

FINAL PROGRAM



52nd Annual Meeting of the Health Physics Society

(American Conference of Radiological Safety)

*21st Biennial Campus Radiation
Safety Officers Meeting*



July 8-12, 2007

***Portland DoubleTree/Oregon Convention Center
Portland, Oregon***

Headquarters Hotel

DoubleTree Portland Lloyd Center

1000 NE Multnomah

Portland, OR 97232

Telephone: (503) 281-6111

Fax: (503) 284-8553

Future Annual Meetings

53rd	7/13-17, 2008	Pittsburgh, PA
54th	7/12-16, 2009	Minneapolis, MN

Future Midyear Topical Meeting

41st	1/27-28/2008	Oakland, CA
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Topic: Radiation Generating Devices

HPS Secretariat

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Registration Hours

Registration at the **Portland DoubleTree Hotel:**

Saturday, July 7	2:00-5:00 pm
Sunday, July 8	7:00 am-7:00 pm

Registration at the **Oregon Convention Center:**

Monday, July 9	8:00 am-4:00 pm
Tuesday, July 10	8:00 am-4:00 pm
Wednesday, July 11	8:00 am-4:00 pm
Thursday, July 12	8:00 am-Noon

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Jennifer Johnson
Philip D. Kearney
Patricia L. Lee
Laura Pring
Matthew C. McFee

Local Arrangements Committee

Co-Chairs: Janet Franco, Jennifer Johnson
Hospitality Suite - Phil Campbell, John Gough
Intramurals - Mike Zittle, Bill Zander
Night Out - Bruce Busby, John Gough, Drew Thatcher
PEP Liaison - Carl Bergsagel, Debra McBaugh
Publicity Midyear Meeting 2006 - Wayne Lei, Rick Tomblison
Publicity & Local Information - Rick Edwards, Marge Slauson, Bill Tuttle,
Lar Winans
Receptions - Rick Tomblison, Jerry Cooper, Mike Stewart
Revenue - Terry Lindsey, Dan Harlan, Anine Grumbles, Martha Dibblee
Science Tours - Rainier Farmer, Mike Stewart
Social Tours - Bill Tuttle, Lar Winans, Phil Campbell, Justin Spence
Souvenirs - Terry Lindsey, Dan Harlan, Martha Dibblee, Anine Grumbles
Treasurer - Dan Harlan
Treasurer Advisor - Norm Dyer
Volunteer Coordinators - Terry Lindsey, Marge Slauson
Webmaster - Bruce Busby, Phil Campbell

Important Events

Welcome Reception

Please plan on stopping in at the Lloyd Center Ballroom of the DoubleTree Hotel Sunday, July 8, from 6:00-7:00 pm. The reception will have light snacks, and a cash bar. There will be an opportunity to meet friends to start your evening in Portland.

Exhibits

Free Lunch! Free Lunch! – Noon, Monday, July 9. All registered attendees are invited to attend a complimentary lunch in the HPS exhibit hall at the Oregon Convention Center.

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

Saturday and Sunday courses will be held at the DoubleTree Hotel. Monday through Thursday, sessions and courses will be held at the Oregon Convention Center.

AAHP Awards Luncheon

Tuesday July 10

Noon-2:15 pm

Oregon Convention Center
Ballroom 201

HPS Awards Banquet

An enjoyable evening, this event will be held in the Oregon 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. The event will last from 7:00-10:00 pm and will take place in the Portland Ballroom at the Oregon Convention Center.

Different This Year

Joint Meeting with the CRSO

The CRSO will hold its Opening Plenary Session Tuesday afternoon. A joint session will be held Wednesday morning with the HPS RSO section. The CRSO will hold two concurrent sessions on Wednesday afternoon and Thursday morning.

Things to Remember!

All Speakers are required to check in at the Speaker Ready Room, Oregon Convention Center, Room A109, at least one session prior to their assigned session.

All posters up Monday–Wednesday in Exhibit Hall
Poster Session featured Monday, 1:30-3:30 pm – No other sessions at that time

AAHP Awards Luncheon

The AAHP is sponsoring an Awards Luncheon on Tuesday, July 10, at Noon, in Ballroom 201 in the Oregon Convention Center. You may purchase tickets on site 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 Oregon Convention Center, in the Portland Ballroom, on Tuesday, July 10, from 7:00 - 10:00 pm. The following awards are to be presented:

Distinguished Scientific Achievement Award

John D. Boice, Jr.
Joseph K. Soldat

Elda E. Anderson Award

Ali A. Simpkins

Founders Award

Robert G. Gallagher

Founders Memorialization

Charles A. Willis

Outstanding Science Teacher Award

Lawrence A. Scheckel

Fellow Award

David G. Cadena, Jr.
Arthur E. Desrosiers
Victor N. Evdokimoff
Gerald L. Gels
Regis A. Greenwood
Gordon M. Lodde
Robert M. Loesch
Stephen V. Musolino

Peter H. Myers
*Mario Overhoff
Mary Ann Parkhoff
Sander C. Perle
Henry B. Spitz
Edward A. Tupin

*posthumously

Menu

House salad, ginger salmon, garlic mashed potatoes, Asian vegetables, bread basket, dessert, coffee and tea.

G. William Morgan Trust Fund

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.

Registration Hours

Registration at the

Portland DoubleTree Hotel:

Saturday, July 72:00-5:00 pm

Sunday, July 87:00 am-7:00 pm

Registration at the

Oregon Convention Center:

Monday, July 98:00 am-4:00 pm

Tuesday, July 10 . . .8:00 am-4:00 pm

Wednesday, July 11 8:00 am-4:00 pm

Thursday, July 128:00 am-Noon

Registration Fees:

Class	Pre-Reg	On-Site
◆HPS Member	\$350	\$425
◆Non-Member**	\$420	\$495
CRSO	\$125	\$140
◆HPS/CRSO	\$425	\$515
◆HPS Non-Mem**/CRSO	\$495	\$585
❖Student	\$ 60	\$ 60
◆HPS Emeritus	No Fee	No Fee
◆HPS PEP Lecturer	No Fee	No Fee
●Companion	\$ 55	\$ 55
■Exhibition ONLY	\$ 25	\$ 25
Exhibitor (2/booth)	No Fee	No Fee
Add'l Awards Dinner	\$ 60	\$ 60
AAHP Awards New CHP	Free	Free
AAHP Awards (CHP)	\$ 10	\$ 10
AHHP Awards Guest	\$ 15	\$ 15
■Member, 1 Day	\$225	\$225
■Non-Member 1 Day	\$225	\$225
■Student, 1 Day	n/a	\$ 30

◆ Includes Sunday Reception, Monday Lunch and Tuesday Awards Dinner

❖ Includes Sunday and Student Receptions, Monday Lunch and Tuesday Awards Dinner

● Includes Sunday Reception, Monday-Wednesday Continental Breakfast and afternoon snacks

■ Includes Sessions and Exhibition ONLY

** Includes Associate Membership for year 2007-FIRST TIME MEMBERS ONLY.

Session Location

Saturday AAHP Courses, Sunday PEP sessions and the adjunct session on Wednesday evening will take place in the DoubleTree Hotel.

All Monday-Thursday sessions and Monday-Wednesday PEP courses will take place in the Oregon Convention Center.

LAC Room

Sunday-ThursdayA108
Oregon Convention Center

Activities and Tours

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

Sunday, July 8

Eola Hills Winery 10 AM-5 PM

Portland City Tour 1-4:30 PM

Monday, July 9

Portland City Tour 9 AM-12:30 PM

Mount Saint Helens 9 AM-5 PM

Open Mic Night 8-11 PM

Tuesday, July 10

HPS 5K Run/Walk 6:30-8:30 AM

North Oregon Coast 8:30 AM-5:30 PM

Golf Eastmoreland 2-9 PM

Reed College Reactor Facility 9 AM-3 PM

Wednesday, July 11

Oregon Wineries 10:15 AM-6 PM

HPS Night Out Dinner Cruise-Sold Out

Portland Micro Brew Bus 5-10 PM

Oregon Health & Sciences Univ 8:30 AM

Thursday, July 12

Columbia Gorge/Mult. Falls 1-5 PM

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** (Room A109 Oregon Convention Center) will be open Sunday from 2-5 pm, Monday through Wednesday from 8-11 am and 2-5 pm. You must check in at the Ready Room (even if you have already submitted your presentation) no later than the following times:

Presentation Time Check-In Deadline

Monday am	5 pm	Sunday
Monday pm	11 am	Monday
Tuesday am	5 pm	Monday
Tuesday pm	11 am	Tuesday
Wednesday am	5 pm	Tuesday
Wednesday pm	11 am	Wednesday
Thursday am	5 pm	Wednesday

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

PEP/CEL Courses

The PEP Ready Room will have hours posted on the door. Saturday and Sunday, Portland Room, DoubleTree Hotel; Monday-Wednesday, Room A107 Oregon Convention Center

Placement Service

Placement Service listings will be posted in the Exhibit Hall.

Business Meeting

The **HPS Annual Business Meeting** will be convened at 5:30 pm on Wednesday, July 11, in A106, Oregon Convention Center.

Badge Color Code

- White=HPS Member, Nonmember, Student
- Tan=CRSO Only
- Yellow=CRSO/HPS
- Blue=Companion
- Green=Exhibition Only
- Salmon=Exhibitor

Companion

Hospitality Room

The Hospitality Room is in the DoubleTree Hotel in the Oregon Room on the lobby level. Come meet with friends and learn about the available attractions in Providence. Local HPS members will be on hand to help with planning day trips and restaurant recommendations. On Monday morning from 8 to 9 am, we invite all registered companions to an official welcome from a local representative who will provide an orientation to Portland and answer any questions you might have. The Monday breakfast will take place in the Oregon Room.

Continental breakfast will be available Monday through Wednesday mornings for registered companions, as will afternoon refreshments if attendance warrants.

Hospitality Room
for Registered Companions
Oregon Room, DoubleTree Hotel,
Lobby Level

Monday Welcome
8:00 - 9:00 am

Days/Hours

Sunday10 am - 3 pm
Monday8 am - 3 pm
Tuesday8 am - 3 pm
Wednesday8 am - 3 pm

Health Physics Society Committee Meetings

DT = DoubleTree Hotel
CC = Convention Center

Friday, July 6, 2007

ABHP BOARD MEETING

8:00 am-5:00 pm Idaho (DT)

Saturday, July 7, 2007

FINANCE COMMITTEE

8:00 am-Noon Hawthorne (DT)

ABHP BOARD MEETING

8:00 am-Noon 3 Sisters (DT)

CONTINUING EDUCATION COMMITTEE

1:00-5:00 pm Morrison (DT)

AAHP EXECUTIVE COMMITTEE

1:00-5:00 pm 3 Sisters (DT)

HPS EXECUTIVE COMMITTEE

1:00-5:00 pm Presidential Suite (DT)

Sunday, July 8, 2007

HPS BOARD OF DIRECTORS

7:30 am-5:00 pm 3 Sisters (DT)

AAHP EXECUTIVE COMMITTEE

8:00 am-5:00 pm Idaho (DT)

PROGRAM COMMITTEE

11:00 am-1:00 pm A109 (CC)

HP/ORS JOURNAL BOARD MEETING

3:00-6:00 pm Sellwood/Ross Island (DT)

Monday, July 9, 2007

RSO SECTION EXECUTIVE BOARD MEETING

Noon-2:00 pm Alaska (DT)

NOMINATING COMMITTEE

Noon-2:30 pm A102 (CC)

CHAPTER COUNCIL MEETING

1:00-2:00 pm B110-112 (CC)

HPS WEB EDITORS

1:00-5:00 pm Morrison (DT)

ANSI N13.14 WORKING GROUP

2:00-3:00 pm A101 (CC)

AEC ACCREDITATION SUBCOMMITTEE

2:00-4:00 pm Idaho (DT)

SCIENTIFIC AND PUBLIC ISSUES COMMITTEE

3:00-4:30 pm A102 (CC)

HISTORY COMMITTEE

3:00-5:00 pm Alaska (DT)

AWARDS COMMITTEE

4:30-5:00 pm A101 (CC)

Tuesday, July 10, 2007

RULES COMMITTEE

7:00-9:00 am Sellwood (DT)

RADIATION SAFETY WITHOUT BORDERS

9:00-11:00 am 3 Sisters (DT)

INTERNATIONAL COLLABORATION COMMITTEE

9:00 am - Noon A101 (CC)

GOVERNMENT & SOCIETY RELATIONS COMMITTEE

10:00 am-Noon Sellwood (DT)

HP PROGRAM DIRECTORS ORGANIZATION

Noon-2:00 pm 3 Sisters (DT)

PUBLIC INFORMATION COMMITTEE

Noon-2:00 pm Washington (DT)

MEMBERSHIP COMMITTEE

1:00-3:00 pm A101 (CC)

ANSI N320 (REACTOR EMERGENCIES)

2:00-5:00 pm A102 (CC)

CSU RECEPTION - ALL ARE WELCOME

5:30-7:00 pm Portland Ballroom Lobby (CC)

Wednesday, July 11, 2007

SCIENCE SUPPORT COMMITTEE

7:00-8:30 am Morrison (DT)

AAHP PROFESSIONAL DEVELOPMENT COMMITTEE

8:00-10:00 am Ross Island (DT)

SOCIETY SUPPORT COMMITTEE

8:00-11:00 am Sellwood (DT)

ANSI N13.12 WRITING GROUP

9:00 am - Noon A101 (CC)

LAB ACCREDITATION COMMITTEE

10:00 am-2:00 pm Hawthorne (DT)

STUDENT BRANCH MEETING

Noon-2:00 pm Sellwood (DT)

HPS DECOMMISSIONING SECTION

1:00-2:00 pm A101 (CC)

STANDARDS/HPSSC MEETING

1:00-4:30 pm Ross Island (DT)

ACADEMIC EDUCATION COMMITTEE

2:00-4:00 pm Morrison (DT)

ANSI N42.50 (RADON PROGENY)

2:00-5:00 pm A102 (CC)

HOMELAND SECURITY COMMITTEE

4:30-6:00 pm Halsey (DT)

Thursday, July 12, 2007

LOCAL ARRANGEMENTS COMMITTEE

7:30-9:30 am A108 (CC)

PROGRAM COMMITTEE

Noon-2:00 pm Morrison (DT)

HPS BOARD OF DIRECTORS LUNCH

Noon-1:00 pm Idaho (DT)

HPS BOARD OF DIRECTORS MEETING

1:00-5:00 pm 3 Sisters (DT)



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52nd Annual Meeting of the Health Physics Society

Portland, Oregon, July 8-12 - Preliminary Scientific Program

Presenter's name is asterisked (*) if other than first author.

MONDAY

7:00-8:00 AM

A105

CEL1 Workforce Pipelines for the Nuclear Renaissance

Ken Ferguson

Ken Ferguson, LLC

7:00-8:00 AM

A106

CEL2 Medical Reserve Corps (MRC) – Volunteer Opportunity for Health Physicists to Contribute to Their Local Communities

Armin Ansari

Centers for Disease Control and Prevention, Atlanta

8:15 AM-Noon Oregon Ballroom 201/202

MAM-A: Plenary Session

Chair: Brian Dodd

8:15 AM

Welcome to Portland

Brian Dodd, President, HPS, and Local Arrangements Committee

8:30 AM

MAM-A.1

Update and Insights on the Po-210 Incident

Bailey, M.R. (G. William Morgan Lecturer)

Health Protection Agency, UK

9:10 AM

MAM-A.2

The International Radiological Work of the U.S. Department of State

Sowder, A.

Bureau of International Security and Nonproliferation, U.S. Department of State

9:50 AM

BREAK

10:20 AM

MAM-A.3

The International Radiation Protection Association and IRPA12

Vice-President

International Radiation Protection Association

10:30 AM

MAM-A.4

Radiation Safety Infrastructure in Developing Countries: A Proactive Approach for Integrated and Continuous Improvement

Mrabit, K. (G. William Morgan Lecturer)

International Atomic Energy Agency, Vienna

11:10 AM

MAM-A.5

The CRITr Program: Training International Law Enforcement Personnel in Radiation Detection

Bernhardt, T., Frame, P., Musolino, S. (Landauer Lecturer)*

Oak Ridge Associated Universities, Brookhaven National Laboratory

Noon-1:30 PM

Exhibit Hall A

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

1:30-3:30 PM

Exhibit Hall

Poster Session

ACCELERATOR

P.1 Instrumentation for Laser Compton Scattering X-Ray Beam Diagnostics

Estes, B., Wells, D., Chouffani, D.

Idaho Accelerator Center (IAC)

P.2 Re-evaluation of ⁷Be Attachment Mechanisms in Ionized Air

May, R., Welch, K., Murla, J.

Jefferson Lab

P.3 Terahertz Radiation Exposure Guidance at Jefferson Lab

May, R., Ferguson, C.

Jefferson Lab

MONDAY

P.4 Compact Shadow Shielding for a Portable 14.1 MeV Isotropic Neutron Generator

Whetstone, Z.D., Lehnert, A.L., Zak, T., Kearfott, K.J.

University of Michigan

P.5 Methodology for Assessing Radiation Detectors Used by Emergency Responders

Wasiolek, P., Simpson, A.

Remote Sensing Laboratory, National Security Technologies, Inc.

P.6 Active, Non-intrusive Inspection Technologies for Homeland Defense

Ankrah, M., Ozcan, I., Spaulding, R., Smith, M., Farfan, E.

Idaho State University, Idaho Accelerator Center

DECOMMISSIONING

P.7 Decommissioning Survey of Old Poultry Farm

Razmianfar, N.

West Virginia University

P.8 Decontamination and Decommissioning Training at Fluor Hanford

Wollam, C.

Fluor Hanford

EMERGENCY PLANNING RESPONSE

P.9 Lessons Learned by the U.S. Army Radiological Advisory Medical Team at Vigilant Shield 2007

Sublett, S.M., Scott, A.L., Melanson, M.A.

US Army

P.10 Wireless Networked Environmental Continuous Air Monitoring in Support of NASA's New Horizons Mission to Pluto

Rodgers, J., Hoy, M., Rodgers, D.

Canberra Albuquerque, Valdosta State University

ENVIRONMENTAL

P.11 Development of Trigger Levels for Application to Core Scan Data at the Linde Formerly Utilized Sites Remedial Action Program (FUSRAP)

Battaglia, T.

Shaw Environmental, Inc.

P.12 Radiation Safety Standards in Practice: Independent Radiological Monitoring Program in Georgia

Avtandilashvili, M., Dunker, R., Pagava, S., Rusetski, V.

Idaho State University, Tbilisi State University

P.13 Development of Release Fractions and Airborne Release Rates for Upstream Components Such as Gloveboxes and Vessels Containing Plutonium

LeBaron, G., Woolery, W., Mishima, J., Bates, J., Jarvis, M.

Fluor Hanford, Inc., U.S. Department of Energy, Richland Operations Office, Pacific Western Technologies, Inc.

P.14 Measurement of Cs-137 Concentration and Estimation of Sedimentation Rate in Lake McDonald

Billa, J., Brey, R., Gesell, T., Thackray, G.

Idaho State University

P.15 Concentrations of Cs-137 in Imported Foodstuffs and Daily Intakes of Radionuclides for People, in Japan

Sugiyama, H., Terada, H., Takahashi, M.N., Iijima, I., Isomura, K., Hirata, A., Sakurai, K., Miyata, M., Goto, S.

National Institute of Public Health, Kanagawa Prefectural Institute of Public Health, Hyogo Pref. Inst. of Public Health and Environ. Sci., Yokohama Quarantine Station, Kobe Quarantine Station

P.16 Characteristics of Localization of Cs in Edible Mushroom (*Pleurotus ostreatus*)

Takahashi, M.N., Kato, F., Maeda, C., Sugiyama, H.

National Institute of Public Health, Toho University

MONDAY

P.17 Measurement of the Polonium-210 and Lead-210 Contents of Chinese Cigarettes

Schayer, S., Nowak, B., Qu, Q., Wang, Y., Cohen, B.

New York University School of Medicine, Peking University Health Science Center, Beijing, PRC

P.18 Biomonitoring Strategies Employed to Assess Impacts from a Low-Level Radioactive Waste Disposal Site (Area G) at Los Alamos National Laboratory

Fresquez, P. R.

Los Alamos National Laboratory

EXTERNAL DOSIMETRY

P.19 High Dose Electron Beam Response of CAF2 Mixed with DY

Gholampoor, M., Gheisari, D., Mirjalili, G., Moini, A.R., Shekari, L.

Yazd University, Iran, Tarbiat Modares University, Iran

P.20 Effects of Marrow Cellularity on Radiation Dose Calculation Using Realistic Anthropomorphic Models

Caracappa, P., Xu, X.

Rensselaer Polytechnic Institute

P.21 Development of a Computational Phantom with Moving Arms and Legs

Akkurt, H., Eckerman, K., Warda, D., Wagner, J., Sherbini, S.

Oak Ridge National Laboratory, US Nuclear Regulatory Commission

P.22 Advanced Radiation Safety and Reduced Personnel Exposure in Interventional Radiology

Bryant, B.

University of Alabama

P.23 ALARA Planning and Teaching Tool Based on Virtual-Reality Technologies

Zhang, D., Xu, X., Bushart, S.

Rensselaer Polytechnic Institute, Electric Power Research Institute

P.24 How Accurate is the Dose Look-up Table in Small Animal Cesium Irradiator?: A Comparison Between Direct TLD Measurement and Dose Look-up Table

Brady, S., Muramoto, G., Ke, C., Toncheva, G., Daigle, L., Nguyen, G., Chute, J., Marslek, P., Dewhirst, M., Yoshizumi, T.

Duke University

P.25 Spectroscopic Neutron Dosimetry

Czirr, J.B., McKnight, T., Klaas, R., Dodd, B.

Photogenics, Health Physics Society

HOMELAND SECURITY

P.26 Estimating Doses To Healthcare Providers After an RDD Event

Dewji, S., Bridges, A., Hertel, N., Burns, K.

Georgia Institute of Technology

P.27 Simulating Cs Radiological Dispersal Devices for Deposition, Dose and Decontamination Studies

Sutton, M., Fischer, R., Dominick, J., Gates-Anderson, D., Gray, J., Hu, Q., McNab, W., Viani, B.

Lawrence Livermore National Laboratory

P.28 Dose Calculations for New Imaging Technologies Used in the Detection of Radiological Weapons of Mass Destruction

O'Brien, R., Lowe, D., Patton, P.

University of Nevada, Las Vegas

P.29 Management of Low Level Radioactive Waste from a Threat Reduction Perspective

Wald-Hopkins, M.

Los Alamos National Laboratory

INTERNAL DOSIMETRY AND BIOASSAY

P.30 Internal Dose Assessment Data Management System for a Large Population of Pu Workers

Bertelli, L., Miller, G., Little, T., Guilmette, R., Glasser, S.

Los Alamos National Laboratory, LogiCreativity

MONDAY

P.31 Uptake and Retention of Inhaled H-3/C-14 Methane in Rats

Carlisle, S., Burchart, P., Boulanger, C., Surette, R.

AECL Chalk River Labs

P.32 Does Exposure to Plutonium Affect Workers Longevity?

Fallahian, N., Brey, R.R., Watson, C.R., James, A.C.

Idaho State University, Washington State University

P.33 Evaluation of the Draft NCRP Wound Model using USTUR Case 262 Data

Germann, L.K., Brey, R., James, A.C.

Idaho State University, Washington State University

P.34 Quantifying the Inhomogeneity of Dose in Marrow/Bone Interface-Rich Skeletal Sites

Gersh, J., Jokisch, D., Toburen, L., Dingfelder, M.

East Carolina University, Francis Marion University

P.35 International Comparison on Monte Carlo Modelling for in vivo Measurements of Americium in a Knee Voxel Phantom

*Gómez-Ros, J., de Carlan, L., Gualdrini, G., Lis, M., Lopez, M., Moraleda, M., Zankl, M., Franck, D.**

CIEMAT, Spain, IRSN, France, ENEA ION-IRP, Italy, GSF, Germany

P.37 Comparison of Radioiodine Biokinetics and Radiation Doses Following the Administration of Tracer and Therapeutic Activity to Patients in Thyroid Cancer Management

Willegaignon, J., Guimarães, M., Stabin, M., Sapienza, M., Buchpiguel, C., Sordi, G.*

University of São Paulo, Brazil, University of Vanderbilt

INTERNATIONAL AND STUDENT

P.39 The Detection and Quantification of Surface Radioactive Contamination

Butikofer, T., Cummings, F., Brey, R.

