and 3-F as well. The three sessions combined will provide the participant a well-rounded view of nuclear and radiological security in today's environment.

3-G Measuring and Displaying Radiation Protection Program Metrics That Matter to Management

Emery, R., Gutierrez, J.
The University of Texas Health Science Center at Houston

Radiation protection programs typically accumulate data and documentation so that regulatory officials can assess compliance with established regulations. The implicit logic associated with this activity is that compliance equates to safety. But in this era of constricted resources, mere regulatory compliance is no longer sufficient to justify all necessary programmatic resources. Radiation protection programs are now expected to readily demonstrate how they add tangible value to the core missions of an organization. The demonstration of this value is expected to be in the form of some sort of performance metrics, but this is an area in which many radiation safety professionals have not been trained. The issue is further compounded by the need to display the metrics in manners that are succinct and compelling, yet another area where formal training is often lacking. This session will first describe a variety of possible radiation protection program performance measures and metrics, and then will focus on the display of the information in ways that clearly convey the intended message. Actual before and after data display "make-overs" will be presented, and ample time will be provided for questions, answers, and discussion.

See abstract for Session 1-G for the rationale of the course development.

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. Participants are highly encouraged to also enroll in Session 1-G and 2-G.

The particular topics included in the PEP series have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy". Ample time will be allotted for questions answers and discussion, and each segment will be supplemented with key reference information.

Monday - 12:15-2:15 pm

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

Carbaugh, E.H.
Dade Moeller and Associates

This PEP 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 measurements 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 measurement 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 judgement in putting the pieces together to form a conclusion, and 6) clearly communicate the conclusions to the worker, the employers, and the regulatory agency.

M-2 Medical Laser Safety Program – What Health Physicists Need to Know

Elder, D.
University of Colorado Hospital

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

M-3 Gamma Spectroscopy for the Health Physicist

Pan, Y.
ORTEC/Advanced Measurement Technology, LLC

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

M-4 Truth, Trust, and Plain Language

Lazo, E.N., Classic, K.L.
OECD Nuclear Energy Agency; Mayo Clinic

Presenting complex ideas in plain language can be difficult. Often, we become distracted by the details of technicalities and lose the message we are trying to convey. And as in any dialogue, we sometimes forget that even a well-constructed, plain language statement is not meant to be the end of the story—rather it is the beginning of a conversation. This PEP will explore various aspects of these issues.

There are three goals of good communication for a health physicist: building a relationship; building trust; and presenting scientific truths. These three goals have at their overlapping central point, plain language. Presenting scientific truths using plain language helps build the relationship by establishing trust. We will explore these aspects through the discussion of examples:

- Plain language in papers
- Plain language in PowerPoint presentations
- Plain language in conversations with groups
- Plain language in face-to-face discussions

These discussions all drive towards building of a relationship of trust. This PEP will also discuss elements of trust. The Organisation for Economic Cooperation and Development (OECD) recently identified six areas where governments can focus to rebuild trust. These ideas shed light on two themes: Complex topics can be shared in plain language easily understood by stakeholders; and many, if not all, of these areas can apply to the relationship between health physicists and non-health physicists.

The six complex areas presented in easily understood plain language are:

- Reliability—Governments have an obligation to minimize uncertainty in the economic, social, and political environment.
- Responsiveness—Trust in government can depend on citizens' experiences when receiving public services, a crucial factor.
- Openness—Open government policies that concentrate on citizen engagement and access to information can increase public trust.
- Better regulation—Proper regulation is important for justice, fairness, and the rule of law as well for delivering public services.
- Integrity and fairness—Integrity is a crucial determinant of trust and is essential if governments want to be recognized as clean, fair, and open.

- Inclusive policy making—Understanding how policies are designed can strengthen institutions and promote trust between government and citizens.

Not only do these serve as examples of clear communication, but they can apply to radiation safety/radiation protection communications.

This PEP will explore ways to use plain language to build trust and help make health physicists better communicators.

M-5 Radiation Safety's Role in Mitigating the "Insider Threat" Risk
Emery, R.
The University of Texas Health Science Center at Houston

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 is losses annually. Although the typical insider targets assets or data, in some cases their actions can also have significant impacts on workplace and environmental health and safety. Because much of an organization's radiation safety program activities are carried out with the workers in their workplace, this represents a unique opportunity to assist in the possible detection of insider threats. This presentation will discuss the threats represented by insiders and will detail their recognized traits so that radiation safety professionals can enhance their situational awareness and report suspicions to the appropriate authorities.

Tuesday - 12:15-2:15 pm

T-1 Monte Carlo Basics for Radiation Transport
Hertel, N.
Oak Ridge National Laboratory and Georgia Institute of Technology

There are a variety of high-powered Monte Carlo radiation transport codes that are in use. One can use those codes without having a basic understanding of the methods used in them to track radiations. People can generate the input to those codes without understanding the underlying methodologies of the transport process and the scoring of fluence, dose and other quantities. This course covers some basic fundamentals without reference to any particular code. The use of probability density functions, cumulative distribution functions and their sampling will be covered to determine the various parameters necessary to transport radiation. The various estimators to compute fluence will be covered as will basic variance reduction. Examples of these techniques will be presented.

T-2 Role of the Health Physicists in Radiation Accident Management
Toohey, R.
MH Chew and Associates

As an emergency response asset of the Department of Energy, the Radiation Emergency Assistance Center/ Training Site (REAC/TS) is charged with providing support, advice, and training on the medical management of radiation accident occurs, close coordination is required between medical and health physics personnel; however, unless extraction of a victim from a very high radiation field is required, medical care always takes priority over radiological considerations. Health physicists must be familiar not only with the application of radiation

protection principles to accident management, but also with medical terminology and procedures, and both on-scene and in-hospital emergency medical care. Challenges include interaction with medical personnel, dose assessment, public information, and post-accident interactions with managers and investigators, and possibly attorneys. Medical personnel must be taught basic radiological terminology, the difference between irradiation and contamination, radiological triage, contamination control procedures during evacuation and treatment, methods for patient decontamination, possible therapies (e.g., administration of DTPA), waste management and preservation of evidence. Dose estimation includes radionuclide identification; intake estimation; deep, shallow and lens dose measurement or estimation; accident reconstruction; and use of opportunistic dosimeters and/or biological dosimetry. Public information concerns include patient privacy, release of facts vs. assumptions, determinations of the effectiveness of plans and procedures, and transmitting technical information to a lay audience. Post-accident interactions include refinements or revisions of dose estimates, stochastic risk estimates, review of operations, review of emergency plans and procedures, and development of lessons learned, as well as potential involvement in litigation. Some actual experiences in radiation accident management will be used to illustrate these points.

