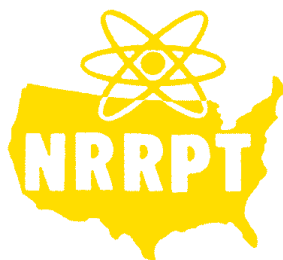


FINAL PROGRAM



51st Annual Meeting of the Health Physics Society

(American Conference of
Radiological Safety)



June 25-29, 2006

***Rhode Island Convention Center
Providence, Rhode Island***

Headquarters Hotel

Westin Hotel

One West Exchange Street
Providence, RI

Telephone: (401) 598-8000

Fax: (401) 598-8200

Future Annual Meetings

52nd	7/8-12, 2007	Portland, OR
53rd	7/13-17, 2008	Pittsburgh, PA
54th	7/12-16, 2009	Minneapolis, MN

Future Midyear Topical Meeting

40th	1/21-24, 2007	Knoxville, TN
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Topic: Decontamination, Decommissioning, and
Environmental Cleanup

HPS Secretariat

1313 Dolley Madison Blvd.

Suite 402

McLean, VA 22101

(703) 790-1745; FAX: (703) 790-2672

Email: hps@burkinc.com; Web Page: www.hps.org

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Meeting At A Glance	Inside/Outside Back Cover

Registration Hours

Registration will take place at the
Rhode Island Convention Center

Saturday, June 24	2:00 - 5:00 pm
Sunday, June 25	7:00 am - 7:00 pm
Monday, June 26	8:00 am - 4:00 pm
Tuesday, June 27	8:00 am - 4:00 pm
Wednesday, June 28	8:00 am - 4:00 pm
Thursday, June 29	8:00 - 10:00 am

Officers

Ruth E. McBurney, *President*
Brian Dodd, *President Elect*
Richard R. Brey, *Secretary*
Richard E. Toohey, *Treasurer*
David J. Allard, *Treasurer Elect*
Raymond A. Guilmette, *Past President*
Richard J. Burk, Jr., *Executive Secretary*

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Advisory Panel to the Board

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Ninni Jacob, Local Arrangements Committee Co-Chair
Raymond H. Johnson, Jr., President's Emeritus Committee Chair
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Genevieve S. Roessler, Newsletter Editor-in-Chief, Web Site Editor
Michael T. Ryan, Journal Editor-in-Chief
Robert A. Scott, Local Arrangements Committee Co-Chair

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Jeri Lynn Anderson
Philip D. Kearney
Kenneth Krieger
Patricia L. Lee
Christopher Martel
Matthew McFee
Steve Reese
Glenn M. Sturchio

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Co Chairs- Robert Scott, Ninni Jacob
Secretary - John Sumares
Treasurer- Michael Whalen
Affiliate Liaison - Jennifer Collins
Board Liaison -Victor Evdokimoff
Floor Manager - William Dundulis
Hospitality Suite- Terry LaFrance
Intramurals-Mitch Galanek, Warren Church
Night Out, Logo/Web Design- Richard Shea
PEP Liaison - John Salladay
Publicity & Local Information -Tara Medich
Receptions- Karyl McGeehan
Social Tours - Frank and Paulette Ascoli
T-Shirts- James Tocci
Technical Tours- William Irwin
Volunteer Staffing - James Cherniak
Webmaster- Doug LaMay

Summer School

David Medich, *Academic Dean*
Chris Martel, *Administrative Dean*

Important Events

Welcome Reception

Please plan on stopping in Ballroom A of the Convention Center Sunday, June 25, from 6:00-7:00 pm.

Exhibits

Free Lunch! Free Lunch! – Noon, Monday, June 26. All registered attendees are invited to attend a complimentary lunch in the exhibit hall.

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

Sessions

All PEP Courses and Sessions will be held at the Rhode Island Convention Center.

AAHP Awards Luncheon

Tuesday June 27
Noon-2:15 pm
Narragansett A, Westin Hotel

HPS Awards Banquet

This event will be held in Ballroom A/B/C of the Rhode Island Convention Center. The awards will be presented after the dinner and the event will last from 7:00-10:00 pm.

Different This Year

Arrive early and enjoy the famed “Waterfire” on Saturday, June 24 evening.

<http://www.waterfire.org/about/index.html>

There are two options for a Night Out on Wednesday Night

Pawsox Baseball Game Dinner Cruise on the Bay Queen

This meeting marks the end of the year-long celebration of the 50th anniversary of the Society and we have several history-related activities planned throughout the meeting:

- ◆ A special poster section featuring histories of HPS chapters and university programs.
- ◆ Historical movies & videos (remember “Duck and Cover?”)
- ◆ Slide shows before the sessions & during breaks.
- ◆ A special History Session on Thursday morning.

Things to Remember!

All Speakers are required to check in at the Speaker Ready Room 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, June 27, at 12:15 pm, in Narragansett A in the Westin Hotel. 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 Rhode Island Convention Center, Ballroom A/B/C on Tuesday, June 27, from 7:00 - 10:00 pm. The following awards are to be presented:

**Robley D. Evans
Commemorative Medal**
Ludwig Feinendegen

**Distinguished Scientific
Achievement Award**
John Auxier

Elda E. Anderson Award
Scott O. Schwahn

Founders Award
L. Max Scott

Fellow Award

Neil M. Barss
Carol D. Berger
Antone Brooks
Robert N. Cherry, Jr.
Frederick F. Haywood
Edward F. Maher
Lorraine Marceau Day
Debra McBaugh

Linda L. Morris
Thomas P. O'Kelley
Jerome Rademacher
Charles S. Sims
Christopher Soares
Lawrence W. Townsend
James T. Voss
Larry O. Waggoner

Menu

Hearts of Romaine with Citrus Segments, Sunflower Seed and Bleu Cheese served with a Port Wine Vinaigrette

Assorted Rolls and Piped Butter

Sautéed Chicken Breast with a Tarragon Cream Sauce with Two Baked Stuffed Shrimp

Sautéed Green Beans

Tarragon Oven Roasted Potatoes

White Chocolate Truffle

Raspberry and Vanilla Ice-Cream covered in a White Chocolate Shell On a Raspberry Painted Plate with a Dab of Whipped Cream

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

Rhode Island Convention Center

Saturday, June 242:00-5:00 pm
 Sunday, June 25 . . .7:00 am-7:00 pm
 Monday, June 26 . . .8:00 am-4:00 pm
 Tuesday, June 27 . . .8:00 am-4:00 pm
 Wednesday, June 28 8:00 am-4:00 pm
 Thursday, June 29 . . .8:00 - 10:00 am

Registration Fees:

Class	Pre-Reg	On-Site
◆HPS Member	\$350	\$425
◆Non-Member**	\$420	\$495
❖Student	\$ 60	\$ 60
●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 2006.