Idaho National Laboratory, Idaho State University

P.40 Nanomaterials: Is it Safe Beyond a Doubt?

Gallagher, R., Sun, L.

Applied Health Physics Inc.

P.41 Response Matrix of a Bonner Sphere Spectrometer with ⁶Li(Eu) Scintillator

Vega-Carrillo, H., Gallego, E., Lorente, A., Manzanares-Acuña, E.

Universidad Autonoma de Zacatecas, Universidad Politecnica de Madrid

P.42 Room Return

Vega-Carrillo, H., Gallego, E., Lorente, A., Manzanares, E.

Universidad Autonoma de Zacatecas, Universidad Politecnica de Madrid

P.43 Absorbed Dose in the Internal Organs of a Pregnant Woman Due to the I-131 Accumulated in her Thyroid

Vega-Carrillo, H., Manzanares-Acuña, E., Barquero, R.

Universidad Autonoma de Zacatecas, Hospital Rio Hortega, Valladolid Spain

P.44 Microstructure Damage of Aluminum Thin Films by ²⁵²Cf Irradiation

Sadi, S., Paulenova, A., Loveland, W., Watson, P.

Oregon State University

MEDICAL

P.45 I-131 Patient Non-compliance in Nuclear Medicine

Perham, C.

University of Virginia

P.46 Comparison of X-ray Radiograph between MCNPX and Direct Ray-Tracing Using the VIP-Man Phantom

Gu, J., Xu, X.

Rensselaer Polytechnic Institute

MONDAY

P.47 Evaluation of Photodynamic Therapy-Induced Edema in the Rat Brain using Magnetic Resonance Imaging
Chighvinadze, D., Hirschberg, H., Patton, P.W., Madsen, S.J.

University of Nevada, Las Vegas, University of California, Irvine

P.48 Comparison Between Region of Interest Selection Techniques Used in Diffusion Tensor Imaging Applied to the Corpus Callosum

Lowe, D., Mangum, J., Patton, P.

University of Nevada, Las Vegas, Spring Valley Nevada Imaging Centers Amigenics

NON-IONIZING

P.49 Measuring Radiofrequency and Microwave Radiation from Varying Signal Strengths

Gaul, W., Davis, B.

Chesapeake Nuclear Services, NASA Dryden Flight Research Center

P.50 The Use of Histomorphometry to Determine the Extent of Cutaneous Laser Injury Thickness

Walker, C., Eurell, T., Johnson, T.

Colorado State University

OPERATIONAL HEALTH PHYSICS

P.51 An Innovative Approach for Training Radiological Control Technician Trainees

Killand, B.

Fluor Hanford

P.52 Implementing the New Supplementary Ionizing Radiation Warning Symbol

Mac Kenzie, C.

International Atomic Energy Agency

P.53 Assessment of Skin Doses from Fallout Sources of Finite Size

Weitz, R.L., Barss, N. M.

Science Applications International Corporation

P.54 An Assessment Tool for Evaluating Radiation Exposures to Nursing Infants from Internally Contaminated Mothers

Timilsina, B., Farfan, E., Donnelly, E.

Idaho State University, Savannah River National Laboratory, Centers for Disease Control and Prevention

P.55 Validation of the Point-Kernel Shielding Program ISO-PC Version 2.2

Rittmann, P.

Fluor Government Group

P.56 Uncertainty Considerations for Decision Levels and Detection Limits Utilizing Computer Codes when the Blank Count Time is an Integer Number of Times Greater than the Sample Count Time

Potter, W., Strzelczyk, J.

Consultant, Sacramento, University of Colorado Health Science Center

P.57 Prenatal Radiation Exposure

Donnelly, E., Ozcan, I., Farfan, E.*

Centers for Disease Control and Prevention, Idaho State University, Savannah River National Laboratory

P.58 Acute Radiation Syndrome and Related Deterministic Effects

Donnelly, E., Smith, J., Naeem, S., Farfan, E.*

Centers for Disease Control and Prevention, Idaho State University, Savannah River National Laboratory

REGULATORY/LEGAL

P.59 Implications of the "Privacy Movement" on a Corporate Radiation Safety Program

Kay, S.E., Mays, T.L.

Eli Lilly and Company

P.60 Risks Associated with Management of a Radiation Safety Program

O'Dou, T.

University of Nevada Las Vegas

MONDAY

P.61 Overview of New Nuclear Reactor Permitting Activities: Preparing for Reviews of Combined Licenses

Parkhurst, M., Miller, B., Stegen, J.A., Kugler, A.

Pacific Northwest National Laboratory, US Nuclear Regulatory Commission

RISK ASSESSMENT

P.62 Prioritization of Los Alamos National Laboratory Repackaging Campaign Using Package Surveillance Data

Hoffman, J., Kelly, E., Smith, P.

Los Alamos National Laboratory

SPECIAL INTERNATIONAL POSTER SESSION

P.63 Measurement of Uranium Uptake by Agricultural Crops at Khan Al-Zabeeb – Jordan

Al-Kharouf, S., Dababneh, M., Al-Hamameh, I.

Royal Scientific, Jordan, Al-Balqaa Applied University, Jordan

P.64 Analysis of the Radioactivity in the Spa “Elguea,” Cuba

Gómez, I., Zerquera, J., González, J., Ferrera, E., Castro, G.

Centro de Protección e Higiene de las Radiaciones

P.65 The Status of Korean Radiological Emergency Preparedness and Development of Radiological Dose Assessment Systems

Han, M.H., Kim, E.H., Suh, K.S., Hwang, W.T., Jeong, H.J.

Korea Atomic Energy Research Institute, Korea

P.66 Potential Errors in Committed Effective Dose Due to the Assumption of a Single Intake Path in Interpretation of Bioassay Results

Lee, J.I., Lee, J.K.

Korea Atomic Energy Research Institute, Republic of Korea, Hanyang University

P.67 Radiological Protection in Hemodynamics Lab

Prado, N., Luz, E., Canevaro, L.

Instituto Militar de Engenharia, Brazil, Instituto de Radioproteção e Dosimetria, Brazil

P.68 Activity Optimization in HMPAO - 99mTc Brain SPECT

Pérez-Díaz, M., Díaz-Rizo, O., Aparicio, E., Díaz, R., Rodriguez, C.

Central University of Las Villas, Cuba, University Hospital Celestino Hdez, Cuba

P.69 Preliminary Study about Radionuclidic Purity and Radiochemical Stability of [153Sm]Sm-EDTMP to Elaborate a Dosimetric Model in Bone Metastases Palliation Cares and Osteosarcoma Therapy

Ridone, S., Arginelli, D., Bortoluzzi, S., Montalto, M., Nocente, M., Inglese, E., Matheoud, R.

Secco Research Centre of Saluggia, Italy, Hospital Maggiore della Carità of Novara and University of Studies of Eastern Piedmont, Italy

P.70 137Cs Activity Concentrations Determined in the Vertical Profile of Sandy Beaches of Italy

Rizzotto, M., Velasco, H., Merkis, N., Toso, J.

Instituto de Matemática Aplicada San Luis (IMASL), Argentina

P.71 Intercomparison of KAP-meter, TLDs and Barracuda System with R-100 Detector

Basiaë, B., Beganoviae, A., Dzaniae, S., Drijeviae, A.

Sarajevo University, Bosnia and Herzegovina, Institute of Public Health of Federation of Bosnia and Herzegovina

P.72 Two-TLD Personal Dosimetry in Interventional Radiology

Bašić, B., Beganoviae, A., Drijeviae, A., Sejmen, E.

Sarajevo University, Bosnia and Herzegovina, Institute of Public Health of Federation of Bosnia and Herzegovina

MONDAY

P.73 Environmental Protection Against Ionizing Radiation - The Challenge of an Umbrella Concept

Steiner, M., Hornung, L., Willrodt, C., Kirchner, G.

Federal Office for Radiation Protection, Germany

P.74 The Assessment of Radon Exposure in Workplaces: Ispepl Radon Measurement Laboratory Approach

Trevisi, R.B., Leonardi, F., Tonnarini, S. National Institute for Occupational Safety and Prevention, Italy

P.75 Verification of the Sealed Radioactive Sources in Federation of Bosnia and Herzegovina

Vidic, A., Dzanic, S. Institute for Public Health of Federation of Bosnia and Herzegovina-Radiation Protection Center, Sarajevo

WORKS-IN-PROGRESS

P.76 Novel 2-Dimensional Dose Distribution Study In 5-Yr Old Pediatric Phantom

Yoshizumi, T., Brady, S., Frush, D., Toncheva, G., Oldham, M. Duke University

P.77 Occupational Radiation Dose to Cardiologists from Cardiac Catheterization Procedures

Kim, K.P., Miller, D., Kleinerman, R., Linet, M., Balter, S., Simon, S. National Institutes of Health, Uniformed Services University, Columbia University

P.78 Evaluation of Small-Size Dosimeters using Optically Stimulated Luminescent (OSL) Dosimetry Materials for Diagnostic Imaging Dosimetry

Dauer, L.T., Ching, H., Kwan, A., Fleishman, R., Rothenberg, L., St. Germain, J.

Memorial Sloan-Kettering Cancer Center

P.79 Determining Cytogenetic Dose Response to Cf-252 Fission Neutrons
Bogard, J.S., Livingston, G.K., Jenkins, M.S.

Oak Ridge National Laboratory, Radiation Emergency Assistance Training Center

P.80 Fostering Some of the Next Decade's Scientists: Searching For "Jenny Neutron" on a Saturday Afternoon

Masih, S., Donahue, M., Burchell, N., Dhar, M. University of Missouri-Kansas City, Honeywell, FM&T, Children's Mercy Hospitals and Clinics-Kansas City

P.81 Quantitative Analysis of the Effects of Ionizing Radiation on Arabidopsis Thaliana

Hood, S., Kurimoto, T., Constable, J.V.H., Huda, A. California State University Fresno

P.82 Homeland Security Radiological Research for Environmental Remediation
Hall, K., Drake, J.L., Lee, S.D.

US Environmental Protection Agency

P.83 Preliminary Design of a Directionally Sensitive Spectroscopic Neutron Detector based upon Shadow Shielding

Zak, T., Whetstone, Z., Lehnert, A., Kearfott, K. University of Michigan

P.84 Regulations and Cleanup-Surprises and Solutions

Terry, J., Hermes, W., Hylton, T., Vitkus, T. Oak Ridge National Laboratory, Oak Ridge Institute for Science and Education

MONDAY

3:30-5:00 PM

A105

MPM-A: NIOSH Dose Reconstruction Project

Co-Chairs: Dade Moeller and Jim Neton

3:30 PM

MPM-A.1

The NIOSH Dose Reconstruction Project: Creating and Managing a Pioneering Scientific Program

Townsend, R.D., Moeller, M.P., Dooley, D.A.*

Oak Ridge Associated Universities, Dade Moeller & Associates, MJW Corporation

3:45 PM

MPM-A.2

The Scientific Basis of Dose Reconstruction

Toohy, R.E., Neton, J.W.

Oak Ridge Associated Universities, Oak Ridge, National Institute for Occupational Safety and Health, Cincinnati

4:00 PM

MPM-A.3

Development of Rapid Methods for Assessing Doses from Internally Deposited Radionuclides

Maher, E.F., McCartney, K.A., Mize, B.D., Sun, L.S., Siebert, S.R.*

Dade Moeller & Associates, MJW Inc.

4:15 PM

MPM-A.4

Implications of Claimant Favorability of Dose and Probability of Causation Calculations Under EEOICPA Subtitle B

Merwin, S., Stewart, D., Smith, M., Potter, K., Kimpan, K., Cragle, D., Hinnefeld, S.*

Dade Moeller & Associates, Oak Ridge Associated Universities, NIOSH Office of Compensation Analysis and Support

4:30 PM

MPM-A.5

The NIOSH Dose Reconstruction Program: Commentary and Conclusions

Neton, J., Elliott, L.

NIOSH

4:45 PM

MPM-A.6

Uncertainty and Variability in Historical Time-Weighted Average Exposure Data

Davis, A., Strom, D.

Pacific Northwest National Laboratory

3:30-5:00 PM

A106

MPM-B: Reactor Health Physics

Chair: Matt Arno

3:30 PM

MPM-B.1

Innovative Approach for Radon Control

Moeller, D., Bump, S., Desrosiers, A.*

Dade Moeller & Associates

3:45 PM

MPM-B.2

EPD-N2 Neutron Correction Factor

Earls, L., Stoicescu, L.

STPNOC

4:00 PM

MPM-B.3

EPRI Alpha Monitoring Guidelines for Operating Nuclear Power Stations

Russell, M., Bushart, S., Cardarelli, R., Darois, E., Oliveira, R.

SCE, EPRI, CNA, RSCS, ANI

4:15 PM

MPM-B.4

Neutron Measurements at Beaver Valley Power Station

Scherpelz, R.I., McConn, R.J., Conrady, M.M., Lebda, J.T.

Battelle Pacific Northwest Division, FirstEnergy Nuclear Operating Company

4:30 PM

MPM-B.5

An Overview of Health Physics Activities During Spent Nuclear Fuel Shipment

Vasudevan, L.

Texas A&M University

4:45 PM

MPM-B.6

Analysis of C-14 Accumulation at Nuclear Facilities

Haque, M., Miller, D.

University of Illinois

MONDAY

3:30-5:15 PM

B110-112

MPM-C: Regulatory/Legal Issues

Co-Chairs: Cynthia Jones and Eva Hickey

3:30 PM **MPM-C.1**

Licensing the Construction of Emission Units of the Hanford Tank Waste Treatment and Immobilization Plant (WTP) to use Non-AG-1 (alternate technology standards) as justified by the Cost Benefit Analysis evaluation of WAC 246-247-110(16)

Laws, G.

Washington State Department of Health

3:45 PM **MPM-C.2**

Radiological Environmental Reviews for New Reactor Licensing

Hickey, E., Stoetzel, G., Krieg, R., Kugler, A.

Pacific Northwest National Laboratory, US Nuclear Regulatory Commission

4:00 PM **MPM-C.3**

Updating the IAEA International Nuclear Event Scale Reporting System

Jones, C.

US Nuclear Regulatory Commission

MONDAY

4:15 PM **MPM-C.4**

Consequences of Altering the Current Evaluation Process for Devices Containing Radioactive Sources

Chapel, S.

IRSC, Inc.

4:30 PM **MPM-C.5**

Unexpected Changes in a University Radiation Safety Program

O'Dou, T.

University of Nevada Las Vegas

4:45 PM **MPM-C.6**

Performing a Radiation Protection Program Assessment

Marshall, G.

Philotechnics

5:00 PM **MPM-C.7**

Health Physics Practices and Legal Determinations

Johnson, R., McKay, L.

Blank Rome, LLP

3:30-4:15 PM

B113-114

MPM-D: First Responders

Chair: Tom O'Connell

3:30 PM **MPM-D.1**

Training First Responders in Washington State to Respond Safely to a Radiological or Nuclear Attack or Accident

Conklin, A.W., Wainhouse, L.E., Henry, M.E., Butowicz, K., Fordham, E.

Washington State Department of Health

3:45 PM **MPM-D.2**

Veterans Healthcare Administration Medical Emergency Radiological Response Team

Bravenec, J., Tuttle, B., Schumacher, T.

Veterans Affairs Medical Center

4:00 PM **MPM-D.3**

US Air Force - Radiation Assessment Team (AFRAT) Reorganization

Nichelson, S.

AFIOH/SDR

3:30-5:00 PM

B115-116

MPM-E: Waste Management

Chair: Susan Jablonski

3:30 PM **MPM-E.1**

NORM/TENORM Waste Disposal in Colorado: The Deer Trail Landfill

Kennedy, Jr., W.E., Retallick, P. G., Nielson, D. B., Kehoe, J. H., Webb, M. M.

Dade Moeller & Associates, Clean Harbors Environmental Services

MONDAY

3:45 PM **MPM-E.2**
Neptunium Speciation in Solutions
Relevant to High Level Waste Processing
Matteson, B., Tkac, P., Paulenova, A.
Oregon State University

4:00 PM **MPM-E.3**
Speciation of Plutonium and Other
Actinides Under UREX Process
Conditions
Tkac, P., Paulenova, A., Matteson, B.
Oregon State University

4:15 PM **MPM-E.4**
Probabilistic Performance Assessment of
a Low-Level Radioactive Waste Disposal
Site on the Nevada Test Site
Shott, G., Yucel, V., Desotell, L., Pyles, G.
National Security Technologies LLC,
National Nuclear Security Administration

4:30 PM **MPM-E.5**
Los Alamos National Laboratory (LANL)
& Nuclear Energy Corporation of South
Africa (NECSA) Cooperate in IAEA Spent
High-Activity Radioactive Sources
(SHARS) Hot Cell Pilot-Project in South
Africa

*Tompkins, J.A., Liebenberg, G., Al-
Mughrabi, M.*
*Los Alamos National Laboratory, Nuclear
Energy Corporation of South Africa, IAEA*

4:45 PM **MPM-E.6**
Development of a Biosphere Model for
Waste Incidental to Reprocessing and
Non-High-Level Waste Consultations
*Simpkins, A., Howard, L., LaPlante, P.,
Mancillas, J., Pensado, O., Turner Gray,
A.*
*Southwest Research Institute, US
Nuclear Regulatory Commission*

3:30-5:00 PM **B117-119**

Movies

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USSSP Consultant Saleem Salaymeh (right) trains IAEA inspectors

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- Technical training

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IAEA Director General Mohamed ElBaradei meets with past interns

Contact: Donna Occhiogrosso at occhio@bnl.gov.

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Brookhaven National Laboratory

TUESDAY

7:00-8:00 AM **A105**

CEL3 ON ALERT: Post 9/11 Integrated
Emergency Planning
Lawrence T. Dauer
Memorial Sloan-Kettering Cancer Center

7:00-8:00 AM **A106**

CEL4 Image-Based Methods in
Internal Dose Calculations – Current
Status
Mike Stabin
Vanderbilt University

8:30 AM-Noon **A105**

TAM-A: AAHP Special Session on Health Physics Education: Status of Academic Programs, Student Recruitment, Funding and Accreditation

Co-Chairs: Jim Bogard, Wes Bolch and
Derek Jokisch

Status of HP Academic Programs and Student Recruitment

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

Summary of HP Manpower and Future
Demand
Nelson, K.
HPS President-elect

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

A Review of HP Academic Programs in
the US
Bolch, W.
University of Florida

Program Descriptions

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

Radiation Protection Technology
Curriculum Development
*Miller, W., Jonassen, D., Schmidt, M.,
Easter, M., Ionas, G., Marra, R., Etter, R.,
Meffert, B.*
University of Missouri-Columbia

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

The Bloomsburg University Health
Physics Program
Simpson, D.
Bloomsburg University

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

The Health Physics Major at Francis
Marion University
Peterson, D., Fulmer, P.
Francis Marion University

10:00 AM **BREAK**

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

Health Physics Programs at Texas A&M
University
Poston, Sr., J.
Texas A&M University

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

Oregon State University's Radiation
Health Physics Program
*Higley, K., Binney, S., Reese, S., Reyes,
J.*
Oregon State University

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

Description of the Health Physics
Program at The University of Tennessee
Miller, L.
The University of Tennessee

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

Radiological Sciences Program at the
University of Massachusetts Lowell
French, C.S., Tries, M. A., Medich, D. C.
University of Massachusetts Lowell

11:30 AM Panel Discussion and Q&A

Competition from Other Fields: How
Does HP Compete?

TUESDAY

8:30 AM-NOON

A106

TAM-B: External Dosimetry A

Co-Chairs: Jack Fix and Tosh Ushino

8:30 AM

TAM-B.1

DOE Mayak External Dose Reconstruction

Teplyakov, I., Gorelov, M.V., Knyazev, V.A., Vasilenko, E.K., Fix, J.J., Scherpelz, R.I.*

Mayak Production Association, Dade Moeller & Associates, Pacific Northwest National Laboratory

8:45 AM

TAM-B.2

Organ Dose Calculations for Mayak Worker Dose Assessment

Scherpelz, R.I., Smetanin, M., Choe, D.O., Vasilenko, E., Gorelov, M., Fix, J.J. Pacific Northwest National Laboratory, Mayak Production Association, University of Utah, Dade Moeller and Associates

9:00 AM

TAM-B.3

Optically Stimulated Luminescence (OSL) and Thermoluminescent (TL) Response of SiO₂ Optical Fiber to Beta Radiation

Bogard, J.S., Goltzari, J.I., Espinosa, G. Oak Ridge National Laboratory, Universidad Nacional Autónoma de México

9:15 AM

TAM-B.4

Determination of Neutron Correction Factors for Personnel and Area Dosimeters Used in the Vicinity of Spent Fuel Storage Casks

Rathbone, B.A., Scherpelz, R. I. Pacific Northwest National Laboratory

9:30 AM

TAM-B.5

Recent Development in GDS Real-time Optical Fiber in vivo Dosimeter

Ushino, T., Justus, B., Huston, A., Ning, H., Miller, R.

Global Dosimetry Solutions, US Naval Research Laboratory, National Cancer Institute

9:45 AM

TAM-B.6

Preliminary External and Internal Dosimetry Data from a New Set of Mother/Fetus Models

Zhang, J., Taranenko, V., Zhang, D., Xu, X., Shi, C.

Rensselaer Polytechnic Institute, Cancer Therapy and Research Center, San Antonio, TX

10:00 AM

BREAK

10:30 AM

TAM-B.7

Effect of Pediatric Subcutaneous Fat Thickness on Effective Dose for External Radiation Exposure: Monte Carlo Calculation Study

Lee, C., Lodwick, D., Hasenauer, D., Bolch, W.

University of Florida

10:45 AM

TAM-B.8

Implementing the Weighting Factors to Determine Occupational Dose

Russell, M., Lantz, M., Cooper, T., Sewell, S., Duran, D.

SCE, PVNGS

11:00 AM

TAM-B.9

Analysis of Anomalous Thermoluminescence Glow Curves

Potter, C., Sanchez, D.

Sandia National Laboratories

11:15 AM

TAM-B.10

Hybrid Computational Phantom VOX-MAT: Combination of Voxel and Mathematical Representation of the Anatomy

*Akkurt, H., Eckerman, K.**

Oak Ridge National Laboratory

11:30 AM

TAM-B.11

Testing of a Hybrid Approach for Rapid Direct Radiation Gamma Dose Assessments for Complex Source/Receptor Geometries

Povetko, O., Benke, R., Kouznetsov, A., Golikov, V.