T-3 Use of an Excel©-Based Probabilistic Tool for Dose Reconstructions, and Schedule Analysis

Darois, E.

Radiation Safety and Control Services Inc. (RSCS)

ModelRiskTM is an Excel add-in application developed and distributed by Vose Software. This tool has a comprehensive range of tools to run Monte Carlo simulations within Excel. Results can be presented in a separate window that allows for customization and sharing a wide range of graphical and statistical analyses. This tool also allows for the specification of over one hundred different types of distributions that can fit to actual data or by using empirical distributions. ModelRisk also allows for parameter correlations for any number of variables.

This PEP will demonstrate the use of ModelRisk for a variety of Health Physics applications and scenarios. These scenarios will show how this tool can evaluate internal and external exposure scenarios where uncertainty exists in each of the input parameters including exposure intervals, radionuclide distributions, source geometry and others. Each exposure case will include a Monte Carlo simulation resulting in a variety of output formats such as probability distribution functions, spider plots and others. Using these tools the user will be able to identify a percentile dose that could be used as justification for a deterministic value for regulatory compliance purposes. Similar probabilistic approaches have been implemented for regulatory compliance purposes which will be discussed.

A demonstration of using this tool to evaluate schedule uncertainty will also be presented using a simple project schedule to compare and contrast deterministic and probabilistic schedule durations.

T-4 Use of Instrument Simulators For Radiation Safety Training

Straccia, F.P., Torres, J., Morton, A.
RSCS, Naval Surface Warfare Center, Carderock Division

The use of instrument simulators provides an effective method for conducting realistic hands-on training in the use of portable instruments and electronic dosimeters. Practical training scenarios can be used without any restrictions regarding the use of actual radioactive material.

This PEP will review accepted training objectives in use at commercial nuclear power plants, military, and homeland security applications. A review of commercially available training simulators will be provided. Training methods to support objectives will be presented for the three applications. Lessons-learned from previous training applications with simulators and methods to assess training effectiveness will be discussed. The session will include hands-on demonstrations of ion chamber survey meters, frisker probes for contamination control and measurement, and electronic dosimetry use including telemetry applications.

T-5 Developing a Laser Safety Program – Where Does a Health Physicist Begin and How Do You Establish a Program From Scratch

Harvey, R.P.
Roswell Park Cancer Institute, University of Buffalo

The health physicist has a diverse role and may engage in many 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 Alpha Spectroscopy for the Health Physicist

Pan, Y.
ORTEC/Advanced Measurement Technology, LLC

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

W-2 Overview of NRC Regulations in 10 CFR Part 37, Physical Protection of Category 1 and Category 2 Quantities of Radioactive Materials

Ragland, R.
NRC

The presentation will provide an overview of the NRC Regulations in 10 CFR Part 37, “Physical Protection of Category 1 and Category 2 Quantities of Radioactive Materials.” Special emphasis will be placed on new requirements for the development of an access authorization program and procedures, a security plan, implementing security procedures, coordination with local law enforcement, development and implementation of a security training program, development of an audit program, response to the identification of suspicious activity, and lessons-learned/experience gained

from NRC Implementation. The target audience includes individuals who are responsible for developing, maintaining, or overseeing a 10 CFR Part 37 security program.

W-3 Preparing for the Joint Commission – What the RSO Should Know

Elder, D.
University of Colorado Hospital

Health Physicists are trained on regulations related to radioactive materials and other sources of radiation. The NRC provides guidance documents to assist in complying with regulations. In medical facilities, the Joint Commission accreditation survey can be as important as inspections by regulators. The goal of this presentation is to provide some strategies that have been effective in preparing for Joint Commission surveys and discuss the new diagnostic imaging standards that are effective July 1, 2015.

W-4 How to Measure and Interpret Beta Exposure Rates

Voss, J.T.
LANL

This PEP presents the theory behind the operation of beta radiation detection instruments. Once a measurement is made the beta exposure rate indication must be interpreted. This involves the determining the beta energy spectrum and the effect of distance and air attenuation on the detected beta energies. Further interpretation for the higher beta energies to determine if there is a "deep dose" factor will be discussed. The types of instruments covered include – ion chambers, plastic scintillators, ZnS scintillators, solid state scintillators (CsI, CLYC, Si, etc.), liquid scintillators, GM detectors, and gas proportional detectors. The detector types have individual beta response factors. Many types of radiation detectors used to measure beta emissions also respond to other types of radiations, this response will be discussed in detail. In addition to the theory of the operation of radiation detectors, their mechanical construction will be presented. Examples of various radiation detectors will be on display.

W-5 Verification and Validation of Radiological Data

Rucker, T.L.
Leidos Corp.

This course will review the requirements and recommendations of ANSI/ANS-41.5-2012, "Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation" published in 2012. This standard provides requirements and recommended practices for determining the validity of radioanalytical data for site characterization, waste acceptance, waste certification, waste treatment design, process control, litigation, and other applications as deemed necessary. The standard provides a minimum set of checks and tests that will ensure a consistent approach for compliance verification and validation of data produced by any radioanalytical laboratory while utilizing project specific measurement quality objectives. This standard was developed with the assumption that a proper data quality objective (DQO) process has been used by the project to define the quality of data needed for the decision process and to develop corresponding MQOs of accuracy, precision, sensitivity, selectivity, and representativeness to be met. The standard also provides minimum qualifications for those performing data verification and validation.

Thursday - 12:15-2:15 pm

Th-1 Designs for Solar Powered Radiation Monitoring Systems

Voss, J.T.
LANL

This presentation presents the theory behind the designs for solar powered radiation monitoring systems. The scope includes how to determine the power requirements for the monitoring system, the available solar energy for the chosen location for the monitoring system, and the needed capacity of the energy storage system. In determining power requirements consideration must be given to the types of radiation to be monitored and the power requirements of different types of monitors. Once the power requirements are determined the available solar energy available at the chose location must be determined. This determination includes the daily available solar power at the location. The needed capacity of the energy storage system takes into consideration the continuous power requirements, start-up power requirements, and operation of radiation monitoring system during periods of no or low solar energy. Consideration should also be given to supplying extra power for routine maintenance of the radiation monitoring system. Several examples of current in use solar powered radiation monitoring systems will be presented.

Th-2 Understanding Ionizing Radiation Carcinogenesis

Raabe, O.G.
University of California - Davis

A comparative evaluation is described for two types of radiation carcinogenesis.

