Health Physics Society
58th Annual Meeting

Final Program

AAHP

USA CAN
NRRPT

ABHP

Monona Terrace Convention Center
Madison, Wisconsin • 7-11 July 2013

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

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Registration Hours and Location

Registration at the Monona Terrace Convention Center

Saturday, 6 July	2:00 - 5:00 pm
Sunday, 7 July	7:30 am - 5:00 pm
Monday, 8 July	7:30 am - 4:00 pm
Tuesday, 9 July	8:00 am - 4:00 pm
Wednesday, 10 July	8:00 am - 4:00 pm
Thursday, 11 July	8:00 - 11:00 am

Future Midyear Topical Meeting

47th	9-12 February 2014	Baton Rouge, LA

Future Annual Meetings

59th	13-17 July 2014	Baltimore, MD
60th	12-16 July 2015	Indianapolis, IN
61st	17-21 July 2016	Spokane, WA

Look online for future meeting details
hps.org/meetings

Officers

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Barbara L. Hamrick, Secretary
Elizabeth Brackett, Secretary-elect
Nancy M. Daugherty, Treasurer
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Brett J. Burk, Executive Director

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Tim Kirkham, Program Committee Chair
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Richard J. Vetter, Congressional & Agency Liaison
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Local Arrangements Committee

Co-Chairs: Mike and Dawn Lewandowski
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Leola DeKock
Audrey Evelan
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Dee Kaiser
Chris Kessler
Kimberly Knight-Wiegert
Dan Miron
Cheryl Olson
Doug Poland
Chuck Roessler
Cheryl Rogers
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Pete Wildenborg
Ning Zhang

2013 Task Force - Madison

Tim Kirkham, Program Committee Chair
Tony Mason, Task Force Chair
Paul Burress
Duane DeMore
Scott Hay
Robin Hill
Bryan Lemieux
Chris Shaw
Latha Vasudevan

Hotels

Headquarters Hotel:
Madison Concourse Hotel and Governor's Club
1 West Dayton Street, Madison, WI 53703; 800-356-8293

Hilton Madison Monona Terrace
9 East Wilson Street, Madison, WI 53703; 608-255-5100

Hyatt Place Madison/Downtown
333 West Washington Avenue, Madison, WI

Sheraton Madison Hotel
706 John Nolen Drive, Madison, WI 53703; 608-251-2300

Speaker Ready Room

Monona Terrace Convention Center, Meeting Rooms K-O

Sunday . . . . . 2:00-5:00 pm
Monday-Wednesday . . . . . 8:00-11:00 am; 2:00-5:00 pm
Thursday . . . . . 8:00-10:00 am

You must check in at the Ready Room
(even if you have already submitted your presentation).
See **Page 8** for more information.

Posters must be put up for display between 8:00 - 10:00 am on Monday, and removed on Wednesday by 11:00 am

Meeting Sponsor

Thank you to the following meeting sponsor

Dan Caulk Memorial Fund

Important Events

Welcome Reception

Please plan on stopping up on the rooftop of the Monona Terrace Convention Center, Sunday, 7 July, from 6:00-7:30 pm. There will be an opportunity to meet friends to start your evening in Madison. Cash bar and light snacks will be available.

Exhibits

Free Lunch! Free Lunch! – Noon, Monday, 8 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!

Sessions and Course Locations

AAHP Courses on Saturday at the Madison Concourse Hotel, PEPs, CELs and all sessions Sunday through Thursday will take place at the Monona Terrace Convention Center.

AAHP Awards Luncheon

Monona Terrace Convention Center, Community Terrace
Tuesday 9 July, Noon-2:00 pm

HPS Annual Business Meeting

The Business Meeting will be convened at 5:30 pm on Wednesday, 10 July, in Ballroom A of the Convention Center.

HPS Awards Banquet

Spend an enjoyable evening with members of the Health Physics Society. This event will be held on Tuesday, 9 July, in the Madison Ballroom of the Monona Terrace Convention Center, 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 7:30-10:30 pm. Included in Member, Non-Member, Emeritus, Past President and Student Registrations.

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 43 for Course information

Things to Remember!

All Speakers are required to check in at the Speaker Ready Room, Meeting Rms K-O at least one session prior to their assigned session.

All posters up Monday–Wednesday in Exhibit Hall

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

AAHP Awards Luncheon

The AAHP is sponsoring an Awards Luncheon on Tuesday, 9 July, Noon-2:00 pm, in the Monona Terrace Convention Center, in the Community Terrace. You may purchase tickets at the Registration Desk.

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 Monona Terrace Ballroom, on Tuesday, 9 July from 7:30 - 10:30 pm.
The following awards are to be presented:

Elda E. Anderson Award
Peter J. Caracappa

Founders Awards
Janet A. Johnson

Geoffrey Eichholz Outstanding Science Teacher Award
Brenda Angus

Honor Roll Award
Thomas E. Widner
George J. Vargo
Robert D. Forrest

Fellows

Shih-Yew Chen
Michael J. Drzyzga
Wayne M. Glines
Jay A. MacLellan
Orhan Suleiman
Billy R. Thomas
X. George Xu
Ronald E. Zelac

Tuesday Evening Awards Menu

House Salad and Bakery Fresh Hard Rolls, Wisconsin Cranberry Chicken with Grilled Tenderloin of Beef Medley Plate, Parsley New Potatoes, Roasted Vegetable Blend. Desserts Include Key Lime Tart or Turtle Cheesecake, Coffee, Teas.

Make Plans to Attend the
2014 Midyear Meeting
Sunday 9 February-Wednesday 12 February
Midyear Topic: "Nuclear Power Radiation Safety: Learning from the Past to Protect the Future"

Baton Rouge, Louisiana
www.hps.org

Registration Fees:

	Pre	On-Site
HPS Member	$430	$530
HPS Member with '13 DUES	$595	$695
Non-Member	$550*	$650*
Student	$ 70	$ 70
ANS Member	$430	$530
RRS Member	$430	$530
Emeritus Member	$215	$265
One-Day Registration	$275	$300
HPS PEP Lecturer	$130	$230
HPS CEL Lecturer	$280	$380
Companion	$ 95	$ 95
Emeritus Companion	$ 48	$ 48

Badge Color Code:

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

Session Location

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

Local Arrangements Committee Room

Monona Terrace Convention Center
Sunday-Thursday Meeting Room N

PEP Ready Room

Monona Terrace Convention Center
Sunday-Wednesday Meeting Room R

Activities and Tours

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

Saturday 6 July

B-Cycle Tour, Memorial Union 5:00 pm

Sunday 7 July

Walk Tour, Capitol Square 2:00 pm

Monday 8 July

Walk Tour, Monona Terrace 9:30 am

Tuesday 9 July

5k Run/2k Walk 7:00 am
Tech Tour Kewaunee 7:00 am
Walk Tour, Capitol/Museum 9:30 am

Wednesday 10 July

Tech Tour UW Cyclotron 8:30 am
Walk Tour, Farm Market and Art Museum 9:30 am
Night Out BBQ by the Bay 6:30 pm
Critical Organ Pub Crawl 6:30 pm

OPEN MIC NIGHT

The 2013 (8th Annual) HPS Open Mic Night will be held on Monday, 8 July in the Madison Concourse Hotel – featuring the popular local band "The Rhythm Kings." The doors open at 8:00 PM.

A special thanks to the Sponsors of this event:

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

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

Speaker Information

Technical Sessions

Speaker Instructions

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

The Ready Room (Meeting Room K-O) will be open Sunday from 2-5 pm, Monday through Wednesday from 8-11 am and 2-5 pm, and Thursday 8-10 am. You must check in at the Ready Room (even if you have already submitted your presentation) no later than the following times:

Presentation Time	Check-In Deadline
Monday am	5 pm Sunday
Monday pm	11 am Monday
Tuesday am	5 pm Monday
Tuesday pm	11 am Tuesday
Wednesday am	5 pm Tuesday
Wednesday pm	11 am Wednesday
Thursday am	5 pm Wednesday

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

PEP/CEL Courses

The PEP Ready Room (Meeting Room R) in the Convention Center will have hours posted on the door Saturday-Wednesday.

Resumes/Job Postings

Find a job or post a job at Booth 904 in the Exhibit Hall.

Companion Hospitality Program

Again this year for Registered Companions

There will not be a Hospitality Room this year

Companion Registration includes Monday-Thursday breakfast buffet at the Madison Concourse Dayton Street Grille, and the Welcome Reception at the Monona Terrace's Rooftop Garden, Sunday 7 July, from 6:00-7:30 pm.

Daily walking tours are offered Monday-Wednesday mornings, led by LAC Co-Chair Dawn Lewandowski, and range from $25-$35. Lunch at a local restaurant is included in the price of the tour. Choose from the tours listed on page 7, or explore the area on your own.

Hospitality Breakfast for Registered Companions
Monday-Thursday
Dayton Street Grille
Madison Concourse Hotel

Student Events

Student Orientation - *Saturday* – 4:00 PM
Welcome Reception - *Sunday* – 6:00-7:30 PM
Exhibitor Opening Luncheon - *Monday* – Noon-1:30 PM
Student/Mentor Reception - *Monday* - 5:30-6:30 PM
Awards Dinner - *Tuesday* – 7:30-10:30 PM

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06/14/2013

Health Physics Society Committee Meetings

Madison Concourse (MC), Convention Center (CC)

Saturday, 6 July 2013

FINANCE COMMITTEE
8:00 am-Noon Conf. Room 1 (MC)

NRRPT
8:30 am-4:30 pm University ABC (MC)

ABHP BOARD MEETING
8:30 am-5:00 pm Conf. Room 2 (MC)

WEB OPERATIONS
9:00 am-Noon University D (MC)

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

HP JOURNAL EDITORIAL BOARD
3:00-5:00 pm Ovations (MC)

Sunday, 7 July 2013

ABHP PART II PANEL
8:00 am-4:00 pm Capitol B (MC)

HPS BOARD OF DIRECTORS
8:00 am-5:00 pm Capitol A (MC)

NRRPT
8:30 am-4:30 pm University ABC (MC)

AAHP EXECUTIVE COMMITTEE
8:30 am-5:00 pm Conf. Room 2 (MC)

PROGRAM COMMITTEE
Noon-1:00 pm Meeting Rooms K-O (CC)

ANSI 42/54
1:00-5:00 pm Conf. Room 1 (MC)

ACCELERATOR SECTION AWARDS MEETING
4:30-6:30 pm Hall of Ideas J (CC)

Monday, 8 July 2013

ELDA ANDERSON BREAKFAST
7:00-8:15 am Meeting Room L (CC)

HP JOURNAL EDITORS MEETING
8:00-9:30 am Dane Room (CC)

ABHP PART II PANEL
8:00 am-4:00 pm Capitol B (MC)

NRRPT
8:30 am-4:30 pm University ABC (MC)

PROFESSIONAL DEVELOPMENT SCHOOL
10:30 am-Noon Dane (CC)

SCIENCE SUPPORT COMMITTEE WORKSHOP PREPARATION
Noon-1:00 pm Meeting Room P (CC)

ACCELERATOR SECTION BOARD MEETING
12:30-1:30 pm Wisconsin Room (CC)

PUBLIC INFORMATION COMMITTEE MEETING
12:30-1:30 pm Dane Room (CC)

INTERSOCIETY RELATIONS COMMITTEE
1:15-2:15 pm Meeting Room P (CC)

MEDICAL HP SECTION BOARD MEETING
1:15-2:45 pm Meeting Room L (CC)

CHAPTER COUNCIL MEETING
1:30-2:30 pm Lecture Hall (CC)

HISTORY COMMITTEE
2:00-4:00 pm Dane Room (CC)

NOMINATING COMMITTEE
2:00-4:00 pm Wisconsin Room (CC)

SECTION COUNCIL MEETING
2:30-3:30 pm Hall of Ideas F (CC)

GOAL 4 COMMITTEE CHAIRS
5:00-6:00 pm Dane Room (CC)

Tuesday, 9 July 2013

PURDUE ALUMNI BREAKFAST
7:00-9:00 am Senate AB (CC)

COMMITTEE CHAIR BREAKFAST
7:30-8:30 am Capitol A (CC)

NRRPT
8:30 am-4:30 pm University ABC (MC)

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

ACADEMIC EDUCATION MEETING/ PROGRAM DIRECTORS MEETING
Noon-1:00 pm Hall of Fame (CC)

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

SCIENCE SUPPORT COMMITTEE
Noon-2:00 pm Meeting Room L (CC)

STUDENT SUPPORT COMMITTEE
1:30-2:30 pm Hall of Fame (CC)

HPS AD HOC MEMBERSHIP CATEGORIES
4:00-5:30 pm Wisconsin Room (CC)

HPS INSTRUMENTATION COMMITTEE
5:00-7:00 pm Assembly Room (MC)

CSU RECEPTION - ALL ARE WELCOME
6:00-7:30 pm Grand Terrace (CC)

VA RADIATION SAFETY OFFICERS
6:00-8:00 pm Conf. Room 1 (MC)

Wednesday, 10 July 2013

EXHIBITOR BREAKFAST
7:30-8:30 am Founder's Room, Hilton Hotel

ANSI N13.1 REVISION
9:00 am-Noon University A (MC)

LEADERSHIP MEETING
11:00 am-Noon Dane Room (CC)

AEC/STUDENT BRANCH MEETING
Noon-1:00 pm Meeting Room L (CC)

CONTINUING EDUCATION COMMITTEE
Noon-1:00 pm Meeting Room R (CC)

SOCIETY SUPPORT COMMITTEE
Noon-2:00 pm Meeting Room M (CC)

STANDARDS COMMITTEE
12:30-2:30 pm Hall of Fame (CC)

AEC/ACADEMIC EDUCATION MEETING
1:00-3:00 pm Meeting Room L (CC)

MEMBERSHIP COMMITTEE
1:00-3:00 pm Wisconsin (CC)

ANSI N13.61 WORKING GROUP
1:00-4:00 pm Conference Room 3 (MC)

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

SCIENTIFIC AND PUBLIC ISSUES COMMITTEE
2:30-4:00 pm Meeting Room M (CC)

Thursday, 11 July 2013

HPS FINANCE AND EXECUTIVE COMMITTEES
8:00-10:00 am Conference Room 3 (MC)

LOCAL ARRANGEMENTS COMMITTEE
9:00-11:00 am Meeting Room N (CC)

ANSI N13.1 REVISION
9:00 am-4:00 pm University A (MC)

HPS BOARD OF DIRECTORS MEETING
10:00 am-5:00 pm Assembly (MC)

PROGRAM COMMITTEE
Noon-2:00 pm Meeting Room L (CC)

BUSINESS MEETINGS

All business meetings are in Monona Terrace

TUESDAY

10:45 AM Madison Ballroom C
Accelerator Section Business Meeting

11:30 AM Madison Ballroom D
Environmental Radon Section Business Meeting

Noon Lecture Hall
Medical Health Physics Section Business Meeting

5:00 PM Madison Ballroom B
Homeland Security Business Meeting

5:15 PM Madison Ballroom A
AAHP Open Meeting

5:15 PM Madison Ballroom B
Military Section Business Meeting

WEDNESDAY

Noon Lecture Hall
Power Reactor Section Business Meeting

5:00 PM Madison Ballroom C
Decommissioning Section Business Meeting

4:45 PM Madison Ballroom D
RSO Section Business Meeting

5:30 PM Madison Ballroom A
HPS Business Meeting

Lectureship Trust Funds

Landauer Memorial Lectureship

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

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

Dade W. Moeller Lectureship

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

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

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

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

G. William Morgan Lectureship

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

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

MONDAY

7:00-8:00 AM Hall of Ideas F

CEL1 Fallout: The Mixed Blessing of Radiation and the Public Health
Sullivan-Fowler, M.
UW Madison's Ebling Library for the Health Sciences

7:00-8:00 AM Hall of Ideas G

CEL2 NRC Nuclear Safety Culture
Zaffuts, P.J.
Morgan, Lewis & Bockius LLP

8:10 AM-Noon Madison Ballroom

MAM-A: Plenary Session

Chair: Armin Ansari

8:10 AM
Opening Remarks
Armin Ansari; President, HPS

8:30 AM MAM-A.1
MELODI - the European Approach to Low Dose Risk Research
Weiss, W. ***(G. William Morgan Lecturer)***
Honorary Member of MELODI

9:15 AM MAM-A.2
Complexity and Radiological Health Protection
Mossman, K. ***(Robert S. Landauer Lecturer)***
Arizona State University

10:00 AM BREAK

10:30 AM MAM-A.3
Medical Countermeasures to Ionizing Radiation Exposure
Moulder, J. ***(Dade Moeller Lecturer)***
Medical College of Wisconsin

11:00 AM MAM-A.4
Nanotechnology and Radiation: Understanding and Advancing the Opportunities
Hoover, M.
CDC-NIOSH

11:30 AM MAM-A.5
New Frontiers in Radiation Risk Communications
Emery, R.
The University of Texas Health Science Center at Houston

Noon-1:30 PM Exhibit Hall

Complimentary Lunch in Exhibit Hall for all Registrants and Opening of Exhibits

1:00 - 3:00 PM Exhibit Hall

P: Poster Session

Emergency Planning/Response

P.3 A Strategy of Rapid Radiological Screening Survey in Large Scale Radiation Accident: Lesson from our Individual Survey after the Fukushima Daiichi Nuclear Power Plant Accidents
Ohba, T., Miyazaki, M., Sato, H., Hasegawa, A., Yusa, T., Shishido, F., Matsuda, N., Ohtsuru, A.
Fukushima Medical University, Japan, Fukushima Medical University Hospital, Japan, Nagasaki University, Japan

Environmental

P.4 Assessment of Radioactivity Levels in Sediments of a Lake Located in the Vicinity of a Nuclear Power Plant
Williams, T., Billa, J., Adzanu, S., Quaye, D., Nwaneri, S.
Alcorn State University

P.6 Qualitative Analysis of NORM Activity Levels in Sludge Samples Collected from a Paper Mill
Laing, R., Billa, J., Adzanu, S., Bartels-Eshun, C., Adjaye, J.
Alcorn State University

P.7 Aerosols Containing Naturally Occurring Radioactive Materials in Korea Phosphate Rock Processing Industry
Lim, H., Choi, W., Kim, S., Lim, W., Kim, K.
Kyung Hee University, Korea Institute of Nuclear Safety

P.8 A Comparative Study of Radio Isotopic Concentration in the Upstream and Downstream Mississippi River Sediments Collected near a Nuclear Plant
Osei, G., Billa, J., Adzanu, S., Yeboah, M.
Alcorn State University

P.9 Transfer Factor of Isotopes in Turnip Leaves and Roots
Franklin, C., Billa, J., Adzanu, S., Dimpah, J.
Alcorn State University

P.10 The Application of Air Cooling Distillation Device for Tritium Analysis of Plant Samples
Fang, H.
Institute of Nuclear Energy Reseaerch, Taiwan

P.11 Uncertainty Analysis of Selective Radiometric Quantities and Application of Prediction Intervals in Radiochemistry Procedures
Deligiannis, A., Dunker, R.E., Harris, J.T.
Idaho State University

P.12 Naturally Occurring Radioactive Materials (NORM) Levels in a Household Water Heating System
Carradine, M., Green, I., Billa, J., Adzanu, S.
Alcorn State University

P.13 Analysis of Contamination Levels in Water of Radioactive Waste-Storage Facilities at the Mayak Production Association
Andreev, S., Popova, I., Pryakhin, E., Kopelov, A., Ivanov, I.
Urals Research Center for Radiation Medicine, Russia, Mayak Production Association, Russia

P.14 Evaluation of Natural and Anthropogenic Isotopes in Mississippi River Fish
Agordzo, H., Billa, J., Adzanu, S., Dordor, M., Nwaneri, S.
Alcorn State University