Session Location

All sessions and PEP courses will take place in the Convention Center. ABHP Courses and the adjunct session on Wednesday evening will take place in the Westin Hotel.

LAC Room

Saturday-Thursday553B
 Convention Center

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 553A) 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 (550A) will have hours posted on the door.

Placement Service

Placement Service listings will be posted in the 100 aisle of the Exhibit Hall. Interviews may be conducted by requesting a room at the Registration desk.

Business Meeting

The HPS Annual Business Meeting will be convened at 5:30 pm on Wednesday, June 28, in Ballroom B, Rhode Island Convention Center.

Badge Color Code

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

Companion/Hospitality Room

The Hospitality Room is in the Westin Hotel in the Library 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 Providence and answer any questions you might have. The Monday breakfast will take place in the Bristol/Kent Room.

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

Activities and Tours

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

Sunday, June 25

Historic Providence 1-3 pm

Monday, June 26

RI Hospital Gamma Knife 1:30-4:30 pm
Open Mic Night 8 pm-Midnight

Tuesday, June 27

5K Walk/Fun Run 6:30-8:30 am
Juliatt Sub Tour 9:30 am-1 pm
Coastal Lighthouses 9:30 am-5 pm
Brown University 1:30-4:30 pm

Wednesday, June 28

MIT Reactor 9 am-5 pm
Newport 9 am-5 pm
Night Out Ballgame 4:45-10 pm
Night Out Dinner Cruise 6-11 pm

Thursday, June 29

Woods Hole Institute 9:30 am-5 pm

Hospitality Room

for Registered Companions

Monday Welcome

8:00 - 9:00 am

Bristol/Kent Room, Westin Hotel

Hours/Days

Library

Lobby Level, Westin Hotel

Sunday 8 am - 3 pm

Monday 9 am - 3 pm

Tuesday 8 am - 3 pm

Wednesday 8 am - 3 pm

Health Physics Society Committee Meetings

CC = Rhode Island Convention Center

W = Westin Hotel

Friday, June 23, 2006

ABHP BOARD MEETING

8:30 am-5:00 pm Newport (W)

Saturday, June 24, 2006

FINANCE COMMITTEE

8:00 am-Noon Washington (W)

ABHP BOARD MEETING

8:30 am-Noon Blackstone (W)

CONTINUING EDUCATION COMMITTEE

1:00-5:00 pm Executive Boardroom (W)

AAHP EXECUTIVE COMMITTEE

1:00-5:00 pm Blackstone (W)

HPS EXECUTIVE COMMITTEE

1:00-5:00 pm President's Suite (W)

HP/ORS JOURNAL BOARD MEETING

3:00-6:00 pm Waterplace II/III (W)

Sunday, June 25, 2006

HPS BOARD OF DIRECTORS

8:00 am-5:00 pm Providence I/IV (W)

AAHP EXECUTIVE COMMITTEE

8:30 am-3:00 pm Blackstone (W)

PROGRAM COMMITTEE

11:00 am-2:00 pm 553A (CC)

Monday, June 26, 2006

RULES COMMITTEE

10:00 am-Noon Executive Boardroom (W)

MEMBERSHIP COMMITTEE

Noon-2:00 pm 550B (CC)

RSO SECTION EXECUTIVE BOARD MEETING

Noon-2:00 pm Providence I (W)

SUMMER SCHOOL COMMITTEE

Noon-2:00 pm 554A (CC)

SYMPOSIA COMMITTEE

12:30-4:30 pm 554B (CC)

CHAPTER COUNCIL MEETING

1:00-2:00 pm Ballroom D (CC)

AEC ACCREDITATION SUBCOMMITTEE

2:00-4:00 pm Providence III (W)

ABHP PASSING POINT WORKSHOP

2:00-5:00 pm Narragansett C (W)

HPS WEB EDITORS

2:00-5:00 pm Providence II (W)

AAHP PROFESSIONAL DEVELOPMENT COMMITTEE

3:00-5:00 pm 554A (CC)

HISTORY COMMITTEE

3:00-5:00 pm 550B (CC)

Tuesday, June 27, 2006

SOCIETY SUPPORT COMMITTEE

8:00-11:00 am Waterplace II (W)

RADIATION SAFETY WITHOUT BORDERS

9:00-11:00 am 554A (CC)

ANSI N13.38 WORKING GROUP

9:00 am-Noon Executive Boardroom (W)

HP PROGRAM DIRECTORS ORGANIZATION

Noon-2:00 pm 554A (CC)

SCIENCE TEACHER WORKSHOP COMMITTEE

Noon-2:00 pm 550B (CC)

PUBLIC INFORMATION COMMITTEE

Noon-2:00 pm 554B (CC)

LEGISLATION AND REGULATION COMMITTEE

1:00-5:00 pm Newport (W)

ANSI/HPS N13.12 WRITING GROUP

1:30-5:00 pm Executive Boardroom (W)

ANSI N13.56 WORKING GROUP

2:00-4:00 pm *Kent (W)*

HOMELAND SECURITY COMMITTEE

3:00-5:00 pm *Waterplace II (W)*

Wednesday, June 28, 2006

**INTERNATIONAL RELATIONS
COMMITTEE**

9:00 am - Noon *550B (CC)*

**LAB ACCREDITATION POLICY COM-
MITTEE/LAB ACCREDITATION ASSESS-
MENT COMMITTEE**

10:00 am-2:00 pm *554A (CC)*

NOMINATING COMMITTEE

Noon-2:30 pm *Newport (W)*

STUDENT BRANCH MEETING

Noon-2:00 pm *554B (CC)*

**ACADEMIC EDUCATION
COMMITTEE**

2:00-4:00 pm *550B (CC)*

HOMELAND SECURITY COMMITTEE

3:00-5:00 pm *Blackstone (W)*

Thursday, June 29, 2006

**LOCAL ARRANGEMENTS
COMMITTEE**

7:30-9:30 am *553B (CC)*

HPSSC MEETING

8:00 am-Noon *Washington (W)*

PROGRAM COMMITTEE

12:30-3:00 pm *Kent (W)*

HPS BOARD OF DIRECTORS

1:00-5:00 pm *Providence I/IV (W)*

51st Annual Meeting of the Health Physics Society
Providence, Rhode Island, June 25-29 - Final Scientific Program
 Presenter's name is asterisked (*) if other than first author.