Ionizing radiation induced cancer from internally deposited radionuclides is analyzed with data from human studies for Ra-226, and from laboratory animal studies for alpha radiation associated with Ra-228, Ra-226, Ra-224, Pu-238, Pu-239, Th-228, Cf-252, Cf-249, and Am-241 and for beta radiation associated with Sr-90, Y-90, Y-91, and Ce-144. Intake routes included ingestion, inhalation, and injection.

Cancer induction risk associated with protracted ionizing radiation exposure is observed to be a rather precise function of lifetime average dose rate to the affected tissues rather than a function of cumulative dose. The lifetime effects are best described by a three-dimensional average dose-rate/time/response relationship that competes with other causes of death during an individual's lifetime. At low average dose rates the time required to induce cancer may exceed the natural life span yielding a lifetime virtual threshold for radiation induced cancer.

In sharp contrast the Atomic Bomb Survivor Studies display a somewhat linear relationship of proportionality between increased lifetime solid cancer rates and acute ionizing radiation exposures. Resolving this paradox involves the conclusion that two completely different carcinogenesis mechanisms are associated with these two types of exposures to ionizing radiation.

These are induction of cancer in the case of protracted exposures and promotion of carcinogenic processes in the case of acute exposures.

Th-3 Randomness and Understanding of Stochastic Risk Assessments

Johnson, R.
Radiation Safety Counseling Institute

While health physicists usually understand that radiation is of main concern for stochastic effects (future random chance of cancer), most of the world

does not understand stochastic effects, randomness, or probabilities. Most people just want to know if they will be "Safe or Not Safe." They do not want to hear about radiation risk estimates as probabilities. When confronted with a risk probability, they are inclined to substitute an easier question, such as, "How do I feel about getting cancer?" They can easily answer this question without any technical knowledge or understanding of randomness or probabilities. Research has shown that when chance or randomness is involved, people's thought processes for safety decisions are often seriously flawed. Not many people understand the principles that govern chance and how these processes play out in decisions for radiation safety. The normal processes for safety decisions can lead to mistaken judgments and technically inappropriate reactions for radiation safety (consider reactions following Fukushima Dai-ichi). Health physicists have long been puzzled and often frustrated about how people can make instant decisions regarding radiation with little or no actual data. Studies in psychology show that our ability to make instant decisions for safety is a part of how our brains are wired for our protection. We are programmed to fear first and think second. We have survived by this innate ability to foresee dangers and take protective actions accordingly. Instant prediction of danger is not something we do consciously by evaluation of facts or circumstances. This is done by our subconscious mind which functions as a superfast computer processing all incoming signals by associations with images and experiences in our memories. Thus we are programmed for instant response without any conscious thought. While this instinct for safety is important for our survival, it is also prone to substantial errors for some dangers, such as radiation. There are at least 15 or more ways that our subconscious is prone to errors relative to the actual circumstances. My studies are showing that even professionals with technical understanding are also prone to errors. This can be demonstrated by the question, "Are your sources of radiation safe?" An instant answer to this question can only come from the subconscious because a conscious evaluation of data takes time to process. Also, when asked, "How do you know?" the answers invariably come down to beliefs in what we have heard or read about radiation safety. Out subconscious mind is prone to running ahead of the facts to draw coherent conclusions from a few scraps of evidence. Subconscious impressions then become the basis for instant decisions and long term beliefs about radiation.

Th-4 Heath Physics Challenges in Proton Therapy

Mohaupt, T.
St. Jude Children's Research Hospital

Many regional medical centers are considering proton therapy for their radiation oncology facilities. This advanced mode of cancer treatment uses an accelerator to drive protons to energies up to 330 MeV delivering the prescribed dose to the target with minimal dose to surrounding tissues, especially organs of high radiosensitivity. Proton interactions in the accelerator and treatment rooms and beam corridor produce intense neutron and gamma radiation levels that require considerable shielding, radiation monitoring systems, and fail safe protective measures. The health physicist should play a key role in reviewing shielding and construction plans, selecting ra-

diation detection and interlock safety systems, verifying the shielding adequacy, developing facility procedures and training syllabuses, and presenting the facility safety measures to staff and regulators. This course introduces the complex environment and multi-year effort health physicist's face when participating in the design, planning, construction, installation, and operation of a proton therapy facility. An overview of the advantages of proton therapy over conventional radiation oncologic treatments, types of proton accelerators and delivery systems, and neutron and gamma radiation environments will also be presented.

Th-5 Evaluating Radiation Skin Dose From Laboratory Contamination Events

Sturchio, G.M., Underwood, K.
Mayo Clinic

It's 8:15 pm and you just got a call from Security that there has been a "radiation spill" in a research lab and the undergraduate researcher has been contaminated. Now what?

This PEP session is targeted for operational health physicists that may have to evaluate radiation skin doses in the laboratory setting (e.g., biomedical, radiopharmacy). It will review the basics of skin biology as it relates to radiation dosimetry and potential biological effects. The impact of point source and disk source irradiation geometries will be examined, as well as having contamination on the skin or on protective clothing. The results of the evaluation – and typical PGM detection efficiencies – will be used to develop a table of conversion factors for commonly used radionuclides (e.g., 14C, 32P, 125I, 99mTc, 18F). The conversion factors will then be used to assess a variety of "real world" events to determine the potential biological and regulatory impact of the initial contamination level. An overview of potential skin decontamination techniques will be presented. The PEP session will close with a suggestion on documenting skin contamination events.

Continuing Education Lectures (CEL)
Monday 13 July through Thursday 16 July

Monday 7:00-8:00 AM

CEL-1 Why Telling the Truth about Radiation is NOT Working?

Johnson, R.
Radiation Safety Counseling Institute

Health physicists have long been frustrated by how easily the media and the public accept radiation mythology as the truth rather than what we are telling them as specialists in radiation safety. Why don't people believe us when we are telling the truth? Part of the problem for HPs is that people simply do not understand our technology. They do not understand our language or our risk estimates as probabilities. Studies of how our minds work show that people, in general, are not inclined to commit a lot of energy to think deeply about subjects, such as radiation. Basically, most of us are lazy thinkers because our minds are programmed to conserve energy wherever possible. The media helps people limit their thinking energy by providing simplified answers to radiation issues. When simple to understand information about radiation is provided by the media, people do not have to expend energy to develop their own technical understanding. Unfortunately, much of what is conveyed by the media is mythology (commonly believed, but not technically true). By repetition over decades radiation mythology has led to an aura of truth. For example, the words "Deadly Radiation" repeated continuously over 60 years or more have resulted in most people accepting those words as the basis for understanding radiation. These words fit the impressions of radiation gathered over a lifetime and most people conclude that this is all they need to know. Our efforts to provide better technical information seem to result in confusion and even skepticism about whether we are telling the truth. Since most people have a clear understanding that radiation is "Deadly," many would wonder why we are trying to make their lives more difficult by telling them they need a different understanding of radiation. Telling people that their understanding is wrong may also not be a good way to open a dialogue for developing better understanding. Attempts to provide technical truths about radiation also miss the fact that people's fears of radiation are based on their associated memories and imagination. In the world of fears, imagination will triumph every time over facts. This presentation will review how people determine the truth, ways the process is prone to errors, and possible answers for more effective radiation risk communication.