Homeland Security

P.15 Improving Consistency in the Radiation Fields used During Testing of Radiation Detection Instruments for Homeland Security Applications
Pibida, L., Mille, M., Norman, B.
NIST

Instrumentation

P.16 Detection Efficiency of a Whole Body Counter by Phantom Size and Counting Geometry
Park, M., Yoo, J., Ha, W., Lee, S., Kim, K.
Kyung Hee University, Korea

P.17 Evaluation of Self Attenuation Coefficient in Environmental Samples
Tsorxe, I., Billa, J., Adzanu, S., Asowata, D., Adjaye, J.
Alcorn State University

P.18 Impact of Quenching Agent on the Counting Efficiency of a Liquid Scintillation Counter (LSC)
Heard, J., Didla, S., Billa, J., Adzanu, S., Adjaye, J.
Alcorn State University

Internal Dosimetry and Bioassay

P.19 Proposed Optimization of Biokinetic Parameters for National Council on Radiation Protection Report 156 Wound Model Using Bioassay Measurement Data from 90Sr-Contaminated Wounds in Nonhuman Primates
Allen, M., Brey, R., Guilmette, R.
Idaho State University, Lovelace Respiratory Research Institute

P.20 Biokinetics of Am-241 Intramuscularly Injected in Non-Human Primates
Hirayama, T., Brey, R.R., Guilmette, R.A.
Idaho State University, Lovelace Respiratory Research Institute

P.21 Effect of a Simulation of 241Am Deposition in Different Areas of the Leg Bones on the Detection Efficiency of a High Purity Germanium Detector
Khalaf, M., Brey, R.
Idaho State University

P.22 Testicular Dosimetry and Radiobiology in Radionuclide Therapy
Meerkhan, S., Larsson, E., Strand, S., Jonsson, B.
Lund University, Sweden

P.23 Measurement of Total Body Potassium by Gender and Age of Korean Subjects
Yoo, J., Park, M., Ha, W., Lee, S., Kim, K.
Kyung Hee University, Korea

Medical Physics

P.24 Moved to WPM-D.8

P.25 Diagnostic Radiation Exposure to Korean Population
Lim, H., Kim, K., Kim, K.
Kyung Hee University, Korea

P.26 Equivalent Dose to Staffs in Different Procedures of Nuclear Medicine
Sina, S., Mehdizadeh Naderi, S., Haghighat Afshar, M., Moradi, H., Sadegh Shobeiry, M., Entezarmahdi, M.*
Shiraz University, Iran, Shiraz University of Medical Sciences, Iran, Shahid Beheshti University, Iran

P.27 Calculation of Organ and Effective Doses in Adults Undergoing Radiographic Examinations using Monte Carlo Simulations
Park, I., Kim, K., Kim, K.
Kyung Hee University, Korea

P.28 A Review of Four Years of Fluoroscopic Events
*Sturchio, G., Tannahill, G.**
Mayo Clinic in Rochester, MN

Operational Health Physics

P.29 Precision of Measurements in Paired Counting with Arbitrary Confidence Levels
Potter, W., Strzelczyk, J.
Consultant, Sacramento, University of Colorado Hospital

P.30 Got Radiation in Your Box? Where's it Going?
Recca, K.
University of Massachusetts Lowell

P.31 A Pilot Project-Based Learning Course in Health Physics at the University of Wisconsin - Madison
Bednarz, B.
University of Wisconsin, Madison

Regulatory/Legal Issues

P.32 Safety Culture: A Continuous Journey
Flannery, C.
US Nuclear Regulatory Commission

Risk Analysis

P.33 Polymorphisms of the NBS1 and PARP1 Genes and DNA Repair Efficiency in Individuals Exposed to Chronic Radiation
Urzhumov, P., Pogodina, A., Akleyev, A.
Urals Research Center For Radiation Medicine, Chelyabinsk

P.34 Assessment of Polymorphism Frequency in Detoxification Genes for a Sample of Persons Exposed to Chronic Radiation
Donov, P., Urzhumov, P., Blinova, E., Akleyev, A.
Urals Research Center For Radiation Medicine, Chelyabinsk

P.35 Radiological Implications of Tar Ball Deposits Along the Gulf Coast
Didla, S., Billa, J., Adzanu, S., Brempong, O., Nwaneri, S.
Alcorn State University

P.36 Radiation Safety Aspects of Nanotechnology: Update on Development of an NCRP Commentary
Hoover, M., Meyers, D., Cash, L., Guilmette, R., Kreyling, W., Oberdoerster, G., Smith, R., Boecker, B.
National Institute for Occupational Safety and Health, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Lovelace Respiratory Research Institute, Helmholtz Institute, Germany, University of Rochester, HPA Centre for Radiation, Chemical and Environmental Hazards, UK

Works-in-Progress

P.37 Feasibility Analysis of Incidence Risk of Cataract in the Mayak Workers Cohort
Bragin, E.V., Azizova, T.V., Bannicova, M.V.
Southern Urals Biophysics Institute

P.38 Determination of Equilibrium Constants for Plutonium-Fulvic Acid Complexes
Wong, J.C., Simpkins, L.A., Powell, B.A.
Clemson University

P.39 Utilization of Acoustically Tensioned Metastable Fluid Detectors in Health Physics
Hagen, A., Archambault, B.C., Fischer, K.F., Taleyarkhan, R.P.
Purdue University, SA Labs, LLC

P.40 Centrifugally Tensioned Metastable Fluid Detectors used for Gamma Blind Neutron Dose Measurement
Webster, J., Hagen, A., Archambault, B., Taleyarkhan, R.P.
Purdue University, S/A Labs LLC

P.41 Status of Industrial Uses of Radiation Devices in Korea
Cho, D.-H., Kim, W.R.
Korea Institute of Nuclear Safety

P.42 The Level of Pathologic Erythrocytes in the Peripheral Blood of Roach (*Rutilus rutilus L.*) Inhabiting Reservoirs with Different Levels of Radioactive Contamination
Shaposhnikova, I., Tryapitsyna, G.A., Styazhkina, E.V., Osipov, D.I., Pryaklun, E.A.
Urals Research Center for Radiation Medicine

P.43 Secondary Sex Ratio in Population Exposed on the Techa River
Pastukhova, E.I., Shalaginov, S.A., Akleyev, A.V.
Urals Research Center for Radiation Medicine, Russia

P.44 Optimizing Light Collection from Extractive Scintillating Resin in Flow-Cell Detectors
Meldrum, A.C., DeVol, T.A.
Clemson University

P.45 Development of a Fast Neutron Activation Counter Using the Cherenkov Effect in Optical Materials
Millard, M.J., DeVol, T.A., Bell, Z.W.
Clemson University, Oak Ridge National Laboratory

P.46 Building Context for Radioactive Waste Characterization
James, D.W., Kalinowski, T.M.
DW James Consulting

P.47 Exact Determination of Critical Level and Associated Detection Limit using the Poisson Distribution and a Spreadsheet
Van Der Karr, M.T.
ZionSolutions

P.48 PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents
DeCair, S.D., Tupin, E.A., Nesky, A.B., Herrenbruck, G.S.*
US EPA

3:00 - 5:00 PM Madison Ballroom A

MPM-A: Waste Management

Chair: John Poston Sr.

3:00 PM MPM-A.1
Radiation Shield Design and Dose Rate Analysis of the Independent Spent Fuel Dry Cask Storage Installation at the Comanche Peak Nuclear Power Plant
Poston Sr., J.W., Chirayath, S.S., Tsvetkov, P.V., Marianno, C.M., Kelly, R.P., Kitcher, E.D.
Texas A&M University

3:15 PM MPM-A.2
Texas' Solution to Irradiated Hardware Disposal Needs
Britten, J., Shaw, C.
WCS LLC

3:30 PM MPM-A.3
Dose Rate Profile Surrounding a Waste Repository
Parson, J., Zoeger, N., Koppitsch, R., Brandl, A.
Colorado State University, Nuclear Engineering Seibersdorf

3:45 PM MPM-A.4
Cost Effective Management of Low-Level Radioactive Waste at an Academic Institution
Zittle, M.
The Jackson Laboratory

4:00 PM MPM-A.5
Components of an ALARA Program
Brown, D.D.
Studsvik, LLC

4:15 PM MPM-A.6
Debugging Radioactive Waste Storage Rooms
Sober, J.C., Brown, E.A., Zahniser, S.
Fred Hutchinson Cancer Research Center

4:30 PM MPM-A.7
Using GIS to determine Suitability for a Low-Level Radioactive Waste Storage Facility
Wilson, C., Wang, W., Wilson, V.
Louisiana State University

4:45 PM MPM-A.8
Radioactive Waste Handling and Disposal at Nuclear Medicine Departments in Shiraz, Iran
Mehdizadeh Naderi, S., Sina, S., Alavi, M., Entezarmahdi, M., Banani, A.
Shiraz University, Iran, Shiraz University of Medical Sciences, Iran

3:00 - 4:15 PM Madison Ballroom B

MPM-B: Homeland Security

Co-Chairs: John Lanza, Eric Daxon

3:00 PM MPM-B.1

Transitioning from Radiation Safety to Health Risk for Emergency Response: Complete the Separation

Daxon, E., Johnson, T.

Battelle Memorial Institute, Colorado State University

3:15 PM MPM-B.4

Dose to Driver in Cargo Screening Systems

Bergstrom, P.M.

National Institute of Standards and Technology

3:30 PM MPM-B.5

Summary of Test Results for the ITRAP+10 Testing

Pibida, L., Murphy, L.

NIST, DNDO

3:45 PM MPM-B.6

Source Collection and Threat Reduction - Recent Developments and New Cost-Share Opportunities

Jennison, M., Martin, D.

DOE/NNSA Global Threat Reduction Initiative, DOE/NNSA Global Threat Reduction Initiative/Energetics Inc.

4:00 PM MPM-B.7

Nuclear Security at the FIFA 2010 Soccer World Cup

Larkin, J.

University of the Witwatersrand, South Africa

3:00 - 4:15 PM Madison Ballroom C

MPM-C: Biokinetics/Bioeffects

Co-Chairs: Raymond Guilmette, Sam Keith

3:00 PM MPM-C.1

Inhalation, Intravenous, and Wound Exposure to Am-241: A Comparison of Unperturbed Biokinetics in the Rat

*Weber, W., Doyle-Eisele, M., Guilmette, R.**

LRRI

3:15 PM MPM-C.2

Health Effects from Exposure to Radon

Keith, L., Wohlers, D., Mumtaz, M., Tarrago, O., Doyle, J.

ATSDR, SRC

3:30 PM MPM-C.3

A Fully Automated Micro-Irradiator for In Vitro Radiobiology Research

Fowler, T., Kimple, R., Micka, J., Bednarz, B.

University of Wisconsin - Madison

3:45 PM MPM-C.4

Characterizing Significance of High LET Electrons for Cell Death with 64Cu-diacetyl-bis(N4-methylthiosemicarbazone)

McMillan, D.D., Kato, T.

Colorado State University

4:00 PM MPM-C.5

Induction and Repair of DNA Double-Strand Breaks in Mammalian Cells Continuously Exposed to γ-Radiation

Anchishkina, N.A., Smetanina, N.M., Archangelskaya, E.Yu., Vorobyeva, N.Yu., Guryev, D.V., Osipov, A.N.

Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency, Russia, Semenov Institute of Chemical Physics, Russian Academy of Sciences, Moscow, Russia

3:00 - 4:30 PM Madison Ballroom D

MPM-D: Internal Dosimetry & Bioassay

Co-Chairs: Steven Brown, James Cassata

3:00 PM MPM-D.1

Technical Basis for Solubility of Modern Uranium Mill Products - Review of Historical Literature and Recent Data

Brown, S., Chambers, D.

SENES Consultants Ltd

3:15 PM MPM-D.2

Two Methodologies for Adjustments of the Human Respiratory Tract Model (ICRP Publication 66) Absorption Parameters and Application to 239/240Pu Fecal and Urine Bioassay Data of Workers Exposed to Transuranic Radionuclides at a CANDU Nuclear Power Plant

Romanowich, L.D.

Bruce Power

3:30 PM MPM-D.3

Methodologies for Determining an Alpha Dosimetry Group Model Using Bioassay Data for Workers Exposed to Transuranic Radionuclides at a CANDU Nuclear Power Plant

Romanowich, L.D.

Bruce Power

3:45 PM MPM-D.4

Department of Defense In Vivo Internal Monitoring with Commerical Whole Body Scanners and Portable Scintillation Detectors Following the 2011 Fukushima Radiation Release

Cassata, J.R., McKenzie-Carter, M.A., Case, D.R., Chehata, M., Falo, G.A., Blake, P.K.

National Council on Radiation Protection and Measurements, Science Applications International Corporation, United States Army Institue of Public Health, Defense Threat Reduction Agency

4:00 PM MPM-D.5

Parameter Sensitivity Analysis of the Revised Human Respiratory Tract Model

Salamatova, V.Yu., Sokolova, A.B.

Southern Urals Biophysics Institute, Russia

4:15 PM MPM-D.6

Neutron-Induced Track Analysis of Plutonium Dioxide Nanoparticles

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

Southern Urals Biophysics Institute, Ozyorsk

3:00 - 4:00 PM Lecture Hall

MPM-E: Regulatory/Legal Issues

Co-Chairs: David Hearnsberger, Paul Zaffuts

3:00 PM MPM-E.1

HPS Publications Implement Society's "SI Only" Position

Dickson, H., Ryan, M., Little, C., Walchuk, M., Roessler, G., Classic, K., Edwards, J.

Health Physics Society Publications

3:15 PM MPM-E.2

Transformational Leadership: A Must in Uncertain Times

Hearnsberger, D.

Argonne National Laboratory

3:30 PM MPM-E.3

Revisions to the US Nuclear Regulatory Commission's Radiation Protection Regulations (10 CFR Part 20)

Flannery, C.

US Nuclear Regulatory Commission

3:45 PM MPM-E.4

Nuclear Regulatory Commission Expectations for a Positive Safety Culture and Safety Conscious Work Environment

Zaffuts, P.

Morgan Lewis

4:00 - 5:00 PM **Lecture Hall**

MPM-E2: HPS - How to Get Involved

Chair: Andy Miller

4:00 PM **MPM-E2.1**

HPS New Member Symposium
Miller, M.
VA Hospital

4:30 PM **MPM-E2.2**

How the Program Committee Works For You
Kirkham, T., Mason, T.
Research Triangle Institute, International, Cabrera Services Inc.

3:00 - 5:00 PM **Hall of Ideas EH**

MPM-F: Science Support Committee: Health Physicists Teaching Science Workshop

Chair: Elaine Marshall

Interactive Workshop — Health Physicists Teaching Science
Marshall, E., Cantley, J., Bullock, C., Dixon, J., Adams, C., Crawford, A., Beharry, K., Cole, R., Braun, J., Razmianfar, N.
Science Support Committee

TUESDAY

7:00-8:00 AM **Hall of Ideas F**

CEL-3 Orphan Sources in PA and a Major Radium-226 Source Recovery Project

Allard, D.J.

Pennsylvania DEP Bureau of Radiation Protection

7:00-8:00 AM **Hall of Ideas G**

CEL-4 Health Physicists' Professional Liability

Monteau, D.G.

Nuclear Risk Specialists

8:30 - 11:45 AM Madison Ballroom A

TAM-A: AAHP Special Session: Medical Physics and Medical Health Physics - Roles and Responsibilities I

Chair: John Frazier

8:30 AM

Introduction

John Frazier

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

Roles and Responsibilities of Medical Physicists and Health Physicists in Nuclear Medicine

Plott, C.

Forsyth Medical Center

9:15 AM **TAM-A.2**

Roles and Responsibilities of Medical Physicists and Health Physicists in Radiation Therapy

St. Germain, J.

Memorial Sloan-Kettering Cancer Center

9:45 AM **TAM-A.3**

Roles and Responsibilities of Medical Physicists and Health Physicists in Diagnostic Radiology

King, S.

Milton S. Hershey Medical Center

10:15 AM **BREAK**

10:45 AM **TAM-A.4**

Academic Programs in Medical Health Physics

Vetter, R.

Mayo Clinic

11:15 AM **TAM-A.5**

Academic Programs in Medical Physics

Hintenlang, D.

University of Florida

8:30 AM - Noon Madison Ballroom B

TAM-B: Homeland Security and Military Sections Joint Special Session, Part I

Co-Chairs: Debra McBaugh, John Cardarelli

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

Disaster Risk Communications Training for Radiation Professionals

Lanza, J.

Florida Department of Health

9:30 AM **TAM-B.2**

Joint CDC/NCRP Improvised Nuclear Device Table Top Exercise—Preliminary Results

Groves, K.L., Cassata, J.R.

S2-Sevorg Services, LLC, National Council on Radiaiton Protection and Measurements

9:50 AM **TAM-B.3**

National Council on Radiation Protection and Measurements Committee SC5-1: Late-Phase Recovery from Nuclear or Radiological Incidents

Chen, S.Y.

Illinois Institute of Technology

10:10 AM **TAM-B.4**

An Analysis of a Spreader Bar Crane Mounted Gamma Ray Radiation Detection System

*Grypp, M., Marianno, C.**

Texas A&M University

10:30 AM **BREAK**

11:00 AM **TAM-B.5**
US EPA Response Capabilities
Draper, D., Hudson, S., Kappelman, D. Dade Moeller, US EPA

11:20 AM **TAM-B.6**
Progress in Environmental Data Sharing During Radiological Emergencies: A Collaboration Effort between Local, State and Federal Radiation Programs
Salame-Alfie, A., Fordham, E., Mulligan, P., Foster, K., DeCair, S., Day, J. CRCPD, Washington DOH, NJDEP, IEMA, EPA, LA County, CA*

11:40 AM **TAM-B.7**
Homeland Security Informatics: Understanding and Advancing the Opportunities
*Hoover, M., Cash, L.**
National Institute for Occupational Safety and Health, Los Alamos National Laboratory

8:30 - 10:45 AM Madison Ballroom C

TAM-C: Accelerator Health Physics

Chair: Wayne Gaul

8:30 AM **TAM-C.1**
A New Insertion Device for CAMD/LSU
Marceau-Day, M.L.
LSU

8:45 AM **TAM-C.2**
Feasibility Study of the Photo-Nuclear Production of Ac^{225}
Rane, S., Starovoitova, V., Harris, J.
Idaho State University

9:00 AM **TAM-C.3**
High Power Beam Dump Upgrades at Jefferson Lab
*Welch, K., Degtiarenko, P., Kharashvili, G., May, R.**
Jefferson Lab

9:15 AM **TAM-C.4**
Using Phosphorus Pentoxyde for Linacs in Beam Neutron Contamination Evaluation
Badreddine, A., Ait-Ziane, M., Mebhah, D., Yennoun, A., Hattali, B., Sissaoui, N., Lounis-Mokrani, Z., Boucenna, A.
Nuclear Research Centre of Algiers, Algiers, Mohamed Essighir Nekkache Hospital, Algiers, Anti-Cancer Center, Blida, Ferhat Abbas University, Setif

9:30 AM **TAM-C.5**
Choosing an Interlocked Area Radiation Monitor for NSLS-II
Walker, L., Welty, T., Casey, B.
Brookhaven National Laboratory

9:45 AM **BREAK**

Again this Year!

Tuesday, 10:00-11:30 am ***Hall of Ideas F***

Workshop: Publishing in Health Physics and Operational Radiation Safety

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

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

10:15 AM **TAM-C.6**
Comparison of Thin Foil Activation Measurements to FLUKA Predictions
*Degtiarenko, P., Kharashvili, G.**
Jefferson Lab

10:30 AM **TAM-C.7**
Radiation Safety Consideration of the New High Gradient Cryomodule Operation at Jefferson Lab
Degtiarenko, P., Keller, M., Kharashvili, G., Vylet, V., Welch, K.*
Jefferson Lab

10:45 AM **Accelerator Section Business Meeting**

8:30 - 11:30 AM Madison Ballroom D

TAM-D: Environmental Radon Section Special Session: NORM - Why the Concern?