Southwest Research Institute, Consultant, Calgary, Canada, Federal Radiological Center, St-Petersburg, Russia

TUESDAY

11:45 AM TAM-B.12

Dose Algorithm Changes Necessary to Satisfy Anticipated Revisions to the Department of Energy Laboratory Accreditation Program for External Dosimetry
Stanford, N.
Stanford Dosimetry, LLC

8:30 AM-NOON B110-112

TAM-C: Medical Health Physics

Co-Chairs: Ben Edwards and Laura Pring

8:30 AM TAM-C.1

Investigation of the Reproducibility of Functional Magnetic Resonance Imaging and Diffusion Tensor Imaging
Mangum, J., Lowe, D., Patton, P.
University of Nevada Las Vegas, Spring Valley Nevada Imaging Centers Amigenics

8:45 AM TAM-C.2

Investigation of Magnetic Resonance Imaging and Spectroscopy for the Detection of Breast Cancer
Etnire, R., Patton, P.
University of Nevada-Las Vegas, Spring Valley Nevada Imaging Centers Amigenics

9:00 AM TAM-C.3

Prostate Volume Delineation and Seed Localization using a 3 T Magnetic Resonance Imager
Davis, J., Patton, P.
University of Nevada-Las Vegas

9:15 AM TAM-C.4

Monte Carlo-Based Calculations of Neutron Activation in a Medical Linear Accelerator
Bednarz, B., Xu, X. G., Taranenko, V., Olson, J.
Rensselaer Polytechnic Institute

9:30 AM TAM-C.5

A Skin Dose Monitoring Program in a Busy Heart Center
Schultz, C.C., Feng, W., Robertson, S.M.
William Beaumont Hospital

9:45 AM BREAK

10:15 AM TAM-C.6

Radiation Dose to Surgical Staff from PET-Based Localization and Radiosurgery of Tumors
Heckathorne, E.S., Dimock, C.W., Dahlbom, M., Daghighian, F.
University of California, Los Angeles, IntraMedical Imaging, LLC

10:30 AM TAM-C.7

A Novel Shielding Design to Reduce Radiation Exposures from Patients Administered F-18 FGD for PET Studies
Sheetz, M., Whitt, D., Talbot, F.
University of Pittsburgh, University of Pittsburgh Medical Center

10:45 AM TAM-C.8

A Skeletal Reference Dosimetry Model for the Adult Female
Kielar, K., Shah, A., Bolch, W.
University of Florida, MD. Anderson Cancer Center

11:00 AM TAM-C.9

A Skeletal Reference Dosimetry Model for the 40-Year Male
Hough, M., Bolch, W.
University of Florida

11:15 AM TAM-C.10

Development Of Hybrid Computational Newborn Phantom for Dosimetry Calculation: The Skeleton
Hasenauer, D., Lee, C., Lodwick, D., Watchman, C., Bolch, W.
University of Florida, Gainesville, University of Arizona, Tucson

TUESDAY

11:30 AM **TAM-C.11**
Improved Phantoms for Internal Dosimetry: Better Realism and Uncertainty Analyses

Stabin, M., Xu, X.G., Segars, W.P., Rogers, J., Gesner, J., Brill, A.B., Emmons, M.
Vanderbilt University, Rensselaer Polytechnic Institute, Duke Advanced Imaging Laboratories

11:45 AM **TAM-C.12**
Assessment of Photodynamic Death of Cultured Human Melanoma Cells and Inflicted Biomolecular Damage using Vital Stains and Synchrotron Infrared Microspectroscopy

Mamoon, A., Gamal - Eldine, A., Ruppel, M., Smith, R., Tsang, T., Miller, L.
Egypt Atomic Energy Authority, Egyptian National Research Council, Stony Brook University, Brookhaven National Laboratory

12:15 PM **Medical HP Business Meeting**

8:00 AM-NOON **B113-114**

TAM-D: Community Preparedness for Radiological Terrorism Response Special Session

Co-Chairs: Brooke Buddemeier and William Rhodes

8:00 AM **TAM-D.1**
An NRC Commissioner's Perspective on Preparedness for Radiological Emergencies

Commissioner Jaczko
US Nuclear Regulatory Commission

8:30 AM **Session Introduction by Chairs**

8:40 AM **TAM-D.2**
Radiological Dispersal Device Characteristics and Limitations
Harper, F., Rhodes, W.
Sandia National Laboratory

9:00 AM **TAM-D.3**
The New York City Plan to Respond to a Radiological Emergency
Musolino, S.
Brookhaven National Laboratory

9:15 AM **TAM-D.4**
Radiological-Community-Preparedness-Resources Pilot Program with the Portland, OR Emergency Response Community
Letellier, B., Royal, M.
Los Alamos National Laboratory, Hicks and Associates

9:30 AM **TAM-D.5**
An Overview of NCRP Commentary No. 19
Poston, Sr., J.
Texas A&M University

9:45 AM **BREAK**

10:15 AM **TAM-D.6**
ASTM Standard for Radiological Emergency Response
Taylor, T.
Los Alamos National Laboratory

10:30 AM **TAM-D.7**
Handbook for Responding to a Radiological Dispersal Device First Responders Guide: The First 12 Hours
Salame-Alfie, A., Fisher-Tyler, F., Gardner, P., Godwin, A., Kaufman, K., Mehrhoff, M., McAllister, K.
New York State Department of Health, Delaware Department of Health & Social Services, New Jersey Department of Environmental Protection, Arizona Radiation Regulatory Agency, County of Los Angeles, Department of Public Health, University of Iowa, Oakdale Campus, Massachusetts Department of Public Health

TUESDAY

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

IAEA Manual for First Responders to a Radiological Emergency
McKenna, T., Buglova, E., O'Connell, T.
International Atomic Energy Agency, Austria

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

Population Monitoring: Development of Planning Guidance for State and Local Officials

Ansari, A., Whitcomb, R., Miller, C.
Centers for Disease Control

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

Interagency Guidance for Response and Recovery Following an Radiological Dispersal Device (RDD) or Improvised Nuclear Device (IND) Attack

MacKinney, J.A.
US Environmental Protection Agency

11:30 AM **Panel Discussion**

National and International Guidance for Emergency Responders

8:30 AM-NOON **B115-116**

TAM-E: Environmental/Radon Special Session

Co-Chairs: Jan Johnson and Craig Little

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

Fossil Fuel Combustion vs. Sustainable Systems: Energy Delivery Potentials and Environmental Consequences

Meyer, R.
Tetra Tech, Inc.

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

Environmental Issues of Reactor High Level Waste Storage and Disposal

Adams, S.
Shaw Environmental

10:00 AM **BREAK**

10:30 AM **TAM-E.3**

Residential Radon Exposure and Lung Cancer

Neuberger, J.
University of Kansas School of Medicine

11:00 AM **TAM-E.4**

Basis for Assessing Radon Health Risk and International Guidelines

Chambers, D.
SENES

11:30 AM **TAM-E.5**

Innovative Approach for Radon Control

Moeller, D.W., Desrosiers, A.
Dade Moeller & Associates

NOON **Environmental/Radon Section Business Meeting**

8:30 AM-NOON **B117-119**

TAM-F: Uncertainty Special Session Sponsored by the Decommissioning Section

Co-Chairs: Carl Gogolak and Joseph Shonka

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

Uncertainty in Energy Resolution Measurements

Volkovitsky, P., Yen, J., Cumberland, L.
National Institute of Standards and Technology (NIST)

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

Uncertainty Calculations in Radiation Instrument Calibrations

Slowey, T., Bryson, L.
K&S Associates, Inc.

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

The Standard Poisson Table

Bramlitt, E.
University of New Mexico

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

Measurement Uncertainty from In-Situ Gamma Spectroscopy of Nonhomogeneous Containers and from Laboratory Assay

Bronson, F., Atrashkevich, V.
Canberra Industries, Consultant

TUESDAY

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

The Importance of Uncertainty
Gogolak, C.
Consultant

9:45 AM **BREAK**

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

Characteristic Limits in the Classical
GUM Approach and in the Monte Carlo
Approach: - ISO 11929 and Beyond
Michel, R.
Leibniz Universitaet Hannover, Germany

10:45 AM **TAM-F.7**

Uncertainty Analysis for Air-Kerma Rate
Measurements from Gamma-Ray Beams
Using Ionization Chambers
Minniti, R.
*National Institute of Standards and
Technology (NIST)*

11:00 AM **TAM-F.8**

Uncertainty Analysis for Gamma-ray
Spectrometry Measurements using High
Purity Germanium Detectors
Pibida, L., Hammond, M., Unterweger, M.
*National Institute of Standards and
Technology (NIST)*

11:15 AM **TAM-F.9**

Applied Uncertainty Estimates in the
Department of Energy Laboratory
Accreditation Program
Schwahn, S.
U.S. Department of Energy

11:30 AM **TAM-F.10**

Methods for Addressing Uncertainties in
the Plutonium Source Term from Los
Alamos
Shonka, J., O'Brien, J., Widner, T.
Shonka Research Associates, ChemRisk

11:45 AM **TAM-F.11**

Everything Is Lognormal or Is It?
Strom, D.
Pacific Northwest National Laboratory

NOON **Decommissioning Section
Business Meeting**

2:30-5:15 PM

A-105

TPM-A: AAHP Special Session on Health Physics Education Funding and Accreditation of Academic Programs

Co-Chairs: Jim Bogard, Wes Bolch and
Derek Jokisch

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

Academic Accreditation and the Health
Physics Society
Brey, R.
Idaho State University

Funding of Academic Programs

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

Supporting University Health Physics
Education in a Changing Environment
Gutteridge, J.
US Department of Energy

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

NIOSH Training Programs in Health
Physics
Borak, T.B., Johnson, T.E.
Colorado State University

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

Congress and the Health Physics Human
Capital Crisis
Dinger, K., Connolly, D.
*Health Physics Society, Capitol
Associates, Inc.*

3:45 PM **BREAK**

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

Health Physics Fellowships
Williamson, C.
SCUREF

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

Health Physics Society's Assistance in
Academic Education
Jokisch, D.
Francis Marion University

4:45 PM **Panel Discussion and Q&A**

Current and Future Funding of Academic
Programs

5:15 PM **AAHP Open Meeting**

TUESDAY

2:30-3:45 PM

A106

TPM-B: External Dosimetry B

Co-Chairs: Gus Potter and Tim Kirkham

2:30 PM

TPM-B.1

A Novel Mouse Dosimetry with MOSFET Technology in Orthovoltage X-ray Irradiator

Brady, S., Muramoto, G., Toncheva, G., Daigle, L., Nguyen, N., Chute, J., Dewhirst, M., Yoshizumi, T.
Duke University

2:45 PM

TPM-B.2

Measurement of a TLD Neutron Dose Factor for a Holtec MPC

Burns, K., Hertel, N. E., Burgett, E., Blaylock, D., Patton, B. P., Kuryla, J.
Georgia Institute of Technology, Farley Nuclear Plant, Georgia Power Environmental Laboratory

3:00 PM

TPM-B.4

Factors Influencing the Accuracy and Precision of Thermoluminescent Detector Calibrations

Harvey, J., Thomas, E., Haverland, N., Kearfott, K.*
University of Michigan

3:15 PM

TPM-B.5

Determination of Minimum Detectable Dose and Dose Response Linearity for Glow Curve Analysis of Five Thermoluminescent Detector Materials

Harvey, J., Thomas, E., Haverland, N., Hammargren, B., Kearfott, K.*
University of Michigan

3:30 PM

TPM-B.6

Characterization of the Glow Curve Peak Fading Properties of Six Common Thermoluminescent Materials

Haverland, N., Harvey, J., Kearfott, K.*
University of Michigan

2:30-5:00 PM

B110-112

TPM-C: Decommissioning

Co-Chairs: Joseph Shonka and Patricia Lee

2:30 PM

TPM-C.1

Decommissioning the Rutgers University Radioactive Waste Processing Facility: Challenges And Successes

McDermott, P.J.
Rutgers University

2:45 PM

TPM-C.2

Historical Site Assessment of University Facilities

Caracappa, P.
Rensselaer Polytechnic Institute

3:00 PM

TPM-C.3

Decommissioning Fifty Years of History at a Small College

Kay, M., Dibblee, M.
AMBRY, Inc.

3:15 PM

TPM-C.4

Residual Activity and Dose Rate Considerations for Disposal of HEU from a Small Research Reactor

Thatcher, A., Andes, T.
NEXTEP CG, BWXT Y-12

3:30 PM

BREAK

4:00 PM

TPM-C.5

Spatially-Dependent Measurements of Surface and Near-Surface Radioactive Material Using In situ Gamma Ray Spectrometry (ISGRS) for Final Status Surveys

Chapman, J.A., Watson, B.A., Boerner, A.J., Abelquist, E.W.*
Oak Ridge Associated Universities, US Nuclear Regulatory Commission

4:15 PM

TPM-C.6

Decommissioning a Beta Thickness Gauge by Recycling the Krypton 85 Gas

*Kay, M., Dibblee, M.**
AMBRY, Inc.

TUESDAY

4:30 PM **TPM-C.7**
Decommissioning Cost Estimates
Marshall, G.
Philotechnics

4:45 PM **TPM-C.8**
First Two MARSSIM Decommissionings of CDC Laboratories
Keith, L., Simpson, P., Bowman, D., Lirette, N.
Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention

2:30-4:30 PM **B113-114**

TPM-D: Community Preparedness for Radiological Terrorism Response Special Session

Co-Chairs: Brooke Buddemeier and William Rhodes

2:30 PM **TPM-D.1**
Radiological Dispersal, Polonium-210, and Lessons for Public Health
Miller, C.W., Whitcomb, Jr., R.C., Ansari, A., Nemhauser, J.B., McCurley, C.
Centers for Disease Control

2:45 PM **TPM-D.2**
Dose Assessment for Reentry or Reoccupancy from Areas Contaminated by a Radiological Dispersal Device
Sullivan, T., Musolino, S., DeFranco, J.
Brookhaven National Laboratory, New York City Department of Health

3:00 PM **TPM-D.3**
Improving National Preparedness Using the Nuclear Scenario
Buddemeier, B.
Lawrence Livermore National Laboratory

3:15 PM **BREAK**

3:45 PM **TPM-D.4**
Options for Response to an Urban Nuclear Detonation
*Wheeler, R., Brandt, L., Buddemeier, B.**
Lawrence Livermore National Laboratory, Sandia National Laboratory

4:00 PM **TPM-D.5**
Title: Federal and State Resources Available to Respond to a Radiological/Nuclear Emergency
Groves, K.L., Maiello, M.
S2-Sevorg Services, LLC, Wyeth Medical

4:15 PM **TPM-D.6**
U.S. Department of Homeland Security Tests of the Colorimetric Dose Control Tool SIRAD for Radiological Emergency Preparedness
Klemic, G., Buddemeier, B., Bailey, P., Monetti, M., Breheny, C., Hall, H.
US Department of Homeland Security, Environmental Measurements Laboratory, Lawrence Livermore National Laboratory

4:30-6:00 PM **Homeland Security Open Meeting**

2:30-5:30 PM **B115-116**

TPM-E: CRSO Plenary Session
Co-Chairs: Jim Schweitzer and Andy Miller

2:30 PM **CRSO PL.1**
Opening/Introduction
Smith, K.
University of California, San Diego

2:40 PM **CRSO PL.2**
NCRP 147 Shielding Calculations
Simpkin, D.
St. Luke's Medical Center

4:45 PM **CRSO PL.3**
Joint CRSO/HPS Session NRC - Fingerprinting for Increased Controls
Einberg, C.
U.S. Nuclear Regulatory Commission

2:30-5:00 PM **B117-119**

Movies

WEDNESDAY

7:00-8:00 AM **A105**

CEL5 Ingestion Derived Intervention Levels (DILs) and Derived Response Levels (DRLs) for Emergency Planning and Response

Patricia L. Lee

Savannah River National Laboratory (SRNL)

7:00-8:00 AM **A106**

CEL6 2006 Gamma Irradiator Accident in Belgium

Mark Smith

Sterigenics International

8:30 AM-NOON **A105**

WAM-A: Environmental

Co-Chairs: Matthew Barnett and Linnea Wahl

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

A Review of Residential Areas Developed around Manhattan Project and Early AEC Sites and Potential Pathways for Public Exposures

Widner, T.E., Robinson, K.D., Flack, S.M. ChemRisk, Inc.

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

A Review of the World's First Test of an Atomic Bomb (Trinity Site, July 16, 1945) and Potential Radiation Exposures to Residents of New Mexico

Widner, T.E., Flack, S.M.

ChemRisk, Inc.

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

Risk Analysis in Response to Community Opposition to Housing Development Based on Strontium-90 in Soil and Construction Dust

Greger, L.R.

California Department of Health

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

Evaluation of U.S. Nuclear Power Plant Radiological Environmental Monitoring Programs

Harris, J., Miller, D.

Purdue University, University of Illinois at Urbana-Champaign

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

Historic Environmental Thermoluminescent Dosimeter Readings at the Hanford Site

Antonio, E., Rathbone, B., Poston, T.

Pacific Northwest National Laboratory

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

Spatial Variability of Partition Coefficients for Radionuclides at the Savannah River Site

Grogan, K., Kaplan, D.I., Fjeld, R.A., DeVol, T.A., Coates, J.T.

Clemson University, Savannah River National Laboratory

10:00 AM **WAM-A.7**

Semi-Automated Areal Survey System

*Hensley, J., Harcek, B., Nichelson, S.**

Pugh, D.

AFIOH/SDR

10:15 AM **BREAK**

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

Review of Radioactive Materials Released from Production Reactors and Public Exposures

Dua, S., Mwaisela-Rose, J., Lagos, L.,

Roelant, D., Srivastava, R.

Florida International University

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

The Analysis of Contaminated HEPA Filters

*LeBaron, G., Bates, J., Woolery, W.**

Fluor Hanford, US Department of Energy

11:15 AM **WAM-A.10**

Evaluating Radioactive Air Emissions from a Minor Source under Rad-NESHAP

*Anderson, K.I., Fuehne, D.P.**

Los Alamos National Laboratory

WEDNESDAY

11:30 AM **WAM-A.11**
Development of a Tritium Dilution Factor from Measured Laboratory Emissions and Localized Ambient Air Sampling
Barfuss, B., Barnett, J., Fritz, B.
Pacific Northwest National Laboratory

11:45 AM **WAM-A.12**
Comparison of Modeled Radionuclide Doses and Air Concentrations in the Environment Using the CAP88-PC Software
Rhoads, K., Aaberg, R.L., Staven, L.H., Rokkan, D.J.
Pacific Northwest National Laboratory, Fluor Hanford, Inc.

8:15 AM-NOON **A106**

WAM-B: Accelerator Section Session

Co-Chairs: Kamran Vaziri, Scott Walker

8:15 AM **WAM-B.1**
Accelerator Shielding at High Energy Accelerators: Past to Present
Sullivan, A.H. (G. William Morgan Lecturer) Presented by *R. Thomas*
CERN (Retired)

9:00 AM **WAM-B.2**
High Energy Activation Foils In a High Energy Neutron Beam
*Walker, L.S., James, M., Nakao, N., Oostens, J.**
Los Alamos National Laboratory, Fermi National Laboratory, Campbellsville University

9:15 AM **WAM-B.3**
Confirmatory Measurements for Radioactive Air Production at Stanford Linear Accelerator Center
Kerimbaev, M., Liu, J.
Stanford Linear Accelerator Center

9:30 AM **WAM-B.4**
Search For Additional Sources of Tritium in the NuMI Tunnel
Vaziri, K.
Fermi National Accelerator Laboratory

9:45 AM **WAM-B.5**
Estimation of Shielding and Radiation Dose for a Pre-Separator Area for Rare Isotope Production via Projectile Fragmentation
Baek, I., Ronningen, R., Bollen, G.
Michigan State University

10:00 AM **WAM-B.6**
Initial Operating Experience at the Spallation Neutron Source
Gregory, D.
Oak Ridge National Laboratory

10:15 AM **BREAK**

10:45 AM **WAM-B.7**
Shielding Requirements for National Synchrotron Light Source - II
*Job, P.K., Casey, W.R.**
Brookhaven National Laboratory

11:00 AM **WAM-B.8**
Monitoring Stray Neutrons with Stilbene Detectors Efficiently
Brodsky, A.
Georgetown University

11:15 AM **WAM-B.9**
Some Operational Experiences with the Personnel Dosimetry Program at Stanford Linear Accelerator Center (SLAC)
Tran, H., Liu, J.
Stanford Linear Accelerator Center (SLAC)

11:30 AM **WAM-B.10**
Testing of a Novel Shielding Material in High Energy Particle Beams
Shannon, M., Burgett, E., Hertel, N., Blaylock, D., Burns, K., Dewji, S., Lobracco, C., Howell, R., Harrison, C., Grulke, E.
Georgia Institute of Technology, Emory University School of Medicine, University of Kentucky

WEDNESDAY

11:45 AM **WAM-B.11**

The Response Change of Radiation Detection Instrumentation to a Magnet Field from a Dipole Magnet

Walker, L.S., Justus, A., Olsher, R., Gordon, L.

Los Alamos National Laboratory

NOON Accelerator Section Business Meeting

8:30-11:45 AM **B110-112**

WAM-C: Internal Dosimetry and Bioassay

Co-Chairs: Elizabeth Brackett and Tim Lynch

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

Using Energy Response Data for Portal Monitors to Create a Physical Basis for the Selection of Radiation Sources used to Mimic a Specific Mixture of Dry Activated Waste in INPO-Mandated Phantom Tests when Replacing Annual Whole Body Counts with Use of Portal Monitors

Hubble, H.

Georgia Institute of Technology

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

Acute Toxicity of Uranium: A Brief Review with Special Reference to Man

Kathren, R., Burklin, R.

Washington State University, Areva NP, Inc.

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

Radiation Measurements Made in Belarus during the First Few Weeks Following the Chornobyl Accident

*Zhukova, O., Podgaiskaya, M., Germenchuk, M., Bouville, A., Luckyanov, N., Voillequé, P., Drozdovitch, V.**

Republican Center of Radiation Control and Environmental Monitoring, Minsk, Belarus, National Cancer Institute, MJP Risk Assessment, Inc.

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

Modeling a Coaxial Germanium System Response to BOMAB Phantom Activity

Lynch, T., Traub, R.

Battelle, Pacific NW Division

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

Calibration of the HMLs Lung Counter as a Bone Counter, using a Knee Phantom

*Kramer, G., Hauck, B., Capello, K.**

Health Canada

9:45 AM **BREAK**

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

Study of the Influence of Biokinetics of Radionuclides on the Calibration Coefficient of in vivo Counting by Monte Carlo Simulation

*Blanchardon, E., Molokanov, A., Kramer, G., Franck, D., Lamart, S.**

IRSN, France, Institute of Biophysics, Moscow, Health Canada

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

The StandFast Whole Body Counter and the Sliced BOMAB Phantom: Efficiency as a Function of Number of Sources and Energy Modelled by MCNP5

Kramer, G., Capello, K.

Health Canada

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

The Variation of Dose to the Respiratory Tract Following the Inhalation of 1 ALI of Plutonium

Traub, R.

Pacific Northwest National Laboratory

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

Thoron Exposure and Lung Dose at a Rare Earth Processing Facility near Bangkok

Harley, N., Chittaporn, P., Wanitsooksumbut, W.

New York University School of Medicine, Thai, OAEF, New York University

WEDNESDAY

11:15 AM **WAM-C.10**

Efficiency Calibration of Bed Type Whole Body Counter Using Monte Carlo Simulations and Application to Intake Estimation of I-131

Kim, J., Choi, H., Lee, B., Lim, Y., Kim, C. Radiation Health Research Institute, South Korea*

11:30 AM **WAM-C.11**

Dose Assessment and Distribution Map for Radon in Dwellings of North-West Iran

Hadad, K., Mehdizadeh, S. Shiraz University, Iran

8:30-11:45 AM **B113-114**

WAM-D: Homeland Security

Chair: Bill Rhodes

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

Los Alamos National Laboratory Project Recovers U.S.-Origin Neutron Sources from Australia

Tompkins, A. Los Alamos National Laboratory-Off-site Source Recovery Project

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

Global Orphan Source Recovery Strategy and Implementation

Mac Kenzie, C. International Atomic Energy Agency, Austria

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

Information Counter-Terrorism for Health Physicists

Van Cleef, D. ORTEC

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

National Security, Health Physics and the Law of Unintended Consequences or Loose Lips... (Still) Sink Ships

Mansfield, W., Sprague, D. Lawrence Livermore National Laboratory*

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

Emergency Response Plans - How Fears May Affect Reality

Johnson, R. Radiation Safety Academy

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

Federal Radiological Emergency Response Assets

Groves, K.L., Maiello, M. S2-Sevorg Services, LLC, Wyeth

10:00 AM **BREAK**

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

Implementation of Increased Controls Order (EA-05-090)

Brown, D., Woods, S. Halliburton Energy Services, Inc.

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

Dosimetric Characterization and Monte Carlo Verification for an Active, Non-Intrusive Inspection System

Ozcan, I., Chandler, K., Ankrah, M., Smith, M., Spaulding, R., Farfan, E. Idaho State University, Savannah River National Laboratory

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

Risk from Low Energy Radionuclide Dispersal

Waller, E., Perera, S., Erhardt, L., Haslip, D. University of Ontario Institute of Technology, Defence R&D Canada Ottawa

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

Technical Assistance to First Responders Pilot Project

O'Connell, T. F. Massachusetts

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

Does Wearable Radiation Shielding Have to Break the Bank?

Hubble, H., Shannon, M., Hertel, N. Georgia Institute of Technology

WEDNESDAY

8:30-11:45 AM **B115-116**

WAM-E: Joint CRSO and RSO Special Session

Co-Chairs: Jim Schweitzer and Andy Miller

8:30 AM **WAM-E.1**
RSO's - A Former Regulator's Perspective

Paperiello, C.
Talisman International

8:45 AM **WAM-E.2**
Digital Radiation Safety

Jackson, A., Peck, D.
Henry Ford Health System

9:00 AM **WAM-E.3**
Radiation Safety and Emergency Management

Bravenec, J., Schumacher, T., Tuttle, B.
Veterans Affairs Medical Center

9:15 AM **WAM-E.4**
Electronic Distribution and Review of Protocols for Radiation Safety Committee Review

Richard, M.
Indiana University Medical Center

9:30 AM **WAM-E.5**
Small Program, Big Needs

Fisher, S.A.
California State University, Fullerton

9:45 AM **BREAK**

10:15 AM **WAM-E.6**
Decommissioning A Thorium-232 Facility

Straccia, F.
Radiation Safety & Control Services, Inc.