CEL-2 Radiation Effects on Humans and Organisms, and Reasons for the Fear

Cuttler, J.
Fox Chase Cancer Center

Evidence is presented on the known beneficial effects of ionizing radiation and the observed threshold dose and dose-rates for the onset of harmful effects. The rate of DNA damage caused by endogenous processes in organisms is discussed and compared with the DNA damage rate caused by natural and human-made radiation. The effect of biological stressors, such as radiation, on the activities of the adaptive protection systems in all organisms is outlined, to explain the scientific mechanisms that lead to the observed dose-response characteristic. The origin of radiophobia

is discussed and remedies are proposed to dispel these fears.

Tuesday 7:00-8:00 AM

CEL-3 Problem Formulation: Ensuring that Numbers Can Be Turned into Knowledge

Hoover, M., Cash, L.
NIOSH and LANL

If our decision-making in the pursuit of radiation safety is to be science-based and data driven, we must begin with a clear definition of "the problem". This presentation will explore some practical examples of the challenges and sometimes fatal flaws associated with problem formulation, including assessment of appropriate levels of detail for data collection and knowledge management. As an example involving occupational air monitoring, we might reasonably state that our mission objective is to measure airborne particles of agent A, having an activity median aerodynamic diameter of B, with a geometric standard deviation of C, in a concentration range of D to E, with a response time of less than F, in the presence of interferents G and H, using a handheld device that can be operated by a worker who is trained to a proficiency of I, and [continuing with inclusion of additional information needed to anticipate, recognize, evaluate, control, and confirm that all relevant details are defined for relevant requirements such as cost, calibration and recalibration, data logging, data analysis, etc.] Our ability to formulate and address problems in a manner that will turn numbers into knowledge for robust decision-making depends of our ability to develop and sustain leaders, cultures, and systems for safety, health, well-being, and productivity. By incorporating a clear definition of the problem into our mission objectives, we can not only meet our own objectives, but we can also help future users assess whether a particular solution is relevant to their problem and sufficiently reliable to meet their mission objectives.

CEL-4 WIPP

Stafford, H.J.
URS

The Waste Isolation Pilot Plant (WIPP), located in southeastern New Mexico, is the world's only underground repository for defense-generated transuranic (TRU) waste. The facility commenced waste disposal operations in March 1999, and operated until February 2014, when two events resulted in a suspension of TRU waste disposal activities. The first event occurred on February 5 when an underground salt haul truck caught fire in a drift (passageway) in the northern part of the underground. The second event occurred in the underground on February 14, 2014, and involved at least one drum of TRU waste that released some of the radioactive contents into the exhaust drift and parts of the active waste disposal panel. The underground ventilation system (UVS) was operating at approximately 400,000 standard cubic feet per minute (SCFM) at the time of release. After an underground monitor detected airborne radioactivity the UVS shifted to HEPA filtration at approximately 60,000 SCFM. Radioactive contamination was dispersed throughout some areas of the underground, and resulted in small but detectable amounts of TRU activity on the surface.

A WIPP recovery plan to safely restart WIPP operations was approved and issued by the Secretary of Energy on September 30, 2014. The plan provides an aggressive schedule that documents return to interim waste disposal operations by March 31, 2016. Much of the

plan deals with decontaminating parts of the underground mine. That aspect of the recovery plan will be the focus of this presentation.

Wednesday 7:00-8:00 AM

CEL-5 Back to the Future: Determining the Presence/Absence of Contamination from a Special-Compound Tritium Experiment Performed in an Open Air Environment

Miltenberger, R.P., Miller, M.L., Simmons, T.N., Green, K.A.
Sandia National Laboratory

An experiment was proposed for the Sandia National Laboratories 10 kilometer sled track which accelerated a solid object to supersonic speeds prior to collision with a test article. The test article was to contain up to 37GBq (1 Curie) of special-compound tritium. This test was to be conducted in the spring of 2015, prior to the normal New Mexico windy season. Initial tests of other material conducted in the late summer and early fall of 2014 with non-radioactive components suggested a possible near-field debris pattern that could extend several thousand feet in the forward direction and several hundred feet to each side of the forward direction center line. The area needed to be radiologically cleared as rapidly as possible after the last test (< 1 month) and returned to a condition that required no radiological controls. This presentation discusses the environmental evaluations conducted to approve the test and the methods evaluated for use, those selected and preliminary results of placebo test monitoring efforts to determine potential contamination of the site and assess the need for remediation.

CEL-6 Hiring a "New" Health Physicist: How to Identify the Ideal Candidate Before the Search

Johnson, T.
Colorado State University

As noted by the NCRP (WARP) as well as ORAU a large number of health physicists are anticipated to retire in the next few years. Many companies and agencies recognize that hiring replacement health physicists with the proper training and experience may be difficult. Identifying a person with the correct skill set is crucial, as hiring and firing personnel is typically a traumatic process for the organization and hiring manager. Although internships are ideal ways to identify students that are a good fit to an organization, only a few internship and mentoring programs exist. The objective of this CEL is to review the needs of the organization in the context of education and training of health physicists. The role of ABET accreditation in ensuring a baseline education in health physics will be discussed, as well as non-accredited and training programs. Identifying the proper needs of the organization and aligning them with the proper educational background is key in identifying the correct person for the job and organization, and is the approach that will be used during this CEL.