Co-Chairs: Doug Chambers, Jeff Whicker

8:30 AM **TAM-D.1**
Towards a Harmonized Approach to Control Exposures to Naturally Occurring Radioactive Material (NORM)
Pappinisseri Puthanveedu, H.
IAEA

9:00 AM **TAM-D.2**
The Journey Continues - Down the Road Towards Updated Policy for TENORM
Egidi, P.
US Environmental Protection Agency

9:15 AM **TAM-D.3**
NORM at Home: Radon in Domestic Water from a Private Well
Harley, N., Chittaporn, P., Cook, G.
NYU School of Medicine

9:30 AM **TAM-D.4**
Radon Dose and NORM
Chambers, D.
SENES

9:45 AM **BREAK**

10:15 AM **TAM-D.5**
Study on Sampling and Measurement of Natural Radionuclides in the Waste Streams of Coal-Fired Plant
Liu, R., Wang, C., Pan, J., Xiong, W.
China Institue of Atomic Energy

10:30 AM **TAM-D.6**
TENORM Experiences and Studies in Pennsylvania
Allard, D.
Bureau of Radiation Protection

11:00 AM **TAM-D.7**
What We Can Learn from Studies of Health Effects in Naturally High Background Areas
Boice, Jr., J.
National Council on Radiation Protection and Measurements

11:30 AM **Environmental Radon Section Business Meeting**

8:30 AM - Noon Lecture Hall

TAM-E: Medical Health Physics I

Co-Chairs: Alan Jackson, Ronald Leuenberg

8:30 AM **TAM-E.1**
Necessary Precautions in Moving a Blood Irradiator
Erdman, M.C., King, S.H.
Penn State Hershey Medical Ctr

8:45 AM **TAM-E.2**
From Transcriptome-Wide to Signalome Investigations of Individual Cancer Patients: Implications for Radiation Medicine and Radiation Therapy
Korzinkin, M., Buzdin, A., Zhestkov, B., Kuzmina, N., Ivanova, E., Smirnov, P., Borisov, N.
Federal Medical Biophysical Center, Institute of Bioorganic Chemistry, Russia

9:00 AM **TAM-E.3**
Dose Reduction for PET Technologists by the Automatic Dose Draw/Injection System
Ding, L., Nguyen, G., Petry, N., Yoshizumi, T.
Duke University Medical Center

9:15 AM **TAM-E.4**
Transmission Measurements of X-ray Imaging Facilities Using Co-57 Flood Sources
Jackson, A.
Henry Ford Hospital

9:30 AM **TAM-E.5**
Contamination Reduction in Waste Pipes
Morris, V.R.
University of Cincinnati

9:45 AM **TAM-E.6**
Radiation Dose from CT Exams Evaluated with Deformable Realistic Adult and Pediatric Phantoms
Stabin, M., Carver, D., Kost, S., Pickens, D., Price, R., Hernanz-Schulman, M.
Vanderbilt University

10:00 AM **BREAK**

10:30 AM **TAM-E.7**
A Fast Monte Carlo Electron Transport Code for Dose Calculations Using the GPU Accelerator
Su, L., Du, X., Liu, T., Xu, X.G.
Rensselaer Polytechnic Institute

10:45 AM **TAM-E.8**
Correlation Between Thyroid Burden and Surface Dose Rate for Felines Undergoing Thyroid Ablation Therapy with I-131
Martin, T.M., Vasudevan, L., Chirayath, S.S.
Texas A&M University

11:00 AM **TAM-E.9**
Why We Should Care about Cumulative Patient Radiation Dose from Diagnostic Medical Procedures
Ulsh, B.A., Morris, R.L.
M. H. Chew & Associates

11:15 AM **TAM-E.10**
Patient Fluoro Skin Dose, Managing Uncertainty
Leuenberger, R.
Louis Stokes Cleveland VA Mecical Center

11:30 AM **TAM-E.11**
Dose-Length-Product-to-Effective-Dose Conversion Factors for Overweight and Obese Patients in X-ray Computed Tomography Examinations
Gao, Y., Ding, A., Caracappa, P., Xu, X.G.
Rensselaer Polytechnic Institute

11:45 AM **TAM-E.12**
Neutron Production and Transport at a Medical Accelerator
Allardice, A.M., Brandl, A., Custis, J., LaRue, S.M.
Colorado State University

Noon **Medical Health Physics Section Business Meeting**

8:00 AM - Noon **Hall of Ideas EH**

TAM-F: Special Session
Non-Ionizing Radiation I

Co-Chairs: Andrew Thatcher, Jerrold Bushberg

8:00 AM
The New NIR Section
Thatcher, A.H.

8:15 AM **TAM-F.1**
Biological Basis of RF Safety Standards & Current Regulatory Activity
Bushberg, J.
University of California Davis School of Medicine

8:45 AM **TAM-F.2**
Use of Experimental Models to Identify Possible Health Effects of Exposure to RF Fields
McCormick, D.L.
IIT Research Institute

9:30 AM **TAM-F.3**
Wi-Fi and Health: Review of Current Status of Research
*Foster, K.R., Moulder, J.E.**
University of Pennsylvania, Medical College of Wisconsin

10:00 AM **BREAK**

10:30 AM **TAM-F.4**
A World Awash with Wireless Devices
Foster, K.
University of Pennsylvania

11:00 AM **TAM-F.5**
Radio-Frequency Fields and Health: A Global View of Science and Policy
Tikalsky, S.
EMF Gateway

11:30 AM **Nonionizing Radiation Ask the Experts Panel**

2:30 - 5:15 PM Madison Ballroom A

TPM-A: AAHP Special Session: Medical Physics and Medical Health Physics - Roles and Responsibilities II

Chair: John Frazier

2:30 PM **TPM-A.1**
Professional Certification Programs for Medical Physicists
Miller, M.
Veterans Administration

3:00 PM **TPM-A.2**
ABHP Certification - Radiation Protection Disciplines
Potter, C.
Sandia National Laboratory

3:30 PM **TPM-A.3**
Ethical Responsibilities of Professionals
Bailey, E.
Consultant

4:00 PM **BREAK**

4:30 PM **Panel Discussion**
Who is Responsible and Accountable

5:00 PM **Closing Comments**

5:15 PM **AAHP Open Meeting**

2:30 - 5:00 PM Madison Ballroom B

TPM-B: Homeland Security and Military Sections Joint Special Session, Part II

Co-Chairs: Debra McBaugh, John Cardarelli

2:30 PM **TPM-B.1**
Passive Neutron Detection in Ports for Homeland Security Applications
Pedicini, E.E., Marianno, C.M., Charlton, W.S.*
Texas A&M University

2:45 PM **TPM-B.2**
Volunteer Now and Make A Difference
Stringfellow, S.
Mississippi State Department of Health

3:05 PM **TPM-B.3**
EPA ASPECT Chemical and Radiological Characterization and Assessment for Homeland Security and Emergency Response Situations during the 2013 Super Bowl
Cardarelli II, J., Thomas, M., Curry, T., Kudarauskas, P.
EPA

3:25 PM **BREAK**

3:55 PM **TPM-B.4**
Characterization of the Radiological Environment at J-Village during Operation Tomodachi
McKenzie-Carter, M.A., Chehata, M., Dunavant, J.D.
Science Applications International Corporation

4:10 PM **TPM-B.5**
Department of Energy Radiological Assistance Program Training
Groves, K.L., Oldewage, H.D., Hatfield, L.M., Stump, R.B.
S2-Sevorg Services, LLC, Sandia National Laboratories, DOE Emergency Operations Training Academy

4:30 PM **Panel Discussion**

5:00 PM **Homeland Security Business Meeting**

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

2:30 - 5:00 PM Madison Ballroom C

TPM-C: Nanotechnology and Radiation Protection

Chair: Lorraine Marceau-Day

Emerging Issues for Radiation Protection and Nanotechnology
Marceau-Day, M.L., Hoover, M.D., Cash, L., Walker, L.S., Sajo, E.
LSU, NIOSH, LANL, BNL, UML

2:30 - 5:00 PM Madison Ballroom D

TPM-D: NESHAPS

Chair: Matthew Barnett

2:30 PM
Comparison of CAP88 PC and MAXDOSE Dose
Farfan, E.B., Jannik, G.T., Lee, P.L., Powell, A.W.*
Savannah River National Laboratory

4:15 PM
NESHAPS - Radioactive Air Meeting
Barnett, J., Vazquez, G.
PNNL, DOE-HQ

2:30 - 5:15 PM Lecture Hall

TPM-E: Medical Health Physics II

Co-Chairs: Glenn Sturchio, John Poston

2:30 PM **TPM-E.1**
Measurements of Radium-223 Activity in a Nuclear Medicine Department
Bevins, N., Jackson, A.
Henry Ford Health System, Detroit

2:45 PM **TPM-E.2**
Operator Exposure Using Portable Dental X-ray Devices
Thatcher, A., Harvey, B., Odlaug, M., Mantyla, S., Clark, S., Jenkins, A., Montemarano, R., Maxim, S.
Washington Department of Health

3:00 PM **TPM-E.3**
A Model for Eye Lens Dose and Whole Body Dose in Interventional Radiology
Rhodes, A., Fiedler, D., Caracappa, P.
Rensselaer Polytechnic Institute

3:15 PM **TPM-E.4**
Medical Isotope Production using the SHINE Process
Pitas, K., Piefer, G., Van Abel, E., Bynum, V.
SHINE Medical Technologies

3:30 PM **BREAK**

4:00 PM **TPM-E.5**
Patient Caring Pattern and Timing of Exposure to Caregivers of Patients Treated with Radioiodine after Thyroidectomy
Jung, J., Jeong, K., Alotaibi, E., Kim, C.
East Carolina University, Korea Institute of Nuclear Safety

4:15 PM **TPM-E.6**
Software for Shielding Calculation Based on NCRP 147 Methodology
Majali, M.
Federal Authority for Nuclear Regulation

4:30 PM **TPM-E.7**
Evaluating MOSFET Dependency on Effective Energy over Diagnostic Energy Range
Ding, L., Nguyen, G., Yoshizumi, T.
Duke University Medical Center

4:45 PM **TPM-E.8**
A Monte Carlo Method to Compute Patient Dose for Chest Computed Tomography Scans Involving Tube Current Modulation
Gao, Y., Ding, A., Caracappa, P., Xu, X.G.
Rensselaer Polytechnic Institute

5:00 PM **TPM-E.9**
Optimal Calibration Setting Numbers for Novel Positron Emission Tomography Nuclides Using Ionization Chamber Radionuclide Calibrators
Szatkowski, D.
Washington University in St. Louis

1:00 - 5:00 PM **Hall of Ideas EH**

TPM-F: Special Session Non-Ionizing Radiation II

Co-Chairs: Donald Haes, Gary Zeman

1:00 PM **TPM-F.1**
Optical Radiation Safety
Sliney, D.H.
Johns Hopkins University Bloomberg School of Public Health

1:45 PM **TPM-F.2**
Review of DOE Accidents
Barat, K.
Laser Safety Solutions

2:15 PM **TPM-F.3**
Laser Safety in R&D Facilities
Barat, K.
Laser Safety Solutions

2:30 PM **TPM-F.4**
Radiofrequency Exposure from Smart-Meters
Foster, K., Tell, R.
University of Pennsylvania, Richard Tell Associates, Inc.

3:00 PM **BREAK**

3:30 PM **TPM-F.5**
Radiofrequency Exposures In a Los Angeles Neighborhood: Continued Public Concern Regarding Increasingly Ubiquitous Radiofrequency Exposures
Thatcher, A.
Andrew H Thatcher Consulting

3:50 PM **TPM-F.6**
Addressing Public Questions About Nonionizing Radiation
Zeman, G.H., Classic, K.L.
Retired, Mayo Clinic

4:10 PM **TPM-F.7**
Certified Laser Safety Officer and Certified Medical Laser Safety Officer Certification Programs
Haes, D.
BAE Systems

4:25 PM **Open Forum/Panel/Closing**

7:30-10:30 PM **Madison Ballroom**

HPS Awards Banquet

WEDNESDAY

7:00-8:00 AM Hall of Ideas F

CEL-5 Emergency Preparedness: Lessons from Hurricane Sandy
Morgan, T.L.
Columbia University

7:00-8:00 AM Hall of Ideas G

CEL-6 A Mindset for Managing Modern Measurements: Understanding and Meeting Current Challenges
Hoover, M.D., Cash, L.J.
National Institute for Occupational Safety and Health, Los Alamos National Laboratory

8:30 AM - Noon Madison Ballroom A

WAM-A: HPS and ANS Special Session: Issues in Low-Dose Radiation Research

Co-Chairs: Bryan Bednarz, Bill Morgan

8:30 AM
Welcoming Statement
Paul Deluca, University of Wisconsin

9:00 AM WAM-A.1
Challenges and Opportunities for Radiological Protection and Low Dose Risk Research
Weiss, W.
Honorary Member of MELODI

9:50 AM Questions and Answers

10:00 AM BREAK

10:30 AM WAM-A.2
A Million US Worker Study
Boice, Jr, J.
NCRP/Vanderbilt University

11:00 AM WAM-A.3
DOE Low Dose Program
Metting, N.F.
DOE Low Dose Radiation Research Program

11:30 AM WAM-A.4
Dose and Dose Rate Effects in the Low Dose Range
Ulsh, B.
MH Chew and Associates

8:00 - 11:45 AM Madison Ballroom B

WAM-B: Special Session: Advancing the Science of Emergency Response I

Co-Chairs: Bill Rhodes, RaJah Mena

8:00 AM WAM-B.1
Use of the eFRMAC Methodology in the Characterization of the Radiological Release Following the Fukushima Nuclear Power Plant Incident
Essex, J., Blumenthal, D., Clark, H., Wagner, E.
National Security Technologies, LLC, Remote Sensing Laboratory, US Department of Energy, National Nuclear Security Administration, NA-42

8:30 AM WAM-B.2
Analysis of Radionuclide Deposition Ratios from the Fukushima-Daiichi Incident
Smith, M.R., Marianno, C., Kraus, T.D., Hunt, B.
Texas A&M University, Sandia National Laboratory

9:00 AM WAM-B.3
Avoidable Dose and Total Dose Radiological Assessments in Support of Public Protection Decisions
*Hunt, B., Kraus, T.**
Sandia National Laboratories

9:30 AM WAM-B.4
Importance of Accounting for the Partitioning of Iodine Released During Nuclear Power Plants Accidents
Kraus, T., Hunt, B.
Sandia National Labs

10:00 AM BREAK

10:30 AM **WAM-B.5**

Enhanced Analysis of Early Aerial Surveys Maps I-131 Deposition from the Fukushima Daiichi Accident

Torii, T., Sugita, T., Okada, C., Reed, M., Blumenthal, D.*

Fukushima Environmental Safety Center, Japan Atomic Energy Agency, US Department of Energy, Remote Sensing Laboratory, National Nuclear Security Administration

11:00 AM **WAM-B.6**

A Case for Changing I-131 Transfer Factors Based on Changes in Dairy Industry Practices

*Dromgoole, L.E., Marianno, C.M.**

Texas A&M University

11:30 AM **WAM-B.7**

Updated Emergency Response Guidance for the First 48 Hours after the Outdoor Detonation of an Explosive Radiological Dispersal Device

Musolino, S., Harper, F., Buddemeier, B., Brown, M., Schlueck, R.

Brookhaven National Laboratory, Sandia National Laboratories, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, New York City Fire Department

8:45 - 11:15 AM Madison Ballroom C

WAM-C: Decommissioning

Co-Chairs: Stacey Sedano, Mike Winters

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

Financial Assurance for Materials Licensees - Then and Now

Monteau, D.

Nuclear Risk Specialists

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

The MARSAME Methodology: Fundamentals and Potential Benefits

Boerner, A.

Oak Ridge Associated Universities, Oak Ridge, TN.

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

Remote Large Area Scanning System

Reese, J., Gray, C.

Cabrera Services

9:30 AM **BREAK**

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

The Air Force's Decommissioning of Nuclear Medicine Facilities

Hale, A.

United States School of Aerospace Medicine

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

Role of the Campus Radiation Safety Officer During Onsite Decommissioning

Zakir, N., Spichiger, G., Tabor, C., Hansen, T.

Georgia Institute of Technology, Ameriphysics

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

Radon Ruined My MDC

Hay, S., Mason, T.

Cabrera Services, Inc.

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

A Field Method for Identifying Radon Interference With Total Alpha Surface Activity Measurements

Sedano, S., Arzate, K., Hay, S., Reese, J.

Cabrera Services, Inc.

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

Decommissioning of Indoor Legacy Thorium

Kirner, N., Croft, C., Wallace, H., Alsteen, L., Baxley, J.

Kirner Consulting, Inc., The Boeing Company, Vast Environmental

8:30 - 11:45 AM Madison Ballroom D

WAM-D: External Dosimetry

Co-Chairs: Justin Vazquez, David Medich

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

Age and Gender Specific Dose Coefficients for Various External Exposure Modes

Bellamy, M., Eckerman, K., Manger, R.
ORNL

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

The Functional Capability DT-702/PD Thermolumiscent Dosimter for Dose Exposures of 0.25 Sv

Lawlor, T.M., Murray, M.M., Nelson, M.E., Romanyukha, A.A., Fairchild, G.R.
US Naval Academy, Naval Dosimetry Center

9:00 AM **WAM-D.4**

Recent Developments in Direct Ion Storage Technology

Bennett, K., Perle, S., Kahilainen, J., Vuotila, M.
Mirion Technologies

9:15 AM **WAM-D.5**

Evaluation of Systematic Errors of EPR Tooth Dosimetry Using Different Methods in the Absence a Metrological Standard

Shishkina, E., Timofeev, Y., Volchkova, A., Fattibene, P., Ivanov, D., Wieser, A., Zalyapin, V., Degteva, M.
URCRM, Russia, ISS, Italy, IMP, Russia, HMGU, Germany, SUSU, Russia

9:30 AM **WAM-D.6**

Cs-137 and 320kVp Orthovoltage Small Animal Irradiator Organ Dose Comparison Using Monte Carlo Methods

Belley, M., Dewhirst, M., Chao, N., Gunasingha, R., Chen, B., Yoshizumi, T.
Duke University

9:45 AM **BREAK**

10:30 AM **WAM-D.8**

Development of a Hot Particle Dose Application for the Android Platform

Cantrell, T., Jokisch, D.
Francis Marion University

10:45 AM **WAM-D.9**

A Dose-Reconstruction Simulation of the 1999 Tokai-Mura Criticality Accident with Victim Postures Modeled Using a Dynamic Computational Human Phantom and Motion Capture Data

Vazquez, J., Caracappa, P., Xu, X.G.
Rensselaer Polytechnic Institute

11:00 AM **WAM-D.10**

Characterisation of LIF:MG,TI (TLD100, TLD600, TLD700) for Neutron Evaluation in Complex Radiation Fields

Lounis-Mokrani, Z., Ait-Ziane, M., Badreddine, A., Imatoukene, D., Mebhah, D., Mezaguer, M.
Nuclear Research Centre of Algiers, 02 Bd Frantz Fanon, Algiers

11:15 AM **WAM-D.11**

Narrow Beam Neutron Dosimetry

Mei, G., Akkurt, H., Gregory, D.
Oak Ridge National Lab

11:30 AM **WAM-D.13**

Variations in the Tissue Equivalence Response of LiF, Al2O3, and Silicon-Based Dosimeters for Brachytherapy and X-ray Equivalent Energy Photons

Medich, D., Poudel, S., Waterman, S., Martel, C.
Worcester Polytechnic Institute, Brigham and Women's Hospital

8:30 AM - Noon Lecture Hall

WAM-E: Power Reactor Section Special Session

Chair: Eric Goldin

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

Tungsten Shield Vest

Thompson, B.
Dominion - North Anna Power Station

8:45 AM **WAM-E.2**
Carbon-14 Background, Pathway and Dose Optimization Analysis
Caffrey, E.A., Higley, K.A.
Oregon State University

9:00 AM **WAM-E.3**
Parameter Uncertainty Analysis for Public Dose Assessment for Nuclear Facilities
Shen, J.
EcoMetrix Inc.