Monday

7:00 - 8:00 AM **Room 551**
CEL-1 The High Background Radiation Area in Ramsar Iran.
 Karam, A., MJW Corporation

7:00 - 8:00 AM **Room B**
CEL-2 Radiation Safety for Security Based Applications: The U.S. Customs and Border Protection Methodology.
 Whitman, R.; US Customs and Border Protection

8:10 am-Noon **Ballroom A**

PL1: Plenary Session 1

Chair: Ruth McBurney

8:10 am
 Welcome to Providence
 Ruth E. McBurney, President, Health Physics Society; Ninni Jacob, Local Arrangements Committee Representative

8:15 am
 Welcome to Providence
 David C. Cicilline, Mayor of Providence

8:25 am
 Introduction of Morgan Lectures
 Raymond H. Johnson, Jr.
Radiation Safety Academy

8:30 am **PL.1**
 Integrating Risk Analysis and Communication
 Baruch Fischhoff (**G. William Morgan Lecture**)
Carnegie Mellon University

9:15 am **PL.2**
 Integrating Security with the Safety Environment
 Margaret V. Federline
U. S. Nuclear Regulatory Commission

10:00 am **Break**

10:30 am **PL3**
 Congressman James R. Langevin
U. S. House of Representatives

11:15 am **PL.4**
 The Nuclear Renaissance and the Role of the Radiation Safety Professional
 Admiral Frank L. Bowman (**Robert S. Landauer, Sr. Lecture**)
Nuclear Energy Institute

P: POSTER SESSION

1:30-3:30 PM **Exhibit Hall**

A section of the posters will be devoted to the History of HPS Chapters and University Programs.

ENVIRONMENTAL

P.1 Use of Trace Radioactivity to Identify Recent Sedimentation Rate in Persian Gulf

Beitollahi, M., Ghiassi-Nejad, M., Amidi, J., Dunker, R.
Idaho State University, Pocatello, Tarbiat Modares University, Tehran-Iran, Iranian Nuclear Regulatory Authority, Tehran-Iran

P.2 Potential Uptake of Radionuclides by Biota Behind a Sediment Retention Structure in Los Alamos Canyon at Los Alamos National Laboratory after the Cerro Grande Fire

Fresquez, P. R.
Los Alamos National Laboratory

P.3 Rapid Determination of Sr-90 using 3M Empore Strontium Rad Disks and Cerenkov Counting in Water Samples

Ngazimbi, R., Dunker, R., Brey, R., Farfan, E.
Idaho State University

Monday

EXTERNAL DOSIMETRY

P.4 Comparison of Effective Doses from Pediatric Stylized and Tomographic Phantoms for External Photon Beams

Lee, C., Lee, C., Bolch, W.

University of Florida

P.5 Fluctuation of Organ Doses in Tomographic Phantoms for External Photon Irradiation

Lee, C., Nagaoka, T.

University of Florida, NICT, Japan

P.6 A Monte Carlo Photon Simulation Code Using Excel[®] VBA Programming

Cummings, F.M., Keller, M.F., Schwahn, S.O.*

Idaho State University

P.7 Evaluation of Neutron Dose-Equivalent Type Survey Meters in a Pulsed, Linear Accelerator-Produced Neutron Field

Anderson, E., Brey, R., Claver, K., Dunker, R.

Idaho State University

P.8 Comparison of ESR Dosimetry in Human vs. *Sus Scrofa Domestica* Tooth Enamel

Heiserman, C., Johnson, T., Zimbrick, J.

Colorado State University

HOMELAND SECURITY & EMERGENCY RESPONSE

P.11 Nuclear and Radiological Incident Scenarios

Donnelly, E., Fallahian*, N., Farfan, E.

Centers for Disease Control and Prevention, Idaho State University

INSTRUMENTATION

P.12 Monte Carlo Calculations of the National Institute of Standards and Technology Heavy-Water-Moderated Cf-252 Sphere

Clement, R., Heimbach, C., Thompson, A.

National Institute of Standards and Technology

P.13 Long Double Precision Computer Code for Exact Detection Limits and Errors of the Second Kind when the Blank Count Time is an Integer Number of Times Greater than the Sample Count Time

Potter, W.E., Strzelczyk, J.

Consultant, Sacramento, CA, University of Colorado Health Science Center, CO

P.14 Cost Effective Geiger Mueller Detectors for the Teaching Environment

Estes, B., Simpson, D.

Bloomsburg University

P.15 Study of GaAs Photo Conductive Detectors (PCDs)

Kharashvili, G., Beezhold, W., Brey, R.,

Gesell, T., Hunt, A.

Idaho State University

P.16 Further Investigation of the Response Characteristics of a Portable Portal Monitor

Balzer, M., Brey, R., Hunt, A., Gesell, T.

Idaho State University

INTERNAL DOSIMETRY

P.17 Determining Transfer Rate Probability Functions for the Systemic Compartments

Ozcan, I., Farfan, E.

Idaho State University

P.18 Determining Probabilistic Distributions for Gastrointestinal Track Transfer Rates

Ankrah, M., Farfan, E.

Idaho State University

P.19 Selecting USTUR Cases to Test ICRP Models Probabilistically

Timilsina, B., Farfan, E.

Idaho State University

P.20 Justification for Using Cs-137 Whole Body Count Information as a Flag for Undertaking In Vitro Analysis of Sr-90/Y-90

McCord, S., Brey, R., Ruhter, P.,

Anderson, B.