Thursday 7:00-8:00 AM

CEL-7 The 1976 Hanford Americium Accident –Then and Now

Carbaugh, E.
Dade Moeller and Associates

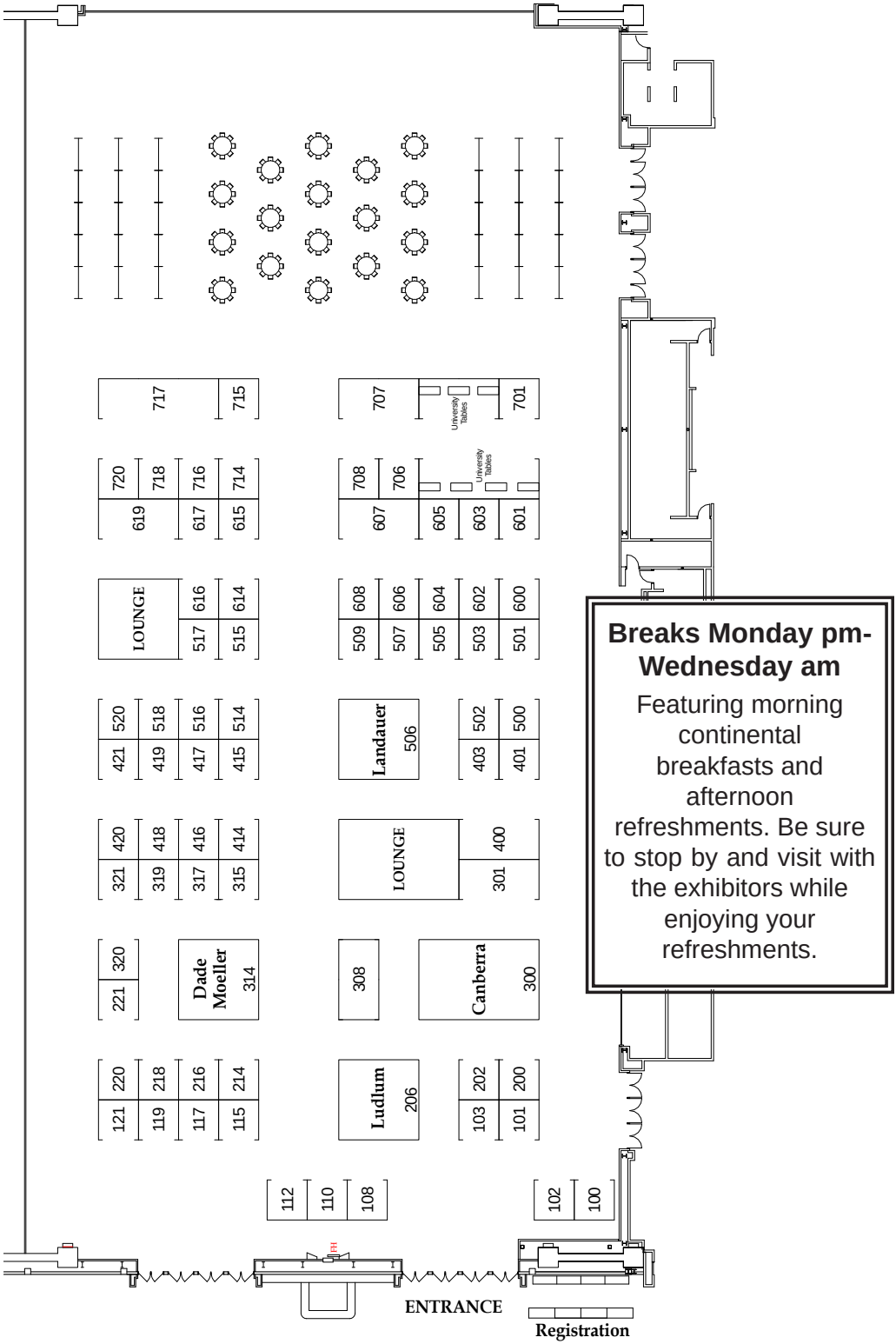
The 1976 chemical explosion of an 241Am ion exchange column at a Hanford Site waste management facility resulted in the extreme contamination of a work with 241Am, nitric acid and debris. The worker underwent medical treatment

for acid burns, as well as wound debridement, extensive personal skin decontamination and long-term DTPA chelation therapy for decorporation of 241Am. 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 may differ today.

CEL-8 Remediation at the Boeing Michigan Aeronautical Research Center (BOMARC)
Rademacher, S.
USAF

The Air Force had a nuclear weapon accident at the Boeing Michigan Aeronautical Research Center (BOMARC) in June 1960. This accident was one of 32 nuclear weapons accidents that the DoD had between 1950 and 1980. Aerospace Defense Command (ADC) initially planned construction of 40 BOMARC missile interceptor sites, with as many as 4,800 missile, though only 11 sites were equipped with a total of 500 missiles among them, some of which only contained non-nuclear warheads. The 1960 accident involved the burning of one missile and its attached nuclear warhead, which involved the dispersal of weapons grade plutonium (WGP), highly-enriched uranium, and depleted uranium to a 9.5 acre area. Los Alamos National Laboratory estimated that 300 g of WGP remained in the environment. Beyond fixative measures implemented shortly after the accident, earnest remedial actions were not initiated until 1989. A 1992 Record of Decision by the Air Force under CERCLA set a soil remedial action criterion at 8 pCi/g 239Pu. Physical remedial actions were accomplished between 2002 and 2009. The project possessed many technical challenges that were due to the heterogeneously-distributed WGP contaminant, the difficulties for field detection of WGP, and problems in sample analysis. In addition, there was local sensitivity to the transport of WGP on public roads that necessitated institution of a more complex and costly transportation plan. The lecture with provide a history of the site, with detailed discussion of some of the challenges in restoration of the site.

2015 Exhibit Hall Floor Plan



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P.50 Integrated Waste Screening System for TENORM Waste

Akers, D., Roybal, L.
Prototype Systems Development, Idaho National Laboratory

The Integrated Waste Screening System (IWSS) is a TENORM measurement technology designed for the rapid screening and segregation of bulk or sampled TENORM wastes. The licensed IWSS technology is based on decades of waste screening technology developed at the Idaho National Laboratory. IWSS is composed of 4 systems including a Mobile Waste Screener (MWS) for use at well, brine or waste processing sites, a Volume Waste Screener for bulk screening and segregation of loose debris, a Subsurface Waste Screener for monitoring subsurface TENORM, and a Surface Waste Screener for surface surveys. The IWSS system has been tested on a range of bulk and sampled TENORM wastes. IWSS utilizes unique density and Radium-226 equlibrium correction methodology to allow both bulk and sampled TENORM wastes to be rapidly measured (i.e.,several minutes) and to provide both printed and digital reports that are corrected for both density and equilibrium effects. IWSS is highly automated and suitable for use by operators with limited training.