10:30 AM **WAM-E.7**
Radiation Safety Aspects of Fluoroscopy

Jacob, N.
Rhode Island Hospital

10:45 AM **WAM-E.8**
The Effectiveness of a Radiological Emergency Plan for Coordinating the Response to a Major Material Licensee Facility Fire

DeSisto, M.A., Smith, L.R., Surr, G., Gillis, E., Romero, E., Cobbe, D., Anderson, G.H., Priddle, D., Sheehan, J.*
PerkinElmer Life and Analytical Sciences, Boston

11:15 AM **WAM-E.9**
A Leaking Sr-90 Sealed Source: Discovery, Resolution and Lessons Learned

Dupré, S., Elwood, S.
Princeton University

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

8:30 AM-NOON **B117-118**

WAM-F: Global Threat Reduction

Chairs: GTRI Staff

This session will touch on the following questions and provide a basic understanding of how a Physical Protection System functions and will discuss the basic fundamental principles of Deterrence, Detection, Delay and Response. The following will be discussed.

1. What is Physical Protection?
2. The importance of the Threat Definition in a performance based system
3. The DEPO (a simple project management approach to the problem)
4. Deterrence, Detection, Delay, Response, and Mitigation
5. Some sensors and some techniques of delay
6. The principle of Timely Detection (ties it all together analytically)
7. Prescriptive vs Performance based approaches
8. Questions

WEDNESDAY

2:30-5:00 PM

A105

WPM-A: Environmental

Co-Chairs: Bernd Kahn and Robert A. Fjeld

2:30 PM **WPM-A.1**
Quantitative Comparison of Sample Preparation Methods for Alpha Spectrometry
Stock, S., Gostic, J., Czerwinski, K., Sudowe, R.
University of Nevada, Las Vegas

2:45 PM **WPM-A.2**
Evaluation of Total Effective Dose Equivalent Due to Naturally Occurring Radioactive Materials using Residual Radioactivity (RESRAD) Code
Beauvais, Z., Kearfott, K.
University of Michigan

3:00 PM **WPM-A.3**
Mapping of Naturally Occurring Radioactive Materials and Indoor Radon Gas Concentrations with Population and Land Type in Several North Central Mountain States
Laird, J., Beauvais, Z., Whetstone, Z., Kearfott, K.
University of Michigan

3:15 PM **WPM-A.4**
The Mobility of Radiocesium and Plutonium in Roach Lake in Southern Nevada
Tabriz, M., Higley, K., Hodge, V., Steinberg, S.
Oregon State University, University of Nevada Las Vegas

3:30 PM **BREAK**

4:00 PM **WPM-A.5**
Determination of Cs-137 and Sr-90 in Selected Southeastern Idaho Watersheds
Beitollahi, M., Gesell, T., Dunker, R., Kimmel, C.
Idaho State University

4:15 PM **WPM-A.6**
Continuous Radionuclide Water Quality Analysis
Gibb, R., Hanlon, J., Melnick, S., Salazar, D., Trelease, A., Caracappa, P.
Rensselaer Polytechnic Institute

4:30 PM **WPM-A.7**
U-Series Concentration in Surface and Ground
Hadad, K., Doulatdar, R.
Shiraz University, Iran

4:45 PM **WPM-A.8**
Post-Chernobyl Kiev in October 1986
Thomas, R.
California

2:30-4:30 PM

A106

WPM-B: Bioeffects

Chair: David Hearnberger

2:30 PM **WPM-B.1**
A Proposed Ultra-Low Level Radiation Biology Research Facility at the Carlsbad, New Mexico, Waste Isolation Pilot Plant (WIPP)
Gomez, L., Brenner, D., Raabe, O.
Orion International Technologies, Inc., Columbia University, University of California, Davis

2:45 PM **WPM-B.2**
Variation in Gamma Emitter Concentration in Urine in a High Background Region
Zhang, R., Crawford, E., Johnson, T.
Colorado State Univeristy

3:00 PM **WPM-B.3**
A ^{131}I Biokinetic Model with Application to Hyperthyroid Patients
Melo, D., Bouville, A., Simon, S., Brill, B., Zanzonico, P., Stabin, M.
National Cancer Institute, Vanderbilt University, Memorial Sloan-Kettering Cancer

3:15 PM **BREAK**

WEDNESDAY

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

A Report from the BidosEPR-2006 Consensus Committee on Bidosimetric Methods to Evaluate Acute Radiation Doses at Short Times After Exposure
Swartz, H., Schauer, D.
Dartmouth Medical Center, NCRP

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

A Report from the BidosEPR-2006 Consensus Committee on Bidosimetric Methods to Evaluate Radiation Doses at Long Times After Exposure
Simon, S.
National Cancer Institute, National Institutes of Health

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

Photochemical Internalization Enhanced Delivery of Bleomycin in Rat Glioma Cells
Kharkhuu, K., Paulissen, S., Hirschberg, H., Madsen, S.
University of Nevada, Las Vegas, University of California, Irvine

2:30-5:00 PM B113-114

WPM-C: Emergency Response Instrumentation

Chair: Ken Krieger

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

Evaluation of Three Portal Monitors for the Screening of the General Public: Advantages and Disadvantages
Kramer, G., Hauck, B., Capello, K.
Health Canada

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

The United States Department of Energy's Aerial Measurement System
Marianno, C.M., Hendricks, T.J.
Remote Sensing Laboratory

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

Using Handheld Detectors to Assess Internal Dose After a Radiological Dispersion Device
LoBracco, C., Hutchinson, J., Hertel, N.
Georgia Tech

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

Developing a Rapid Screening Method for 90Sr Contamination in Urine
Crawford, E., LaRosa, J., Johnson, T.
Colorado State University, National Institute of Standards and Technology, CSU

3:30 PM **BREAK**

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

Detector Measurement-to-Activity Conversion Coefficients for First Responders and First Receivers to a Radiological Dispersion Event using Stylized and Tomographic Models
Hurtado, J., Ambrose, R., Lee, C., Bolch, W.
University of Florida

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

Training Emergency Responders to Use a Colorimetric Dosimeter
Desrosiers, A., Lewis, D.
Dade Moeller & Associates, International Specialty Products, Inc.

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

Potential Use of Personal Portable Electronic Devices for Retrospective Dosimetry Following a Large Neutron Exposure
Simpson, D., Schwarz, D., Popp, D., McDonald, D.
Bloomsburg University, Penn State University

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

Explosives Detection Using Fast Neutrons
Lehnert, A., Whetstone, Z., Zak, T., Kearfott, K.
University of Michigan, Ann Arbor

WEDNESDAY

2:45-4:45 PM

B115-116

WPM-D: Radiation Safety Without Borders

Co-Chairs: Amir Mohagheshi and Howard Dickson

2:45 PM **WPM-D.1**
History of Radiation Safety Without Borders Program

Dickson, H.
EG&G

3:00 PM **WPM-D.2**
Radiation Safety Standards in Developing Countries: Latin American and the Caribbean Experiences.

Borras, C.
Washington, DC

3:15 PM **WPM-D.3**
The South Texas Chapter's Radiation Safety Without Border's Visit to Costa Rica

Emery, R., Felknor, S.
University of Texas, Houston

3:30 PM **WPM-D.4**
Insight into Nuclear Science and Technology Programs in Latin America

Lopez, J.A., Puig, D.E.
University of Texas Southwestern Medical Center - Dallas, Asociacion Uruguaya de RadioProteccion

3:45 PM **BREAK**

4:00 PM **WPM-D.5**
International Outreach Opportunities

Gilley, D.
Florida State Department of Health

4:15 PM **WPM-D.6**
Helping African Countries Find Solutions for Radioactive Wastes

Robertson, G.
Washington State Department of Health

4:30 PM **WPM-D.7**
Appraisal of the Radiation Authority in Viet Nam

Wainhouse, L.
Washington State Department of Health

2:30-5:00 PM

A103

CRSO Session A

2:30 PM **CRSO A.1**
Decommissioning

Crawford, J.
University of Missouri

3:20 PM **CRSO A.2**
Laser Safety Programs

Barat, K.
Lawrence Berkeley National Lab

4:10 PM **CRSO A.3**
Sharing Resources and Forms

Martz, M.
Medical College of Wisconsin

2:30-5:00 PM

A104

CRSO Session B

2:30 PM **CRSO B.1**
Medical Health Physics

Kroger, L.
University of California, Davis Health System

3:20 PM **CRSO B.2**
Medical Health Physics

Richard, M.
Indiana University Medical Center

4:10 PM **CRSO B.3**
Training Techniques/Demos

Dupré, S.
Princeton University

2:30-5:00 PM

B119

Radioactive Air - NESHAPs Meeting

Co-Chairs: Gustavo Vasquez and Matthew Barnett

WEDNESDAY

2:30-5:00 PM **B117/118**

Movies

5:30-6:30 PM **A106**

HPS Business Meeting

6:00-8:00 PM **Sisters/Bachelor (DT)**

WPM-E: ADJUNCT TECHNICAL SESSION

Aerosol Measurements

Chair: Morgan Cox

6:00 PM **WPM-E.1**
Conversion from Physical to Aerodynamic Diameters for Radioactive Aerosols
Whicker, J.
Los Alamos National Laboratory

6:15 PM **WPM-E.2**
Operational Experience with the Alpha 7L CAM in a Plutonium Facility
Wannigman, D.L.
Los Alamos National Laboratory

6:30 PM **WPM-E.3**
The Canberra iSolo; Can it Accurately Measure Transuranic (TRU) Activity in Air Filters?
Hayes, R.
National Security Technologies

6:45 PM **WPM-E.4**
Numerical Computation of Particle Collision Rates in Disparate Flow Regimes
Sajo, E.
Louisiana State University

7:00 PM **WPM-E.5**
A View of the Two New Comprehensive International Electrotechnical Commission (IEC) Standards for Noble Gas Monitoring and for Tritium Monitoring
Cox, M.
NIST/DHS

7:15 PM **WPM-E.6**
Comparison of Alpha Particle and Gamma Ray Spectra using Various Radiation Detector Types for Radon and Thoron Progeny in the Presence of Transuranic Radionuclides
Voss, J.T.
Los Alamos National Laboratory

7:30 PM **WPM-E.7**
The Status of American National Standards Institute (ANSI) and IEC Standards for Air Sampling and Monitoring
Cox, M.
NIST/DHS

7:45 PM **WPM-E.8**
A Review of the New Textbook on Radioactive Air Sampling
Maiello, M.
Wyeth Research Lab

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.

THURSDAY

7:00-8:00 AM **A105**

CEL7 Training First Responders on Radiological Dispersal Devices (RRDs) and Improvised Nuclear Devices (INDs)
K.L. "Ken" Groves
S2-Sevorg Services, LLC

7:00-8:00 AM **A106**

CEL8 Subsurface Soil DCGLs
Jeffrey Lively
MACTEC

8:30 AM-NOON **A105**

THAM-A: Current Topics in Internal Dose Assessment Special Session

Co-Chairs: Ray Guilmette and Keith Eckerman

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

Are All Internal Dose Assessments Created Equally?
Guilmette, R.
Los Alamos National Laboratory

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

Dosimetric Quantities and Concepts of Radiation Protection
Eckerman, K.
Oak Ridge National Laboratory

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

Assessment of Individual Doses for Use in Epidemiological Studies
Bouville, A., Simon, S.
National Cancer Institute, National Institutes of Health

9:45 AM **BREAK**

10:00 AM **THAM-A.4**

Dose Assessment for Pu Workers at the Mayak Production Association
Romanov, S.
Southern Urals Biophysics Institute, Russia

10:30 AM **THAM-A.5**

Challenges and Potential Solutions for Patient Specific Dose Reconstruction in Diagnostic and Therapeutic Medical Exposures
Bolch, W.E.
University of Florida

11:00 AM **THAM-A.6**

Occupational Internal Dosimetry
La Bone, T. R.
MJW Corporation

11:30 AM **THAM-A.7**

Dose Reconstruction for Compensation Programs
Toohy, R.
Oak Ridge Associated Universities

8:30 AM-NOON **A106**

THAM-B: 10 CFR 835 Roundtable Session

Co-Chairs: Scott Schwahn, Peter O'Connell and Robert Loesch

On August 10, 2006, the Department of Energy (DOE) announced that it was proposing changes in Title 10, Code of Federal Regulations, Part 835. Among other changes, fundamental changes in dosimetry have been proposed. The proposed revision updates the dosimetric models and dose terms to be consistent with newer recommendations from the International Commission on Radiological Protection (ICRP), including use of updated tissue and radiation weighting factors and updated derived air concentration Values. At many DOE facilities, these changes will require considerable effort. Aside from the direct impact on DOE facilities, there are questions about how these changes will impact other programs such as the Department of Energy Laboratory Accreditation Program (DOELAP), consensus standards groups, and calibration laboratories. This panel discussion is intended to provide a forum for participants to ask

THURSDAY

questions, understand how these changes may impact their facilities, and to share methods that will be used to implement the changes. Department of Energy representatives will be present to assist in the discussion.

It should be recognized that as of the time of this abstract, the revision to 10 CFR 835 was only proposed. By the time of the meeting, the rule may be finalized.

8:45 AM-NOON B110-112

THAM-C: Operational Health Physics

Co-Chairs: Tara Medich and Jeff Whicker

8:45 AM THAM-C.1

Distance Continuing Education On-line: Experiences of the Colorado State University Student Chapter of Health Physics Society

Elder, D., Johnson, T.

Colorado State University, Colorado State University

9:00 AM THAM-C.3

Dose Reduction in a Positron Emission Tomography Chemistry Laboratory

Brunette, J., Jacobson, M.

Mayo Clinic

9:15 AM THAM-C.4

Decontamination of a Fume Hood Contaminated with Tritiated Thymidine

Walter, K.J., Johnson, T.E.

Colorado State University

9:30 AM THAM-C.5

Decontamination of Nuclear Medicine Isotopes from Hard Surfaces using a Peelable Polymer-based Hydrogel

Edgington, G. J., O'Neill, M. P., Johnson, T. E., Gaul, W. C., Davidson, M. S., Lee, K. M.*

Cellular Bioengineering, Inc., Colorado State University, Chesapeake Nuclear Services, Palmetto Health

9:45 AM THAM-C.6

Aerosol Distribution Inside the Object Shelter: Present Day Data, Questions and Explanations.

Aryasov, P., Nechaev, S., Tsygankov, N., Dmitrienko, A.

Radiation Protection Institute of Ukraine, State Enterprise Chernobyl Nuclear Power Plant

10:00 AM BREAK

10:30 AM THAM-C.7

Estimating the Airborne Contamination Hazard using a Hand-Held Instrument

Duran, M., Fanning, M.

Los Alamos National Laboratory

10:45 AM THAM-C.8

The Next Generation Air Particle Detectors for the United States Navy

Hayes, R., Marianno, C.

NSTec

11:00 AM THAM-C.9

Sampling and Monitoring Releases of Airborne Radioactivity in the Workplace of Nuclear Facilities: Status of ANSI N13.56

Whicker, J., Hoover, M.

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

11:15 AM THAM-C.10

Repair and Design Modifications of a Source Transfer Tube at a High-Dose Gamma Irradiation Facility

Williams, R., McDonald, D., Melton, O., Mullins, W., Lynn, D., Blevins, E., Palmateer-Oxenber, T.*

US Army White Sands Missile Range, Syndetix Inc., US Army Developmental Test Command

11:30 AM THAM-C.11

Alpha Attenuation Due to Dust Loading

Dailey, A.
Francis Marion University, Savannah River Site

THURSDAY

11:45 AM **THAM-C.12**
Can Analysis of Bremsstrahlung Energies Help Identify Low-Energy Beta Emitting Radionuclides?
Williams, V., Krampert, J., Cook, A. Merck & Co., Inc.

8:30-9:45 AM **B113-114**

THAM-D: Emergency Response

Chair: Brooke Buddemeier

8:30 AM **THAM-D.1**
State Radiation Control Program Preparedness and Response to a Natural Disaster
Lanza, J., Williamson, J., Goff, R. Florida Department of Health, Mississippi Division of Radiological Health

8:45 AM **THAM-D.2**
US NRC Protective Action Recommendation Study
Sullivan, R. US Nuclear Regulatory Commission

9:00 AM **THAM-D.3**
Evacuations in the Post-Katrina World
Milligan, P., Jones, J. US Nuclear Regulatory Commission, Sandia National Labs

9:15 AM **THAM-D.4**
Disaster Preparedness and Recovery for R&D Facilities
Norton, M. Philotechnics Ltd.

9:30 AM **THAM-D.5**
Response to Cesium-137 Contamination of a Steel Mill
Cherry, R., Flynn, C., Krieger, K., Stuckey, W. Earth Tech, Private Consultant, LeTourneau Steel Group

8:30 AM-NOON **B115-116**

THAM-E: Instrumentation

Co-Chairs: Matt Arno and Don Halter

8:30 AM **THAM-E.1**
A Three Exposure, High Energy Neutron Spectrometer
Burgett, E., Shannon, M., Hertel, N., Howell, R. Georgia Institute of Technology, Emory University School of Medicine*

8:45 AM **THAM-E.2**
Back to the Basic: Conversion of 4-20 mA Analog Current Signals to the Information of Interest in Log Scale Range
Chiou, H. Washington TRU Solutions, LLC

9:00 AM **THAM-E.3**
Proof of Concept for a Digital Phoswich Spectrometer
Farsoni, A., Hamby, D. Oregon State University

9:15 AM **THAM-E.4**
Calibration of a Charcoal Canister-Based Radon Screening System Using a Small Radon Chamber
Cooper, D.E., Harvey, J., Lehnert, A., Kearfott, K. University of Michigan*

9:30 AM **THAM-E.5**
Comparison of MCNP and RADSAT for Detector Simulation
McConn Jr, R., Pagh, R., Smith, L. Pacific Northwest National Laboratory

9:45 AM **THAM-E.6**
Comparison of Measured Counting Efficiencies for Carbon-14, Strontium-89, Strontium-90, and Yttrium-90 with Estimates from a Monte Carlo Model
Nichols, M., Kahn, B. Georgia Power Environmental Lab, Georgia Tech Research Institute

THURSDAY

10:00 AM **THAM-E.7**
Application of Direct Dose Detection
Technology to Health Physics
Oswald, R., Hodgson, R.
Radiation Detection Company, Inc.,
Radiation Watch, Ltd.

10:15 AM **BREAK**

10:45 AM **THAM-E.8**
Radiation Safety Aspects of the Neutron
Sources Replacement for the Fissile
Mass Flow Monitor
Radev, R., Uckan, T., March-Leuba, J.,
Powell, D., Nelson, D.
Lawrence Livermore National Laboratory,
Oak Ridge National Laboratory, Sandia
National Laboratory

11:00 AM **THAM-E.9**
A "Litmus Paper" Dosimeter
Savignac, N., Gomez, L., Warner, B.
RLP Dosimetry, Caldera Pharmaceuticals

11:15 AM **THAM-E.10**
Characterization of Various In Situ Object
Counting System Apertures
Wagoner, D.A.
Francis Marion University

11:30 AM **THAM-E.11**
Development and Testing of a
Lanthanum Bromide Portable Field
Gamma-ray Spectrometer
Giles, J., Oertel, C., Roybal, L.
Idaho National Laboratory

11:45 AM **THAM-E.12**
The Study of High Dose 10MeV
Electron Response of CaSO₄:Dy as
Thermoluminescence Dosimeter
Moini, A.R., Gheisari, D., Mirjalili, G.,
Gholamipoor, M., Esmaili, J.
Yazd University, Iran, Atomic Energy
Organization of Iran, University of
Technology, Iran

8:30 AM **A103**

8:30 AM
CRSO Old Goat Awards and Business
Meeting

Election of New Officers

9:00 AM
Off-Site Source Recovery Project
Tompkins, A.
Los Alamos National Laboratory

9:30 - 11:30 AM **A103**

CRSO Session A

IATA/ICAO Radioactive Material Refresher
Parker, R.
Roy Parker and Associates

9:30 - 11:30 AM **A104**

CRSO Session B

Veterinary Use of Radioactive Materials &
Additional Topics
Schweitzer, J., Stemen, T.
Purdue University, Yale University

AAHP Courses

Saturday, July 7, 2007 - 8 AM-5 PM

AAHP 1 Eight-hour OSHA Hazardous Waste Operations Refresher Training

**Jan Johnson, Judson Kenoyer
Tetra Tech, Dade Moeller & Associates**

The objective for this course is to provide annual refresher training, as described in 29 CFR 1910.120 (e), for workers who may be exposed to hazardous substances, health hazards, or safety hazards associated with hazardous waste operations. A certificate will be awarded to document compliance with the refresher training requirement. After completing the course, attendees will be able to describe the regulations, guidance, and resource materials related to occupational health and safety for hazardous waste operations and will be familiar with chemical, physical, biological, and ergonomic hazards and their mitigation. In addition, hazardous chemical monitoring methods, use of personal protective equipment, and medical surveillance requirements will be discussed. The class will provide participants the opportunity to discuss specific problems in an interactive group setting with fellow professionals in radiation and occupational health and safety.

AAHP 2 Emergency Dose Assessment

**Steven F. LaVie, Randolph L. Sullivan,
Patricia A. Milligan
US NRC Office of Nuclear Security
and Incident Response**

When a radiological emergency occurs at a nuclear power plant, critical decisions may be necessary concerning protective actions for persons on the plant site and for the public beyond the site boundary. These decisions are based on assessments of the potential offsite consequences of the radiological

emergency. Nuclear power plants have systems and equipment for assessing and monitoring plant systems and effluent releases to the environment. These plants have developed methods and procedures for equating plant and effluent parameter data to the magnitude of release of radioactive materials to the environment. The plant's emergency response organization includes personnel qualified in performing these monitoring and assessments.

This session addresses one of the more significant accident assessments' functions: the assessment of the projected doses to people onsite and offsite due to released of radioactive material to the environment caused by the radiological emergency. Although these assessments are often referred to as dose assessments or dose projections, they are generally based in part on other accident assessments such as core dome estimates. Reduced to its fundamentals, a dose assessment (1) quantifies or estimates the types, forms, and magnitude of the radioactive materials released, (2) estimates the dispersion of these materials through the environment following release, and (3) estimates the dose to downwind receptors from the materials transported to their location. This session will provide an overview or review into the process of performing dose assessments.

AAHP 3 Homeland Security Instrumentation for the Health Physicist **Brian Rees**

Los Alamos National Laboratory

Health physicists are experts in radiation protection, and are frequently one of the people consulted when radioactive materials are encountered in homeland security situations. While a

health physicist is well versed in many aspects of radiation protection, they may not be fully aware of the function and functioning of the many types of radiation detection and identification equipment being used in homeland security applications. The use of radiation detection equipment will continue to expand as the concern about radiological or nuclear terrorism continues.

This session will describe various types of equipment used such as: pager-type devices, portal monitors, search instruments, and radioisotope identifiers. The session will also address their function, application, mandated sensitivities, and limitations.

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Professional Enrichment Program

Sunday, July 8 through Wednesday, July 11, 2007

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, July 8, a series of 24 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, Tuesday, and Wednesday afternoons from 12:15 - 2:15 pm.

Registration for each two-hour course is \$60 and is limited to 60 attendees on a first-come, first-served basis. Those whose registrations are received before the pre-registration deadline will be sent confirmation of their PEP course registration.

Students with a current ID card will be admitted free of charge to any sessions

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

Please Note!!

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

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

SUNDAY - 8:00-10:00 AM

PEP 1A Identification and Control of Electromagnetic Fields (0 - 300 GHz) (Part 1 of 3)

Ben Edwards, Tom Johnson
Duke University, Colorado State University

For over a hundred years there has been a marked development and increased utilization of equipment and devices for industrial, scientific, medical, telecommunications, and military applications that emit one or more types of non-ionizing radiant energy in the microwave (MW), radiofrequency (RF) and extremely low frequency (ELF) portions of the electromagnetic spectrum (i.e., 0 - 300 GHz). At the

same time, there has been a growing concern in government agencies, industry, and professional societies as well as among the public regarding the possible health hazards associated with the development, manufacture, and operation of devices that emit electromagnetic radiant energy in this frequency range. To address these concerns, private scientific organizations and government agencies have developed exposure guidance and consensus standards to protect workers and the public against possible hazards. This course will review safety issues associated with this extremely broad portion of the electromagnetic spec-

trum, which covers everything from “batteries” to “heat lamps”, or “DC to daylight”.