Idaho State University, Idaho National Laboratory

Monday

P.21 Health Effects Based on Prolonged Radiation Exposure: A Radiobiological Study on Animals

Billa, J., Donnelly, E., Farfan, E.
Idaho State University, Centers for Disease Control and Prevention

P.22 Validation of Detection Levels in a Urine Bioassay Program

La Bone, T., Fauth, D., Findley, W., Priester, H.
MJW Corporation, Washington Savannah River Company

P.23 Assessment of Annual Effective Dose to Workers in the Florida Phosphate Industry Via Characterization of Lung Fluid Solubility

Kim, K., Wu, C., Birky, B., Bolch, W.
University of Florida

P.24 Exploratory Project to Integrate CAD in MCNP Geometry Modeling

Furler, M., Bednarz, B., Xu, X.G.
Rensselaer Polytechnic Institute

MEDICAL HEALTH PHYSICS

P.25 Development of Graduate Health Physics Program Based in the Radiation Safety Office at a Major University Medical Center

Yoshizumi, T., Reiman, R., Vylet, V., Samei, E., Dobbins, J.
Duke University

P.26 Alpha Particle Transport in Voxelized Trabecular Bone Images

Tabatadze, G., Patton, P.
University of Nevada, Las Vegas

P.27 Intercomparison of X-ray Film, TLD, and OSL Dosimeter Response To Tc-99m, F-18, and Mixed Tc-99m/F-18 Radiation Exposures.

Sturchio, G.M., Forrest, R.
Mayo Clinic Rochester, University of Pennsylvania

P.28 Fundamental Data Applicable to the Design of Nuclear Medicine Imaging Facilities

Nasher, K., Brey, R., Jenkins, P., Hoffman, J., Butterfield, R.
Idaho State University, University of Utah Hospitals and Clinics

P.29 Accurate Estimate of Activation Products and a Decay Time for HAVAR[®] Entrance Foils of a GE[®]PETtrace Medical Cyclotron

Manickam, V.M., Brey, R., Chen, J., Jenkins, P., Christian, P., Gibby, J., Buckway, B.
Idaho State University, University of Utah Hospitals and Clinics

OPERATIONAL HEALTH PHYSICS

P.30 Radiological Toolbox

Sherbini, S., DeCicco, J., Karagiannis, H., Eckerman, K.
US Nuclear Regulatory Commission, Oak Ridge National Laboratory

P.31 Radiation Safety for Enclosed X-Ray Systems in the University Setting

Caracappa, P.
Rensselaer Polytechnic Institute

P.33 Incineration of Non-PCB Radioactive and Hazardous Materials Exceeding Waste Acceptance Criteria

Knox, W.
Advanced Systems Technology

INTERNATIONAL POSTERS

P.34 Technologies to Explore Gamma Radiation Influence on Structurally Dependent Exoemission Properties of Bone

Zakaria, M., Bogucarska, T., Noskov, V., Dekhtyar, Y.
Riga Technical University, Latvia

Monday

P.35 Comparison Between Two Protocols Trs 277 and Trs 398 for the Determination of Absorbed Dose to Water in External Radiotherapy: Experiences of Madagascar
Ramanandraibe, M.J., Randriant-sizafy, R. D., Andriambololona, R., Rolland, R.

Institut National des Sciences et Techniques Nucléaires, Madagascar

P.36 Radioanalytical Determination of ²³⁹⁺²⁴⁰Pu and ²⁴¹Am in Biological Samples by Anion Exchange and Extraction Chromatography for Radiation Safety Purposes

Ridone, S., Arginelli, D., Berton, G., Bortoluzzi, S., Canuto, G., Montalto, M., Nocente, M., Vegro, M.

Italian National Agency for New Technologies, Energy and Environment-ENEA, Research Centre of Saluggia, Institute of Radiation Protection ION-IRP, Italy

P.37 Radioactivity in Building Materials and Its Contribution to the Indoor Exposure Doses in Tanzania

Banzi, F.P., Msaki, P.

Tanzania Atomic Energy Commission, University of Dar Es Salaam, Tanzania

P.38 Radiological Surveillance of Foods in Cuba

Fernández Gómez, I.M., Rodríguez Castro, G.V., Carrazana González, J.A., Capote Ferrera, E., Martínez Ricardo, N.
Center for Radiation Protection and Hygiene, Cuba

P. 39 Design and Construction of a Measurement Device for Extremely Low Frequency Electric and Magnetic Fields.
Hosseinpanah, S., Farvadin, D.
Atomic Energy Organization of Iran (AEOI)

P. 40 Cancer Incidence in Female Health Care Workers Occupationally Exposed to Ionising Radiation, 1982-2002
Matisane, L.

Riga Stradins University, Latvia

P.41 New Large Area Gas Proportional Detectors

Olshvanger, B., Boforodzki, G.

Canberra Company, Canada

P.42 Comparisons of Activity Measurements with Radionuclide Calibrators - A Tool for Quality Assessment and Improvement in Nuclear Medicine

Oropesa, P., Hernández, A.T., Serra, R., Varela, C.

Centro de Isótopos (CENTIS), Cuba, Centro de Control Estatal de Equipos Médicos (CCEEM), Cuba

P.43 Some Results of a Simulated Test for Administration of Activity in Nuclear Medicine

Oropesa, P., Hernández, A.T., Serra, R.A.

Varela, C., Woods, M.J.

Centro de Isótopos (CENTIS), Cuba, Centro de Control Estatal de Equipos Médicos (CCEEM), Cuba, Ionising Radiation Metrology Consultants Ltd, UK

P.44 Nuclear Energy From 1945 to 2005. Combating Nuclear and Radiological Terrorism

Puig, D.E.

High Studies National Centre (Ministry of Defence), Uruguay

P.45 An Instrumental Method for the Assessment of Gamma Dose Due to FPNG Releases Using Gamma Tracer Probe

Rao, D.D., Vanave, S.V., Hegde, A.G., Joshi, M.L.