P.51 A Philatelic Look at Health Physics History - Pitchblende

Johnston, T.J.
NIST

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

P.52 How to Fool Yourself with a Continuous Air Monitor

Strom, D.J.
Pacific Northwest National Laboratory

Most designs of continuous air monitors (CAMs) and so-called “grab samplers” suck air through a collection medium (filter, absorber, adsorber, or concentrator) to collect and concentrate airborne radioactive material. Unlike grab samplers, CAMs continuously measure radiation emitted from the collection medium or air volume and can alarm when such measurements indicate abnormal values. This presentation addresses a problem in the interpretation of data from fixed-filter CAMs. Except in exceptionally-low radon/thoron (Rn/Tn) areas with synthetic atmospheres (e.g., spacecraft, submarines) or air aged over oceans so that Rn/Tn decay products are negligible, alpha- and beta-radiation measurements are complicated by the presence of short-lived airborne Rn/Tn decay products. To achieve high sensitivity to alpha-emitters

of concern, such as Pu, Am, or U, modern CAMs using Si detectors for alpha spectroscopy employ sophisticated algorithms for Rn/Tn compensation, and use a rolling-average algorithm that updates frequently. For example, the rolling-average algorithm may sum counts over the previous 10 or 120 minutes, but update that sum every minute. Graphs of such sums can be very misleading to professionals, managers, and regulators, due to the inherent delay in realistic presentation of significant concentration changes. This presentation illustrates the problem using a specific example at a nuclear D&D site.

P.53 Assessment of Radiological Impact of Oil Refineries in Korea

Kim, Y.G., Choi, C.K., Kim, S.Y., Kim, K.P.*
Kyung Hee University

Oil refinery generates various solid and liquid wastes such as scale, sludge and waste water. These wastes and crude oil contain naturally occurring radioactive material (NORM). Therefore, the workers in oil refinery may be exposed to the radioactive materials. The objective of this study is to assess radiological impact of oil refineries. There are four oil refineries in Korea. We visited all the refineries and assessed radiation exposures. Crude oil, products, and wastes in oil refinery are generally handled in tanks or pipelines. Also most workers spent time indoor such as control room. Therefore, internal radiation exposure resulting from inhalation of airborne particulates containing NORM is likely to be negligible in the oil refineries. We measured external dose rates at refining process areas. In addition, we collected crude oil, sludge, and wastewater samples and measured radioactivity concentrations of uranium series and thorium series using gamma spectroscopy. External dose rates appeared similarly to background level at all the refining process areas. Radioactivity concentrations in crude oil and wastewater were under level of minimum detectable activity (MDA). Radioactivity concentrations of uranium series and thorium series in sludge samples ranged 4-17 Bq/kg and MDA-20 Bq/kg, respectively. Small amount of radioactive materials in crude oil was concentrated during refinery process and went to the sludge rather than oil products. In conclusion, radioactivity concentrations in crude oils and wastes in oil refineries in Korea were low and external radiation dose to workers was negligible. Therefore, radiological impact of oil refineries is insignificant.
*This study was supported by the Korea Institute of Nuclear Safety.

P.54 Major Input Parameters Influencing Radiation Dose to the Public in Contaminated Areas after Nuclear Power Plant Accident

Go, A.R., Kim, M.J., Kim, S.Y., Kim, K.P.
Kyung Hee University

After a nuclear power plant accident, large areas are contaminated. As an emergency preparedness, it is necessary to establish dose assessment procedures for decision of evacuated areas after accident and resident return areas after decontamination. Radiation dose at the contaminated areas depends on many input parameters. However, there is a limit to quickly collect all the input parameters. The objective of this study was to determine major input parameters influencing dose to the public. Sensitivity analysis was performed by using the partial rank correlation coefficient (PRCC) method. We considered environmental parameters of soil, personal consumption parameters, transfer coefficients, and climate parameters. The probabilistic distri-

bution model for each parameter was assumed based on hypothetical exposure scenario. Absolute value of PRCC in plant transfer coefficient was 0.90, which was the highest value and followed by cover zone soil density (0.73), contaminate zone depth (0.65), meat transfer coefficient (0.33), cover zone soil depth (0.32), leaf vegetable consumption rate (0.17), and milk transfer coefficient (0.16). The above parameters had relatively high sensitivity compared to other parameters. Absolute values of PRCC in environment parameters (unsaturated zone, saturated zone) and climate parameters had low sensitivity, ranging 0.01-0.07. The input parameters associated with external exposure path (soil density and depth) and ingestion exposure path (plant, milk, and meat transfer coefficients) had high sensitivity. Therefore, soil depth and density of cover zone, depth of contaminated zone, and plant, meat, and milk transfer coefficients were finally selected as main input parameters. The selected parameters can be used to determine priority of data collection for radiation dose assessment at radioactive contaminated areas. *This study is supported by Grant 20141510101630 from the Energy Technology Development Project of Korea.

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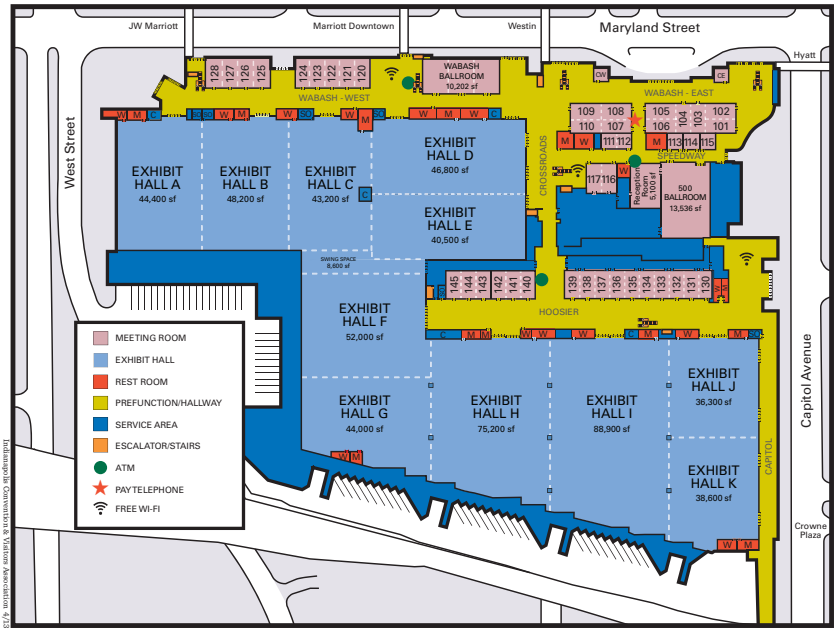