9:15 AM **WAM-E.4**
Atmospheric Dispersion Modeling for Dose Assessment Due to Airborne Releases from the Proposed Site for Nuclear Power Plant (NPP) in Nigeria
Aliyu, A.S., Ramli, A.T., Liman, M.S.
Univeristi Teknologi Malaysia, Nasarawa State University Keffi, Nigeria

9:30 AM **WAM-E.5**
Post-Fukushima Emergency Response Radiological Monitoring
Romanowich, L., Kirkham, T.
Bruce Power, RTI

9:45 AM **BREAK**

10:15 AM **WAM-E.6**
Recent Experiences of Entering Decommissioning
Adams, R., Shannon, D.
Kewaunee Power Station

11:00 AM **WAM-E.7**
Present Situation and Challenge of Radiation Protection Optimization Design of Nuclear Power Plants in China
Mi, A., Mao, Y., Gao, G., Liu, S., Ma, J., Qiu, L.
China Nuclear Power Engineering Co.,Ltd.

11:15 AM **WAM-E.8**
Report on the NRC Public Meeting on Recommendations for Enhancing Reactor Safety in the 21st Century
Voss, J.
Voss Associates

11:30 AM **WAM-E.9**
U.S. Nuclear Power Reactor Radiation Protection - Life-cycle Planning
Andersen, R.
Nuclear Energy Institute

Noon **Power Reactor Section Business Meeting**

8:30 AM - Noon **Hall of Ideas EH**

WAM-F: Environmental I

Co-Chairs: Jim Reese, Katharine Arzate

8:30 AM **WAM-F.1**
The VA Uranium Working Group and the Uranium Mining Moratorium
Little, C., Bailey, E., Johnson, J., Wright, T.
Two Lines, Inc., Bailey Consulting, Sopris Environmental, LLC, Wright Environmental Services

8:45 AM **WAM-F.2**
Outcomes of Public Meetings In Virginia to Solicit Input on Cessation of Uranium Mining Moratorium
Little, C., Barhke, C., Wright, T.
Two Lines, Inc., Wright Environmental Services

9:00 AM **WAM-F.3**
Findings of the Virginia Uranium Project
Bailey, E., Johnson, J., Little, C., Wright, T.
Bailey Consulting, Sopris Environmental, Two Lines, Inc., Wright Environmental Services

9:15 AM **WAM-F.4**
Potential Public Health Impacts of Uranium Recovery Operations
Johnson, J.A.
Sopris Environmental

9:30 AM **WAM-F.5**
MILDOS-AREA Update
Biwer, B., LePoire, D., Kamboj, S., Chang, Y.-S., Chen, S.Y., Giebel, S., Watson, B.
Argonne National Laboratory, US Nuclear Regulatory Commission

10:00 AM **BREAK**

10:30 AM **WAM-F.6**
Methodology for Environmental Dose Calculations in Support of the Commercial Light Water Reactor Supplemental Environmental Impact Statement
Simpkins, A.A.
Dade Moeller

10:45 AM **WAM-F.7**
Development of a Reference Person for the Savannah River Site
Stone, D., Higley, K., Jannik, T.
Oregon State University and Savannah River National Laboratory

11:00 AM **WAM-F.8**
Developing Environmental Investigation Levels at a Low-Level Radioactive Waste Facilities
Matthews, T., Shaw, C., Ngachin, M., Zychowski, G.*
WCS

11:15 AM **WAM-F.9**
Trending Environmental Data at a Low-Level Radioactive Waste Facility
Matthews, T., Shaw, C., Ngachin, M., Zychowski, G.*
WCS

11:30 AM **WAM-F.10**
Correcting Measurements of 222Rn in Methane and Carbon Dioxide using Scintillation Cells Calibrated for 222Rn in Air
Jenkins, P., Burkhart, J., Camley, R.
Bowser-Morner, Inc., University of Colorado-Colorado Springs

11:45 AM **WAM-F.11**
Terrestrial Gamma Dose Rates in Akoko, Southwestern Nigeria
Ajayi, I.R.
Adekunle Ajasin University, Akungba-Akoko, Nigeria

2:15 - 5:15 PM Madison Ballroom A

WPM-A: HPS and ANS Special Session: Issues in Low-Dose Radiation Research, Why it Matters

Chair: Bill Morgan

2:15 PM **WPM-A.1**
Regulatory Issues in the Low Radiation Dose Arena
Puskin, J.
US Environmental Protection Agency, Washington, DC

2:45 PM **WPM-A.2**
Integrating Low Dose Radiation Studies into Policy Decision-Making and Communicating Low Dose Science
Locke, P.
Johns Hopkins Bloomberg School of Public Health

3:15 PM **WPM-A.3**
Issues in Low Dose Radiation Ecology
Higley, K., Ruedig, E.B., Caffrey, E.A., Napier, J.B., Neville, D.R.
Oregon State University

3:45 PM **BREAK**

4:00 PM **Roundtable**
Discussion and Closing Remarks

2:15 - 5:00 PM Madison Ballroom B

WPM-B: Special Session: Advancing the Science of Emergency Response II

Co-Chairs: Bill Rhodes, RaJah Mena

2:15 PM **WPM-B.1**
Turbo FRMAC Software Tool for Performing Radiological Assessments in Support of Public Protection Decision
Fulton, J.
Sandia National Labs

2:45 PM **WPM-B.2**
Development of a Custom Portal Monitor for Detection of Radioactive Contamination on Livestock
Erchinger, J., Marianno, C., Herring, A.*
Texas A&M University

3:15 PM **BREAK**

3:30 PM **WPM-B.3**
Radiological Emergency Response Education: Teaching the Next Generation of Radiation Professionals
Marianno, C.
Texas A&M University

4:00 PM **WPM-B.4**
Dose Estimation and Effects of Radioactive Particulate Inhalation in Search and Rescue Dogs
Trevino, J., Marianno, C., Poston, J., Bisset, W.
Texas A&M University, Texas A&M University Veterinary School

4:30 PM **WPM-B.5**
A Review of the Indonesian Emergency Response Plan
Volia, M.
Texas A&M University, College Station

2:15 - 5:00 PM Madison Ballroom C

WPM-C: Decommissioning Section Special Session: Real World Applications of Various Computer Codes

Chair: Sarah Roberts

2:15 PM **WPM-C.1**
Decommissioning Software Applications
Boerner, A.J.
Oak Ridge Associated Universities

2:45 PM **WPM-C.2**
Air Dispersion Modeling in Planning Decontamination and Decommissioning of Highly Contaminated Buildings
*Droppo, J.G., Napier, B.A., Rishel, J.P.**
Pacific Northwest National Laboratory

3:15 PM **WPM-C.3**
A Ranked Set Sampling Design Procedure for Class 1 Final Status Surveys Involving Hard-to-Detect Radionuclides in Soil Using Visual Sample Plan
Vitkus, T.
ORAU

3:45 PM **BREAK**

4:00 PM **WPM-C.4**
Challenges in Measuring, Analyzing, Visualizing, and Predicting Gamma Radiation Fields in 3 Dimensions at the Chernobyl Nuclear Power Plant
Strom, D.
PNNL

4:30 PM **WPM-C.5**
An Update on the Development and Application of the RESRAD Family of Codes
Yu, C.
Argonne National Lab

5:00 PM **Decommissioning Section Business Meeting**

2:30 - 4:45 PM Madison Ballroom D

WPM-D: Medical Health Physics III

Chair: George Xu

2:30 PM **WPM-D.1**
Hot Cell Shielding Design for I-124-NM404: A Novel Positron Emission Tomography Imaging Agent
Riley, D., Yang, Y., Campos, D., Wickre, P., Fowler, T., Bednarz, B.
University of Wisconsin, Madison

2:45 PM **WPM-D.2**
Monitoring Compliance with Institutional CTDIvol Notification Value Policy
Supanich, M.P., Bevins, N.B., Vanderhoek, M.*
Henry Ford Health System

3:00 PM **WPM-D.3**
Hypothetical Treatment Modality for HER2+ Breast Cancers Based on BNCT with Gold Nanoparticles
Tamplin, M., Jevremovic, T., Magda, J.
Utah Nuclear Engineering Program, University of Utah

3:15 PM **WPM-D.4**
Radiation Transmission Data for Radionuclides used in Novel Nuclear Medicine Procedures.
*Yang, Y., Wickre, P., Bednarz, B.**
UW-Madison, WI

3:30 PM **BREAK**

3:45 PM **WPM-D.5**
An Advanced Interface Program for Construction and Conversion of Multiple Monte Carlo Radiation Transport Models
Yu, S., Wang, D., Gan, Q., Cheng, M., He, T., Wu, M., Long, P., Zeng, Q., Hu, L., Wu, Y.*
Institute of Nuclear Energy Safety Technology, University of Science and Technology of China

4:00 PM **WPM-D.6**
Error Analysis of Medical Images Using Statistical Approach
Aceil, S.
Alcorn State University

4:15 PM **WPM-D.7**
The University of Florida/National Cancer Institute Family of Hybrid Computational Phantoms Representing the Current United States Population of Adults and Pediatrics
Geyer, A.M., O'Reilly, S., Lee, C., Bolch, W.E., Stepusin, E.J., Long, D.J.
University of Florida, National Cancer Institute

4:30 PM **WPM-D.8**
Characterizing the Dose Fields of the Radionuclide Cu-64-ATSM in Canines using PET
Hetrick, L., Kraft, S., Kato, T., Furukawa, T., Fujibayashi, Y., McMillan, D., Zhang, D.
Colorado State University

4:45 PM **RSO Section Business Meeting**

2:30 - 5:30 PM **Lecture Hall**

WPM-E: Special Session: Licensing & Regulatory Issues Dealing with a Low-Level Waste Disposal Facility

Chair: Scott Kirk

2:30 PM **WPM-E.1**
Regulatory Affairs Update for the WCS Low-Level Radioactive Waste Disposal Facilities
Kirk, S.
Waste Control Specialists LCC

3:30 PM **BREAK**

4:00 PM **WPM-E.2**
RAP Region 4 ID Test
Hayes, R., Beekman, M.
WIPP/RAP Region 4

4:30 PM **WPM-E.3**
RAP Region 4 Consequence Management Test
Hayes, R., Beekman, M.
WIPP/RAP Region 4

5:00 PM **WPM-E.4**
RAP Region 4 Pedestrian Search Test
*Hayes, R., Beekman, M.**
WIPP/RAP Region 4

2:30 - 5:00 PM Hall of Ideas EH

WPM-F: Environmental II

Co-Chairs: Hank Siegrist, John Jacobus

2:30 PM WPM-F.2

Detection and Analysis of Low Level Tritium in Rainwater for Proposed Environmental Monitoring Program

Gillis, J., Jackson, D., Gay, D., Brandl, A.
Colorado State University, Fort Collins

2:45 PM WPM-F.3

Stable and Radioactive Metal Contamination in Bangs Lake, Grand Bay National Estuarine Research Reserve

Kurgatt, S., Johnson, E., Essien, F., Glasgow, D.
Florida A & M University, Oak Ridge National Laboratory

3:00 PM WPM-F.4

Concentration Levels of 137Cs in Soil of the State of Zacatecas, Mexico, Before and After the Fukushima Accident

Mireles-Garcìa, F., D·Vila-Rangel, J.I., Pinedo-Vega, J.L., Rìos-MartÌnez, C., Saucedo-Anaya, S.A., Lûpez-del-Rìo, H., Valdez-Arteaga, M.G., Jaureguí-Mancillas, A.
Autonomous University of Zacatecas

3:15 PM WPM-F.5

Methodology Used to Evaluate and Further Analyze Radionuclide Measurements Following Fukushima

Sublett, S., Guss, P., Wasiolek, P., Brandl, A.
Colorado State University, National Security Technologies, LLC

3:30 PM BREAK

4:00 PM WPM-F.6

Comparing OLTARIS and Monte Carlo Estimations for Deep Space Dose Analysis

Baunach, J.D., Singleterry, R.C., Stabin, M.G.
Vanderbilt University, NASA Langley Research Center

4:15 PM WPM-F.7

Quantification of Dry Concentration Factor for 134Cs in Marine Diatom Thalassiosira Weissflogii

*Krzyaniak, N., Higley, K., Napier, J.**
Oregon State University

4:30 PM WPM-F.8

Bloomsburg University Joins the RADNET System

Barnhart, J., Simpson, D.
Bloomsburg University

4:45 PM WPM-F.1

Evaluation of Radioactive Air Emission at SLAC

Chan, I.
SLAC National Accelerator Lab

6:00 - 8:00 PM Lecture Hall

WPM-G: Aerosol Measurements

Chair: Morgan Cox

6:00 PM WPM-G.1

A Hybrid Peak-Fit Algorithm for Personal Contamination Monitors (CAMs)

Baltz, D.
Bladewerx

7:00 PM WPM-G.2

International Electrotechnical Commission (IEC) Standards for Airborne Radioactivity Measurements

Cox, M.
CHP, Moreland Hills, OH

THURSDAY

7:00-8:00 AM **Hall of Ideas F**

CEL -7 How to Reduce Errors for Radiation Safety Decisions
Johnson, R.
Radiation Safety Counseling Institute

7:00-8:00 AM **Hall of Ideas G**

CEL-8 From Oklo to the Galaxy: Nuclear Criticality as a Contributor to Gamma Ray Burst Events
Hayes, R.B.
Nuclear Waste Partnership LLC

8:30 - 10:30 AM Madison Ballroom A

THAM-A: Emergency Planning / Emergency Response

Co-Chairs: Craig Bias, Stacey Sedano

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

Update of the Canadian Guidelines for Protective Actions During a Nuclear Emergency
Beaton, D., Bergman, L., Chen, J.
Radiation Protection Bureau, Health Canada

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

The NCRP Operation Tomodachi Radiation Dose Assessment Peer Review
Grissom, M., Till, J., Apostoaei, A., Kennedy, W., Mercier, J., Boice, J.
MPG—HP, Inc., RAC, Neeses, SENES Oak Ridge, Inc., Dade Moeller & Associates, Tech62, NCRP

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

Environmental Radiation Monitoring Data Standardization - A Key Component of a Coordinated Radiological Emergency Response
Allen, B., Crawford, S., Blumenthal, D., DeCair, S., Glassman, E.
Chainbridge Technologies, DHS/FEMA, DOE/NNSA, EPA, ORISE/ORAU

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

Medical Facility Experience with the Shared Burden Improvised Nuclear Device Drill
Jackson, A., Snider, J.
Henry Ford Hospital

9:30 AM **BREAK**

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

Recovery of Ir-192 HDR Source at NYU after Hurricane Sandy
Piccolo, R., Snyder, W., DeWyngaert, J., Haskell, M., Wagner, S., Piccolo, R.
Varian Medical Systems, Inc, NYU Langone Medical Center

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

The Development of a Livestock Decontamination Protocol
Sprenger, P., Brandl, A., Johnson, T.
Colorado State University

8:30 - 11:45 AM Madison Ballroom B

THAM-B: Instrumentation

Co-Chairs: James Voss, Katharine Arzate

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

Personal Real-Time Alpha and Beta Particulate Air Monitors as Electronic Dosimeters for Airborne Radioactivity
Voss, J.
Voss Associates

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

Areal Radiological Surveys - A Comparison of Radiation Detection Technologies.
Bailey, D., Cardarelli, J., Johnson, T.
Colorado State University, EPA

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

Calibration of AMS Radiation Detection Systems DOE/NV/25946—1695
Malchow, R., Wasiolek, P.
Remote Sensing Laboratory

9:15 AM **THAM-B.4**
ANSI N13.1-1999 Stack Testing for Nuclear Power Plants
Asamoto, B., Ramakrishna, N., Owen, S., Held, M., McNair, G., Madden, C.
Consultant for HI-Q Environmental Products Company, Inc., HI-Q Environmental Products Company, Inc., Energy Northwest

9:30 AM **THAM-B.5**
Efficiency Modeling for Neutron Detectors
Scallan, L., Brandl, A., Kiser, M.
Colorado State University

9:45 AM **BREAK**

10:15 AM **THAM-B.6**
False Neutron Response Resulting from Cross Talk of a Neutron/Gamma Scintillator Radioisotope Identifier
Hale, A.
United States School of Aerospace Medicine

10:30 AM **THAM-B.7**
A Compact Multi Element Tissue Equivalent Proportional Counter for Low Energy Neutron Fields
Ali, F., Waker, A.J., Waller, E.
University of Ontario Institute of Technology

10:45 AM **THAM-B.8**
Using a Mobile Large Volume Gamma Ray Spectrometer System to Detect Radioactive Particles at a Nuclear Site
Sander, L., Grasty, R., Martel, J., Bates, M.
Sander Geophysics Ltd., Gamma-Bob Inc.

11:00 AM **THAM-B.9**
Advances in Mechanically Cooled High Purity Germanium Detectors
Whorton, J.T.
ORTEC

11:15 AM **THAM-B.10**
Qualification of an Electronically Cooled Gamma Spectroscopy System
Arzate, K., Reese, S., Gray, C.
Cabrera Services Inc.