These fields are alleged to have a number of long term health effects, most notably cancer. The present controversy surrounding wireless communications, low frequency fields, and new non-lethal weapons technology will be explored. Exposure criteria of the Institute of Electrical and Electronic Engineers (ANSI/IEEE-2006), the American Conference of Governmental Industrial Hygienists (ACGIH), as well as the International Commission for Non-ionizing Radiation (ICNIRP) will be reviewed. There will be extensive discussion on how to establish appropriate control measures based on calculations and field measurements. At the end of this PEP, the student will understand the proven health risks associated with these fields and will be able to explain risks to the concerned layman. Case studies will be presented to aid in the understanding of the actual risks of exposure to these fields. Multimedia presentations, class discussions, and equipment demonstrations will be used to present the material.

PEP 1B Medical Internal Dose Calculations – Current Methods and Tools

Mike Stabin

Vanderbilt University

Methods for performing internal dose calculations in medical applications are undergoing rapid change. Traditional mathematical model-based internal dose calculations are being replaced with significantly more realistic standardized models, and patient-specific dose calculations, principally for therapy applications, are coming of age. 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. More data and resources are becoming available through the internet, and the power and speed of available tools is increasing rapidly. This program will give an overview of current tools and common practice in internal dose assessment in nuclear medicine, 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.

PEP 1C Neutron Dosimetry

Joe McDonald

Pacific Northwest National Laboratory (Emeritus Laboratory Fellow)

The determination of dose equivalent in neutron fields is complex, but necessary, in a number of working environments. Neutrons represent a radiological hazard in nuclear power plants, accelerator facilities, source fabrication facilities, the transportation and storage of nuclear waste, reprocessing of nuclear fuel and nuclear physics research.

Neutrons are not generally considered to be an environmental radiation protection problem, but aircrew and astronauts are exposed to the cosmic neutron flux.

Neutron dosimetry is more complex than photon (gamma-ray, x-ray

and bremsstrahlung) dosimetry. The reasons for this increased complexity include: the wide range of neutron energies encountered in workplaces such as nuclear power reactors and high energy research accelerators. The neutron energies can extend over more than ten orders of magnitude. Neutrons are nearly always accompanied by photons, therefore some method for separately determining the effects of these two radiations may be needed. The interactions of neutrons with materials used as detectors are complex because of the nature of the neutron cross sections in various elements. In addition, the elements in the materials used to fabricate neutron detectors and dosimeters are nearly always significantly different from the elements present in biological tissues. This complication requires the use of conversion coefficients to determine the dose equivalent in tissue, and it explains why there are no perfect neutron dosimeters. Nevertheless, there are many useful, practical and accurate neutron dosimeters and area survey instruments that can be used in various situations to measure quantities appropriate for determining neutron dose equivalent or dose equivalent rate.

The accurate determination of ambient and personal dose equivalents in neutron fields requires the proper use of appropriate radiological quantities and units, knowledge of the dose equivalent response of the personal dosimeters and area survey meters employed, measurement or calculation of the fluence spectrum in the workplace and the fluence spectrum of the reference radiation used to calibrate the survey instruments and personal dosimeters. This PEP class will present information on the physical and dosimetric properties of neutrons, quantities and units, conversion coeffi-

cients, sources of neutrons, neutron instruments and dosimeters, and calibration procedures.

PEP 1D Saving Lives and Changing Family Histories: Appropriate Utilization of in utero Radiation Risk Estimates from Human and Animal Studies in Order to Counsel Pregnant Women Who have been Exposed to Ionizing Radiation

Robert Brent

A.I. duPont Hospital for Children, Wilmington, DE and Thomas Jefferson University

It is accepted that exposures during pregnancy to acute, high doses of ionizing radiation can result in congenital malformations, mental retardation, growth retardation as well as hypothetically increasing the risk of the development of malignancy later in life. The controversies have involved the determination of the no-effect dose for congenital malformations and mental retardation and the quantitative risk estimate for the development of cancer of various types. Three other questions that will be addressed are: 1) Does fractionation and protraction of the radiation decrease the developmental radiation risks? 2) Is the concept of the "all or none phenomenon" a valid principle, in spite of the fact that some investigators have criticized it? In other words, is the very early embryo less likely to be malformed following ionizing radiation exposures? 3) Can the embryo be significantly affected if the mother is exposed to radiation but the embryo is not exposed?

Our laboratory has pursued answers to these questions from animal models; utilizing exposures of ionizing radiation in the diagnostic range and above, and by reviewing the human radiation literature. Because the risk of reproductive effects is low at low

exposures, it is important to utilize very large numbers of animals in order to obtain statistically reliable results. Late-gestation and early neonatal exposures in the rat should be performed because that is the stage of neuronal proliferation and migration that is equivalent to the most sensitive stage for the induction of mental retardation in the human; namely, from the 8th to the 15th week post-conception. The threshold dose for major malformations, growth retardation and measurable CNS (central nervous system) effects) could be determined. These thresholds were approximately 0.2 Gy (20 rad) during the most sensitive stages of mammalian organogenesis. New information from clinical studies correlates quite well with the animal studies. Since most diagnostic radiological studies involve exposures below 0.1 Gy and the threshold dose for reproductive effects is significantly greater than 0.1 Gy, we now have more reliable information in order to perform appropriate clinical counseling. The vast majority of diagnostic radiological procedures does not represent a measurable risk for congenital malformations, miscarriage and mental retardation and represent a hypothetical carcinogenic risk far below the spontaneous risk.

The difficulties of providing scientifically appropriate counseling will be discussed using examples submitted to the HPS ATE website.

PEP 1E EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series: Basics of Fire & Life Safety and Risk Management & Insurance (Part 1 of 3)

Robert Emery, Bruce Brown and Michael Charlton

The University of Texas Health Science Center at San Antonio

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) programs, which include among other health and safety aspects, radiation safety programs. Unfortunately, many of these consolidations were not accompanied by formal staff training efforts 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 programs, from the perspective of practicing radiation safety professionals who now are involved in a broader set of health and safety issues. The PEP series will consist of three 2 hour segments:

* Part 1 will address the “Basics of Fire & Life Safety” and “Risk Management & Insurance”. 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 require-

ments for means of egress will also be discussed. The risk management & insurance portion of the session will address the issues of retained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle), and how these aspects impact EH&S operations.

* Part 2 will examine the “Basics of Biological & Chemical Safety” and “Security 101 for Radiation Safety Professionals”. During the first part of this session, the classification of infectious agents and the various assigned biosafety levels will be discussed. Aspects of chemical exposures, exposure limits, and monitoring and control strategies will also be discussed. The second part of the session will focus on security as it is applied in hospital and university settings. Various strategies employed to improve security controls will also be presented.

* 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 an acceptable level of 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 metric information in manners that are but succinct and compelling, yet another area where formal training is often lacking. This session will first describe a variety of possible radiation protection program performance measures and metrics, and then will focus on the display of the information in ways that clearly convey the intended message. Actual before and after data display “make-overs” will be presented and ample time will be provided for questions, answers, and discussion.

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

PEP 1F ON ALERT: Post 9/11 Integrated Emergency Planning
Lawrence T. Dauer
Memorial Sloan-Kettering Cancer Center

In the post 9/11 period, there has been a coordinated country-wide effort to improve response systems and to develop the prevention, preparedness, recovery, and mitigation capabilities of Federal, State, local, private-sector, and non-governmental organizations. A National Incident Management System has been developed to encourage all parties to work together effectively and efficiently to prepare for, prevent, respond to, and recover from domestic incidents, regardless of cause, size, or complexity, including

acts of catastrophic terrorism. Historically, health physics and radiation safety staffs have played central roles in individual site, local community, and state/national emergency response planning and events.

This PEP will present an overview of the current integrated emergency planning processes. It is the intent of the course to provide the radiation safety officer or radiation safety professional with tools necessary to respond to all emergencies within the current incident response framework. This PEP will include both didactic and interactive elements. The following topics will be covered:

- 1) What would I do if? (workshop/drill);
- 2) What's so bad about that? (hazard vulnerability and assessment);
- 3) Knowledge itself is power (chemical, biological, radiological, nuclear, and explosion facts)
- 4) Hiking up the chain of command (incident command systems)
- 5) I love it when a plan comes together (practical emergency planning and administration tips)
- 6) It is all people stuff (the psychology of disaster).

PEP 1G Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME): Overview and Current Status

Carl Gogolak
Consultant

The Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) is a supplement to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). Like MARSSIM, MARSAME is a joint effort by the Department of Defense (DOD), Department of Energy (DOE),

Environmental Protection Agency (EPA), and Nuclear Regulatory Commission (NRC). A workshop on the draft MARSAME manual was conducted at the HPS midyear meeting in Knoxville just as the document was being released for public comment.

MARSAME provides technical information on approaches for planning, implementing, assessing, and documenting surveys to determine proper disposition of material and Equipment (M&E). Examples of M&E include metals, concrete, tools, equipment, piping, conduit, furniture, and dispersible bulk materials such as trash, rubble, roofing materials, and sludge. Liquids, gases, and solids stored in containers (e.g., drums of liquid, pressurized gas cylinders, containerized soil) are also included in the scope of this document. Release (including clearance) and interdiction are types of disposition options in MARSAME.

The purpose of this supplement is to provide information for the design and implementation of technically defensible surveys for disposition of M&E. MARSAME provides information on selecting and properly applying disposition survey strategies and selecting measurement methods. The data quality objectives (DQO) process is used for selecting the best disposition survey design based on the selected disposition option, action level, description of the M&E (e.g., size, accessibility, component materials), and description of the radioactivity (e.g., radionuclides, types of radiation, surficial versus volumetric activity). Detailed information on the DQO Process can be found in EPA QA/G-4 (EPA 2006a), MARSSIM Appendix D, and MARLAP Appendix B. This supplement describes a number of different approaches for performing technically defensible disposition surveys and provides information for opti-

mizing survey designs.

Disposition surveys may be performed as a single event or as part of a routine process. Single event disposition surveys are usually performed once in association with a specific project. Surveying a backhoe at the completion of a decommissioning project is one example of a single event disposition survey. Routine process disposition surveys are usually associated with ongoing tasks where similar surveys are performed repeatedly. One example of a routine process disposition survey would be a radiological survey of tools prior to removal from a controlled area at a nuclear facility. Both single event and routine process types of surveys are included in the scope of MARSAME.

Case studies highlight the MARSAME graded approach including Initial Assessment, Inputs to the Decision Rule, Survey Design, Survey Implementation, and Survey Results Assessment.

PEP 1H Medical Health Physics Refresher

Mike Charlton

University of Texas Health Science Center at San Antonio

The dynamic medical health physics setting mandates continual review of current practices. The medical health physics environment has drastically changed over the recent past with new applications, new imaging modalities, and a new regulatory structure. This continual evolution makes it challenging for the practicing medical health physicist to remain abreast of current issues. This continuing education session will review recent regulatory changes, highlight commonly observed radiation-producing device deficiencies, review a typical PET/CT shielding problem, and discuss recent

medical irradiator security issues. Ideas for improving medical health physics programs focusing on training, example shielding calculations, medical health physics safety surveys, and commonly observed medical health physics issues are provided. Attendees will have the opportunity to ask medical health physics questions and exchange key successes that worked in their environment with the speaker.

Medical Health Physics Refresher:

1. The University of Texas Health Science Center at San Antonio maintains the only medical health physics graduate program in Texas. This novel program emphasizes the tangible relationship between physicians, medical physicists, and health physicist in the conduct of medicine.

2. This refresher course was developing through lectures given to assist health physics students and radiology residents prepare for national board examinations.

3. Dr. Charlton was awarded the 2006 Teacher of the Year Award in UTHSCSA Radiology and the first non-clinician to receive the award in more than a decade.

SUNDAY - 10:30 AM-12:30 PM

PEP 2A Non-ionizing Radiation: An Overview of Incoherent Non-ionizing Radiation Hazards (Part 2 of 3)

Tom Johnson

Colorado State University

Incoherent non-ionizing radiation (NIR) hazards can be encountered by health physicists, but are not typically addressed in any formal education program. This course will provide a basic overview of incoherent NIR hazards. Examples of some common situations will be provided and discussed. Course attendees will learn the basic terminology and nomenclature, spectral

region designations, regulatory framework, biological effects and consensus guidance. The recommended exposure limits for this type of NIR will be a key part of the class. After completing this course, attendees will be conversant in which standards apply for some different types of sources, and specific hazards associated with incoherent NIR.

While some knowledge of NIR may be helpful, both experienced and novice health physicists with safety interests or responsibilities in this area will benefit from this course.

PEP 2B RDD/IND Awareness Training for First Responders

Ken Groves

DOE-National Nuclear Security Administration

This class will familiarize the health physicist with issues that are discussed with First Responders (fire fighters, EMTs, HAZMAT and Law Enforcement personnel) who need a basic concept of how to effectively respond to a Radiological Dispersal Device (RDD) or an Improvised Nuclear Device (IND) incident. This training is normally taught in a four-hour four-module training session by Department of Energy (DOE) Radiological Assistance Program (RAP) health physicists in DOE RAP Region 4 (AZ, NM, TX OK & KS).

In this PEP session you will get a copy of the PowerPoint presentation used for the DOE RAP Region 4 Training and background on how over the last 3 years this training has been useful in training First Responders in DOE RAP Region 4. Additional radiological emergency training material will be discussed and made available to the PEP students.

PEP 2C Advances in Customized Phantoms and Organ Models for Medical Dosimetry Studies – Stylized to Voxel to Hybrid

Wesley Bolch

University of Florida

In this presentation, we will explore past, present, and future modeling techniques needed for customized estimates of radiation organ dose to medical patients. In their 2005 report, the BEIR VII committee recommends that future studies on radiation risks should give priority to prospective assessments and medical follow up of patients, particularly children, undergoing present-day high-dose fluoroscopy and CT imaging. Such studies would ideally benefit from computational phantoms of the patient that can be customized to their unique internal anatomy and body morphometry, without reliance on reference phantoms as is current practice. We will discuss specific and customized dose models for the radiosensitive tissues of the skeleton, and follow with the movement away from equation-based anatomic phantoms to more anatomically realistic voxel-based phantoms. Finally, the concept of a hybrid phantom is introduced which provides for the anatomic realism of a voxel phantom, while retaining the modeling flexibility of an equation-based phantom. During the present, methods for assessing patient doses in diagnostic radiology, interventional cardiac fluoroscopy, and computed tomography will be discussed and reviewed.

PEP 2D Fundamentals of Radiation Risk Communication for Health Physicists, Dealing with the Public (Part 1 of 2)

Ray Johnson

Radiation Safety Academy

A poll of over 1,400 HPS members during my President-elect visits showed that by far the greatest concerns of the Society are for the difficulties in public understanding of radiation issues. Public fears, based on misperceptions of radiation risks, are causing wasted manpower and financial resources on trivial risks. We seem to be losing ground in our efforts to help people understand radiation. Is there any hope? My answer is YES, absolutely. HPs are successful because of the many tools they can apply to solving problems. But, what tools do we have to apply to communication and people issues that are often the greatest day-to-day challenge. HPs can learn a few simple tools to become more effective communicators on issues of radiation risks. We will review and practice several fundamental tools available from the fields of psychology, behavioral, and communication sciences for practical help in dealing with public understanding of radiation. Many of these tools have been presented in monthly columns in the HPS Newsletter "Insights in Communication" from 1994 to 2001. A complete set of these articles will be provided. Attendees are requested to bring to the session at least three communication scenarios that you would like to address in the class.

PEP 2E EH&S "Boot Camp" for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series: Basics of Biological & Chemical Safety and Security 101 for Radiation Safety Professionals (Part 2 of 3)

Robert Emery, Bruce Brown and Michael Charlton

The University of Texas Health Science Center at San Antonio

See description of PEP 1E for overview all of the 3 courses.

Part 2 will examine the "Basics of Biological & Chemical Safety" and "Security 101 for Radiation Safety Professionals". During the first part of this session, the classification of infectious agents and the various assigned biosafety levels will be discussed. Aspects of chemical exposures, exposure limits, and monitoring and control strategies will also be discussed. The second part of the session will focus on security as it is applied in hospital and university settings. Various strategies employed to improve security controls will also be presented.

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

PEP 2F Health Physics Aspects of Depleted Uranium (DU)

Ronald L. Kathren

Washington State University at Tri-Cities, Richland

Interest in potential health effects of depleted uranium has intensified because of its use in munitions in the two Gulf Wars and in Kosovo, which have introduced large quantities into the environment, and reports of a so-called Gulf War Syndrome attributable to exposure to DU. This PEP course will briefly cover the production, uses, chemistry and radiological properties of DU; biokinetics (including route of entry), distribution and excretion within the body; acute and chronic chemical toxicity and radiological effects; bioassay and evaluation and assessment of intakes and internal exposures; and epidemiology.

PEP 2G Occupational Internal Dosimetry Calculations (Part 1 of 2)

Tom LaBone

MJW Corporation

Participants interested in this presentation should register for both Parts 1 and 2

In this four-hour PEP we will explore the systems of models, approximations, assumptions, and numerical calculations that are essential to the practice of internal dosimetry in an occupational setting. Emphasis will be placed on performing the calculations in class and providing enough information to allow the sufficiently motivated student to do the same at home.

Perhaps the most fundamental type of calculation is the dose to organs and tissues from a given intake of radioactive material. The three dosimetric schemas in common use today are those of ICRP 30 (and associated publications), ICRP 30 as modified in Federal Guidance Report 11, and ICRP

56 (and associated publications, especially ICRP 66). The dose from an intake of Co-60 will be calculated from first principles using Mathcad and the open-source language R. These results will then be compared to the output of the specialized computer codes CINDY, IMBA, and DCAL.

The next type of calculation is to predict the content of a "bioassay compartment." A bioassay compartment is the combination of compartments from the biokinetic model that correspond to what we think a radiobioassay is measuring. The content of the bioassay compartment at a given time is commonly referred to as an "intake retention fraction." As an example, the intake retention fractions for Co-60 will be calculated using Mathcad and R. These results will then be compared to the output of CINDY and IMBA and the tabulations of NUREG/CR-4884 and Potter.

The final type of calculation we will cover is the use of the intake retention fractions and the observed bioassay data to estimate the intake. Although not mathematically complex, this must be considered to be the most interesting of all internal dose calculations because of the high degree of professional judgment often required. Bioassay data for Co-60 will be evaluated using Mathcad and R. These results will then be compared to the output of CINDY and IMBA.

PEP 2H Review of IATA Requirements for Air Transportation of Radioactive Material

Sean M. Austin

Radiation Safety Academy, Inc.

This session will review requirements of the International Air Transport Association (IATA) pertaining to the air transportation of radioactive materials. There have been changes to these

requirements pertaining to the preparation of radioactive materials for shipment in excepted packages. We will review IATA requirements for training of HAZMAT employees, classification of hazardous materials, exemptions, normal form and special form radioactive materials, limited quantities of materials, articles and instruments containing a radioactive component, low-specific activity shipments (LSA-I, LSA-II, LSA-III), and surface contaminated objects (SCO-I and SCO-II). We will review requirements for radioactive material packagings, marking and labeling packages, placarding vehicles, and completion of shipping papers. There will be discussion explaining the differences between IATA requirements and the hazardous materials regulations of the U.S. Department of Transportation.

SUNDAY - 2:00-4:00 PM

PEP 3A Laser Safety for Health Physicists (Part 3 of 3)

Ben Edwards
Duke University

This course provides an overview of laser physics, biological effects, and hazards, as well as a concise distillation of the requirements in the ANSI Z136.1-2007 Standard for the Safe Use of Lasers. Course attendees will learn practical laser safety principles to assist in developing and conducting laser safety training, performing safety evaluations, completing hazard calculations, 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. Participants should bring a scientific calculator to allow a "walk through" of example pre-worked hazard calculations. Students will also find

their own copy of ANSI Z136.1 a helpful reference.

PEP 3B Design Considerations for Industrial Radiation Processing

Mark Smith
Sterigenics International

Industrial irradiators have been in commercial use since the 1950's for a variety of applications, including sterilization or microbial reduction in medical and pharmaceutical supplies and consumer products, microbial reduction and disinfection of food products, radiation effects studies, chemical and polymer synthesis and modifications, and insect eradication through sterile male release programs. Design of commercial industrial irradiators may incorporate variations in the type of radiation source being used, the presentation of product to the radiation field, and methods for conveying product through the irradiator. In general, irradiator design is based on the product expected to be processed and on requirements for uniformity in dose delivery or volumetric throughput for the facility.

This PEP session will describe design considerations for industrial radiation processing facilities, including the choice of radiation source and the variations possible in product presentation. Specific topics will include

- * Source-product configuration flexibility in ANSI Category IV gamma irradiators (panoramic in-air irradiation with source storage underwater), which are most commonly type of gamma irradiator used in large-scale industrial radiation processing, and the related performance characteristics for design variations,

- * Product presentation to the radiation source for electron beam irradiators, including considerations of beam penetration and volume throughput,

- * Proposed designs for new high-

power electron accelerators that will be used to generate x-rays for high volume processing applications,

- * Design of safety features and interlocks for the various systems, and

- * Considerations for ancillary systems (e.g., irradiator room ventilation).

Several variations in system designs will be discussed, with an explanation of advantages and disadvantages of each for specific processing applications. In addition, general economic considerations will be included for comparison among technologies. At the conclusion of the presentation, persons attending the session are expected to have an appreciation for different irradiator designs and how systems may be adapted for specific applications.

Gamma irradiators that meet the definition of Category I (self-contained), II (panoramic, dry source storage), and III (underwater) under the ANSI classification, and accelerator-based irradiators that meet the IAEA definition of Category I (self-contained) will be mentioned incidentally for comparison purposes. Detailed descriptions of the design of such systems will not be included in this PEP.

PEP 3C Instrument Selection, Calibration, and Use for Unrestricted Release

Ed Walker

This presentation shall describe issues that must be considered for the detection and evaluation of residual radiation and radioactive material on surfaces of items, on building and land surfaces, and on personnel prior to unconditional release to the public. The discussion will focus on issues associated with portable radiation detection systems only.

Selection of an appropriate detection system must consider the radiation

source emissions, source geometries, and measurement protocol, e.g. scan vs. fixed point measurements. The presentation will include examples of the effects of calibration and check source characteristics when applied to the interpretation of field measurements. These effects include source vs. detector geometries, and the physical characteristics of the fabricated source vs. residual field conditions.

The presentation will also include common field practices that impact the interpretation of field measurements using laboratory calibration conditions.

PEP 3D Fundamentals of Radiation Risk Communication for Health Physicists, Dealing with Radiation Workers (Part 2 of 2)

Ray Johnson

Radiation Safety Academy

While most HPs are well prepared to deal with technical issues for implementing a successful radiation safety program, many are not well prepared for communication or people issues. Few are trained to deal with issues involving feelings, such as an upset worker, an overly alarmed worker, or an overly complacent worker. Do you know how to deal with anger in the workplace or resistance to safety program requirements? How do you motivate safety program performance and ALARA, with the carrot or the stick? What do you do when a worker refuses to implement radiation safety requirements? How do you deal with the images that workers may have about the consequences of exposure to radiation? How do you deal with grievances or union issues? What about a worker who files a complaint with the regulatory authorities and threatens legal actions? How do you respond to members of the public who believe that your facility is causing unacceptable radia-

tion exposures? How do you answer questions from the news media? We will address these questions and others that you may pose with a few practical tools that you can easily learn. We will also include practice time in the class to help you begin to develop your skills with these tools. This class will build upon tools presented in Part A. Again, attendees are requested to bring at least three communication scenarios for practice with the tools provided in the class.

PEP 3E EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series: Measuring and Displaying Radiation Protection Program Metrics That Matter (to Management) (Part 3 of 3)

Robert Emery, Bruce Brown and Michael Charlton

The University of Texas Health Science Center at San Antonio

See description of PEP 1E for overview all of the 3 courses.

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 an acceptable level of 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 metric information in manners that are but succinct and compelling, yet another area where formal training is often lacking. This session will first describe a variety of possible radiation protection program performance measures and metrics, and then will focus on the display of the information in ways that clearly convey the intended message. Actual before and after data display “make-overs” will be presented and ample time will be provided for questions, answers, and discussion.