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AAHP 3 Nuclear Science and Technology at the WIPP
8:00 AM-5:00 PM Capitol 3 (W)

Sunday, 12 July

All Sunday PEP Courses take place at the Westin Indianapolis (Monday-Thursday PEPs take place in the Indiana Convention Center)

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

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

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

Welcome Reception
6:00-7:30 PM
Westin Grand Ballroom 4-5

Sunday PEP Locations
PEP A = Capitol 1 (W)
PEP B = Capitol 3 (W)
PEP C = Capitol 2 (W)
PEP D = Grand 3 (W)
PEP E = Caucus (W)
PEP F = Cabinet (W)
PEP G = Senate 1 (W)

Monday-Thursday PEP Locations
1 - Room 103
2 - Room 117
3 - Room 101
4 - Room 102
5 - Room 116

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, 13 July

CEL1 Why Telling the Truth about Radiation is NOT Working?
7:00-8:00 AM 103

CEL2 Radiation Effects on Humans and Organisms, and Reasons for the Fear
7:00-8:00 AM 117

ABHP Exam - Part 1
8:00-11:00 AM Capitol 2 (W)

MAM-A Plenary
8:15 AM-Noon Room 500

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

PEP Program - 12:15-2:15 PM
M-1 Where Did This Come From? Lessons Learned from Bioassay Investigations
M-2 Medical Laser Safety Program – What Health Physicists Need to Know
M-3 Gamma Spectroscopy for the Health Physicist
M-4 Truth, Trust, and Plain Language
M-5 Radiation Safety's Role in Mitigating the "Insider Threat" Risk

ABHP Exam - Part II
12:30-6:30 PM Capitol 2 (W)

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

Chapter Council Meeting
1:30-2:30 PM 105/106

Section Council Meeting
2:30-3:30 PM 105/106

MPM-A Medical Dosimetry
3:00-5:00 PM Room 101

MPM-B Academic Institutions
3:00-4:45 PM Room 104

MPM-C Emergency Response/ Homeland Security
3:00-5:15 PM Room 107

MPM-D Decontamination and Decommissioning
3:15-4:30 PM Room 108

MPM-E Power Reactor Health Physics
3:00-5:45 PM Room 109

MPM-F Regulatory/Licensing
3:00-4:15 PM Room 110

MPM-G Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation
3:00-6:00 PM Room 116

Student/Mentor Reception
5:30-6:30 PM Grand Ballroom 3 (W)

Tuesday, 14 July

CEL 3 Problem Formulation: Ensuring that Numbers Can Be Turned ...
7:00-8:00 AM 103

CEL4 WIPP
7:00-8:00 AM 117

TAM-A Medical Health Physics Special Session
8:30-11:15 AM Room 105/106

TAM-B AAHP Special Session: Professional Ethics and Health Physics
8:30-11:45 AM Room 104

TAM-C Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation
8:30 AM-Noon Room 107

TAM-D Special Session: Advancements in Accelerator Radiation Safety
8:30 AM-Noon Room 108

TAM-E Special Session: TENORM
8:00-11:45 AM Room 109

TAM-F Internal Dosimetry
8:30-11:30 AM Room 110

TAM-G Special Session: Non-Ionizing Radiation
8:15 AM-12:15 PM Room 116

Publishing in HPS Journals Workshop
10:00-11:30 AM 103

AAHP Awards Luncheon
Noon-2:00 PM Wabash Ballroom

PEP Program - 12:15-2:15 PM
T-1 Monte Carlo Basics for Radiation Transport
T-2 Transportation Regulations and Radiation Safety
T-3 Use of an Excel©-Based Probabilistic Tool for Dose Reconstructions, and Schedule Analysis
T-4 Use of Instrument Simulators For Radiation Safety Training
T-5 Developing a Laser Safety Program – Where Does a Health Physicist ...

TPM-A Medical Health Physics
2:30-5:15 PM Room 105/106

TPM-B AAHP Special Session: Professional Ethics and Health Physics
2:30-5:00 PM Room 104

TPM-C Special Session: Health Risks from Low Doses and Low Dose-Rates of Ionizing Radiation
2:30-5:30 PM Room 107

TPM-D Radiological Operatives Support
2:30 - 5:30 PM Room 108

TPM-E Special Session: TENORM
2:30-5:30 PM Room 109

TPM-F NESHAPS
2:30-4:45 PM Room 110

TPM-G Special Session: WIPP
2:30-5:15 PM Room 116

AAHP Business Meeting
5:00 PM Room 104

HPS Awards Banquet
7:00-9:00 PM Grand Ballroom 4-5 (W)

Wednesday, 15 July

CEL5 Back to the Future. Determining the Presence/Absence of Contamination from a Special-Compound Tritium Experiment Performed in an Open Air Environment
7:00-8:00 AM 103

CEL6 Hiring a "New" Health Physicist: How to Identify the Ideal Candidate Before the Search
7:00-8:00 AM 117

WAM-A Celebrating our Past - Looking to the Future
8:15 AM-12:15 PM Rooms 105/106

WAM-B Special Session: Simple Language Communication
8:30-11:15 AM Room 104

WAM-C Special Session: Nanotechnology
8:30 AM-Noon Room 107

WAM-D Special Session: Homeland Security
8:30 AM-Noon Room 108

WAM-E External Dosimetry
8:30 AM-12:15 PM Room 109

WAM-F Special Session: End of Life Management of Disused Sources - A Global Problem, Part I
8:30 AM-Noon Room 110

PEP Program - 12:15-2:15 PM

W-1 Alpha Spectroscopy for the Health Physicist

W-2 Overview of NRC Regulations in 10 CFR Part 37, Physical Protection of Category 1 and Category 2 Quantities of Radioactive Materials

W-3 Preparing for the Joint Commission – What the RSO Should Know

W-4 How to Measure and Interpret Beta Exposure Rates

W-5 Verification and Validation of Radiological Data

WPM-A Celebrating our Past - Looking to the Future
2:30-5:00 PM Rooms 105/106

WPM-B Special Session: Communications Workshop
2:30-5:30 PM Room 104

WPM-D Special Session: Homeland Security
2:30-4:30 PM Room 108

WPM-F Special Session: End of Life Management of Disused Radioactive Sources - A Global Problem, Part II
2:30-5:00 PM Room 110

HPS Business Meeting
5:30-6:30 PM 107

Thursday, 16 July

CEL7 The 1976 Hanford Americium Accident –Then and Now
7:00-8:00 AM 103

CEL8 Remediation at the Boeing Michigan Aeronautical Research Center (BOMARC)
7:00-8:00 AM 117