11:30 AM **THAM-B.11**
Performance of the LED Stabilized 3" x 5" x 16" NaI Detector
Oginni, B.M., Bronson, F.L., Mueller, W.F.
Canberra Industries Inc, Meriden, CT

8:30 - 11:30 AM Madison Ballroom C

THAM-C: Risk Analysis

Co-Chairs: Otto Raabe, Thomas Mohaupt

8:30 AM **THAM-C.1**
Perceptions of Product Irradiation in a College Population
Condon, C., Johnson, T., Peel, J.
Colorado State University

8:45 AM **THAM-C.2**
Understanding Ionizing Radiation Carcinogenesis
Raabe, O.G.
University of California, Davis

9:00 AM **THAM-C.3**
Putting Radiation Risk into Perspective
Mohaupt, T.
St. Jude Children's Research Hospital

9:15 AM **THAM-C.4**
Proof of Principal and Future Applications of the Run-Ahead Predictive Simulation Software (RAPSS)
Makinson, K., Klein, A.
Oregon State University

9:30 AM **BREAK**

10:00 AM **THAM-C.5**
Dose and Dose-Rate Effectiveness Factors
Hoel, D.
Medical University of South Carolina, Charleston

10:15 AM **THAM-C.6**
Talking about Radiation: Rhetorical Contexts, Audience Analysis, and Risk Communication
Goldin, E.T.
University of Nevada, Reno

10:30 AM **THAM-C.7**
Preliminary Study on Effects of Variation in Baseline Lifetime Cancer Risk on Epidemiological Provability of Cancer at Low Doses
Ogino, H., Hattori, T., Iwasaki, T., Hamada, N., Fujimichi, Y., Yoshida, K.
Central Research Institute of Electric Power Industry

10:45 AM **THAM-C.8**
Dose Estimates Resulting from Improved Location and Terrain Shielding Data for the Japanese Atomic Bomb Survivors
Cullings, H.M., Grant, E.J., Watanabe, T., Oda, T., Funamoto, S., Ozasa, K., Kodama, K.
Radiation Effects Research Foundation

11:00 AM **THAM-C.9**
Digestive Tract Cancer Mortality in Mayak Worker Cohort
Osipov, M., Sokolnikov, M.
Southern Urals Biophysics Institute, Russia

11:15 AM **THAM-C.10**
The Morbidity Rate of Malignant Neoplasms of Hematopoietic and Lymphoid Tissue among the Individuals Who have been Exposed to Technogenic Radiation in Childhood
Martinenko, I.A.
Southern Urals Biophysics Institute

8:45 - 11:45 AM Madison Ballroom D

THAM-D: Operational Health Physics

Co-Chairs: Hanna Moussa, Matthew Moeller

8:45 AM **THAM-D.2**
Comparison of Academic Classroom Lecture Verses Intern Practical Applications at a Nuclear Power Plant
Hurst, V.
Texas State Technical College

9:00 AM **THAM-D.3**
How the Subconsious Mind Makes Decisions for Radiation Safety
Johnson, R.H.
Dade Moeller Training Academy

9:15 AM **THAM-D.4**
Progress on Developing Methods to Forecast Radiation Doses from Solar Particle Events
Moussa, H., Townsend, L.
Texas Tech University, University of Tennessee

9:30 AM **THAM-D.5**
The Business of Health Physics - Looking Back to See Ahead
Moeller, M.
Dade Moeller

9:45 AM **BREAK**

10:15 AM **THAM-D.6**
Community Involvement of the Colorado State University Health Physics Program: Ideas for Boosting Interest in and Understanding of Radiation and Radiation Protection
Martinez, N., Johnson, T.
Colorado State University

10:30 AM **THAM-D.7**
Maintaining Strong Radiation Protection Programs in the Face of Shrinking DOE Budgets
Ikenberry, T., Wright, E., Hearnsberger, D., Herrington III, W., McCartney, K.
Dade Moeller, Argonne National Laboratory

10:45 AM **THAM-D.8**
Aerosol Size Distribution in the Schwartzwalder Uranium Mine
Liu, X., Doerges, J., Volckens, J., Johnson, T.
Iowa State University, Colorado State University

11:00 AM **THAM-D.9**
Current Status of The Accreditation of Radiological Laboratories in the US
Voss, J.
Voss Associates

11:15 AM **THAM-D.10**
Occupational Radiation Dose to JPL Staff from MMRTG Activities for the MSL Launch
Martz, M., Phillips, J., Clarke, E., Gurney, J., Lake, D.
Jet Propulsion Lab, Idaho National Lab, Kennedy Space Center

11:30 AM **THAM-D.1**
Resurrecting a Radiation Protection Program
Krieger, K., Morris, L., Stallard, A.
Texas State Technical College

8:30 - 10:15 AM **Lecture Hall**

THAM-E: Contemporary Topics in Health Physics

Chair: Kenneth Krieger

8:30 AM **THAM-E.1**
A Health Physics Student's Experience at the AECL ZED-2 Reactor Physics Winter School
Muelelr, B., Parson, J., Johnson, T.
Colorado State University

8:45 AM **THAM-E.2**
Use of Hardware Accelerators for Monte Carlo-based Neutron Radiation Transport: A Preliminary Study
*Riblett, M.J., Liu, T., Ji, W., Xu, X.G.**
Rensselaer Polytechnic Institute

9:00 AM **THAM-E.3**
Smile for the Camera
Sun, C.
HPS

9:15 AM **THAM-E.4**
Health Physicist's Liability
Monteau, D.
Nuclear Risk Specialists

9:30 AM **THAM-E.5**
Examples of Unreliable/Invalid Science Reporting in Journalism, and a Method for Strategically Improving Topical Scientific Discourse in the Media
Krieger, K., Lohaus, J.
Radiation Technology Inc, ML Scientific

9:45 AM **THAM-E.6**
Radiofrequency Fadiation May Help Astronauts in Space Missions
Abdollahi, H., Khademi, S.
Kerman University of Medical Sciences, Iran, Mashhad University of Medical Sciences, Iran

10:00 AM **THAM-E.7**
The Thorium Fuel Cycle: Revisiting the Road Not Taken
Ulsh, B.A., Rich, B.L.
M.H. Chew & Associates

8:30 - 11:00 AM **Hall of Ideas EH**

THAM-F: Environmental III

Co-Chairs: Scott Hay, Phil Rutherford

8:30 AM **THAM-F.1**
Biological Remediation Strategy for Immobilizing Cs-137 in Soils
Whitlow, J., Higley, K., Comolli, M., Bensen, M., Parson, J.
Oregon State University

8:45 AM **THAM-F.2**
Mycoremediation of Radiation Contaminated Soils
Rasmussen, E., Stamets, P. (Presented by LaZar, S.)
Mycelium Group International

9:00 AM **THAM-F.3**
Finding Radiotrophic Mutualist Mycorrhizae Suitable for Bioremediation
Neville, D.R., Gomez-Fernandez, M., Jia, J., Higley, K.A.
Oregon State University

9:15 AM **THAM-F.4**
Applications of Chitosan for Environmental Remediation
Leonard, M., Higley, K., Knox, A.
Oregon State University, Savannah River National Laboratory

9:30 AM **THAM-F.5**
Radiation Dose-Effects Relationships in the Freshwater Snail *Campeloma decisum*
Bennett, E., Walsh, S., Cochrane, C., Jia, J., Gomez-Fernandez, M., Carr, J., Rowan, D., Higley, K.
Oregon State University, Chalk River Laboratories

9:45 AM **BREAK**

10:15 AM **THAM-F.6**
Zoogenic Transfer of Technogenic Radionuclides by Faunal Forms as a Factor of Exposure to Population
Nevolina, I.V., Dmitrieva, A.V., Smagin, A.I., Suslova, K.G., Vostrotin, V.V.
Southern Urals Biophysics Institute

10:30 AM **THAM-F.7**
The Experimental Method to Monitor Organically Bound Tritium
Kabanov, D.I., Kochetkov, O.A., Semenova, M.P.
Scientific Research Center - A.I.Burnasyan Federal Medical Biophysical Center of the Federal Medical Biological Agency (SRC-FMBC), Russia

10:45 AM **THAM-F.8**
Environmental Radiological Assistance Directory (ERAD)
McLellan, K., Favret, D.
Department of Energy

AAHP Courses

Saturday 6 July 2013 - 8 AM-5 PM - Madison Concourse Hotel

AAHP 1 Parlor 629

Introduction to Medical Health Physics

Vetter, R.J., Miller, K.L.

Mayo Clinic, Penn State Hershey Medical Center

The medical health physicist works with physicians, medical physicists, biomedical researchers, allied health personnel and administrators to assure the safe use of machine produced ionizing radiation, radioactive materials, and sealed sources, as well as sources of non-ionizing radiation in clinics, hospitals, and laboratories. Ionizing radiation sources typically include linear accelerators and sealed sources in radiation therapy, x-ray machines in diagnostic radiology and cardiology, and sealed and unsealed radioactive sources in nuclear medicine and biomedical research. This course provides an introduction to medical health physics and addresses basic program elements without going into the depth necessary to become an expert medical health physicist. Due to the breadth of a comprehensive medical health physics program, discussion in this course will be limited to protection in fluoroscopy, nuclear medicine, and brachytherapy, regulatory compliance, human subject research and interactions with the Institutional Review Board, and responsibilities of the radiation safety officer. Each of eight lectures will include didactic material on specific subjects, identification of a pearl of wisdom, and discussion of one problem similar to those on the certification exams offered by the American Board of Health Physics and American Board of Medical Physics.

AAHP 2 Capitol A

How We Make Decisions for Radiation Safety and are Prone to Errors

Johnson, R.

Radiation Safety Counseling Institute

How can people make instant decisions for radiation safety when they have little or no data, no time to gather data, and little capability to understand the data if they had any? The answer is in the normal functioning of our subconscious minds which are programmed to constantly scan all inputs for predicting danger and reacting accordingly. We have survived as a species by paying attention to our instincts for avoiding danger. Because of repeated bad news stories about radiation by the media we have learned that radiation is to be feared and avoided at all costs. Our subconscious mind does not evaluate the risks of radiation before making an instant decision for safety. Evaluation of risks is a function of the slow, deliberate, rational, logical processes of our conscious mind. Since subconscious decisions for safety are not derived by reasoning, attempts to persuade people to change their minds by reasoning may not be successful. Because the subconscious mind does not hear qualifiers like “not,” “low,” or “small,” when we tell someone, “You do not have to be afraid,” all they hear is “be afraid.” Also while fast decisions by the subconscious mind are vital for protecting us from the imminent danger of a striking snake, the subconscious mind is very prone to numerous errors for decisions about dangers that are not imminent, such as radiation. Although subconscious decisions are fraught with fallacies, the conscious mind is not inclined to seek out information to change

the decisions. Why would anyone want to change their views about radiation? Isn't it better to be safe than sorry? As specialists in radiation safety can we benefit from understanding how people make decisions for radiation safety and can we influence the process to facilitate more balanced decisions? The answer is a definite YES. However, we will need to commit the energy to move out of our own comfort zone of subconscious decisions to become open to insights from the psychology of radiation safety. This workshop is an opportunity to go beyond our technical understanding of radiation to prepare for dealing with people issues in radiation safety. Attendees should bring real world issues and questions for processing in classroom exercises. This workshop is not about listening to theories, but learning from practical applications

AAHP 3 Capitol B

Overview of Internal Dosimetry

Toohey, R.

M.H. Chew & Associates

This course will present an overview of internal dose assessment, including the ICRP systems, dose parameters and recommended limits for internal doses, the intake, biokinetic, and dosimetry models used to compute internal doses, the in-vivo and in-vitro methods used to obtain data for dose assessments, U.S. regulatory requirements, software packages used to compute internal doses, treatment options for reducing internal dose, and several detailed case studies of radionuclide intakes and dose calculations.

Professional Enrichment Program (PEP)
Sunday 7 July through Wednesday 10 July

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

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

In addition to the above-mentioned sessions for Sunday, five PEP lectures are scheduled on Monday - Wednesday 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.

Students with a current ID card will be admitted free of charge to any sessions which still have space available after the waiting list has been admitted. Student admission will be on a first-come, first-served basis and will only begin 15 minutes after the start of the session to allow for completion of ticket processing.

Please Note!!

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

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

Sunday - 8:00 - 10:00 am

1-A EH&S "Boot Camp" for Radiation Safety Professionals – Part I

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

It is currently quite rare for organizations to maintain stand-alone radiation safety programs. Resource constraints and workplace complexities have served as a catalyst for the creation of comprehensive environmental health & safety (EH&S) or risk management (RM) programs, which include, among other health and safety aspects, radiation safety programs. But many of these consolidations were not inclusive of staff training to instill an understanding of the areas now aligned with the radiation safety function. This situation is unfortunate because when armed with a basic understanding of the other safety programs, the radiation safety staff can provide improved customer service and address many simple issues before they become major problems. This unique Professional Enrichment Program (PEP) series is designed to address this shortcoming by providing an overview of a number of key aspects of EH&S and RM programs from the perspective of practicing radiation safety professionals who now are involved in a broader set of health and safety issues. The PEP series will consist of three 2 hour segments:

This PEP will address "The Basics of Risk Management & Insurance" and "The Basics of Fire & Life Safety." The risk management and 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.

1-B. Laser Safety for Health Physicists

Ben Edwards

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 Z136.1-2007 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. Students will also find bringing their own copy of ANSI Z136.1-2007 a helpful reference.

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

Morgan Cox

NOTE: It is suggested to attend both ANSI N42 standards PEP courses for maximum effect.

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

This PEP course includes the discussion of some eighteen ANSI N42 standards for Radiation Protection Instrumentation (RPI) in effect, being revised or being combined, including those for performance & testing requirements for portable radiation detectors, ANSI N42.17A for normal environmental conditions and ANSI N42.17C for extreme environmental conditions and ANSI N42.323A/B, for calibration of portable instruments over the entire range of concern, i.e., in the normal range and for near background measurements; performance criteria for alarming personnel monitors in ANSI N42.20; airborne radioactivity monitors in ANSI N42.30 for tritium, ANSI N42.17B for workplace airborne monitoring, ANSI N42.18 for airborne and liquid effluent on-site monitoring, and ANSI N323C for test and calibration of airborne radioactive monitoring; instrument communication protocols in ANSI N42.36; in-plant plutonium monitoring in ANSI N317; reactor emergency monitoring in ANSI N320; carbon fiber personnel dosimeters in ANSI N322; installed radiation detectors in ANSI N323D; ANSI N42.26 for personnel warning devices; radon progeny monitoring in ANSI N42.50; and radon gas monitoring in ANSI N42.51.

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

1-D Introduction to CAP88 PC Version 4

Reid J. Rosnick

US Environmental Protection Agency

NOTE: It is suggested to attend both CAP88 PC PEP courses for maximum effect.

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 first class is more of an introduction to the CAP88 code, including what it does, how it does it, the models and equations used behind the scenes, how and where to download, install, and run the code, the file types and where the files would be located, etc. This course would be intended for a novice or new user, although more experienced users could also benefit from the background information.

This class includes software demonstrations of how to use the code properly, with participants encouraged but not required to bring a laptop with CAP88 installed.

1-E So now you're the RSO: Elements of an Effective Radiation Safety Program

Thomas L. Morgan
Columbia University

Designation as a Radiation Safety Officer brings with it unique opportunities and challenges. The author will offer insights on how to manage a radiation safety program from his 18 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.

Sunday - 10:30 AM – 12:30 PM

2-A EH&S "Boot Camp" for Radiation Safety Professionals – Part II

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

See description for PEP 1-A. Part 2 will examine "Security 101 for Radiation Safety Professionals" and "The Basics of Biological & Chemical Safety". The first part of this session will focus on security as it is applied in 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.

2-B Performing ANSI Z136-based Laser Safety Hazard Calculations

Ben Edwards
Vanderbilt University

This course provides a step-by-step guide for performing laser hazard calculations based on the principles and methodology in the ANSI Z136.1-2007 Standard for the Safe Use of Lasers. Some proposed changes in the MPE calculations planned for the next revision of the Z136.1 Standard will also be discussed. 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 in the ANSI 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 key concepts under discussion. Students will also find bringing their own copy of ANSI Z136.1-2007 a helpful reference.

2-C Status of ANSI N42 Standards for Homeland Security Instruments

Morgan Cox

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

Instrumentation (HSI), including those for performance criteria for personal radiation detectors in ANSI N42.32; portable radiation detectors in ANSI N42.33; portable detection and identification of radionuclides in ANSI N42.34; all types of portal radiation monitors in ANSI N42.35; for training requirements for homeland security personnel in ANSI N42.37; spectroscopy-based portal monitors in ANSI N42.38; performance criteria for neutron detectors in ANSI N42.39; neutron detectors for detection of contraband in ANSI N42.40; active interrogation systems in ANSI N42.41; data formatting in ANSI N42.42; mobile portal monitors in ANSI N42.43; checkpoint calibration of image-screening systems in ANSI N42.44; criteria for evaluating x-ray computer tomography security screening in ANSI N42.45; performance of imaging x-ray and gamma ray systems for cargo and vehicles in ANSI N42.46; measuring the imaging performance of x-ray and gamma ray systems for security screening of humans in ANSI N42.47; spectroscopic personal detectors in ANSI N42.48; personal emergency radiation detectors (PERDs) in ANSI N42.49A for alarming radiation

detectors and in ANSI N42.49B for non-alarming radiation detectors; backpack-based radiation detection systems used for Homeland Security in ANSI N42.53; and portable contamination detectors for emergency response in ANSI N42.58.

2-D CAP88 PC Version 4 Advanced Topics

Reid J. Rosnick
US Environmental Protection Agency

This second course on CAP88 PC Version 4 is tailored for more advanced and experienced users of the code, and would include 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.

This class also includes software demonstrations of how to use the code properly, with participants encouraged but not required to bring a laptop with CAP88 installed. We envision that participants who attend the first course would have sufficient knowledge so that they could also take the second course and understand the ideas and material presented.

2-E Tools and Strategies for Modeling Radionuclides in the Environment - Part I

Edward Waller
University of Ontario Institute of Technology

Environmental modeling is important for a variety of reasons, including establishing baselines, determining transport and effects radionuclide releases during both accident and non-accident conditions, and demonstrating compliance with local, state and federal regulations. In addition, increased emphasis is being placed on effects to non-human biota, and therefore standard environmental models are being modified to accommodate these receptors.

A full treatment of all environmental modeling principles is beyond the scope of a 2 hr PEP; interactive discussion of various tools to aid radiation professionals in performing environmental modeling and assessment will be performed. As such, this PEP may be regarded as a basic introduction to environmental modeling, and is not oriented towards the professional that routinely utilizes these tools. It will introduce the participant to tools that are readily available for this mission.

Part I of this PEP will focus on:

(i) Introduction to environmental modeling

(ii) Basic equations and references - where to find them and when to use them

Students are encouraged to bring their laptops to follow along with the instructor. Students will be provided with materials, links and information to enable them to rapidly utilize some of the tools at their immediate disposal.

2-F Clarifying the Application of Standard or Ambient Gas Volumetric Measurements

James Voss, Scott Owen
Voss Associates, Hi-Q Environmental Products Company, Inc.

The objective of this PEP is to clarify the concept and application of “standard” and “ambient” units when performing gas volumetric measurements. In the context of this presentation “Standard” means STP (Standard Temperature and Pressure) while “Ambient” means the actual conditions at which the measurement is made (Actual Temperature and

Pressure). The user must be aware that definitions of "Standard" conditions are slightly different and abundant. To convert between "Standard" and "Ambient" gas volumes it is necessary to establish which units are to be used. Various ANSI standards reference standard temperature as 20, 22, or 25 degrees Centigrade and standard pressure as 760 mm Hg or 29.92 inches Hg. Standard Temperature and Pressure as defined by IUPAC (International Union of Pure and Applied Chemistry) is air at 0oC (273.15 K, 32 oF) and 105 pascals. Commonly used in the Imperial and USA system of units - is air at 60 oF (520 oR) and 14.696 psia (15.6oC, 1 atm). Note that the earlier IUAPC definition of STP to 273.15 K and 1 atm (1.01325 105 Pa) is discontinued.

Sunday - 2:00 – 4:00 PM

3-A EH&S "Boot Camp" for Radiation Safety Professionals – Part III

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

See description for PEP 1-A. Part 3 will focus on "Measuring and Displaying Radiation Protection Program Metrics That Matter to Management". Radiation protection programs typically 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.

3-B Non-Ionizing Radiation: An Overview of Biological Effects and Exposure Limits

Ben Edwards
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 "ionizing" part of the electromagnetic 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 consensus "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 envelop 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 safety interests or responsibilities will benefit from this course.

3-C NRC Nuclear Safety Culture

Paul J. Zaffuts
Morgan, Lewis & Bockius LLP

This class will address NRC's expectations for a strong nuclear safety culture and safety conscious work environment (SCWE) and will provide the participants with an understanding of:

The principles and elements of the NRC's safety culture and SCWE policies.

How the NRC incorporates these areas into its inspection and assessment regime.

The safety, legal, and regulatory risks of a degraded safety culture and SCWE, such as increased possibility of human error, failures to appropriately identify and resolve issues and concerns, enhanced NRC scrutiny, NRC investigations, claims of whistleblower retaliation, and adverse publicity.

Real-life practices and methods to assess and enhance the safety culture and SCWE.

Relevant case studies and challenges.

This is a timely presentation because the NRC is expanding its emphasis on safety culture and SCWE beyond power reactors and fuel cycle facilities. For instance, the NRC is now providing notice to all licensed users of radiological materials of its safety culture policy statement and "encouraging" licensees to review it and "adapt it to your particular needs in order to develop and maintain a positive safety culture as you engage in NRC-regulated activities."