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

PEP 3F Photographic Film Dosimetry

Ronald L. Kathren

Washington State University at Tri-Cities

Photographic film has historically been used for personnel monitoring and still is widely used today. This course provides an overview of the basic principles of photographic film dosimetry for beta-and photon radiations and neutrons, with emphasis will on recognition, identification and mitigation of sources of error and uncertainty and artifacts in film dosimetry, and as such should be of interest to persons doing historical dose reconstructions as well as those currently

using film dosimetry for operation control. Topics covered include the theory of the latent image, film processing and development, beta and photon energy dependence, dose rate dependence, film badge design, effects of environmental factors including temperature, humidity, and chemical effects, calibration and interpretation of multielement badges for beta and photon mixed field radiations, precision and accuracy, conversion of dose to organ dose, and uncertainty analysis. Special techniques to extend the range of the film will also be discussed. A separate section will briefly cover nuclear track emulsions used for neutron dosimetry, and thus will be of particular value to persons doing historic dose reconstructions from personnel dosimeters utilizing photographic films, as well as for those utilizing photographic film dosimetry.

PEP 3G Continuation of Occupational Internal Dosimetry Calculations (Part 2 of 2)

Tom LaBone

MJW Corporation

This is a continuation of PEP 2G. Please see the abstract listed for PEP 2G. Participants interested in this presentation should register for both Parts 1 and 2.

PEP 3H Assumptions and Methods in Dose Reconstruction

Daniel J. Strom

Pacific Northwest National Laboratory

The requirements and equations for dose reconstruction in support of compensation decisions are presented. The notions of error, uncertainty, variability, and covariance are reviewed. Recently developed methods and assumptions for generic site technical basis documents for Atomic Weapons Employers under EEOICPA are covered. Methods and assumptions that

can be used when there is a paucity of data are presented. Use and misuse of distributions, in particular the lognormal, is discussed with examples. A Monte-Carlo approach to analysis of uncertainty and variability in time-weighted average air concentrations is used to illustrate the methods, and two freeware computer programs (LOG-NORM4 and Lognormal Fitting Utility) are demonstrated*. Independence and covariance, particularly over time, is discussed in the context of uncertainty for time series external dosimetry results and doses inferred from bioassay or workplace indicators. It is shown that ignoring covariance causes underestimation of uncertainty in dose reconstruction.

*Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC05-76RLO 1830.

MONDAY - 12:15-2:15 PM

PEP M1 Basic Statistics

Steve S. Prevette

Fluor Hanford

This session will cover basic statistics for Health Physics. How to use the statistical formulae covered in the American Board of Health Physics examination will be provided. Hands-on physical demonstrations will be used to demonstrate statistical calculations such as mean, standard deviation, variance, and sampling. Counting statistics, the Chi Square Test and the Student T Test will be included. A basic introduction to the principles behind Bayesian statistical calculations will be performed using an ordinary set of playing cards. If you have questions about statistics and their usage, this session will be of help to you.

PEP M2 Design, Fabrication, and Use of Anthro-pometric Phantoms for Calibrating Direct In Vivo Measurements of Internally-Deposited Radio-active Materials

Henry Spitz

University of Cincinnati

Conventional methods for direct, in vivo measurement of internally deposited, photon-emitting radioactive materials involve arranging one or more detectors on or near a subject in such a manner to optimize detection of the radiation emitted by the radioactive material suspected to be present in the body. Calibration factors, which relate the response of the detector system to the actual quantity of radioactive material being detected, are determined by measuring a surrogate for the human body which contains a known quantity of radioactive material that is distributed in a manner similar to that expected to be present in the subject being measured. The design of the surrogate (phantom) is dependent upon many factors, some of which include photon energy, activity distribution, detector type, and detector arrangement. A simple point source of a known quantity of a radioactive material located 30 cm from the detector may be an adequate calibration phantom for some applications. Alternatively, it may be necessary to use a surrogate that is a realistic approximation of the human form containing radioactive material distributed in a manner that simulates one or more of the internal body organs. This course will describe the design criteria, methods of fabrication, and the use of phantoms for measuring low photon energy (EXX 200 keV) emitting radionuclides deposited in the lungs, liver, and skeleton. Design criteria for adopting chemical formulations suitable for use as tissue substitutes in the Lawrence Livermore Thoracic Phantom

as well as the skull and knee phantoms will also be described. Methods used at the University of Cincinnati for fabricating tissue substitutes used in these phantoms will be described.

PEP M3 Cell and Molecular Effects of Low Doses of Radiation

Antone L. Brooks

**Washington State University
TriCities**

Recent research has been conducted to provide solid data on the response of molecules, cells, tissues and organisms to very low doses of low LET ionizing radiation. Many new biological phenomena have been observed following low doses of radiation which suggest the need for paradigm changes in radiation biology. For example, it has been demonstrated that gene and protein expression change as a function of radiation dose and that these changes can be related to biological effects not previously recognized. These new biological effects include radiation-induced apoptosis, adaptive responses, bystander effects, and genomic instability. It has also been determined that genetic background plays a major role in the magnitude of each of these biological responses to radiation. This presentation will review the mechanisms behind these changes as a function of radiation dose and discuss how dose related changes in mechanisms can result in non-linear dose-response relationships.

Two different types of adaptive responses have been identified. First, low doses of radiation decrease the amount of damage observed relative to background levels. Second, a small "priming dose" of radiation given before a high acute "challenge dose" results in decreased biological response relative to that seen following the high dose alone. In studies of the adaptive

response it has been demonstrated that different sets of genes are activated following either high or low doses of radiation, thus suggesting unique biological responses in cells that are capable of adaptive responses.

Bystander effects have been demonstrated that show that a cell traversed by an alpha particle or "hit" by a focused low LET beam communicate with neighboring cells and can produce changes in "non-hit" cells. These changes have been shown to be both "harmful" and "protective" and are most marked following exposure to high-LET radiation. This cell/cell communication impacts current use of "hit-theory" in defining radiation risk since it makes the radiation target is much larger than the individual cell.

Radiation-induced genomic instability is seen at a high frequency in cells many cell divisions after the radiation exposure. The instability results in increased frequency of mutations, chromosome aberrations, and cell killing. Radiation-induced genomic instability seems to be one of the early stages in the carcinogenesis process and has been seen both in vitro and in vivo. Genomic instability suggests there are frequent radiation-induced changes following radiation, rather than rare mutational events.

Tissue interactions have been shown to modify the expression of cellular and molecular damage and to be critical in the expression of cancer. Both initial biological damage and cancer incidence can be modified with treatment after radiation exposure.

These recent scientific advances provide a scientific basis for the observed non-linear dose-response relationships seen in many biological systems. These new biological findings that make it necessary for the field of radiation biology to adopt new para-

digms associated with the biological responses to low doses of radiation. It is important that these new paradigms be recognized by regulatory and scientific community to better evaluate the risks and hazards associated with low doses of ionizing radiation.

Research supported by Office of Science (BER), U.S. DOE through grant No. DE-FG02-99ER62787 to Washington State University.

PEP M4 Training for Medical Examiners and Coroners in Handling Fatalities from INDS

C.M. Wood

Center for Disease Control

Detonation of a radiological WMD could result in a large number of radioactively contaminated fatalities. There is a need for training for medical examiners and coroners, in dealing with this situation.

CDC has guidelines pending publication. The New York City Office of the Chief Medical Examiner staff and the past president of the National Funeral Directors' Association have assisted in this effort. This presentation will summarize CDC's guidelines and suggest some ways the nuclear industry could assist medical examiners, coroners, and funeral directors.

The planning and safety precautions followed in a nuclear power plant for maintenance in a radiologically controlled area are appropriate for medical examiners and coroners. The purpose of this presentation is to encourage a dialogue between the two communities.

PEP M5 Technical Auditing for Health Physicists (Part 1 of 3 on Laboratory Accreditation, See PEPs T5 and W5)

Sam Keith, Ken Swinth, and Tom Slowey

HPS Laboratory Accreditation Policy Committee

The objective of this professional enrichment program topic is to provide a framework around which the participant can help customers (assesseees) improve through the process of technical assessment. Technical assessing requires an assessor to know what's important in an industry and where to help the assessee focus resources for optimization of the production process. The philosophy espoused during the training is that compliance and conformance form the bedrock from which a business can improve and optimize operations. The "why" is the most important part in helping the assessee understand the "how" of improvement. The process is presented around the Plan-Do-Study-Act model. Techniques will be presented to assist assessors communicate with the team, the customer, interviewees and the sponsoring organization. The presentation is general enough to apply to all health physics areas.

This course provides information to individuals interested in the HPS accreditation program, and is also part of a course for certifying individuals to assess laboratories for HPS accreditation.

TUESDAY - 12:15-2:15 PM

PEP T1 Choosing Radiological Performance Indicators

**Steve Prevette
Fluor Hanford**

This session will provide ideas on deciding what to measure, how to ana-

lyze the resulting numbers, and how to make decisions from the results. Suggested Leading and Lagging performance indicators will be discussed, and case studies provided. Analysis will focus upon the use of Statistical Process Control for trending, and Pareto Charting for categorization of causes and events. Techniques in use at the Hanford Washington Department of Energy site will be overviewed. If you are involved with, or have been a victim of performance measures, this session will help you succeed with your measures.

PEP T2 Radiological Design Review of Radiological Facilities and Equipment

Gloria T. Mei

Oak Ridge National Laboratory

Federal regulations specify that physical design features are to be used as the primary control for new or modified facilities and equipment in order to keep radiation exposures of workers and the general public as low as reasonably achievable (ALARA). How do we know if the design features of a new facility demonstrate the application of ALARA principles? How do we ensure the application of these ALARA principles?

The lecturer will discuss the regulatory requirements/guidelines for radiological design and the principles/processes of radiological design review. The objective of the radiological design review is to verify that the design features are consistent with the design criteria and to help ensure that radiological outcomes of the design are optimized. An effective ALARA review identifies project design decisions that impact the ALARA principles and documents the application of ALARA principles and various radiological control features that have been

considered or incorporated at various design stages.

Drawing upon experiences at a DOE facility, the lecturer will also discuss issues relevant to the establishment of an effective radiological design team based on the project size, resources, and various other factors. Key points for ALARA considerations during various design stages as well as the practices and challenges for an effective ALARA review will be included in the lecture. The application of radiological engineering tools that may help the design team adequately evaluate ALARA issues during the design and review will also be presented. Examples of radiological design reviews of facilities and equipment for various projects in the area of waste treatment, radioactive ion beams, neutron source accumulator rings, and neutron scattering instruments will be used to discuss specific ALARA issues.

PEP T3 Statistics – What Is It Good For? (A Practical Primer for the Practicing Professional)

Jay A. MacLellan

Pacific Northwest National Laboratory

This class will be of particular interest to those charged with interpreting low-level measurements such as bioassay, release surveys, or environmental sample results. The very low-level detection capabilities often required for such analyses pose real data interpretation challenges. Protocols for confirming the presence of radioactivity in bioassay and general monitoring data require defensible statistical assumptions and proper interpretations of results. Statistical capability descriptions (false-positive and false-negative rates) may be fairly clear-cut at the performance testing and contractual detection level, but when the activity level drops to the decision level the definition

of “positive” becomes ambiguous. Using detection protocols that require repeat measurements of samples can also hold surprises that seem counter-intuitive. Also, detection criteria based on the estimated uncertainty of results with zero background or net counts may require special consideration. The emphasis for the presentation will be on the concepts of statistical protocols rather than the math.

*Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC05-76RLO 1830.

PEP T4 Overview of Interactive Radioepidemiological Program (IREP)

David C. Kocher

SENES Oak Ridge, Inc.

The Interactive RadioEpidemiological Program (IREP) is a web-based, interactive computer program to estimate the probability that a given cancer in an individual was induced by given exposures to ionizing radiation. This probability is referred to as "probability of causation/assigned share" (PC/AS). IREP is used to estimate PC/AS in compensation programs for energy workers and military participants at atmospheric nuclear-weapons tests. IREP calculates PC/AS for all cancer types except chronic lymphocytic leukemia. PC/AS for a given cancer in an individual is calculated from an estimate of the excess relative risk (ERR) associated with given radiation exposures and the relationship $PC/AS = ERR/(ERR + 1)$. IREP is intended to provide unbiased estimates of ERR and PC/AS and their uncertainties to represent the current state of knowledge. A full accounting of uncertainty is necessary when decisions about granting claims for compensation for cancer are made on the basis of an estimate of the upper 99% credibility

limit of PC/AS to given claimants the "benefit of the doubt" in the presence of uncertainty. This lecture presents an overview of models and methods incorporated in IREP to estimate probability distributions of ERR and PC/AS including (1) models to estimate ERRs for specific cancer types in study populations, principally the Japanese atomic-bomb survivors, as a function of sex, age at exposure, and attained age or time since exposure, (2) corrections to ERRs in study populations to account for random and systematic errors in dosimetry, (3) adjustments to ERRs at times shortly after exposure to account for a minimum latency period of specific types of cancer, and (4) adjustments to apply ERRs in atomic-bomb survivors to the U.S. population and to conditions of exposure other than acute exposure to low-LET radiations at relatively high doses. Approaches to accounting for uncertainty in the models are emphasized. Limitations of IREP are discussed, and modifications that may be incorporated in future versions of the program are mentioned. [*The findings and conclusions in this Abstract have not been formally disseminated by the National Institute for Occupational Safety and Health (NIOSH) and should not be construed to represent any agency determination or policy. This work is supported by NIOSH under Contract No. 200-2006-18097.]

PEP T5 HPS Laboratory Accreditation Program Assessor Training (Part 2 of 3 on Laboratory Accreditation, See PEPs M5 and W5)

Ken Swinth

HPS Laboratory Accreditation Policy Committee

The objective of this professional enrichment program topic is to familiarize HPS Laboratory Accreditation Program technical assessors and oth-

ers with the process of evaluating candidate laboratories against HPS requirements. The HPS program is similar to other ISO/IEC 17025 based accreditation programs and the training will be useful for anyone interested in the accreditation process. The training will describe the program documentation, incorporated elements of ISO/IEC 17025, the HPS accreditation process, and will specifically address technical requirements for instrument calibration and source manufacturing laboratories. Emphasis will be on evaluation of laboratory practices, documentation, and facilities against HPS requirements. The course will also provide an opportunity for the student to practice identification of non-compliant items.

This course provides information to individuals interested in the HPS accreditation program, and is also part of the training required for all members of the HPS Laboratory Accreditation Assessment Committee and for other individuals who may perform assessments of laboratories. The course is recommended for facilities interested in accreditation.

WEDNESDAY - 12:15-2:15 PM

PEP W1 Mixed Waste Management at a Large University / Medical Institution

Mike Zittle

Oregon State University

Mixed Waste contains both radiological and chemical constituents and is subject to complex regulations and legal requirements making storage, treatment, transportation, and disposal difficult and expensive. Management of mixed waste at academic and medical institutions can be especially difficult because of the small quantities and wide varieties of wastes generated. Because these organizations are often

non-profit or government funded, it is important to keep costs down while maintaining regulatory compliance. Although often perceived as difficult, it is possible to be in compliance with all Federal and State EPA and NRC regulations without going over budget.

This PEP will focus on mixed waste management techniques at universities and medical institutions. An overview of the many regulations and enforcement agencies will be presented, focusing on the EPA Conditional Exemption for the Storage, Treatment, Transportation, and Disposal of Mixed Wastes. Sorting and segregation schemes for managing mixed waste will be presented and discussed. Training mixed waste generators is perhaps the most effective means of managing mixed waste. Creative ideas will be presented that allow waste managers at academic and medical institutions to train waste generators and reduce the cost of mixed waste disposal at the same time.

PEP W2 Health Physics Concerns of Neutron Exposures, Criticality Safety and Criticality Accidents

***David R. Simpson
Bloomsburg University***

For most Health Physicists, neutron exposure is, at most, only a minimal issue in their workplace. However, with the potential terrorist threats of the use of nuclear materials, including weapons grade materials; it is important that all Health Physicists have at least some understanding of neutron exposures, dosimetry and criticality safety. In this presentation, a brief introduction will be given describing sources of neutrons and the biological effects of neutron exposures. Next, a review of criticality safety will be given with special emphasis on areas where the Health Physicist may play a role,

such as safely handling large quantities of special nuclear materials, spill control, etc. Finally, several criticality accidents will be reviewed and methods discussed on how neutron doses can be estimated based on both biological and physical neutron activation of materials from the exposed individuals.

PEP W3 Health Physics Society Technical Assistance to First Responders

***Thomas O'Connell and Thomas Clawson
Technical Resource Group***

Many first responder organizations have received radiation detection equipment through federal grants. Initial training on the basics of radiation and response as well as on the use of the radiation detection equipment may have been offered initially to these response organizations. In addition to ongoing training opportunities at the state, local and or federal levels, the Health Physics Society (HPS) and the Department of Homeland Security have developed a partnership to provide support to the local first response community.

Many volunteers from local HPS chapters and radiation safety organizations (CRCPD, state radiation authorities, emergency management, etc.) are currently conducting field checks on the equipment, providing training and serving as a local source of expertise.

A training package for the local physics subject matter expert volunteer to conduct technical assistance to local first responders was compiled through a pilot project. The package contains presentations, instructor guidance, lessons learned and best practices.

The product of the pilot program and the suggested means of "qualifying" a local radiation safety volunteer instructor will be covered.

PEP W4 Fundamentals of Neutron Detection and Detection Systems

Jeff Chapman

Canberra

In 1932, James Chadwick published a seminal paper in the Proceedings of the Royal Society titled "The Existence of a Neutron." 73 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.

PEP W5 Introduction to Uncertainty Calculation (Part 3 of 3 on Laboratory Accreditation, See PEPs M5 and T5)

Carl V. Gogolak

HPS Laboratory Accreditation Policy Committee

An important element in the activities of health physicists who are responsible for the safety of personnel and the general public is the measurement of radiation from various sources, including reactors, radiation-generating machines and radioactive sources used in industry and in the medical diagnosis and treatment of patients. To be meaningful, these measurements must be made using instruments and sources that are not only traceable to a national standards laboratory (e.g., NIST) but also must be performed by competent personnel using appropriate technical

standards and procedures designed to ensure the calibration results meet required uncertainty.

The definition of traceability that has achieved global acceptance in the metrology community is contained in the International Vocabulary of Basic and General Terms in Metrology (VIM; 1993):

"...the property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, all having stated uncertainties."

Because of the importance of uncertainty calculations in Laboratory Accreditation this course will concentrate on the corresponding technical issues involving laboratory quality assurance, the estimation of uncertainty, and limits of detection. Internationally recognized standards from ISO GUM and their NIST counterparts will be explained using examples. Software developed for implementing these standards will be demonstrated.

Continuing Education Lectures

Monday, July 9 through Thursday, July 12 - 7:00-8:00 AM

Included in Registration Fee

MONDAY - 7:00-8:00 AM

CEL1 **A105**
Workforce Pipelines for the Nuclear Renaissance
Ken Ferguson
Ken Ferguson, LLC

We are now in a place where nuclear industry participants have been striving and awaiting for decades...a rebirth and renaissance of major initiatives and opportunities. New nuclear power plants, the needs of dozens of operating nuclear plants with extended operating licenses, management of weapons grade nuclear materials, waste management, recycling of nuclear materials are examples of the work ahead. Challenges related to an effective response include a mismatch of staffing needs and the related anticipated pipelines of new entrants to the nuclear workforce projected for the future. This lecture will provide a review of the resurgence of needs, opportunities, and challenges in which health physics plays a vital consideration. Important features of past and ongoing work related to meeting such workforce pipelines will be addressed including a discussion of key elements of a current, major initiative with a focus on development of a new entry workforce pipeline for the nuclear segment. The lecture will cover the variety of attentions necessary for such efforts to be successful and progress to date.

CEL2 **A106**
Medical Reserve Corps (MRC) – Volunteer Opportunity for Health Physicists to Contribute to Their Local Communities
Armin Ansari
Centers for Disease Control and Prevention, Atlanta

The Medical Reserve Corps (MRC) are community-based teams of local volunteer medical and public health professionals who can contribute their skills and expertise throughout the year as well as during times of community need. There are currently more than 500 MRCs in the nation covering all 50 states with more than 80,000 professionals and ordinary citizens participating. The MRC provides the organizational structure and appropriate training so that the unit and its volunteer members are well-integrated in their local emergency response structure and would operate in a NIMS-compliant manner. 75% of MRCs are housed in local/county health departments. Being volunteer members of MRC provides a personal recognition and familiarity for health physicists in their community, and that can be a priceless asset at a time of real radiation emergency. As an MRC member, health physicists also have an opportunity to educate and increase radiation literacy among their MRC peers and in their community. The time commitment is minimal. Potential rewards are significant.

TUESDAY - 7:00-8:00 AM

CEL3 **A105**
**ON ALERT: Post 9/11 Integrated
Emergency Planning**
Lawrence T. Dauer
**Memorial Sloan-Kettering Cancer
Center**

In the post 9/11 period, there has been a coordinated country-wide effort to improve response systems and to develop the prevention, preparedness, recovery, and mitigation capabilities of Federal, State, local, private-sector, and non-governmental organizations. A National Incident Management System has been developed to encourage all parties to work together effectively and efficiently to prepare for, prevent, respond to, and recover from domestic incidents, regardless of cause, size, or complexity, including acts of catastrophic terrorism. Historically, health physics and radiation safety staffs have played central roles in individual site, local community, and state/national emergency response planning and events.

This CEL will present an overview of the current integrated emergency planning processes. It is the intent of the course to provide the radiation safety officer or radiation safety professional with tools necessary to respond to all emergencies within the current incident response framework. The following topics will be covered:

- 1) What's so bad about that? (hazard vulnerability and assessment);
- 2) Knowledge itself is power (CBRNE facts)
- 3) Hiking up the chain of command (incident command systems)
- 4) I love it when a plan comes together (practical emergency planning and administration tips)
- 5) It is all people stuff (the psychology of disaster).

CEL4 **A106**
**Image-Based Methods in Internal
Dose Calculations – Current Status**
Mike Stabin
Vanderbilt University

Both standardized dose calculations for diagnostic uses of radiopharmaceuticals and patient-individualized methods, mostly for use in therapeutic applications, are currently moving towards image-based methods and models. These techniques will soon replace approaches using the stylized, mathematical models that have been in use for some decades. In this lecture, currently available models and ongoing research in this area will be discussed. Available body and organ models, for humans and animals, and internet and software tools and resources will be reviewed. A review of Monte Carlo techniques for use of these kinds of image-based models in radiation transport calculations will also be given. The emphasis will be on the practical use of these models and tools in problem solving, particularly for individual nuclear medicine patients in therapy.

WEDNESDAY - 7:00-8:00 AM

CEL5 **A105**
**Ingestion Derived Intervention Levels
(DILs) and Derived Response Levels
(DRLs) for Emergency Planning and
Response**
Patricia L. Lee
**Savannah River National Laboratory
(SRNL)**

In 1998, the Food and Drug Administration (FDA) issued an update to their 1982 recommendations on accidental radioactive contamination of human food and animal feeds. The recommendations provide guidance on limiting dose received as result of ingestion of accidentally contaminated food by setting Derived Intervention Levels

(DILs) and taking protective action. This lecture will provide an overview of ingestion DILs and Derived Response Levels (DRLs) for emergency planning and response and discuss their development and implementation at the Savannah River Site (SRS).

CEL6 **A106**
2006 Gamma Irradiator Accident in Belgium
Mark Smith
Sterigenics International

In March 2006, an accident occurred at an industrial irradiator in Fleurus, Belgium, that resulted in inadvertent exposure of an operator at the facility. Due to mechanical problems with the irradiator, the source rack rose from its fully shielded position to a height within the water storage pool that resulted in large dose rates inside the irradiator while an individual was in the irradiator room. At the time of the accident, the irradiator held approximately 770,000 curies of cobalt-60, which resulted in a dose to the individual of 4.4 to 4.8 Gy.

The lecture will explain the accident time line, discuss the causes of the accident from a system design and procedural perspective, and describe the corrective actions that have been implemented since the accident. Relevance of the root cause to other irradiator designs will be discussed, with particular attention to mechanical and programmatic protections that should be in place at all such facilities.

CEL7 **A105**
Training First Responders on Radiological Dispersal Devices (RRDs) and Improvised Nuclear Devices (INDs)
K.L. "Ken" Groves
S2-Sevorg Services, LLC

This class will describe concepts and options on training First Responders (EMTs, Fire Fighters, HAZMAT Teams and Law Enforcement personnel) on issues concerning responses to incidents involving RDDs and INDs. Background information on likely sources of RAM and SNM will also be reviewed. A review of current guidance documents, such as NCRP Commentary No. 19, will be discussed.