THAM-A AIRRS/RSO
8:15-10:45 AM Rooms 105/106

THAM-B Instrumentation
8:30-11:45 AM Room 104

THAM-C Environmental Monitoring
8:15-11:45 AM Room 107

THAM-D Special Session: Next Generation Challenges
8:30 AM-Noon Room 108

PEP Program - 12:15-2:15 PM

Th-1 Designs for Solar Powered Radiation Monitoring Systems

Th-2 Understanding Ionizing Radiation Carcinogenesis

Th-3 Randomness and Understanding of Stochastic Risk Assessments

Th-4 Heath Physics Challenges in Proton Therapy

Th-5 Evaluating Radiation Skin Dose From Laboratory Contamination Events

THPM-A1 Radiobiology/Biological Response
2:15-4:00 PM Rooms 105/106

THPM-A2 Radiation Effects
4:00-5:00 PM Room 105/106

THPM-B Risk Assessment
2:15-5:00 PM Room 104

THPM-C Special Session: Radiation in Flight
2:30-5:15 PM Room 107

THPM-D Special Session: Next Generation Challenges
2:30-5:00 PM Room 108

Monday-Thursday
PEP Locations
1 - Room 103
2 - Room 117
3 - Room 101
4 - Room 102
5 - Room 116

Registration Hours

Registration at the Indiana Convention Center Hall D Foyer

Saturday	2:00 - 5:00 PM
Sunday	7:30 AM - 5:00 PM
Monday	7:30 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

Monday, 13 July 2015

4:30 PM Room 108 (CC)
Decommissioning Section Business Meeting

4:30 PM Room 110 (CC)
Military Section Business Meeting

5:45 PM Room 109 (CC)
Power Reactor Section Business Meeting

Tuesday, 14 July 2015

10:30 AM Room 108 (CC)
Accelerator Section Business Meeting

11:15 AM Room 105/106 (CC)
Medical Section Business Meeting

5:00 PM Room 104 (CC)
AAHP Business Meeting

5:15 PM Room 116 (CC)
NIR Section Business Meeting

Wednesday, 15 July 2015

4:30 PM Room 108 (CC)
Homeland Security Section Business Meeting

5:30 PM Room 107 (CC)
HPS Business Meeting

Thursday, 16 July 2015

10:45 AM Room 105/106 (CC)
AIRRS/RSO Section Business Meeting

NOTE FOR CHPs

The American Academy of Health Physics has approved the following meeting-related activities for Continuing Education Credits for CHPs:

* Meeting attendance is granted 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.

2015 HPS Exhibitors

2016 Annual Meeting-Spokane... Booth: 320
AAHP/ABHP..... Booth: 321
AIHA..... Booth: 602
Ameriphysics, LLC..... Booth: 202
Arrow-Tech Inc. ..... Booth: 420
Bayer Healthcare ..... Booth: 416
Berkeley Nucleonics Corp..... Booth: 507
Best Dosimetry Services ..... Booth: 315
(formerly Best Medical)
Bionomics.....Booth: 115
Bladewerx LLC..... Booth: 200
Bloomsburg Univ..... Univ Table
Capintec, Inc..... Booth: 718
Canberra..... Booth: 300
CDC and Prevention, Radiation . Booth: 218
Studies Branch
Centronic LLC ..... Booth: 614
Chase Environ Group, Inc. ..... Booth: 500
Chesapeake Nuclear Serv, Inc.... Booth: 414
CHP Consultants ..... Booth: 418
Clemson University..... Univ Table
Colorado State Univ..... Univ Table
CRCPD..... Booth: 319
Curie Services..... Booth: 604
Dade Moeller ..... Booth: 314
Eckert & Ziegler..... Booth: 301
Enovativetech..... Booth: 121
ENVINET GmbH..... Booth: 607
F&J Specialty Products ..... Booth: 715
FLIR ..... Booth: 102
Fuji Electric Corp of America .....Booth: 110
G/O Corporation..... Booth: 714
Gamma Products..... Booth: 615
H3D, Inc..... Booth: 501
Health Physics Instruments.....Booth: 112
Hi-Q Environmental Products Co...Booth: 103
Hitachi Aloka Medical Ltd ..... Booth: 419
Hopewell Designs ..... Booth: 517
HPS Journal ..... Booth: 617
HPS Web Ops/Newsletter..... Booth: 619
Idaho State Univ..... Univ Table
Illinois Inst of Tech ..... Booth: 503
J.L. Shepherd..... Booth: 401
K & S Associates..... Booth: 108
Kromek Ltd ..... Booth: 516
LabLogic Systems, Inc ..... Booth: 608
Landauer ..... Booth: 506
LND, Inc. ..... Booth: 220
Ludlum Measurements..... Booth: 206
Mazur Instruments ..... Booth: 214
Mirion Technologies ..... Booth: 308
NATS, Incorporated ..... Booth: 514
NRRPT ..... Booth: 706
Nuclear News..... Booth: 100
ORAU ..... Booth: 616
Oregon State Univ ..... Univ Table
ORTEC ..... Booth: 400
Perkin Elmer.....Booth: 117
Perma-Fix Environ Services..... Booth: 603
PHDS (Knoxville TN) ..... Booth: 502
Philotechnics, Ltd. ..... Booth: 505
Qal-Tek ..... Booth: 221
Quest Environ & Safety Products...Booth: 716
Radiation Detection Company .... Booth: 606
Radiation Safety & ..... Booth: 701
Control Services Inc (RSCS)
Radiation Safety Assoc, Inc..... Booth: 417
Radiation Solutions, Inc ..... Booth: 403
Radiological Security Partnership...Booth: 717
Resumes/Job Listings ..... Booth: 720
RSO, Inc. ..... Booth: 317
Saphymo GmbH ..... Booth: 708
SE International..... Booth: 415
Spectral Labs Incorporated ..... Booth: 520
Spectrum Techniques ..... Booth: 101
Target Systemelektronik GmbH . Booth: 216
Technical Assoc/Overhoff Tech ... Booth: 600
Teletrix..... Booth: 421
TestAmerica Laboratories Inc..... Booth: 518
ThermoFisher..... Booth: 707
Tracerco..... Booth: 515
Ultra Electronics/Lab Impex ..... Booth: 509
Unfors RaySafe, Inc/Fluke Biomed Booth: 601
University of Michigan..... Univ Table
Washington State Univ ..... Univ Table
X-Z Lab .....Booth: 119

HUMAN HEALTH

ENVIRONMENTAL HEALTH

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