3-D Role of the Health Physicist in Radiation Accident Management

Richard Toohey
M.H. Chew & 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 victims. When a 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.

3-E Tools and Strategies for Modeling Radionuclides in the Environment - Part II

Edward Waller
University of Ontario Institute of Technology

See description for PEP 1-A. Part II of this PEP will focus on:

(i) Overview of common tools used in environmental modeling studies, for example:
- Spreadsheets
- RESRAD
- HOTSPOT
- ERICA
- Commercial/Limited distribution specialized software

(ii) Introductory uncertainty analysis (using CrystalBall)

Students are encouraged to bring their laptops to follow along with the instructor. Students will be provided with materials, links and information to enable them to rapidly utilize some of the tools at their immediate disposal.

3-F Estimating the Uncertainties in Radiological Measurements

James T. Voss
Voss Associates

The objective of this PEP is to provide an overview of the many variables involved in estimating the uncertainties in radiological measurements. It is desired that radioactive sources and radiation instrument calibrations be traceable to NIST (National Institute of Standards and Technology) or other recognized NMI (National Metrology Institute). Where no recognized standard source exists it may be necessary to rely on the concept of "first principles." A radioactive source or transfer instrument provided by NIST or recognized NMI will have an uncertainty attached to its stated value. In addition it may be necessary for the user to adapt a process to the supplied radioactive source, such as extracting radon-222 gas from a solid radium-226 source. That process will have an uncertainty value to be factored into the overall radiological measurement uncertainty. The process of preparing solid or liquid radioactive sources from a standard source from NIST or recognized NMI will have an uncertainty attached to it. When that standard source is used by a calibration facility to calibrate radiation detectors there is again an uncertainty attached. Further, when the radiation detector is used to make the actual radiological measurement we again have an uncertainty attached to that measurement. All of these uncertainties go into the propagation of error calculations.

There are additional uncertainties to be taken into account such as radiological and environmental interferences. Limits of detection must also be taken into account before reaching any final statement of the value for the radiological measurement.

Monday - 12:15-2:15 pm

M-1 Developing a Laser Safety Program – Where does a Health Physicist Begin and How do you Establish a Program from Scratch?

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

The health physicist has a diverse role and may engage in many different disciplines. One of those arenas may encompass non-ionizing radiation and the safe use of lasers. Health physicists have traditionally focused on radiation protection from ionizing forms of electromagnetic radiation and may have limited knowledge in laser safety. An individual in this situation may need guidance and tools to develop a laser safety program from its foundation. This course will attempt to provide guidance and methodology to establish a laser safety program at any organization.

M-2 Characteristic Limits in Health Physics

Thomas R. LaBone
MJW Corporation

Characteristic limits are the general term for what we in health physics refer to as the detection level (DL), minimum detectable amount (MDA), and combined standard uncertainty (csu). The DL and MDA are concerned with our ability to detect an analyte in a sample, whereas the csu is used to define the interval that we think contains the true value of what we are tying to measure. In this lecture we will discuss how characteristic limits are calculated and used. In addition, we will discuss the concept of minimum quantifiable value (MQV), which is concerned with our ability to quantify an analyte rather than just detect it.

M-3 So you want to be a Medical RSO?

Ninni Jacob
Rhode Island Hospital

The Radiation Safety Program in an Academic Medical setting is very challenging, covers many departments and a wide range of personnel (employees, physicians and patients). Each of these groups presents unique opportunities for an RSO. The RSO is responsible for not only radioactive materials, but also for radiation-generating equipment- both ionizing and non-ionizing, like MRI, and lasers.

The regulations and NUREGs that govern medical institutions are more comprehensive than those for academic institutions. The RSO has to meet rigorous qualifications and experience requirements. Quality and Patient Safety are a priority at a hospital and the risk versus benefit issues come up for patients as well as human research subjects.

M-4 The MARSAME Methodology: Fundamentals, Applications, and Benefits

Alex J. Boerner, Jay Tarzia
Oak Ridge Associated Universities, Radiation Safety & Control Services

Published in January 2009, the "Multi-Agency Radiation Survey and Assessment of Materials and Equipment" manual (MARSAME) was a joint effort between the U.S. Department of Energy (DOE), the U.S. Department of Defense (DoD), the U.S. Environmental

Protection Agency (EPA), and the U.S. Nuclear Regulatory Commission (NRC) to aid sites in the clearance of materials and equipment (M&E). The MARSAME manual supplements the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), published in 1997.

As cited in the MARSAME, a variety of M&E can be applied to this process, including (but not limite to) metals, concrete, tools, equipment, piping, conduit, and furniture. The MARSAME methodology is a defense in depth methodology which involves a stepwise approach to material release. The process starts with an initial historical assessment to identify potential radionuclides and radioactive processes that could have impacted the material. After this initial knowledge is gained, Measurement Quality Objectives (MQOs) are developed as a basis to plan characterization and final surveys for material release. Finally, the survey plans and survey implementation results are reviewed against Data Quality Assessment (DQA) criteria developed to ensure that the survey results meet the original objectives.

Flexibility and a graded approach are inherent components of the MARSAME methodology. Because large quantities of M&E potentially affected by radioactivity are present in the United States and abroad, owners of the M&E need to identify acceptable disposition options. Thirteen disposition scenarios are described in MARSAME. If the methodology is appropriately planned and implemented, the benefits of the MARSAME approach include worker and public protection, reduction in the amount of disposed radioactive waste, reuse of materials (resulting in environmental and material sustainability advantages), and cost savings.

This class introduces participants to the MARSAME methodology. It will be an interactive learning environment and (limited) exercise discussions are included. (Please bring a calculator just in case!). During the class, practical applications of MARSAME will be discussed to present how the process can be adapted to release material under a variety of scenarios. Lessons learned from MARSAME implementation will also be discussed.

M-5 Part I - Radiation Safety Decisions - How We are Prone to Errors

Ray Johnson
Radiation Safety Counseling Institute

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 have survived by this innate ability to foresee dangers and take protective actions accordingly. Predicting danger is not something we do consciously by evaluation of facts or circumstances. For example, if we took the time to analyze whether a nearby snake looks angry and whether it is close enough or fast enough to strike us, it may be too late. Instead our subconscious has automatically responded with an order to our body which says jump back. In fact, we have probably jumped back before we are even consciously aware of the snake at our feet. Our subconscious 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. In the process of making decisions for radiation safety, 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 beliefs then become the basis for instant decisions.

Tuesday - 12:15-2:15 pm

T-1 Nanoparticle Characterization and Control Fundamentals: A Graded Approach

Mark D. Hoover
National Institute for Occupational Safety and Health

Given the considerable current interest in characterizing and controlling risks to worker health from potential exposures to engineered nanoparticles, this course will present an update on existing and emerging national and international information resources and a graded approach to sampling, characterization, and control of nanoparticles in the workplace. The graded approach begins with process knowledge, particle counting, and microscopy assessments for level 1 for initial screening; a level 2 for comprehensive characterization of detailed composition, size, concentration, and biophysical property assessments; and (ideally) an economical and efficient level 3 routine monitoring and control step involving a necessary and sufficient subset of level 1 and 2 methods for the material and situation of interest. The graded approach enables appropriate selection of handling and containment practices to match material properties and amounts. Sampling by filtration is an especially important method for collecting and evaluating any type of airborne material, including nanoparticles and other ultrafine aerosols such as radon decay products. Fundamentals will be presented for inertia (efficient collection for large particles) and diffusion (efficient collection for very small particles) that affect the efficiency and most penetrating particle size (MPPS) of filters; efficiency and MPPS for the various filter types that can be used for collection of nanoparticles; and issues for selection of filters with appropriate collection efficiency, MPPS, durability, pressure drop, and surface characteristics. Examples and nanoinformatics safety and health resources are provided.

T-2 Current Models and Methods in Medical Internal Dosimetry

Michael Stabin
Vanderbilt University

Traditional mathematical model-based anatomical models have been replaced with more realistic standardized anatomical models based on patient image data. Other recent model changes that will affect standardized dose estimates for radiopharmaceuticals include replacement of the traditional ICRP 30 GI tract model with the ICRP human alimentary tract (HAT) model and use of updated tissue weighting factors for calculation of effective dose. Calculation of

internal dose estimates from animal or human data sets requires knowledge of a number of important principles and relationships in kinetic analysis and dose assessment, and knowledgeable use of available software tools. Adjustments to traditional dose calculations based on patient-specific measurements are routinely needed, especially in therapy calculations, for marrow activity (based on measured blood parameters), organ mass (based on volumes measured by ultrasound or Computed Tomography (CT)), and other variables. This program will give an overview of standard calculation techniques and models, and demonstrate how new models have introduced changes to standard calculations, with practical examples worked out in several important areas of application. A brief discussion will be included of current issues in radiation biology that are pertinent to the interpretation of calculated dose estimates.

T-3 Fundamentals of Alpha Spectroscopy

David Pan
ORTEC

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

T-4 Health Physics Challenges in Proton Therapy

Thomas Mohaupt
St. Jude Children's Research Hospital

There are 10 operational proton therapy facilities in the U.S. with 8 more in the construction phase. 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 may play a key role in reviewing shielding and construction plans, selecting radiation 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 discussed.

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

Richard P. Harvey

Roswell Park Cancer Institute, University of Buffalo

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

Wednesday - 12:15-2:15 pm

W-1 Radiation and Life in the Universe

Andrew Karam

Director of Radiological Operations, NYPD

The universe is permeated with radiation and has been since its earliest days. Although life on Earth is a relative new phenomenon compared to the age of the universe it, too, has been exposed to radiation from terrestrial and cosmic sources since it first appeared. This radiation environment, however, has evolved gradually with time in addition to being subject to episodic fluctuations due to the occasional brief high-energy event. Both the gradual and the abrupt changes have the ability to influence life anywhere in the universe, including the evolution of life on Earth and the ability of living organisms to be transferred between planets.

In this PEP we will briefly discuss the sources of radiation in the universe and how these have likely changed with time. We will then explore how the universe's radiation levels might have influenced rates of evolution on Earth (and on any other life-bearing planets) as well as how episodic events might impact not only life on our planet, but how these might also constrain the movement of life between planets.

W-2 Part II - Radiation Safety Decisions – Reprogramming our Internal Computers

Ray Johnson

Radiation Safety Counseling Institute

As noted in Part I, everyone makes decisions instantly by subconscious processing of information from our environment to predict and avoid danger. This is true for both technical and non-technical people alike. My studies show that radiation safety professionals may also make instant decisions for safety, and then go back and rationalize their decisions to make them appear to be the product of careful analysis of actual data. We then proceed to seek out others to confirm our beliefs. As we band together (such as at an HPS conference) our beliefs become reinforced and stronger. Once a belief is established, we tend to be more open to confirmation and less open to contradictory views. Why would we seek out information that is contradictory to our beliefs? Our conscious minds are inherently lazy and do not want to expend effort to second guess intuitive perceptions and judgments even though these judgments may be strongly biased and prone to errors as discussed in Part I. Anti-radiation sentiments commonly publicized through the media have led to prevalent concerns for radiation safety. Because of such widespread concerns, much of the public is now programmed to have very cautious views about radiation. The question then becomes, "Why would anyone want to change their prevailing view that radiation is danger-

ous?" To change views requires that we engage the conscious mind to evaluate radiation safety. Rather than jumping from cause to effect, we should consider the steps that any health physicist would follow to answer questions about health risk, namely; what form and quantity of radiation are we talking about , where is it located, what are the exposure conditions, and most importantly, how much radiation energy is deposited in our body. With this information we can then say something about possible risk. Other strategies for reprogramming our subconscious minds will be offered.

W-3 Fundamentals of Gamma Spectroscopy

David Pan
ORTEC

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

W-4 Fundamentals of Neutron Detection and Detection Systems

Jeff Chapman
Oak Ridge Associated Universities

In 1932, James Chadwick published a seminal paper in the Proc. Roy. Society titled "The Existence of a Neutron." 81 years later we rely on a number of detection processes to provide neutron dosimetry for personnel, to confirm operational shielding design requirements, and to measure special nuclear materials (SNM). This PEP session will focus on the fundamentals of neutron detection and an overview of devices used to detect SNM. The following topics will be covered: fast neutron detectors; thermal neutron detectors; neutron moderation and absorption; passive neutron counting with SNAP detectors; passive neutron coincidence and multiplicity counting; active neutron interrogation; and portal monitors.

Continuing Education Lectures (CEL)
Monday 8 July through Thursday 11 July

Monday 7:00-8:00 AM

CEL-1 Fallout: The Mixed Blessing of Radiation and the Public Health
Sullivan-Fowler, M.
UW Madison's Ebling Library for the Health Sciences

This presentation will present an overview of Ebling Library's current historical exhibit, Fallout: The Mixed Blessing of Radiation & the Public Health. Material and artifacts from the exhibit and Ebling's collections will be on display.

"Fallout" is an examination of subjects such as the early use of x-rays in diagnosis & treatment, occupational hazards of working with radiation, the military use of x-rays, University of Wisconsin connections with Marie Curie, fallout shelters in the 1960s, the bombing of Hiroshima, nuclear accidents like Three-Mile Island, UW's Departments of Medical Physics & Radiology, shoe fitting fluoroscopes and the like.

The exhibit is supported by artifacts, journals, books, and other ephemera from Ebling's Rare Books & Special Collections and materials from other campus libraries and UW's Radiology Department.

"Fallout" was imagined in conjunction with UW's Go Big Read common reading program; this year's book is "Radioactive" by Lauren Redniss.

Location of exhibit: Ebling's 3rd floor Historical Reading Room and is open when the library is open.

CEL-2 NRC Nuclear Safety Culture
Zaffuts, P.J.
Morgan, Lewis & Bockius LLP

This CEL will address NRC's expectations for a strong nuclear safety culture and safety conscious work environment (SCWE) and will provide the participants with an understanding of:

The principles and elements of the NRC's safety culture and SCWE policies.

How the NRC incorporates these areas into its inspection and assessment regime.

The safety, legal, and regulatory risks of a degraded safety culture and SCWE, such as increased possibility of human error, failures to appropriately identify and resolve issues and concerns, enhanced NRC scrutiny, NRC investigations, claims of whistleblower retaliation, and adverse publicity.

Real-life practices and methods to assess and enhance the safety culture and SCWE.

This is a timely presentation because the NRC is expanding its emphasis on safety culture and SCWE beyond power reactors and fuel cycle facilities. For instance, the NRC is now providing notice to all licensed users of radiological materials of its safety culture policy statement and "encouraging" licensees to review it and "adapt it to your particular needs in order to develop and maintain a positive safety culture as you engage in NRC-regulated activities."

Tuesday 7:00-8:00 AM

CEL-3 Orphan Sources in PA and a Major Radium-226 Source Recovery Project

Allard, D.
Pennsylvania DEP Bureau of Radiation Protection

On January 19, 2012, four large circa 1920 medical radium-226 sealed sources were found at a solid waste transfer facility in Norristown, PA. The waste was from a construction debris dumpster used at an adult residential community in West Chester, PA. The total activity was estimated to be approximately one curie (Ci). The as-found shielded radiation dose rate was about 2 roentgens per hour (R/h), but the unshielded radiation dose rate from these sources was about 100 R/h at three inches. This CEL will describe the various "orphan" radioactive source situations the Commonwealth of Pennsylvania has had to address in the past 10-15 years, and, the particularly interesting challenges this recent 1 Ci of orphan Ra-226 presented with respect to public outreach and transfer or disposal scenarios.

CEL-4 Health Physicists' Professional Liability

Monteau, D.G.
Nuclear Risk Specialists

The intent of this CEL is to impart a general understanding of the professional risks associated with the Health Physics profession and to provide information about the ways to minimize its financial impact. The presentation includes topical discussion of the liability exposures associated with professional practice with a particular focus on Health Physics. Topical segments identify and define: who is at risk; what is at risk; what responsibilities give rise to the potential for an error or an omission; traditional methods of risk avoidance, safety and loss prevention; estimating the cost of risk and the range of methods used to limit and transfer costs. The meaning of indemnification is described by illustrating the contrast in the risk environment between employees and consultants. Insurance solutions such as: professional liability insurance, errors and omissions insurance and general liability insurance are defined and compared by the way these types of insurance respond to claims. Session is capped by a general discussion of professional liability claims history, the frequency of claims against Health Physicists and "Lawsuitland" where perception prevails over reality and fault and costs are unrelated topics.

Wednesday 7:00-8:00 AM

CEL-5 Emergency Preparedness: Lessons from Hurricane Sandy

Morgan, T.L.
Columbia University

Hurricane Sandy presented unique challenges to hospitals and universities in the metropolitan New York area. The majority of the population in the five boroughs was impacted in some way. In many cases, hospital and university operations were severely disrupted. In several cases, entire facilities were evacuated when primary and backup power sources failed due to flooding. This talk will discuss the challenges faced by a major research university and teaching hospital during Sandy. The author will compare and contrast lessons learned from this event with experiences at a similar type of institution located farther inland. The goal is to present general principles of planning for large-scale events capable of disrupting operations and to discuss the role of radiation safety professionals in this planning.

CEL-6 A Mindset for Managing Modern Measurements: Understanding and Meeting Current Challenges

Hoover, M.D., Cash, L.J.

National Institute for Occupational Safety and Health, Los Alamos National Laboratory

Although technology is advancing, resources to evaluate, select, and apply emerging and existing measurement options are tightening. This CEL will clarify current capabilities and gaps for instrumentation and approaches needed to anticipate, recognize, evaluate, control and confirm the presence, characteristics, and proper control or mitigation of radiation hazards. Focus will be on relevant and reliable characterization of airborne particles, including nanomaterials (<100 nm in dimension). Approaches, issues, resources, and guidance for workplace and off-site dispersion of radioactive particulate matter of all sizes will be addressed, including relative concerns for sample collection and evaluation at low or high pressures, direct aerosol dispersion as well as deposition and resuspension of particulate materials, and approaches for simultaneous measurement of multiple parameters or characterization of complex mixtures.

Thursday 7:00-8:00 AM

CEL -7 How to Reduce Errors for Radiation Safety Decisions

Johnson, R.

Radiation Safety Counseling Institute

For lack of data and technical understanding people will often draw conclusions about radiation safety by creating a coherent story based on what they have always heard. Since most everyone has heard of the dangers of radiation through the media, a coherent story will often result in jumping from cause (radiation) to effect (cancer) without considering the technical steps for evaluating radiation health risks. Because out subconscious minds are programmed to constantly scan our environment for any indications of danger, at the first sign our automatic fear response kicks in and we will react accordingly. Unfortunately, instant decisions for safety may be affected in many ways that have nothing to do with the actual circumstances. For example errors in such decisions can be affected by 1) the bias of small numbers, 2) the bias of confidence over doubt, 3) causation and chance, 4) anchoring, 5) priming, 6) familiarity and ease of recall, 7) impressions, 8) sets and prototypes, 9) the halo effect, and 10) confirmation bias. Recognizing the many ways we may be prone to errors in radiation safety decisions will allow us to reprogram our approaches for such decisions and to better help others with their decisions.