CEL8 **A106**
Subsurface Soil DCGLs
Jeffrey Lively
MACTEC

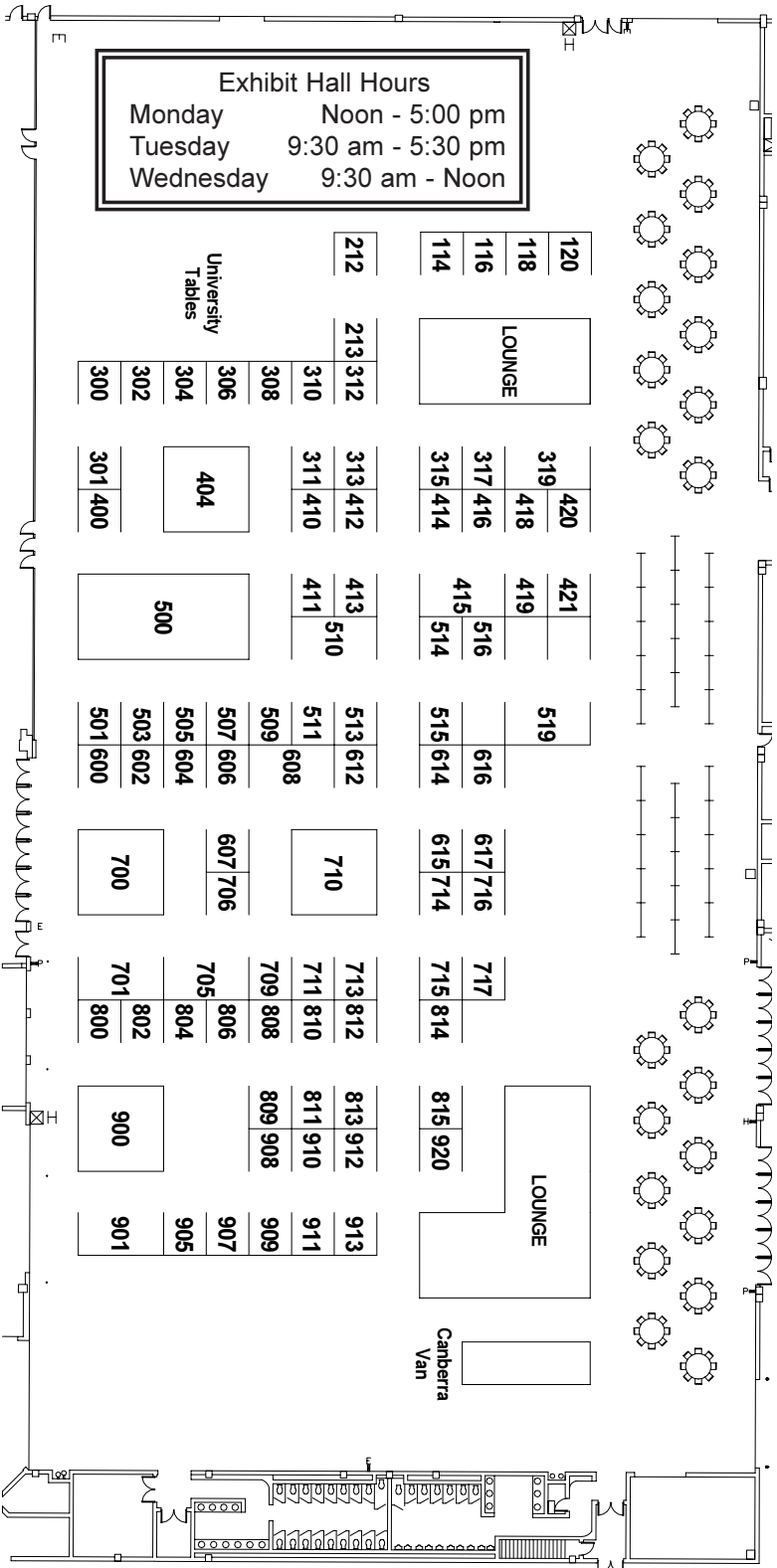


Exhibit Hall Hours

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

212	213	310	308	306	304	302	300	301	400	404	500	501	600	700	701	800	900	901			
114	116	118	120	LOUNGE		319	420	418	421	419	519	616	617	716	717	815	920	LOUNGE			
313	412	413	510	513	612	710	713	812	813	912	913	311	410	411	511	608	607	706	705	806	907
315	414	514	515	614	614	615	714	714	715	814	814	709	808	809	908	909	804	905	802	801	901
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2007 Exhibit Hall Floor Plan

2007 Exhibitors

ABHP/AAHP BOOTH: 304

2008 ANNUAL MEETING - PITTSBURGH, PA BOOTH: 416

2008 MIDYEAR MEETING - OAKLAND, CA BOOTH: 418

ACCUSYNC MEDICAL RESEARCH BOOTH: 310

AccuSync Medical Research Corporation designs and manufactures the finest R-wave triggering devices and ECG monitors available for gated cardiac studies in SPECT, PET, and CT, as well as multi-modal systems. The product line also includes survey meters, wipe test counting systems and single- and dual-channel analyzers for nuclear medicine.

ADCO SERVICES, INC. BOOTH: 212

Adco Services, Inc. handles the brokering for processing and disposal of radioactive, hazardous, and non-hazardous wastes.

ALPHA SPECTRA, INC. BOOTH: 809

Alpha Spectra, Inc. Manufactures gamma-ray detectors for health physics, academic, industrial, medical and exploration applications. Scintillation materials used include most of the common phosphors e.g. NaI(Tl), BGO, Plastic etc.

AMERICAN NUCLEAR SOCIETY BOOTH: 813

The American Nuclear Society publishes Nuclear News, Radwaste Solutions, technical journals, standards and position statements. Its 11,000 members represent to the government and the public a unified voice in support of nuclear science and technology.

ANALYTICS, INC. BOOTH: 503

Supplier of NIST-traceable radioactivity standards for the calibration of alpha, beta, and gamma-ray detec-

tors. Provider of performance evaluation programs for effluent and environmental monitoring programs.

APANTEC & FUJI ELECTRIC SYSTEMS BOOTH: 118

Fuji Electric Systems and Apantec LLC are pleased to announce a newly formed relationship and will jointly display and offer a broad line of radiation monitoring instrumentation products including: dosimeters, survey instruments, contamination monitors, wireless and fixed area monitors, emergency response equipment, gaseous/liquid effluent RMS systems, RMS tracking & trending software and nuclear, biological, and chemical (CBRNE) training services. Please stop in to see what we have!

ARROW-TECH INC. BOOTH: 806

Arrow-Tech, Inc. is the manufacturer of the Direct-Reading Dosimeter. Arrow-Tech handles a full line of Radiation Detection equipment and maintains customers throughout the world providing quality, reliable, durable products and service. Industries served include the Health Physics, Homeland Security, NDI, Industrial & Medical Radiology and 1st Responders. Arrow-Tech provides calibration services.

BERKELEY NUCLEONICS CORP. - POLINUCLEONICS BOOTH: 414

Berkeley Nucleonics Corporation is a leading solution provider for radiological detection. BNC offers a broad spectrum of radiological security products and services to industries involved in environmental monitoring, emergency response, radiation protection and counter-terrorism.

BIONOMICS, INC. BOOTH: 400

Radioactive and Mixed Waste Dispersal Services.

BLADEWERX LLC. BOOTH: 509

Bladewerx designs and manufactures health physics instrumentation and offers design engineering services to the radiation protection industry. The company specializes in air monitoring and provides cutting edge technology in both algorithm development and attractive but practical software and hardware user-interface design.

CANBERRA INDUSTRIES BOOTH: 500

Canberra is the world's leading supplier of analytical instruments, systems and services for radiation measurement. Applications for Canberra offerings include health physics, nuclear power operations, Radiation Monitoring Systems (RMS), nuclear safeguards, nuclear waste management, environmental radiochemistry and other areas.

The new Canberra has the broadest array of Health Physics capabilities in the industry. HP related products include a full range of gamma and alpha spectroscopy equipment, personnel contamination monitors, hand held survey instruments for alpha, beta, gamma and neutron measurement, whole body counters and area monitors. The company also offers a full range of services including repair and maintenance, training and expert data review.

**CHASE BOOTH: 912
ENVIRONMENTAL GROUP INC.**

Chase Environmental Group, Inc. is a full-service, decontamination, decommissioning, remediation, and waste management firm, providing safe, high quality, practical, cost effective solutions to your environmental needs.

**CHESAPEAKE BOOTH: 705, 707
NUCLEAR SERVICES INC.**

Licensed to perform radiological surveys and decommissioning activities nationwide. MARSSIM practitioners. Program management, licensing support. Technology applications for efflu-

ents, tritium-in-groundwater, operational and environmental gamma spectral characterization. Proprietary wireless radionuclide detection/mapping system - MARSS Responder - for characterization and emergency response.

**CLEAN HARBORS BOOTH: 815
ENVIRONMENTAL SERVICES**

Clean Harbors Environmental Services is North America's leading provider of environmental and hazardous waste management services. Our services include field services and emergency response, industrial services, laboratory chemical packing and waste transportation and disposal. Visit us at www.cleanharbors.com

**CONFERENCE OF BOOTH: 302
RADIATION CONTROL PROGRAM
DIRECTORS, INC. (CBRNE)**

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

**DADE MOELLER BOOTH: 617
& ASSOCIATES**

Dade Moeller & Associates (www.moellerinc.com) is a nationally-recognized consulting firm specializing in radiological & nuclear safety, public & environmental health protection, occupational safety & health, and technical & site services. We provide the full range of professional and technician services in radiation protection, health physics, and worker safety to government and commercial nuclear clients. The company has offices in nine states employing more than 150 professionals, including more Certified Health Physicists than any other private company in the United States.

**ECKERT & ZIEGLER BOOTH: 505
ISOTOPE PRODUCTS**

ENERGY SOLUTIONS INC. BOOTH: 511

EnergySolutions, LLC is the largest nuclear oriented services company in the U.S. We provide radiological services and solutions, including surveys, health physics consulting, and radioactive waste management, treatment, and disposal to commercial and government organizations dealing with radioactive material.

EV PRODUCTS BOOTH: 114

eV PRODUCTS is the leading manufacturer of Cadmium Zinc Telluride (CZT) solid-state radiation sensor systems. eV PRODUCTS' next generation sensor modules are enabling miniaturized, portable, high resolution spectroscopy systems for Security and Health Physics Applications.

**F&J SPECIALTY BOOTH: 313
PRODUCTS, INC.**

F&J is the premier manufacturer of traditional and microprocessor controlled air sampling systems, airflow calibrators, tritium collection and lightweight battery powered emergency response air samplers systems, including portable beta-gamma continuous air monitors. F&J is also the world's largest manufacturer of radioiodine collection cartridges, such as TEDA impregnated charcoal and silver zeolite cartridges. Other product lines include radon detection products, filter media and personal air samplers. Most instruments have the applicable North American ANSI/UL certification or European Union CE mark.

**FAR WEST BOOTH: 711
TECHNOLOGY, INC./ HEALTH
PHYSICS INSTRUMENTS**

Health Physics Instruments manufactures instruments and devices that measure gamma, neutron, beta, and alpha radiation. The line includes

portable Geiger-counters through sophisticated fixed monitors, rem meters, and multichannel analyzers. HPI has been serving the Health Physics community for over 30 years.

FEMTO-TECH BOOTH: 213

Femto-TECH, INC. is a leader in the design and manufacture of continuous radon monitors and real time tritium instrumentation.

FLUKE BIOMEDICAL BOOTH: 709

Fluke Biomedical provides the latest technology in radiation detection meters available with wireless capability. The Victoreen® ASM 990 Series Survey Meter excels in detecting radioactive contamination. The 451P/B Ion Chamber Survey Meters perform high-sensitivity measurements of exposure and exposure rate.

**FRAMEWORK BOOTH: 514
SCIENTIFIC**

Framework Scientific is a highly dynamic company involved in the development of advanced cutting edge scientific instrumentation and software, with an emphasis on radiation measurements.

We are pleased to introduce our Acoustical Bubble Counter ABC 1260, a state of the art neutron detector designed for the superheated drop (bubble) detector technology pioneered at Yale University. The unit offers:

- High Neutron sensitivity
- Dose equivalent response
- Photon discrimination
- Digital Active counting
- Standard PC interface
- Optional High Z kit for enhanced high-energy response to several hundred MeV.
- Programmable dose rate alarms
- Network connectivity

Web Site: www.framesci.com

FRHAM SAFETY PRODUCTS, INC. BOOTH: 920

Frham Safety Products, Inc. is a leading supplier of both Nuclear and Industrial safety equipment throughout North America. Serving commercial and governmental facilities, Frham offers innovative radiation and contamination protection, health physics supplies, rad-waste reduction items, along with custom manufacturing.

G/O CORPORATION BOOTH: 412

G/O Corporation is a supplier of both nuclear and industrial safety equipment. G/O provides health physics supplies, rad-waste reduction items, many custom signage and barrier products

GAMMA PRODUCTS, INC. BOOTH: 311

"GasLess" Alpha/Beta Counting System the "Mini T."

GENERAL ATOMICS BOOTH: 717

General Atomics Electronic Systems leads the world in radiation and environmental monitoring systems. The DOSE-GARD® electronic dosimeters, ENVIRO-GARD radiation monitors, and Radnet wireless environmental monitors extend that leadership into the emergency preparedness community. General Atomics is your lifetime solution.

GENERAL ENGINEERING LABS. BOOTH: 802

Radiochemistry, Bioassay, Analytical chemistry, REMP, NPDES, TCLP, 10CRFG1 Support.

GLOBAL DOSIMETRY SOLUTIONS, INC. BOOTH: 901, 903

Global Dosimetry Solutions, a division of Mirion Technologies, provides radiation monitoring services to many industries. Crucial for managing the risks of cumulative radiation exposure, our solutions ensure the safety of individuals worldwide.

HERBERT M PARKER FOUNDATION - WSU TRI-CITIES - DEVELOPMENT OFFICE BOOTH: 713

The Herbert M. Parker Foundation for education in the radiological sciences was created in 1987 to memorialize Mr. Parker and his many significant contributions to radiation protection, radiation biology, the environment, and radiotherapy. The Foundation preserves Mr. Parker's legacy of ethical and scientific standards and his concern for the protection of people and the environment. We invite you to become a member and join in advancing the preservation of the health physics profession.

HI-Q ENVIRONMENTAL PRODUCTS CO. BOOTH: 715

HI-Q Environmental Products Company has been a leading Manufacturer of Air Sampling Equipment, Systems & Accessories since 1973. Our product line includes: Continuous duty high & low volume air samplers, air flow calibrators, radioiodine sampling cartridges, collection filter paper, combination filter holders, and complete stack/fume hood sampling systems including the Shrouded Probe designed per ANSI N13.1 1999.

HOPEWELL DESIGNS, INC. BOOTH: 607

Hopewell Designs, Inc. manufactures irradiator calibration systems for radiation detection instruments and personnel dosimetry. Systems may be manual or automated dependent on the customers requirements. Our product line also encompasses X-Ray inspection systems, lead shielding, and mechanical positioning systems.

HPS PUBLICATIONS BOOTH: REG AREA

**IAEA/BROOKHAVEN BOOTH: 814
NATIONAL LABORATORY**

The Brookhaven National Laboratory (BNL) recruits for the International Atomic Energy Agency (IAEA) located in Vienna, Austria. The IAEA is a science and technology-based organization that serves as the global focal point for nuclear cooperation. This organization is responsible for preventing the spread of nuclear weapons employing specialized safeguards technologies to accomplish its mission.

ICX RADIATION BOOTH: 308

ICx Radiation (formerly Target Instruments) is a radiation detection equipment innovator and manufacturer. Since 1984, we have been a leader in the digitization of signal processing electronics as well as in the rapid & accurate identification of radionuclides using scintillation detectors.

**ILLINOIS INSTITUTE BOOTH: 614
OF TECHNOLOGY**

The IIT Master of Health Physics degree combines technical depth in radiation physics and government regulation with radiation planning, safety, and instrumentation. Program curriculum includes courses in communication and management, essential for the working professional. No thesis required.

Study at your convenience, part-time and online! www.bcps.iit.edu/psm

IRSC, INC. BOOTH: 908

International Radiation Safety Consulting, Inc. (IRSC, Inc.) provides comprehensive regulatory support to manufacturers and distributors of instruments containing radioactive sources. Our clients are largely U.S. corporations seeking regulatory assistance to sell their products domestically and throughout the world.

**J. L. SHEPHERD BOOTH: 312
& ASSOCIATES**

Biological research, blood component, sterilization and process irradiators. Gamma, beta and neutron instrument calibration facilities. Automated computer controls and databases. Irradiator/Calibrator IC security upgrades, service, repair, relocations and decommissioning. Hot cell manipulators, windows and lead glass available.

K & S ASSOCIATES BOOTH: 716

K & S Associates provides accredited calibrations for health physics equipment, such as survey meters, kVp, mAs, and light meters, plus densitometers, dosimeters, multifunction meters, ion chambers, electrometers, triad kits and much more.

**LAB IMPEX BOOTH: 600
SYSTEMS LTD.**

Instruments for Alpha-Beta Continuous Air Monitoring (the SmartCAM), Area Gamma Monitoring, Noble Gas Monitoring and Iodine Monitoring. Complete systems for Stack and Duct Monitoring and Facility wide networks. Applications within Nuclear, Industrial and PET.

LANCS INDUSTRIES BOOTH: 812

Lancs Industries manufactures containments, tents, glovebags, protective clothing and lead shielding. Lancs specializes in fabricating custom designed items to prevent contamination in radiological work environments.

**LANDAUER INC. BOOTHS: 305, 307,
404, 406**

Landauer is the nation's leading provider of personnel radiation dosimetry services. New OSL technology, Luxel® dosimeter, measures x-ray, beta and gamma radiation along with neutron detection capabilities. NVLAP accredited. Landauer offers a full range of

reports, ALARA aids, interactive computer systems, dosimetry management PC software and other related services. Aurion operational dosimetry service combines the Internet and cutting edge DIS technology to help control exposure.

LASER- PROFESSIONALS INC. BOOTH: 714

Laser-Professionals Inc. provides Laser Safety Training Programs, Consulting Services, and Software Products for the Laser Safety Officer. All courses and products are designed and produced by physicists who are hands-on laser users with decades of experience building lasers, using lasers, and teaching people about lasers and laser safety.

LOS ALAMOS NATIONAL LABORATORY/OFFSITE SOURCE RECOVERY PROJECT BOOTH: 300

The Off-Site Source Recovery Project (OSRP) is part of the National Nuclear Security Administration's (NNSA) Office of Global Threat Reduction (NA-21) and is managed at Los Alamos National Laboratory through the Nuclear Nonproliferation Division. OSRP has NNSA sponsored mission to remove excess, unwanted, abandoned, or orphan radioactive sealed sources from the environment that pose a potential risk to health safety, and national security.

LUDLUM MEASUREMENTS, INC. BOOTHS: 701, 703

Ludlum Measurements, Inc. will display portable and laboratory instrumentation used to detect and measure nuclear radiation.

MACTEC, INC. BOOTHS: 319, 321

From characterization through license termination, MACTEC is your radiological decommissioning choice. With our mobile NRC license and various Agreement State licenses, we can

perform characterization, decontamination, remediation and demolition, as well as waste packaging and transportation while minimizing client liability.

MGP INSTRUMENTS BOOTH: 900

MGP Instruments provides a full range of instrumentation and engineering services for health physics applications and radiation monitoring systems. We are more than just a leader in technology. We are also recognized for our outstanding customer support.

MJW CORPORATION BOOTH: 301

MJW Corporation Inc. provides a variety of radiological consulting services as well as innovative software solutions for health physics and other technical industries. The Radiological Division of MJW specializes in internal dose assessment, reconstruction and radiological and health physics services for private industry and government agencies. MJW's software line brings state-of-the-art applications to health physics, nuclear related fields, and all aspects of emergency preparedness, disaster recovery, asset management and pre-risk mitigation. Collaboration between the multimedia and radiological divisions keeps MJW on the front line of flourishing technological progress. Check out our updated product page at <http://www.mjwcorp.com> or call us toll-free at 1-888-MJWCORP for more information.

NORTH AMERICAN SCIENTIFIC BOOTH: 507

NAS is a manufacturer of radioactive 'reference' sources used to calibrate a variety of equipment in such fields as nuclear medicine, biotechnology, environmental safety, and industrial research.

NRRT BOOTH: 419

**OAK RIDGE BOOTH: 516
ASSOCIATE UNIVERSITIES**

ORAU provides a variety of services in the radiological sciences: training, environmental surveys, decommissioning, epidemiology, and emergency response.

ON SITE SYSTEMS, INC. BOOTH: 515

On Site Systems, Inc. is a software development company with a single focus, Environmental Health and Biological, Chemical and Radiological Safety Data Management software, both client-server and Web based applications. The EH&S Assistant is a centralized database and safety management system providing comprehensive compliance documentation. The Health Physics

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WORKS-IN-PROGRESS ABSTRACTS

P.76 Novel 2-Dimensional Dose Distribution Study In 5-Yr Old Pediatric Phantom

*Yoshizumi, T., Brady, S., Frush, D.,
Toncheva, G., Oldham, M.
Duke University*

Purpose: We have studied physics characteristics of radiochromic film (Gafchromic XR-QA, ISP, Wayne, NJ), and applied this new technology for visualization of 2-dimensional CT dose distributions of internal organs in 5-yr old pediatric phantom (CIRS).

Method and Materials: Physics characteristics studied were: film optical growth as a function of exposure, change in film optical density as a function of post-exposure time, film sensitivity to ambient light conditions, and optical density as a function of exposure. For dose distribution study, three sections of the phantom were selected and overlaid with the Gafchromic film; these were the upper thorax, mid-thorax, and abdomen regions. A chest-abdomen-pelvis scan was performed with a MDCT scanner (VCT, GE Healthcare). The scan parameters were 120 kVp, 320 mA, 0.4 s and 1.375 pitch. The film was digitized with EPSON Perfection 4990 PHOTO 24-hr post exposure and the film density was converted into optical density.

Results: Gafchromic film showed: 1.2% optical density growth in one day due to ambient light exposure, post irradiation optical density growth of 2.5 % in one day with only an additional 3.3% growth over nine additional days for film exposure of 6.5 R and lower for lower exposures, and linearity in optical density growth over 0 to 6.5 R exposure range. Gafchromic film was able to produce a dose distribution pattern corresponding to different tissue materials, i.e., lungs, soft-tissues, and spine.

Conclusions: We have produced a 2-D dose distribution of an anthropomor-

phic phantom using a Gafchromic film. The film showed clear delineation of dose distribution due to various organ structures in the phantom. This new technology may be further developed to obtain a 3-D dose distribution mapping of an anthropomorphic phantom as well as a 2-D fusion image between CT and dose distribution.

P.77 Occupational Radiation Dose to Cardiologists from Cardiac Catheterization Procedures

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ersity*

Cardiac catheterization procedures using fluoroscopy and image intensifier have been used since the 1950s and have revolutionized the practice of cardiology. These procedures expose operator to scattered radiation. The objectives of the present investigation were to provide a systematic comprehensive summary of reported radiation dose to cardiologists, to identify primary factors influencing radiation dose and to evaluate temporal changes in radiation doses. Using Medline, we identified all English-language journal articles and other published data reporting radiation exposures to cardiologists from the early 1970s through the present. We abstracted the reported radiation doses and all other relevant information and estimated effective doses to the cardiologists in each study to facilitate comparisons. The estimated effective dose per procedure (uSv) ranged from 0.02 - 38.0 for diagnostic catheterizations (DC), 0.17 - 31.2 for percutaneous coronary interventions (PCI), 0.24 - 9.6 for ablations and 0.29 - 17.4 for pacemaker or defibrillator implantations. We estimated that the ratios of doses measured over protective shields between various

anatomic sites and the thyroid were 0.9;±1.0 for an eye, 1.1;±1.6 for the trunk, and 1.3;±1.9 for a hand. Generally, radiation dose is higher on the left side of a physician's body, because the left side of the physician is closer to primary beam when operating on the right side of patient. Modest operator dose reductions over time were observed for DC and ablation. Doses were not statistically significantly reduced over time for PCI in these data. Increased complexity of medical procedures appears to have offset improvements in technology. The large variation in operator doses observed for the same type of procedure suggests that optimizing procedure protocols and implementing general use of the most effective types of protective devices and shields may reduce occupational radiation doses to operators.

P.78 Evaluation of Small-Size Dosimeters using Optically Stimulated Luminescent (OSL) Dosimetry Materials for Diagnostic Imaging Dosimetry

Dauer, L.T., Ching, H., Kwan, A., Fleishman, R., Rothenberg, L., St. Germain, J.