Tarapur Atomic Power Station, India, Health Physics Division, BARC, Mumbai

Monday

P.46 Spectra and Dosimetric Features of Isotopic Neutron Sources

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

Unidad Académica de Estudios Nucleares de la UAZ, México, Universidad Politécnica de Madrid, Spain

P.47 Neutron Dosimetry Using Artificial Neural Networks

Vega-Carrillo, H.R., Perales-Muñoz, W. A., Gallego, E., Lorente, A.

Unidad Académica de Estudios Nucleares de la UAZ, México, Universidad Politécnica de Madrid, Spain

P.48 Neutron Fluence Rate Measured Through Prompt Gamma Rays

Vega-Carrillo, H.R.

Unidad Académica de Estudios Nucleares de la UAZ, México

WORKS-IN-PROGRESS

P.49 Radiation Health and Safety of a Radioisotope Powered Micro-Fuel Cell

Maloy, K., Palmer, T.

Oregon State University

P.50 Determination of Enrichment Parameters after Reduction of Synthetic Tritiated Samples in a Proton Exchange Membrane Electrolyzer

Soreefan, A.M., DeVol, T.A.

Clemson University

P.51 Large Size Chambers used for Calibrating a Cesium-137 Gamma-Ray Beam Irradiator

Minniti, R.

National Institute of Standards and Technology (NIST)

P.52 Derivation of Absorbed Fractions and External Dose Conversion Factors for Selected Reference Organisms Being Considered by the ICRP

Kamboj, S., Yu, C., Domotor, S.

Argonne National Laboratory, US Department of Energy

P.53 A Comparison of Dose-Based Residual Contamination Levels Estimated for Five Geologically and Environmentally Distinct Locations

Tabriz, M., Bak, A., Higley, K.

Oregon State University

P.54 A Preliminary Investigation into the Dependence of Radiosensitivity on Mass Across a Range of Phyla

Bytwerk, D., Higley, K.

Oregon State University

P.55 Estimation of Work-Related Medical X-ray Dose for the Multi-Site Leukemia Case Control Study

Anderson, J.L., Daniels R.D.

National Institute for Occupational Safety and Health (NIOSH)

P.56 Application of Classical versus Bayesian Statistical Methods to Online Radiological Monitoring Data

Attardo, A., French, P.D., DeVol, T.A.

Clemson University, ADA Technologies, Inc.

3:30-4:45 PM

Room 551

MPM-A: Risk Analysis

Chair: Patricia Lee

3:30 PM

MPM-A.1

Radiation and Breast Cancer in Ukraine following the Chernobyl Accident: A Case-Control Study

Khyrunenko, L.I., Anspaugh, L.R.,

Gryshenko, V.G., Gulak, L.O.,

Fedorenko, Z.P.

Science, Engineering and Ecological Centre "Polygon," Ukraine, University of Utah, Scientific Research Center for Radiation Medicine, Ukraine, National Cancer Registry, Ukraine

3:45 PM

MPM-A.2

Revised Prioritization of LANL Nuclear Material for Repackaging and Stabilization

Hoffman, J., Smith, P.

Los Alamos National Laboratory

Monday

4:00 PM **MPM-A.3**
Laboratory Risk Assessment Inspection Procedure

Dua, S., Mwaisela, J., Hevia, R., Knowles, T., Youngblut, W.

Florida International University

4:15 PM **MPM-A.4**
Determining the Bioavailability of Soil-Associated Radium Using In Vitro Methodology

Tack, K., Bytwerk, D. Higley, K.

Oregon State University

4:30 PM **MPM-A.5**
Radon Risk Assessment Reviewed

Conrath, S.

US Environmental Protection Agency

3:30-5:15 PM **Ballroom B**

MPM-B: Internal Dosimetry and Bioassay

Co-Chairs: James Griffin and Thomas La Bone

3:30 PM **MPM-B.1**
Pushing the Envelope: Four Potential Plutonium Intakes Detected by Low-Level Routine Bioassay

Carbaugh, E., Antonio, C.

Pacific Northwest National Laboratory

3:45 PM **MPM-B.2**
Estimation of Median Lethal Intakes for Radionuclide Ingestion

Langsted, J.

Shaw Environmental & Infrastructure, Inc.

4:00 PM **MPM-B.3**
Radiation Dose from Cigarette Tobacco

Papastefanou, C.
Aristotle University of Thessaloniki, Greece

4:15 PM **MPM-B.4**
Radon and Thoron Equilibrium Factors: Calculation and Experimental Values

Harley, N., Chittaporn, P.

New York University School of Medicine

4:30 PM **MPM-B.5**
Localized Deposition Patterns of Molecular Phase Po-218 in Lung Bifurcations

Gutti, V., Tompson, R., Loyalka, S.

University of Missouri - Columbia

4:45 PM **MPM-B.6**
A Compartmental Model for Natural Uranium Transferred into Human Hair after a Chronic Intake of Uranium-Rich Water

Li, W., Muikku, M., Salonen, L., Wahl, W., Hoellriegel, V., Roth, P., Rahola, T., Oeh, U.

GSF-National Research Center for Environment and Health, STUK-Radiation and Nuclear Safety Authority

5:00 PM **MPM-B.7**
Energy-Lost Distribution in a Thin Layer of Tissue

Moussa, H., Townsend, L., Eckerman, K.

University of Tennessee, Oak Ridge National Laboratory

3:30-4:45 PM **Ballroom D**

MPM-C: Instrumentation

Chair: Jeri Anderson

3:30 PM **MPM-C.1**
Performance of a Portable, Electro-mechanically Cooled HPGe Detector For Site Characterization

Keyser, R., Hagenauer, R.

ORTEC

3:45 PM **MPM-C.2**
Lowering the Minimum Detection Limits of a Gamma Spectrometry System

Hoffman, C., Harker, Y., Wells, D.

CWI, Idaho State University

4:00 PM **MPM-C.3**
Single Photon Emission Computed Tomography (SPECT) for Imaging Fissionable Material in Waste Barrels

Naeem, S.F., Wells, D.P., White, T.,

Roney, T.

Idaho State University, Idaho Accelerator Center, Idaho National Laboratory

Monday

4:15 PM

MPM-C.4

A New Wide-Energy Efficiency Curve for
GE Based Detection Systems

Kramer, G.