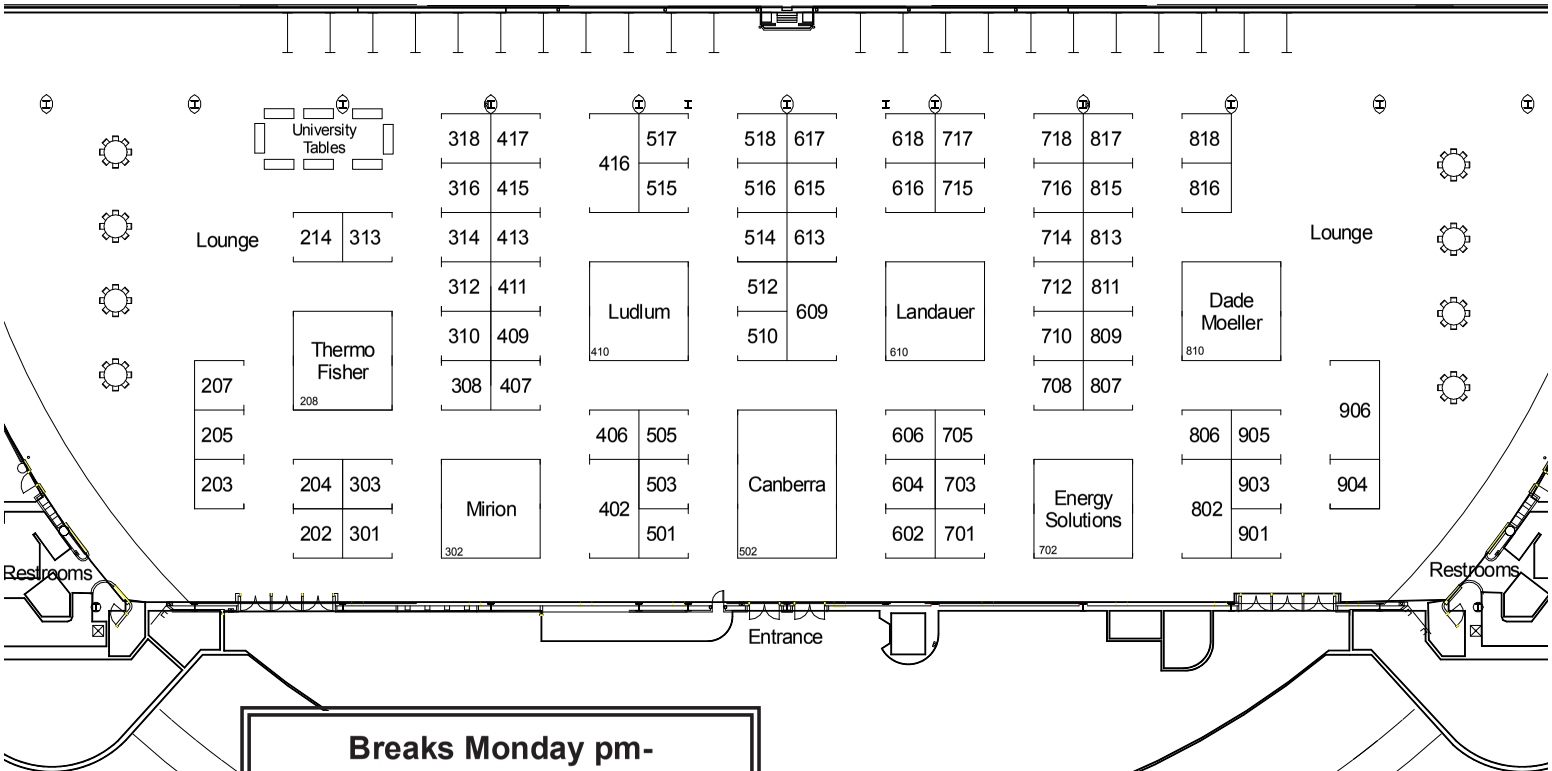
CEL-8 From Oklo to the Galaxy: Nuclear Criticality as a Contributor to Gamma Ray Burst Events

Hayes, R.B.

Nuclear Waste Partnership LLC

Gamma ray bursts are continually occurring around the universe as measured by modern satellites. Most gamma ray bursts are able to be explained using supernovae related phenomenon. Some measured results still lack compelling explanations and a contributory cause from nuclear criticality is proposed. This is shown to have general properties consistent with various known gamma ray burst properties. The galactic origin of fast rise exponential decay gamma ray bursts is considered a strong candidate for these types of events. The presentation should be of particular interest to those with any fascination in astronomy as the topic has a strong dependence on familiar terrestrial nuclear science.

2013 Exhibit Hall Floor Plan



Breaks Monday pm-Wednesday am

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

Exhibit Hall Hours

Monday	Noon - 5:00 pm
Tuesday	9:30 am - 5:30 pm
Wednesday	9:30 am - Noon

2013 Exhibitors

2014 Annual Meeting Booth: 717
Baltimore

2014 Midyear Meeting Booth: 417
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P.37 Feasibility Analysis of Incidence Risk of Cataract in the Mayak Workers Cohort

Bragin, E.V., Azizova, T.V., Bannicova, M.V.; Southern Urals Biophysics Institute

Objective of this study is to perform feasibility analysis of incidence risk of cataract in the Mayak workers cohort. The major advantages of the cohort of Mayak workers are as follows: large population size, long-lasting follow-up period (more than 50 years), individually measured doses, vital status known for 90% of the cohort. At the first stage of the study we identified all cases of cataract (2830) registered in the "Clinic" Medical and Dosimetry Database for the entire follow-up period (up to December 31, 2005). Number of cases of cataract was statistically significantly greater in males compared to females. The majority of cases of cataract were registered in 1991-2005, which can be explained by the age of study subjects in that period. According to retrospective expertise in randomly selected 300 cases of cataract, the diagnosis was confirmed in 265 cases (88.3%) and not confirmed in 11 cases (3.7%); due to the lack of data diagnosis couldn't be confirmed or refuted in 24 cases (8%).Cataracts diagnosed based on outpatient basis (211 – 79.62%) prevailed in randomly selected and verified cases (265). Information on cataract type (nuclear, cortical, posterior and anterior subcapsular) in the study group of verified cases was available for 219 individuals (73%). Surgical treatment was carried out in 39 cases of cataract (14.72%). The number of surgeries was approximately the same in males and females; however, males tend to have both eyes operated. Thus, the first stage of the study allowed concluding that the analysis of incidence risk of cataract in the cohort of Mayak workers first employed at one of the main facilities in 1948-1958 followed-up to 31.12.2005 is considered as feasible.

P.38 Determination of Equilibrium Constants for Plutonium-Fulvic Acid Complexes

Wong, J.C., Simpkins, L.A., Powell, B.A.; Clemson University

The presence of natural organic matter can increase or decrease Pu mobility in the subsurface depending on organic ligand character, pH, and soil type. To examine this phenomena, equilibrium constants were determined for aqueous plutonium (Pu) complexation with Suwanee River fulvic acid (FA) using batch experiments and solvent extraction. Batch sorption experiments for Pu in a gibbsite system have suggested that increased sorption at low pH in the presence of humic acid is due to the formation of ternary surface complexes, while decreased sorption at circumneutral pH in the presence of FA is due to the formation of aqueous complexes. Pu-FA equilibrium constants were determined from experimental solutions across the pH range 4 to 8 which contained ~1E-10 total Pu(IV) and 10 mM NaCl. After 3 days equilibration, free Pu4+ was separated by solvent extraction leaving Pu-FA complexes in the aqueous phase. Aqueous Pu was measured with liquid scintillation counting. Speciation curves were modeled in FITEQL using a four-site model for FA with discrete pKa values of 3, 5, 7, and 9. Ligand site densities were determined by potentiometic titration. The estimation of Pu-FA complexation constants will expand the thermodynamic database for Pu reactions and help de-

velop a predictive transport model for Pu. *Supported by the Subsurface Biogeochemical Research Program of the U.S. Department of Energy's Office of Biological and Environmental Research.

P.39 Utilization of Acoustically Tensioned Metastable Fluid Detectors in Health Physics

Hagen, A., Archambault, B.C., Fischer, K.F., Taleyarkhan, R.P.; Purdue University, SA Labs, LLC

A novel neutron detection methodology and possible applications in health physics are provided in the following abstract. Cavitations which occur in tensioned fluids indicate incident neutron flux. The tensile (negative) pressures needed for detection of neutrons are provided by the creation of an acoustic field within a resonant acoustic chamber using a piezoelectric transducer (PZT). This methodology and the resulting physical designs are called Acoustically Tensioned Metastable Fluid Detectors (ATMFDs). The detectors are able to detect both thermal and fast neutrons at an efficiency of above 90%, operate with complete γ blindness, and are both more economical and less complex than conventional neutron detector systems. The utility of these systems when applied to health physics lies mainly in two different applications, the detection of n yields in high γ environments, and the radiation exposure monitoring. Detection of n yields in high γ environments is especially important in calculating a supplemental dose during procedures using tungsten targets. For instance, conventional X-Ray Radiography provides an unaccounted for n dose because of the (γ,n) reaction of tungsten in bremsstrahlung sources. Akkurt demonstrated this by using irradiation foils and complicated detector geometry [1]. ATMFD systems have detected neutrons in γ environments of up to (10)^8 γ/(cm^2 s) [2], have construction costs of $200 - $2000, and can detect both fast and thermal neutrons (by leveraging boron in tri-methyl borate's (n,α) reaction) [3]. These characteristics make ATMFD systems a perfect candidate for determining the unknown n dose in tungsten target situations. The final and most obvious application of the ATMFD to health physics is in the monitoring of neutron exposure. Because of the low construction costs and current advancements in dosimetry applications for the ATMFD, it would provide a more economical and operator friendly way of measuring dose in a static context. A record of total counts can be networked to make the persistent neutron exposure measurement available from any internet capable computer. These characteristics establish ATMFD systems as a low cost and comprehensive competitor for currently available radiation exposure monitors.

P.40 Centrifugally Tensioned Metastable Fluid Detectors used for Gamma Blind Neutron Dose Measurement

Webster, J., Hagen, A., Archambault, B., Taleyarkhan, R.P.; Purdue University, S/A Labs LLC

The Centrifugally Tensioned Metastable Fluid Detector (CTMFD) is a unique radiation detection system which can be selectively sensitive to neutron, alpha, and fission based radiation sources. One of the more novel attributes of the CTMFD is complete insensitivity to gamma photons which allows detection of neutrons/alphas in a high gamma background environment. The operating principle of the CTMFD is radiation induced Nanoscale vaporization of a tensioned liquid. This process is similar to superheated droplet detectors but

CTMFDs use mechanical tension (subvacuum pressures) instead of thermal superheat to provide the stored energy needed for radiation induced vaporization. The use of mechanical tension for placing the liquid in a metastable state allows a greater degree of control over the energy and particle sensitivity of the detector as well as considerably higher detection efficiency (as high as 90% intrinsic efficiency in some cases). CTMFDs have been demonstrated experimentally to be able to detect neutron radiation while ignoring intense gamma sources of 10^11 gammas/second. A portable version of the CTMFD has been constructed which can be used to provide neutron dose measurement in a system which weighs ten times less than BF3 or He-3 based neutron monitors and costs much less.

P.41 Status of Industrial Uses of Radiation Devices in Korea

Cho, D.-H., Kim, W.R.; Korea Institute of Nuclear Safety

Radiation is valuable tool for quality management in industry. However, the use of radiation results in radiation exposure and thus potentially negative health effects. Nonetheless, some industrial radiation devices such as industrial gauges are not regulated or loosely regulated for radiation safety compared to medical radiation devices or industrial radiographic devices. Such less strict regulations of industrial gauges are based on the fact that radiation exposure is negligible because the devices have low level of radiation by self-shielding structure and they are generally installed at inaccessible places. Radiation exposure levels of some recent radiation devices are not negligible by emphasizing convenience in the use. The public are more concerned about radiation exposure after Fukushima nuclear power plant accident. Now, industrial gauges cannot be regarded as radiation safety devices. Recently we begun a study to investigate status of industrial uses of radiation devices in Korea and categorize industrial radiation devices. In 2012, numbers of companies for production, sale, and use of radiation devices in Korea were about 3,500 under notification and 1,500 under license permission. Number of companies using industrial gauges with license permission was 523. About 23,000 radiation devices were used. Fractions of the radiation devices utilizing radioisotopes, radiation generators, and both of them were 65%, 23%, and 12%, respectively. Among the radiation devices utilizing radioisotopes, 58% used beta radiation sources and 32% and 10% used gamma and neutron sources. About 75% of the radiation generators have been used for thickness or level gauges. The other 25% of generators have been used for various purposes, such as accelerator. After investigation of industrial use status, the radiation devices will be categorized from radiation safety aspect. The categorization of radiation devices will be useful for radiation safety regulation.

P.42 The Level of Pathologic Erythrocytes in the Peripheral Blood of Roach (Rutilus rutilus L.) Inhabiting Reservoirs with Different Levels of Radioactive Contamination

Shaposhnikova, I., Tryapitsyna, G.A., Styazhkina, E.V., Osipov, D.I., Pryaklun, E.A.; Urals Research Center for Radiation Medicine

These studies were carried out in the summer of 2009. The level of pathological erythrocytes was assessed in the peripheral blood of roach (Rutilus rutilus L.) caught in the storage reservoirs for low level radioactive waste from the

Mayak PA (reservoirs R-4, R-10, R-11 of the Techa River cascade system). Roach from the Shershny reservoir and the Buffer reservoir (Chelyabinsk region) was used as a control. The abnormalities noted in the erythrocytes included micronuclei, amitosis, pyknosis. Roach blood samples were obtained by puncture of the tail vein using heparinized syringes. Smears were prepared on slides, the material was fixed in absolute methanol for 3 min and stained with 5% Giemsa for 10 min. The number of normal erythrocytes without nuclear abnormalities and the number of damaged cells were estimated by analysis of 3000 cells per one fish. The contents of radionuclides in water, sediments, and roach ware measured. Dose rates for roach were calculated using the software package ERICA Assessment Tool 1.0 May 2009. It is revealed that chronic radiation exposure with the dose rates in the range from 0.8 up to 19 mGy/d leads to a twofold increase in the frequency of erythrocytes with micronuclei in peripheral blood, dose-dependent increase in the frequency of red blood cells with the nuclear pyknosis, but it does not cause any significant increase in the level of erythrocyte amitosis. It is suggested that the frequency of apoptosis in peripheral blood erythrocytes of fish could be used as a biological marker of chronic radiation exposure resulting from radioactive contamination of the aquatic ecosystems.

P.43 Secondary Sex Ratio in Population Exposed on the Techa River

Pastukhova, E.I., Shalaginov, S.A., Akleyev, A.V.; Urals Research Center for Radiation Medicine, Russia

Sex ratio at birth (secondary sex ratio) most commonly comprises 104-110 newborn boys to 100 newborn girls, although it may change under the influence of various factors. The effect of ionizing radiation on the sex ratio has for a long time been discussed in the scientific literature. The study involved analyses of sex ratio for 20,502 F1-offspring born in 1950-1994 to parents exposed in the riverside villages on the Techa. The study used doses to the gonads (ovaries and testes) accumulated by each parent before the time of conception of the child and estimated on the basis of the Techa River Dosimetry System (TRDS-2009). The maternal average gonadal dose was 32 mGy (maximum: 454 mGy), the paternal average gonadal dose was 30 mGy (maximum: 531 mGy), the average summarized dose to the gonads of both parents was 63 mGy (maximum: 976 mGy). The control group consisted of 86,478 unexposed residents of the adjacent areas with similar conditions of life. Secondary sex ratio for the offspring of the exposed population was 1.03 which is significantly lower than that estimated for the reference population 1.06 (P=0.035). There was an inverse dependence of the secondary sex ratio on the consolidated parental gonadal dose (Y = 1.05 - 0.30*D, R2 = 0.846, P = 0.009, D - dose). Dependence of the sex ratio on the maternal gonadal doses (Y = 1.05 - 0.19*D, R2 = 0.217, P = 0.351) and paternal gonadal doses (Y = 1.02 - 0.09*D , R2 = 0.011, P = 0.844) showed a similar trend. The study also involved

assessment of the influence exerted by non-radiation factors on the secondary sex ratio. The sex ratio was inversely dependent on the age of mother (Y = 1.28 - 0.009*Agem, R2 = 0.804, P = 0.039, Agem - the age of the mother). The effect of paternal age was not significant. There was a tendency for the secondary sex ratio to decrease with birth order (Y = 1.07 - 0.01*Par, R2 = 0.496, P = 0.184, Par – birth order).

P.44 Optimizing Light Collection from Extractive Scintillating Resin in Flow-Cell Detectors

Meldrum, A.C., DeVol, T.A.; Clemson University

Light collection efficiency is of critical importance to obtain optimum detection efficiency from extractive scintillating resin. Extractive scintillating resins have been synthesized for use in a flow-cell detector for the ultra-low level detection of alpha and beta radioactivity in water. Many parameters, including the number of resin bead layers, the porosity of the resin, the packing of the beads within the flow cell, and the index of refraction (n) of the media in the pore space will affect the amount of light collected by a photomultiplier tube (PMT). The goal of this research is to develop a fundamental understanding of these parameters by conducting some experiments that can be used to validate our computer model. The experimental data consists of looking at the response of layered sheets of BC-400 plastic scintillator to point sources of alpha radiation (Polonium-210) and beta radiations (Carbon-14, Emax = 156 keV; Thallium-204, Emax = 763 keV; Strontium-90/Yttrium-90, Emax = 546 keV/2280keV). The experiments were conducted with air (n=1) as well as water (n=1.33) between each layer of scintillator. The amount of light detected by the PMT was shown to decrease with increasing number of scintillator layers. For up to 10 scintillator layers, the amount of light detected by the PMT decreased by approximately 35% when water was in between each layer. However with air in between each scintillator layer, this decrease in light collected by the PMT was approximately 60%. These experimental results along with preliminary modeling results will be presented.

P.45 Development of a Fast Neutron Activation Counter Using the Cherenkov Effect in Optical Materials

Millard, M.J., DeVol, T.A., Bell, Z.W.; Clemson University, Oak Ridge National Laboratory

This paper presents experimental data and theoretical basis for the detection of fast neutrons via the activation of constituents of a high index of refraction transparent material with subsequent quantification of the Cherenkov Effect. Neutron reactions with the constituents of a transparent material, e.g. glass, may result in the production of a radioactive isotope. The subsequent decay from the new radionuclide needs to emit either gamma rays or beta particles. The threshold energy for the production of Cherenkov photons depends on the index of refraction of the transparent material. In general, this energy must be at least a few hundred keV. In addition, the product radionuclide must have a short half-life, on the order of minutes to days, in order for the decay to be measured quickly. Both Am-Be and Pu-Be were utilized to evaluate this technique. PbHPO4 glasses doped with Indium and Gallium were tested. The resulting decay curve showed that it was the phosphorous in the glass that was able to capture the fast neutrons through an (n, p) reaction. The cross section of P-31(n, p)Si-31

reaction is approximately 0.1 barns for neutrons with energies from 3 to 10 MeV. The Si-28(n, p)Al-28 has a similar cross section in this energy region and so a pure SiO2 glass was tested and was also able to capture enough fast neutrons to be counted. A computer program designed to search for reactions with high cross sections that create radionuclides with energetic beta emissions found the Mg-24(n, p)Na-24 and Al-27(n, p)Mg-27 reactions, which are now being investigated.

P.46 Building Context for Radioactive Waste Characterization

James, D.W., Kalinowski, T.M.; DW James Consulting

Radiological characterization of radioactive waste is required to demonstrate conformance with Federal and State regulations and disposal site license criteria. The Nuclear Regulatory Commission has published guidance for radiological waste characterization that includes an expectation of accuracy. The guidance specifically identifies accuracy as the regulatory objective, i.e. over-estimating waste activity is just as unacceptable as under-estimating waste activity. Most waste generators depend on sample data to perform characterization. How we use this data to best effect however, depends not only on the results from samples that we analyze but also on knowledge of how, and under what conditions the waste is generated and our expectations of what the results should be. Simple sample and measurement data may not be enough in complex situations to develop confidence in the results. Building that confidence requires that we understand the process that creates the radioisotopes, the processes we use to collect samples as well as the processes used to analyze the samples and the potential sources of error associated with each. Data without context does not establish any measurable confidence. Industry research and regulatory guidance point to a number of methods that can be used to build context within which one can establish confidence in waste characterization data. This paper will explore ways to build context and confidence in radioactive waste sample data. While the paper focuses on nuclear power plant wastes, the concepts presented are generally applicable to the overall process of radiological characterization.