Sloan-Kettering Cancer Center

Purpose: While aluminium oxide (AL₂O₃:C) sapphire has been used for personnel dosimetry measurements utilizing optically stimulated luminescence (OSL) characteristics since 1996. Recently, small-sized DOT dosimeters and portable LASER readers have been developed using aluminum oxide that may be useful in the diagnostic imaging field. We report here an evaluation of these dosimeters for use with a diagnostic x-ray energy range of 22-140 kVp.

Materials and Methods: Dosimeters with single active elements of aluminum oxide (Landauer InLight™ DOT dosimeters) were exposed to diag-

nostic x-rays. 3 measurements were obtained from each dosimeter within 1-3 days using a portable LASER reader (Landauer MicroStar™) using an 80 kVp calibration. Dosimeters were evaluated for energy response both on-phantom and free-in-air (with 5 dosimeters each exposed at 22, 35, 50, 80, 120, and 140 kVp) normalized to 80 kVp. Dosimeters were compared to ion chamber results both on-phantom and free-in-air (with an ion chamber and 5 dosimeters each exposed at 22, 35, 50, 80, 120, and 140 kVp) and measured using an 80 kVp reader calibration. The angular response was determined by exposing 5 dosimeters each at varying incident angles (0, 45, 90, 135, and 180 degrees) using an 80 kVp x-ray beam. In addition, linearity was evaluated from 100 iGy through 20 Gy.

Results: Energy dependence was shown to be within +/- 15% when exposed free-in-air over the diagnostic energy range of 22-140 kVp and dosimeters similarly compared with ion chamber results within +/- 15% when exposed free-in-air. Energy dependence was shown to be within +/- 17% when exposed on phantom over the diagnostic energy range of 22-140 kVp and dosimeters similarly compared with ion chamber results within +/- 17% when exposed on-phantom. Angular response differences at 45, 135, and 180 degrees were shown to be within < 3% of the 0 degree response. A 15% reduction in response was identified when dosimeter was exposed on edge (90 degrees). Dosimeters were shown to have a linear response from 100 µGy through 20 Gy

Conclusion: Small size aluminum oxide OSL dosimeters and portable readers can be a convenient methodology for patient dosimetry applications across the diagnostic imaging energy range. The dosimeters can be quickly

read and analyzed. Dosimeters are linear over a large dose range and compare well with ion chamber results, having acceptable energy and angular dependence.

P.79 Determining Cytogenetic Dose Response to Cf-252 Fission Neutrons

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Oak Ridge National Laboratory, Radiation Emergency Assistance Training Center

This presentation describes preliminary results of recent efforts to re-establish a capability for cytogenetic radiation biodosimetry by the Radiation Emergency Assistance Center/Training Site (REAC/TS) at the U.S. Department of Energy's Oak Ridge Institute for Science and Education (ORISE). Cytogenetic biodosimetry is used to identify damage to chromosomes in individuals who have been exposed to ionizing radiation. The number and type of chromosomal abnormalities in tissues of exposed individuals is used to calculate radiation dose estimates that are used by physicians in determining the appropriate treatment for a patient. Chromosomal aberrations in human blood are currently being evaluated for known radiation fields to establish dose-response relationships for X rays, gamma photons and neutrons. The neutron dose response study is complete. Blood samples in plastic cuvettes were placed in a slot within a Lexan phantom and irradiated with neutrons from the spontaneous fission of californium-252. The elevated doses desired (0.1 Gy to 2 Gy) in a limited time (a half-hour, or less) dictated a small source-to-target distance. Measurements of photon intensity from the Cf-252 source along the axis of the cuvette using Luxel® optically-stimulated luminescence dosimeters confirm an inverse-r-square distribution

of the radiation field from the source, provide an estimate of the source material's location within its capsule, and allow calculation of the mean neutron fluence rate to the sample. Details of the neutron exposures (including a description of the phantom, details of the exposure geometry and the methods for estimating and verifying the mean and geometric distribution of neutron fluence) and a preliminary assessment of the cytogenetic neutron dose response are presented.

*This work was performed under Contract # DE-AC05-06OR23100 between the U.S. Department of Energy and Oak Ridge Associated Universities.

P.80 Fostering Some of the Next Decade's Scientists: Searching For "Jenny Neutron" on a Saturday Afternoon

Masih, S., Donahue, M., Burchell, N., Dhar, M.

University of Missouri-Kansas City, Honeywell, FM&T, Children's Mercy Hospitals, Clinics-Kansas City

Safety training for adults is not the same as safety training for younger beings. Introducing a preteen to radiological science careers is really not the same as providing instructional materials to educators, yet this is precisely the age group where an introduction to special science topics may result in a student in a health physics class in the future. We share materials for a simple forty-minute presentation on radiation sciences and careers used at a science enrichment experience aimed specifically at fifth through eighth grade girls, and discuss the environment in which they were developed and used. The preparation required took far less time than putting together an HPS Science Teachers Workshop, being a 4-H project leader or even a Scout leader or badge advisor. The activity still supports science education in general.

P.81 Quantitative Analysis of the Effects of Ionizing Radiation on Arabidopsis Thaliana

Hood, S., Kurimoto, T., Constable, J.V.H., Huda, A.

California State University Fresno

Few studies have examined the impact of radiation on physiologically active plants and subsequent impact on growth, rates of photosynthesis and respiration, and chlorophyll content. Assessing whether plants can be used as biological dosimeters to measure the amount of radiation dose after accidental radiation exposures or leaks to the environment is analyzed/discussed/presented (which word is more appropriate). *Arabidopsis thaliana* was chosen due to its frequent use as a model in the plant sciences. The plants were grown in controlled environment chambers with 12 hour day/20 oC/75% humidity and divided into three growth stages. The plants were then irradiated with a linear accelerator. The irradiation doses were delivered as either a single dose or dual fractionated doses with the same total radiation dose. The total irradiation doses were delivered at four levels, 0.5, 4, 50, and 150 Gy. Pre-harvest measurements include photosynthetic and respiration rates, and chlorophyll fluorescence. Post-harvest measurements consist of plant height, leaf area and total plant biomass. This research has the potential to define whether the plants have the capability of serving as biological dosimeters as well as whether their response at different growth stages can illustrate the role of DNA repair mechanisms at different doses and different rates of dose. This work is a continuation and expansion of a research project undertaken in 2004/2005.

P.82 Homeland Security Radiological Research for Environmental Remediation

Hall, K., Drake, J.L., Lee, S.D.

US Environmental Protection Agency

In the aftermath of the terrorist attacks of September 11, 2001, and the anthrax attacks in the Fall of 2001, federal and state personnel carried out their mission to provide response, recovery, and remediation under trying circumstances. The U.S. Environmental Protection Agency (EPA) is charged with protecting the nation's land, air, and water resources. The National Homeland Security Research Center (NHSRC) is EPA's center for conducting research to facilitate protection and decontamination of structures and water infrastructure subject to chemical, biological, or radiological incidences of national significance. NHSRC's research is designed to provide appropriate, effective, and validated technologies, methods, and guidance to understand the risks posed by these agents and to enhance our ability to detect, contain, and clean up in the event of an incident involving such agents. Active NHSRC projects include: Participating in the establishment of an environmental Laboratory Response Network (eLRN) for contaminants of interest; standardization of radiological sampling protocols during the cleanup phase of an event; establishment of an All Hazards Receipt Facility (AHRF) providing first line protection for analytical laboratories receiving samples from the field; standardization of radioanalytical methods to be used for contamination quantification and final site release, identification of effective cleanup technologies and planning tools for the responder community, and collaboration with EPA's Office of Radiation and Indoor Air (ORIA) for development of fast methods to decrease radioanalytical sample analy-

sis turn-around times during a homeland security event. Activities within NHSRC directly support the Homeland Security Presidential Directives (HSPDs) which have helped to define EPA's homeland security role.

P.83 Preliminary Design of a Directionally Sensitive Spectroscopic Neutron Detector based upon Shadow Shielding

Zak, T., Whetstone, Z., Lehnert, A., Kearfott, K.

University of Michigan

Measurement systems based upon neutron detection are complicated by the fact that each neutron may scatter several times before impacting a detector. Neutrons may multiply-scatter within objects of interest or off nearby materials such as air, the ground, shielding or surrounding equipment, thereby decreasing both the angular resolution and signal to noise ratio in the neutron energy spectrum. Shadow shielding may be used to limit the field of view of the detector in order to provide a more precise scattering angle for neutron detection and improved neutron energy spectra. The goal of this study is to optimize the directionality of a shadow shielded detector while minimizing cost and size without compromising detection efficiency. The Monte Carlo N-Particle Radiation Transport Code (MCNP) was used to simulate several geometries which consisted of a hypothetical detector enclosed by a shadow shield made of steel, concrete, water, boron and other hydrogenous materials. Each geometry contained a detector enclosed by a shadow shield with an opening creating a preferentially-sensitive detector face. The surrounding area consisted of air with varying humidity and dust in addition to a ground composed of either soil or concrete. Various other scattering objects were added to

the environment to simulate more realistic conditions. An isotropic source that emitted neutrons with energies of 2.5 MeV, 14.1 MeV, and a Cf-252 spectrum was positioned at 30° angles ranging in intervals from 0° to 180° and distances varying from 0.1 to 10 meters with respect to the shielded detector. Simulations were run with various numbers of particle histories to ensure that statistical noise was acceptable. The optimal energy bin size for the simulations was determined by comparing the expected full width at half maximum of an ideal source to that obtained by a simulated spectrum with different energy bin sizes. Comparing the resulting neutron energy spectra for different designs gave insight to desirable shielding materials and geometries. The collected results from the aforementioned simulations and a final shielding recommendation are presented.

P.84 Regulations and Cleanup Surprises and Solutions

Terry, J., Hermes, W., Hylton, T., Vitkus, T.
Oak Ridge National Laboratory, Oak Ridge Institute for Science and Education

With assistance from the Oak Ridge National Laboratory and the Oak Ridge Institute for Science and Education, the Defense National Stockpile Center is cleaning up low-activity residual radioactive contamination at the Curtis Bay Depot near Baltimore, Maryland. The contamination results from storage of commodities containing licensable quantities of source material. The primary sources of residual contamination were thorium nitrate and monazite sand; both commodities have been removed from the site. The predominant contaminant is thorium. Characterization results are provided; for over 99% of the site these results were of sufficient quality and

quantity to satisfy the Multi-Agency Radiation Survey and Site Investigation Manual guidance for final status surveys. Twenty-four buildings that were unsafe to enter were deconstructed sufficiently to allow characterization. The lengthy timeline for derived concentration guideline level approval is presented. A disposal pathway is presented for large quantities of soil and building materials with contamination resulting from licensable source material. The final status survey design has been implemented in an iterative manner to meet the needs of the project; for example, portions of two class 2 outdoor survey units have been transformed into one class 1 survey unit. Because of site-specific conditions and events, gaps existed in the characterization data. Despite planning to account for these gaps during the remediation phase, the resulting unknowns have led to more material for disposal and higher remediation costs. The surprises encountered and the solutions implemented are presented.

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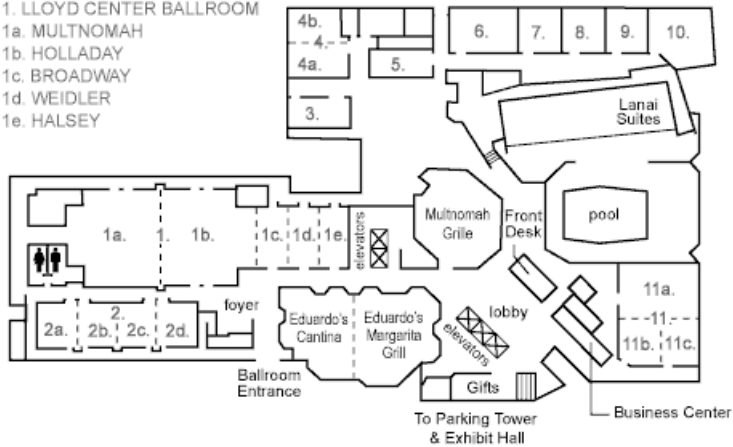
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Portland DoubleTree Hotel

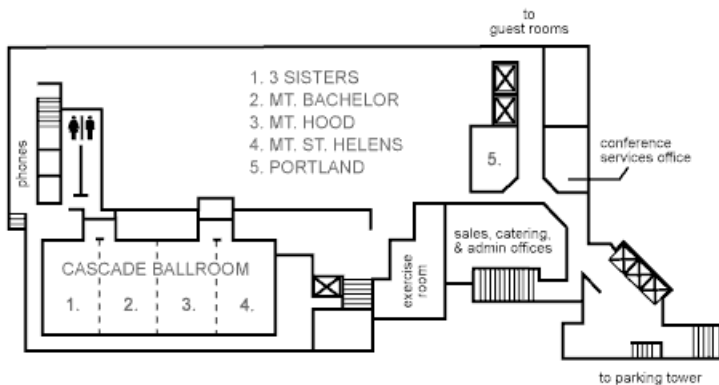
DOUBLETREE HOTEL & EXECUTIVE MEETING CENTER PORTLAND-LLOYD CENTER - FIRST LEVEL

1. LLOYD CENTER BALLROOM
1a. MULTNOMAH
1b. HOLLADAY
1c. BROADWAY
1d. WEIDLER
1e. HALSEY

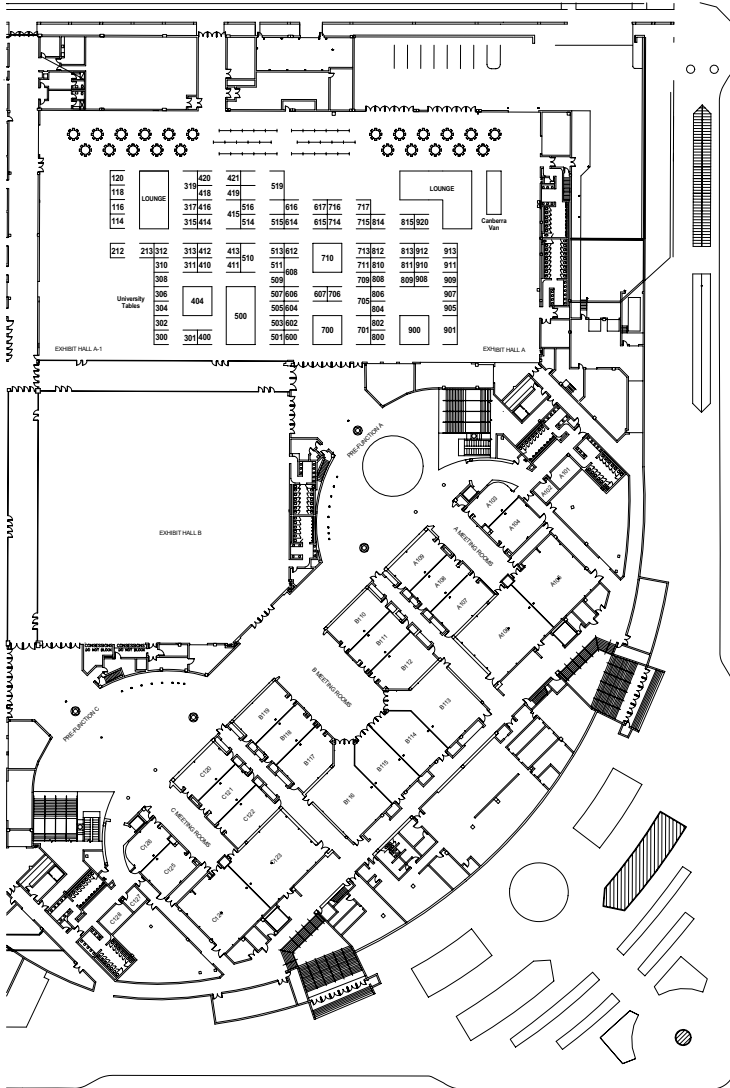


2. WILLAMETTE BALLROOM
2a. HAWTHORNE
2b. SELLWOOD
2c. ROSS ISLAND
2d. MORRISON
3. WASHINGTON
4. ADAMS/JEFFERSON
- 4a. ADAMS
4b. JEFFERSON
5. HAMILTON
6. ROOSEVELT
7. MADISON
8. LINCOLN
9. GRANT
10. JACKSON
11. PACIFIC NORTHWEST BALLROOM
11a. OREGON
11b. ALASKA
11c. IDAHO

DOUBLETREE HOTEL & EXECUTIVE MEETING CENTER PORTLAND-LLOYD CENTER - SECOND LEVEL



Oregon Convention Center



Saturday, July 7

AAHP 1 Eight-hour OSHA Hazardous Waste Operations Refresher Training
8:00 am-5:00 pm Mt Bachelor (DT)
AAHP 2 Emergency Dose Assessment
8:00 am-5:00 pm Mt Hood (DT)
AAHP 3 Homeland Security Instrumentation for the Health Physicist
8:00 am - 5:00 pm Mt St Helens (DT)

Sunday, July 8

All Sunday PEPs are at the DoubleTree Hotel

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

PEP 2-A thru 2-H
10:30 am-12:30 pm

PEP 3-A thru 3-H
2:00-4:00 pm

Sunday PEP Rooms:

1A/2A/3A Halsey/Weidler
1B/2B/3B Mt. St. Helens
1C/2C/3C Mt. Hood
1D/2D/3D Mt. Bachelor
1E/2E/3E Holladay
1F/2F/3F Multnomah
1G/2G/3G Sellwood/Hawthorne
1H/2H/3H Ross Island/Morrison

Welcome Reception

6:00-7:00 pm
Lloyd Center Ballroom,
DoubleTree

All Events are in the Convention Center or DoubleTree Hotel (DT) as noted

Section Business Meetings**Tuesday**

Medical HP B110-112, 12:15 pm
Decommissioning B117-119, Noon
Environ/Radon B115-116, Noon

Wednesday

Accelerator A106, Noon
RSO B115-116, 11:45 am

Monday, July 9

CEL1 Workforce Pipelines for the Nuclear Renaissance
7:00-8:00 am A105
CEL2 Medical Reserve Corps (MRC) – volunteer opportunity for health physicists to contribute to their local communities
7:00-8:00 am A106

ABHP Exam - Part 1

8:00-11:00 am 3 Sisters/
Mt Bachelor (DT)

MAM-A Plenary Session

8:15 am-Noon Oregon Ballroom
201/202

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 Basic Statistics. A105
PEP M2 Design, Fabrication, and Use of Anthropometric Phantoms for Calibrating Direct In Vivo Measurements of Internally-Deposited Radioactive Materials. A106

PEP M3 Cell and Molecular Effects of Low Doses of Radiation. C120-121

PEP M4 Training for Medical Examiners and Coroners in Handling fatalities from INDs. C122

PEP M5 Technical Auditing for Health Physicists (Part 1 of 3 on Laboratory Accreditation, See PEPs T5 and W5). B113-114

ABHP Exam - Part II

12:30 - 6:30 pm 3 Sisters/
Mt Bachelor (DT)

HPS Chapter Council

1:00 - 2:00 pm B110-112

Poster Session

1:30 - 3:30 pm Exhibit Hall

MPM-A NIOSH Dose Reconstruction Project
3:30-5:00 pm A105

MPM-B Reactor Health Physics
3:30-5:00 pm A106

MPM-C Regulatory/Legal Issues
3:30-5:15 pm B110-112

MPM-D First Responders
3:30-4:15 B113-114

MPM-E Waste Management
3:30-5:00 pm B115-116

Movies

3:30-5:00 pm B117-119

Student Reception

5:30 - 6:30 pm Ross Island/
Morrison (DT)

Tuesday, July 10

CEL3 ON ALERT: Post 9/11 Integrated Emergency Planning
7:00-8:00 am A105

CEL4 Image-Based Methods in Internal Dose Calculations-Current Status
7:00-8:00 am A106

TAM-A AAHP Special Session on HP Education
8:30 am-Noon A105

TAM-B External Dosimetry A
8:30 am-Noon A106

TAM-C Medical Health Physics
8:30 am-Noon B110-112

TAM-D Comm Preparedness for Radiological Terror Response
8:00 am-Noon B113-114

TAM-E Env/Radon Special Sess
8:30 am-Noon B115-116

TAM-F Uncertainty Special Sess Sponsored by the Decomm Section
8:30 am-Noon B117-119

AAHP Awards Luncheon

Noon-2:15 pm Ballroom 201

PEP Program

12:15-2:15 pm

PEP T1 Choosing Radiological Performance Indicators. A105

PEP T2 Radiological Design Review of Radiological Facilities and Equipment. A106

PEP T3 Statistics – What Is It Good For? (A Practical Primer for the Practicing Professional). C120-121

PEP T4 Environ Radioactivity Studies at the Savannah River Ecology Lab: ...C122

PEP T5 HPS Lab Accreditation Program Assessor Training (See PEPs M5 and W5). B113-114

TPM-A AAHP Special Session on HP Education
2:30-5:15 pm A105

TPM-B External Dosimetry B
2:30-3:45 pm A106

TPM-C Decommissioning
2:30-5:00 pm B110-112

TPM-D Community Preparedness for Radiological Terrorism Response Special Sess
2:30-4:30 pm B113-114

TPM-E CRSO Plenary Session
2:30-5:00 pm B115-116

Movies

2:30-5:00 pm B117-119

AAHP Open Meeting

5:15 pm A105

HPS Awards Dinner & Recep
7:00-10:00 pm Portland Ballroom

Wednesday, July 11**Thursday, July 12****Registration Hours****CEL5** Ingestion DILs & DRLs for Emer Planning & Response
7:00-8:00 am A105**CEL6** 2006 Gamma Irradiator Accident in Belgium
7:00-8:00 am A106**WAM-A** Environmental
8:30 am-Noon A105**WAM-B:** Accelerator Special Sess
8:15 am-Noon A106**WAM-C:** Internal Dosimetry and Bioassay
8:30-11:45 am B110-112**WAM-D** Homeland Security
8:30-11:45 am B113-114**WAM-E** Joint CRSO and RSO Special Session
8:30-11:45 am B115-116**WAM-F** Global Threat Reduction Session
8:30 am -Noon B117-118**PEP Program**

12:15-2:15 pm

PEP W1 Mixed Waste Mgmt at a Large Univ/Medical Institution. A105**PEP W2** HP Concerns of Neutron Exposures, Criticality Safety and Criticality Accidents. B110-112**PEP W3** HPS Technical Assistance to First Responders. C120-121**PEP W4** Fundamentals of Neutron Detection and Detection Systems. C122**PEP W5** Introduction to Uncertainty Calculation (See PEPs M5 and T5). B117-118**WPM-A** Environmental
2:30-5:00 pm A105**WPM-B** Bioeffects
2:00-4:30 pm A106**WPM-C** Emergency Response Instrumentation
2:30-5:00 pm B113-114**WPM-D** Radiation Safety Without Borders
2:45-4:45 pm B115-116**WPM-E** Aerosol Measurements
6:00-8:00 pm 3 Sisters/
Mt Bachelor (DT)**Movies**

2:30-5:00 pm B117-118

Radioactive Air - NESHAPs**Meeting**
2:30-5:00 pm B119**CRSO Concurrent Sessions**
2:30-5:00 pm A103 and A104**HPS Business Meeting**
5:30 pm A106**Aerosol Measurements**
6:00-8:00 pm DoubleTree**CEL7** Training First Responders on Radiological Dispersal Devices (RRDs) and Improvised Nuclear Devices (INDs)
7:00-8:00 am A105**CEL8** Subsurface Soil DCGLs
7:00-8:00 am A106**THAM-A** Current Topics in Internal Dose Assessment Special Session
8:30 am -Noon A105**THAM-B** 10 CFR 835
8:30 am-Noon A106**THAM-C** Operational Health Physics
8:45 am-Noon B110-112**THAM-D** Emergency Response
8:30-9:45 am B113-114**THAM-E** Instrumentation
8:30 am-Noon B115-116**CRSO Concurrent Sessions**
8:30 am-Noon A103 and A104**DoubleTree Hotel**Saturday 2:00 - 5:00 pm
Sunday 7:00 am - 7:00 pm**Convention Center**Monday 8:00 am - 4:00 pm
Tuesday 8:00 am - 4:00 pm
Wednesday 8:00 am - 4:00 pm
Thursday 8:00 - 10:00 am**Exhibit Hall Hours****Exhibit Hall**Monday Noon - 5:00 pm
Tuesday 9:30 am - 5:30 pm
Wednesday 9:30 am - Noon

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

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.