Health Canada

4:30 PM

MPM-C.5

The HPS Quest for NACLA Recognition

Keith, L., Wu, C., Cummings, R. Swinth,

K., O'Connell, T., Alvarez, J.

*Agency for Toxic Substances and
Disease Registry (ASTDR), US
Department of Energy, Consultant, MA,
Auxier Associates*

3:30-5:00 PM

Room 552

Historical Videos and Movies

Tuesday

7:00 - 8:00 AM **Room 551**
CEL-3 The Lions, Rhinos and Reactors of South Africa.

Allard, D.; Pennsylvania Department of Environmental Protection Bureau of Radiation Protection

7:00 - 8:00 AM **Ballroom B**
CEL-4 Internal Dose Issues in Pregnancy.

Stabin, M.; Vanderbilt University

8:30 AM-Noon **Room 551**

TAM-A: Environmental

Co-Chairs: Matthew Barnett and Craig Little

8:30 AM **TAM-A.1**
Variation of Dissolved Radon Concentration in Private Wells
Guiseppe, V.E., Hess, C.T.
University of Maine

8:45 AM **TAM-A.2**
Recent Environmental Analysis of Biota at Amchitka Island
Favret, D., Stabin, M., Burger, J., Kosson, D., Gochfeld, M., Powers, C.W.
Vanderbilt University, Rutgers University, Robert Wood Johnson Medical School, University of Medicine and Dentistry of New Jersey and Institute for Responsible Management

9:00 AM **TAM-A.3**
Gamma-ray Spectroscopy and X-ray Fluorescence of Radioactive Household Items
Feeley, R., Hess, C.
University of Maine

9:15 AM **TAM-A.4**
 ^{238}U , ^{232}Th , ^{40}K , and ^{137}Cs Activities and Salt Mineralogy in the Black Butte Soil Series of the Virgin River Floodplain, NV, USA
Morton, J., Buck, B., Merkle, D.
University of Nevada, Las Vegas, National Resources Conservation Service

9:30 AM **TAM-A.5**
Evaluation of Radionuclide Accumulation in Soil Due to Long-Term Irrigation
Wu, D.
Bechtel SAIC Company

9:45 AM **TAM-A.6**
Partition Coefficients (Kd) for Uranium in Size-Selected Surface Soils: Implications for Dose Assessment
Whicker, J., Pinder, J., Breshears, D.
Los Alamos National Laboratory, Colorado State University, University of Arizona

10:00 AM **TAM-A.7**
Characterization of World War II Operations in D Building at Los Alamos to Support Estimation of Airborne Plutonium Releases
Widner, T., Knutsen, J., Shonka, J., O'Brien, J., Burns, R., Buddenbaum, J., Flack, S.
ChemRisk, Inc., Shonka Research Associates, ENSR Corporation

10:15 AM **BREAK**

10:45 AM **TAM-A.8**
Study of the Variation in Airborne Gross Beta Concentrations and Related Climate Conditions
Satterwhite, C.A., Gesell, T.F.
Idaho National Laboratory, Idaho State University

11:00 AM **TAM-A.9**
In situ Aerosol Probe Occlusion Tests at the Waste Isolation Pilot Plant
Arimoto, R., Team, E.
CEMRC/New Mexico State University, WTS

11:15 AM **TAM-A.10**
Modifying a 60 Year Old Stack Sampling System to Meet ANSI N13.1-1999 Equivalency
Simmons, F.
Fluor Hanford, Inc.

Tuesday

11:30 AM **TAM-A.11**
NESHAP Compliance Methodology for
On-Site Members of the Public
McElhoe, B.
CDM Federal Services Inc.

11:45 AM **TAM-A.12**
Implementing a Web-Based Radioactive
Material Tracking System
Ballinger, M., Gervais, T.
Pacific Northwest National Laboratory

8:30 AM-Noon **Ballroom B**

**TAM-B: Government Section:
Increased Controls for
Radioactive Sources and
Impacts of the Energy Policy
Act of 2005**

Chair: Cynthia Jones

8:30 AM **TAM-B.1**
History of State Involvement in Security of
High Risk Radioactive Materials
O'Kelley, P.
South Carolina Radiological Health

9:00 AM **TAM-B.2**
Issuance of the Increased Controls for
Radioactive Materials in Quantities of
Concern
Hamrick, B.
California Department of Health Services

9:30 AM **BREAK**

10:00 AM **TAM-B.3**
Implementation and Inspection of the
Increased Controls in Massachusetts
Gallagher, R.
*Massachusetts Radiation Control Pro-
gram*

10:30 AM **TAM-B.4**
Experiences in Culture Clash Enhanced
Security Requirements and Research
Ring, J.
Harvard University

11:00 AM **TAM-B.5**
NIH Response to NRC Order for
Increased Controls Over Certain
Quantities of Radioactive Materials
Baryoun, A.
National Institutes of Health

11:30 AM **TAM-B.6**
Recent Activities to Enhance Radiation
Source Protection and Control - the
Energy Policy Act and the Increased
Controls
Broaddus, D.
US Nuclear Regulatory Commission

Noon **Government Section Business
Meeting**

8:30 AM-Noon **Ballroom D**

**TAM-C: AAHP Session:
Radiation Measurement
Instrumentation for HPs - Looking
Back at the Past and Looking
Forward to the Future**

Chair: Frazier Bronson

8:30 AM **TAM-C.1**
Pictures from an Exhibition: The Birth and
Evolution of Field Instruments for Health
Physics
Kathren, R. L. (**G. William Morgan
Lecturer**)
Washington State University

9:00 AM **TAM-C.2**
Portable Gamma Dose/Exposure Rate
Instruments - What Does the Future
Hold?
Rima, S.
MACTEC, Inc.

9:15 AM **TAM-C.3**
Field Neutron Instruments and Measure-
ments
Vylet, V.
Duke University

Tuesday

9:30 AM **TAM-C.4**
Contamination Measurements And
Instrumentation
Shonka, J.J.
Shonka Research Associates, Inc.