P.47 Exact Determination of Critical Level and Associated Detection Limit using the Poisson Distribution and a Spreadsheet

Van Der Karr, M.T.; ZionSolutions

A pragmatic approach to determine the critical level Lc and detection limit Ld using a spreadsheet as a tool to calculate and plot probability distributions is demonstrated. MDA formulas assume background and source probability distributions can be modeled using the Normal distribution approximation. For a low background mean, the normal assumption does not adequately approximate nuclear counting statistics. Thus the normal Z-score (1.645 SD for 95% of the distribution) can not be used as well as the formulas based on this. This poster presentation presents elementary statistics as might be applied to nuclear counting including: the difference between discrete and continuous distributions, the normal distribution, the standardized normal distribution and z-score, the Poisson distribution, the Normal-Poisson distribution, what is meant by over-dispersed Poisson, the negative-binomial distribution as a better approximation when the variance is greater than the mean, what is meant by critical level and detection

limit, and where type I and Type II error rates come from and how they might apply to nuclear counting. A relatively practical means of empirically determining the exact critical level is shown using a data-logging instrument. This data is compared to a Poisson and negative binomial distribution. A detection limit above this the background distribution is plotted and compared to Lloyd Currie's table used for the detection of rare nuclear events. The detection limit determined by the spreadsheet using the Poisson distribution for high background means is then compared to the results of a classical MDA formula. The scope of the spreadsheet is finally demonstrated including: vanishingly small background means to means of several hundred, a provision of recalculating Lc and Ld for longer count times than the initial count, as well as macros that automate the process to a click of the mouse.

P.48 PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents

DeCair, S.D., Tupin, E.A., Nesky, A.B., Herrenbruck, G.S.; US EPA*

On April 15, 2013, EPA issued an official notice in the Federal Register to announce the publication of "Protective Action Guides and Planning Guidance for Radiological Incidents." This long awaited update to the 1992 "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" (EPA-400-R-92-001) (widely known as the "PAG Manual") addresses multiple issues that have emerged over the last two decades. The updated PAG Manual now applies to a broader range of radiological emergencies, including terrorist acts. The 1992 version, while applicable to a wide range of radiological emergencies, was heavily focused on nuclear power plant incidents. Content about protective actions related to food consumption has been updated in the revised manual. EPA has adopted the 1998 food Protective Action Guides (PAGs) from the Food and Drug Administration (FDA). In addition, EPA has adopted the latest guidance from FDA on administration of potassium iodide (KI). New content in the revised manual includes: planning guides on reentry to areas that have been closed because of a radiological incident, planning guidance for a cleanup process and planning considerations for radioactive waste disposal. The new manual recommends a careful community involvement process before making decisions on cleanup and waste disposal. The new document is not proposing a specific drinking water PAG. The poster illustrates these key changes and explains how PAGs would be used. The revised PAG Manual is a draft for interim use. EPA is soliciting comments on the revision. Comments are due July 15, 2013. The full text of the new PAG Manual can be downloaded at: www.epa.gov/radiation/rert/pags.html.

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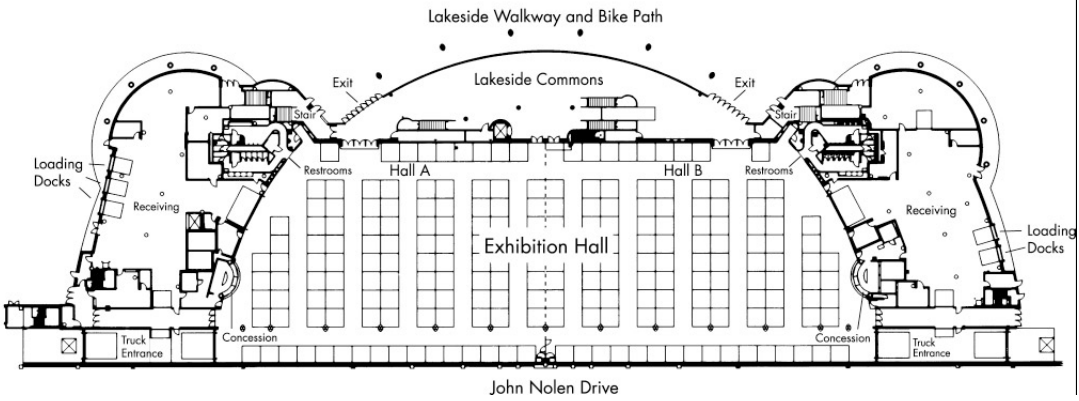
Monona Terrace Convention Center Floorplans

LEVEL 1 - LAKESIDE



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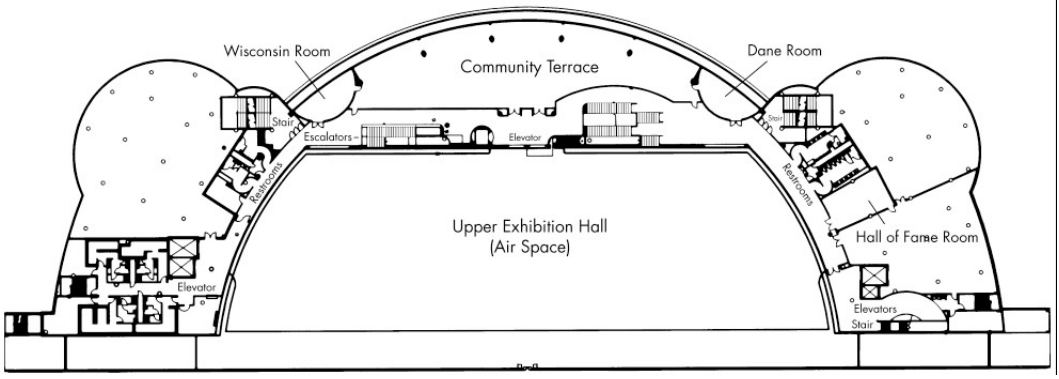
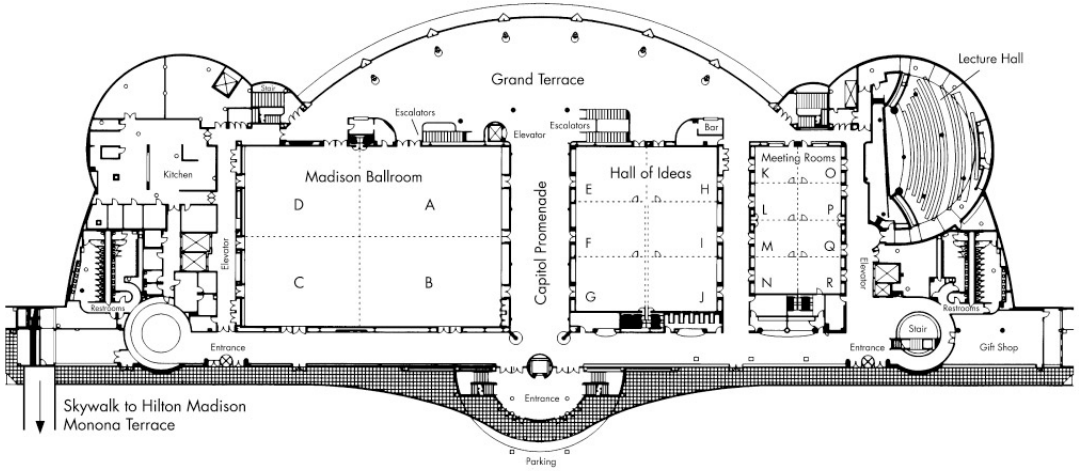
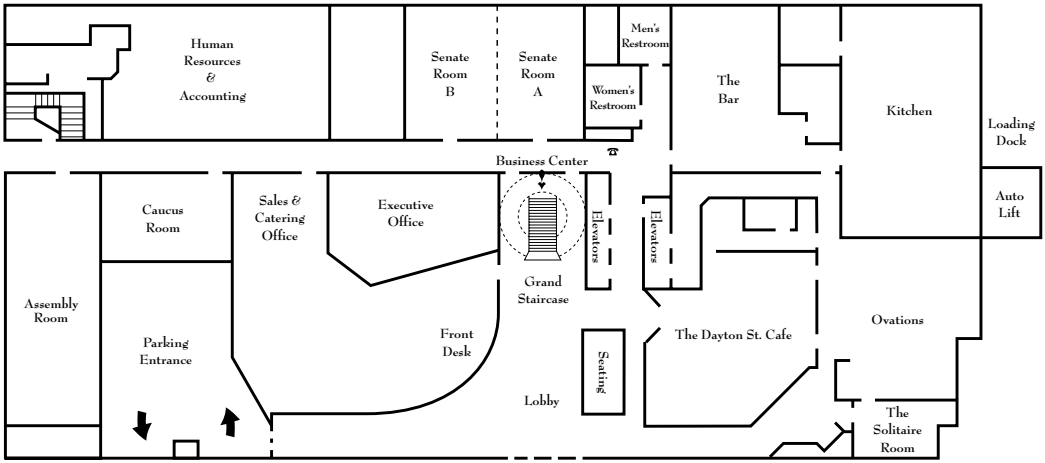


LEVEL 4 - MEETING ROOMS / GRAND TERRACE

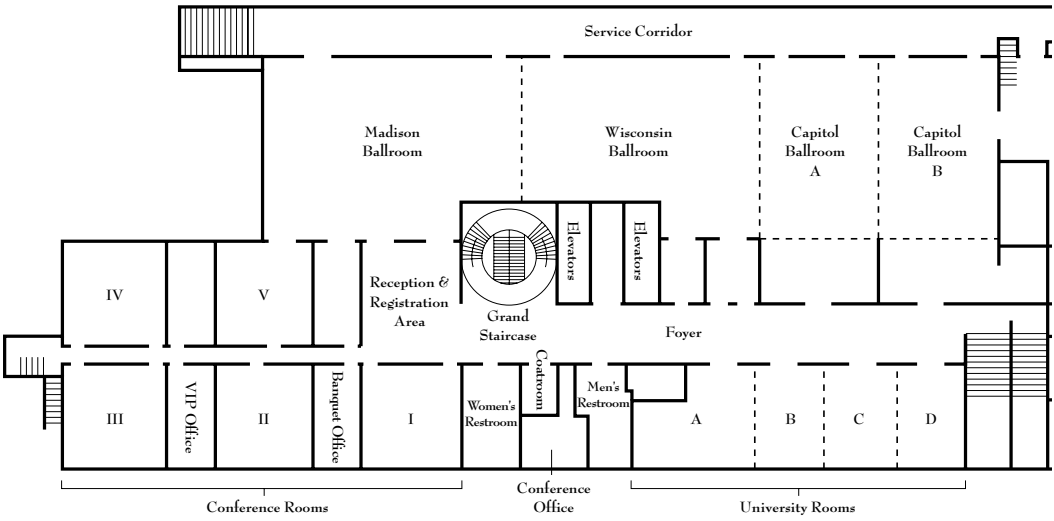


Madison Concourse Hotel Floorplans

1st Floor



2nd Floor



Notes

Saturday, 6 July

All AAHP Courses take place at the Madison Concourse Hotel

AAHP 1 Introduction to Medical Health Physics
8:00 AM-5:00 PM Parlor 629

AAHP 2 How We Make Decisions for Radiation Safety and are Prone to Errors
8:00 AM-5:00 PM Capitol A

AAHP 3 Overview of Internal Dosimetry
8:00 AM-5:00 PM Capitol B

Sunday, 7 July

All PEP Courses take place at the Monona Terrace Convention Center

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

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

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

Welcome Reception
6:00-7:30 PM
Monona Terrace Convention Center

Sunday PEP Locations
A - Hall of Ideas E
B - Hall of Ideas F
C - Hall of Ideas G
D - Hall of Ideas H
E - Hall of Ideas I
F - Hall of Ideas J

Monday-Wednesday PEP Locations
1 - Hall of Ideas F
2 - Hall of Ideas G
3 - Hall of Ideas I
4 - Hall of Ideas J
5 - Hall of Ideas QR

KEY
MAM-Monday AM Session
MPM-Monday PM Session
TAM-Tuesday AM Session
TPM-Tuesday PM Session
WAM-Wednesday AM Session
WPM-Wednesday PM Session
THAM-Thursday AM Session

(MC)-Madison Concourse
(CC)-Convention Center

Monday, 8 July

CEL1 Fallout: The Mixed Blessing of Radiation and the Public Health
7:00-8:00 AM Hall of Ideas F

CEL2 NRC Nuclear Safety Culture
7:00-8:00 AM Hall of Ideas G

ABHP Exam - Part I
8:00-11:00 AM Capitol A (MC)

MAM-A Plenary
8:10 AM-Noon Madison Ballroom

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

PEP Program - 12:15-2:15 PM

PEP M1 Developing a Laser Safety Program – Where does a Health Physicist Begin and How do you Establish a Program from Scratch?

PEP M2 Characteristic Limits in Health Physics

PEP M3 So you want to be a Medical RSO?

PEP M4 The MARSAME Methodology: Fundamentals, Applications, and Benefits

PEP M5 Part I - Radiation Safety Decisions - How We are Prone to Errors

ABHP Exam - Part II
12:30-6:30 PM Capitol A (MC)

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

Chapter Council Meeting
1:20-2:30 PM Lecture Hall (CC)

Section Council Meeting
2:30-3:30 PM Hall of Ideas F (CC)

MPM-A Waste Management
3:00-5:00 PM Ballroom A

MPM-B Homeland Security
3:00-4:15 PM Ballroom B

MPM-C Biokinetics/Bioeffects
3:00-4:15 PM Ballroom C

MPM-D Internal Dosimetry & Bioassay
3:00-4:30 PM Ballroom D

MPM-E Regulatory/Legal Issues
3:00-4:00 PM Lecture Hall

MPM-E2 HPS-How to Get Involved
4:00-5:00 PM Lecture Hall

MPM-F Science Support Committee: Health Physicists Teaching Science Workshop
3:00-5:00 PM Hall of Ideas EH

Student/Mentor Reception
5:30-6:30 PM Community Terrace (MC)

Tuesday, 9 July

CEL 3 Orphan Sources in PA and a Major Radium-226 Source Recovery Project
7:00-8:00 AM Hall of Ideas F

CEL4 Health Physicists' Professional Liability
7:00-8:00 AM Hall of Ideas G

TAM-A AAHP Special Session: Medical Physics and Medical Health Physics - Roles and Responsibilities I
8:30-11:45 AM Ballroom A

TAM-B Homeland Security and Military Sections Joint Special Session, Part I
8:30 AM-Noon Ballroom B

TAM-C Accelerator Health Physics
8:30-10:45 AM Ballroom C

TAM-D Environmental Radon Section Special Session: NORM - Why the Concern?
8:30-11:30 AM Ballroom D

TAM-E Medical Health Physics I
8:30 AM-Noon Lecture Hall

TAM-F Special Session: Non-Ionizing Radiation I
8:00 AM-Noon Hall of Ideas EH

Publishing in HPS Journals
10:00-11:30 AM Hall of Ideas F

AAHP Awards Luncheon
Noon-2:00 PM Community Terrace

PEP Program - 12:15-2:15 PM

PEP T1 Nanoparticle Characterization and Control Fundamentals: A Graded Approach

PEP T2 Current Models and Methods in Medical Internal Dosimetry

PEP T3 Fundamentals of Alpha Spectroscopy

PEP T4 Health Physics Challenges in Proton Therapy

PEP T5 Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions

TPM-A AAHP Special Session: Medical Physics and Medical Health Physics - Roles and Responsibilities II
2:30-5:15 PM Ballroom A

TPM-B Homeland Security and Military Sections Joint Special Session, Part II
2:30-5:00 PM Ballroom B

TPM-C Nanotechnology and Radiation Protection
2:30-5:00 PM Ballroom C

TPM-D NESHAPS
2:30 - 5:00 PM Ballroom D

TPM-E Medical Health Physics II
2:30-5:15 PM Lecture Hall

TPM-F Special Session Non-Ionizing Radiation II
1:00 - 5:00 PM Hall of Ideas EH

AAHP Open Meeting
5:15 PM Ballroom A

HPS Awards Banquet
7:30-10:30 PM Ballroom

Wednesday, 10 July

CEL5 Emergency Preparedness: Lessons from Hurricane Sandy
7:00-8:00 AM Hall of Ideas F

CEL6 A Mindset for Managing Modern Measurements: Understanding ...
7:00-8:00 AM Hall of Ideas G

WAM-A HPS and ANS Special Session: Issues in Low-Dose Radiation Research
8:30 AM-Noon Ballroom A

WAM-B Special Session: Advancing the Science of Emergency Response I
8:00-11:45 AM Ballroom B

WAM-C Decommissioning
8:45-11:15 AM Ballroom C

WAM-D External Dosimetry
8:30-11:45 AM Ballroom D

WAM-E Power Reactor Section Special Session
8:30 AM-Noon Lecture Hall

WAM-F Environmental I
8:30 AM-Noon Hall of Ideas EH

PEP Program - 12:15-2:15 PM

PEP W1 Radiation and Life in the Universe

PEP W2 Part II - Radiation Safety Decisions – Reprogramming our Internal Computers

PEP W3 Fundamentals of Gamma Spectroscopy

PEP W4 Fundamentals of Neutron Detection and Detection Systems

WPM-A HPS and ANS Special Session: Issues in Low-Dose Radiation ...
2:15-5:15 PM Ballroom A

WPM-B Special Session: Advancing the Science of Emergency Response II
2:15-5:00 PM Ballroom B

WPM-C Decommissioning Section Special Session: Real World Applications of Various Computer Codes
2:15-5:00 PM Ballroom C

WPM-D Medical Health Physics III
2:30-4:45 PM Ballroom D

WPM-E Special Session: Licensing & Regulatory Issues Dealing ...
2:30-5:30 PM Lecture Hall

WPM-F Environmental II
2:30-5:00 PM Hall of Ideas EH

HPS Business Meeting
5:30-6:30 PM Ballroom A

WPM-G Aerosol Measurements
6:00-8:00 PM Lecture Hall

Thursday, 11 July

CEL7 How to Reduce Errors for Radiation Safety Decisions
7:00-8:00 AM Hall of Ideas F

CEL8 From Oklo to the Galaxy: Nuclear Criticality as a Contributor to Gamma...
7:00-8:00 AM Hall of Ideas G

THAM-A Emergency Planning/Emergency Response
8:30-10:30 AM Ballroom A

THAM-B Instrumentation
8:30-11:45 AM Ballroom B

THAM-C Risk Analysis
8:30-11:30 AM Ballroom C

THAM-D Operational Health Physics
8:45-11:45 AM Ballroom D

THAM-E Contemporary Topics in Health Physics
8:30-10:15 AM Lecture Hall

THAM-F Environmental III
8:30-11:00 AM Hall of Ideas EH

Registration Hours

Registration at the Monona Terrace Convention Center
Exhibit Hall A/B 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 - 5:30 PM
Wednesday	9:30 AM - Noon

Business Meetings

TUESDAY

10:45 AM **Madison Ballroom C**
Accelerator Section Business Meeting

11:30 AM **Madison Ballroom D**
Environmental Radon Section Business Meeting

Noon **Lecture Hall**
Medical Health Physics Section Business Meeting

5:00 PM **Madison Ballroom B**
Homeland Security Business Meeting

5:15 PM **Madison Ballroom A**
AAHP Open Meeting

5:15 PM **Madison Ballroom B**
Military Section Business Meeting

WEDNESDAY

Noon **Lecture Hall**
Power Reactor Section Business Meeting

5:00 PM **Madison Ballroom C**
Decommissioning Section Business Meeting

4:45 PM **Madison Ballroom D**
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.