9:45 AM **TAM-C.5**
Portable Gamma Spectroscopy - A Brief
Look at the State of the Art and a Vision of
the Next Generation
Smith, R. J.
Westinghouse Savannah River Company

10:00 AM **BREAK**

10:30 AM **TAM-C.6**
The History and Direction of Passive
Dosimetry
Lucas, A.C.
Nextep Technologies, Inc.

10:45 AM **TAM-C.7**
Current & Future Applications of
Electronic Dosimetry
Lopez, S., Straccia, F.
*MGP Instruments, Inc., Radiation Safety &
Control Services, Inc.*

11:00 AM **TAM-C.8**
Current and Future Biological Dosimetry
Tools for Health Physicists
Blakely, W., Prasanna, P.*, Goans, R.
*Armed Forces Radiobiology Research
Institute (AFRRI), MJW Corporation*

11:30 AM **TAM-C.9**
Personnel Contamination Monitors
Philipson, J., Fedko, A.
Bruce Power Canada

11:45 AM **TAM-C.10**
Radiation Detection for Homeland
Security: Past, Present, and Future
Ely, J.
Pacific Northwest National Laboratory

8:30 AM-Noon **Room 552**

Historical Videos and Movies

2:30-5:30 PM **Room 551**

TPM-A: RSO Special Session

Co-Chairs: Jim Schweitzer and Robert
Gallagher

2:30 PM **TPM-A.1**
Partial Decontamination of a Manhattan
Project Building
Morgan, T.
University of Rochester

2:45 PM **TPM-A.2**
The Safety Light Corporation Environ-
mental Issues and Potential Impacts on
Radiation Safety Programs
Simpson, D.
Bloomsburg University

3:00 PM **TPM-A.3**
Radon Testing of Student Residences at a
Large University
Linsley, M.E.
Penn State University

3:15 PM **TPM-A.4**
Radon Testing as a Campus Community
Service
Mohaupt, T.
Wright State University

3:30 PM **BREAK**

4:00 PM **TPM-A.5**
Performance-Based Interactive Radiation
Safety Training for the Laboratory
Environment
Crouch, G.P.
Indiana University - Bloomington

4:15 PM **TPM-A.6**
Radiation Safety Orientation Seminars-
Taking it to the Web
Hanlon, J., Ring, J.
Harvard University

4:30 PM **TPM-A.7**
Assessment and Mitigation of Laser
Safety Hazards in a University Laboratory
Setting
Jo, M., Oberg, S., Barat, K.
University of Nevada, Reno, CLSO

Tuesday

4:45 PM

TPM-A.8

Circumstances Surrounding a Laser Injury at Purdue University
Handy, M.
Purdue University

5:00 PM

TPM-A.9

An Evaluation of Radiation Safety Staff Response to a Fire in a Radiation Use Facility
Wang, W.-H., Matthews II, K.L.
Louisiana State University

5:15 PM

TPM-A.10

Radiation Safety Program in a Veterinary Teaching Hospital
Schweitzer, J.
Purdue University

5:30 PM

RSO Section Business Meeting

2:30-5:30 PM

Ballroom B

TPM-B: External Dosimetry

Co-Chairs: Jack Fix and David Hearnberger

2:30 PM

TPM-B.1

DOE Mayak Study External Dosimetry Database
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

2:45 PM

TPM-B.2

Quantification of Errors in Nuclear Workers Doses - Photon Radiation with Energy Between 100-3000 keV
Thierry-Chef, I., Marshall, M., Fix, J.J., Bermann, F., Gilbert, E.S., Hacker, C., Heinmiller, B., Pearce, M.S., Utterback, D., Moser, M., *Pemicka, F., Cardis, E.*
International Agency for Research on Cancer, France, Twin Trees, UK, Dade Moeller & Associates, WA, Commissariat à l'Energie Atomique, France, National Cancer Institute, MD, Australian Nuclear Science and Technology Organisation, Australia, Atomic Energy of Canada Limited, Canada, University of Newcastle, UK, National Institute for Occupational Safety and Health, OH, Bundesamt für Gesundheitswesen und Strahlenschutz, Switzerland, International Atomic Energy Agency, Austria

3:00 PM

TPM-B.3

DOELAP Beta Source Recharacterization Using ISO 6980-2
Bean, L.C., Schwahn, S.O.*
US Department of Energy

3:15 PM

TPM-B.4

A Backscatter Correction Model for Three-Dimensional Beta Sources
Durham, J.S., Krobl, K., Karagiannis, H., Sherbini, S.
Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute, Colorado State University, US Nuclear Regulatory Commission

3:30 PM

TPM-B.5

Determining Dose from a Bi-213 Skin Contamination
Roberson, M., Carter, D.
National Institutes of Health

3:45 PM

TPM-B.6

A Validated System to Assay Radioactive Particles for Expedient Skin Dose Rate Estimation
Heinmiller, B., Dubeau, J.
Atomic Energy of Canada, Ltd. (AECL) Chalk River, DETEC Consultants

Tuesday

4:00 PM **BREAK**

4:30 PM **TPM-B.7**
Exploratory Project to Integrate CAD in MCNP Geometry Modeling
Furler, M., Bednarz, B., Xu, X.
Rensselaer Polytechnic Institute

4:45 PM **TPM-B.8**
Development of Organ-Specific External Dose Coefficients for Dose Reconstruction for Medical Personnel
Simon, S., Seltzer, S.
National Cancer Institute, National Institute of Standards and Technology

5:00 PM **TPM-B.9**
A Revised Method of Estimating Red Bone Marrow Dose in Image-Based Computational Models
Caracappa, P., Xu, X.
Rensselaer Polytechnic Institute

5:15 PM **TPM-B.10**
Characterization of a Low Dose Rate Facility Using Radiochromic Film
Sirisalee Magers, T., Ullrich, R., Johnson, T.
Colorado State University

2:30-5:15 PM **Ballroom D**

TPM-C: AAHP Session: Radiation Measurement Instrumentation for HPs - Looking Back at the Past and Looking Forward to the Future

Chair: Frazier Bronson

2:30 PM **TPM-C.1**
The Evolution of Laboratory Instrumentation for Operational Health Physicists
Bronson, F.
Canberra Industries

3:00 PM **TPM-C.2**
Alpha-Beta Counting Instrumentation* (UCRLABS-218200)
Radev, R.
Lawrence Livermore National Laboratory

3:15 PM **TPM-C.3**
Liquid Scintillation Counters and Measurements Today
Passo, Jr., C.
PerkinElmer Life and Analytical Sciences

3:30 PM **TPM-C.4**
Two New Scintillators: LaCl3 and LaBr3
Rozsa, C., Mayhugh, M.
Saint-Gobain Crystals

3:45 PM **BREAK**

4:15 PM **TPM-C.5**
Solid State Detectors
Shah, K.
Radiation Monitoring Devices, Inc.

4:30 PM **TPM-C.6**
Multichannel Analyzers Based on Digital Signal Processing
Jordanov, V.
Yantel, LLC

4:45 PM **TPM-C.7**
In Vivo Measurement Instrumentation
Lynch, T.
Pacific Northwest National Laboratory

5:00 PM **TPM-C.8**
General Industry Developments that Affect Health Physics Instrumentation
Kasper, K.
Envirocare of Utah, LLC

5:15 PM **AAHP Business Meeting**

2:30-5:00 PM **Room 552**

Historical Videos and Movies

2:30-5:00 PM **Room 555B**

NESHAP Meeting

Wednesday

7:00 - 8:00 AM **Room 552**

CEL-5 A Review on Distribution of Radiopharmaceuticals: Implication on Radiation Therapy and Protection
Venkata, L.; University of Medicine and Dentistry of New Jersey, Newark, New Jersey

7:00 - 8:00 AM **Ballroom B**

CEL-6 SAXTON Nuclear Reactor Decommissioning
Granlund, R.; Health Physics Consultant

8:45-11:15 AM **Room 552**

WAM-A: Decommissioning Section Special Session

Co-Chairs: Tim Vitkus and Joe Shonka

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

Update on N13.59 Characterization of Land Areas and Structures in Support of Decommissioning
Abelquist, E.

Oak Ridge Associated Universities (ORAU)

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

Empirical Versus Theoretical Determination of Total Instrument Efficiency for Assessing Natural Thorium Surface Activity During Decommissioning
Vitkus, T., Condra, D.

Oak Ridge Institute for Science & Education (ORISE)

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

Radiological Aspects of the D&D of a Radiosurgery Facility
Bump, S.

Dade Moeller & Associates

9:30 AM **BREAK**

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

Rigorous Application of Signal Detection Theory to Field Measurements
Shonka, J.J.

Shonka Research Associates, Inc.

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

Improving Scanning Detection Capabilities Using Gamma Spectral Techniques for Decommissioning Surveys
Bland, J.S., Doan, J., Gaul, W., Nardi, A.J.

Chesapeake Nuclear Services, Westinghouse Electric Company

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

Estimating the Uncertainty of Surface Activity Measurements Using the ISO Guide to the Expression of Uncertainty in Measurement

Gogolak, C.

Consultant

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

8:30 AM-Noon **Ballroom B**

WAM-B: Medical Health Physics

Co-Chairs: John Jacobus and Michael Stabin

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

Dealing with a Case of Deliberate Misuse of Radioactive Materials

King, S.H., Miller, K.L.

M.S. Hershey Medical Center

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

Photodynamically Inflicted Biomolecular Damage and Cell Death of Malignant Melanoma Cells in Culture

Mamoon, A., Telivala, T., Smith, R.,

Wang, Q., Miller, L.

Egyptian Atomic Energy Authority (EAEA), Brookhaven National Laboratory

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

Struggling with Radiation when the Subject is your Child

Fellman, A.

Radiation Safety Academy, Inc.

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

New Jersey's Quality Assurance Regulations: A Physicist's Perspective

Garelick, I.

St. Barnabas Medical Center, Livingston, NJ

Wednesday

9:30 AM **WAM-B.5**
Training Program for Occupational Dose Reduction in a Positron Emission Tomography (PET) Imaging Facility
Schleipman, A.R.
Brigham and Women's Hospital

9:45 AM **WAM-B.6**
Benchmark Data for Radiation Doses in Pediatric Cardiac Catheterization Procedures: Basis for Establishing Reference Dose Levels
Al-Haj, A., Lobrighito, A., Rafeh, W., Al-Humaidan, A.
King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia

10:00 AM **BREAK**

10:30 AM **WAM-B.7**
Calibration of Radiochromic Films for Patient Dosimetry in Interventional Radiology
Al-Haj, A., Chantziantoniou, K., Lobrighito, A., Iqeilan, N., Lagarde, C.
King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia

10:45 AM **WAM-B.8**
Occupational Radiation Dose in Stress Myocardial Perfusion Imaging: Comparison Between ⁸²Rb and ^{99m}Tc-MIBI
Schleipman, A.R., Castronovo, Jr., F.
Brigham and Women's Hospital, Harvard Medical School

11:00 AM **WAM-B.9**
Factors Influencing the Radiation Doses in Pediatric CT Procedures
Al-Haj, A., Lobrighito, A.
King Faisal Specialist Hospital & Research Centre, Saudi Arabia

11:15 AM **WAM-B.10**
A Novel Dosimetry Method for Cone Beam CT: Dose Comparison between Cone Beam CT and Conventional CT
Yoshizumi, T., Toncheva, G., Nguyen, G., Yoo, S., Godfrey, D., Munro, P., Yin, F.-F.
Duke University, Varian Medical System, CA

11:30 AM **WAM-B.11**
Radioactive Scorpion Venom Therapy
Jackson, A., Harkness, B.
Henry Ford Health System

11:45 AM **WAM-B.12**
Iodine-131 Therapy And The Dialysis Patient
Bohan, M.J., Richardson, R.L.
Yale-New Haven Hospital

Noon **Medical HP Section Business Meeting**

8:30 AM-Noon **Ballroom D**

WAM-C: Power Reactor Special Session: A Nuclear Power Renaissance in the United States?

Co-Chairs: Larry E.Haynes and Ralph Andersen

8:30 AM **WAM-C.1**
The Future of Nuclear Power in the US
Andersen, R.
Nuclear Energy Institute

9:15 AM **WAM-C.3**
AP1000 by Westinghouse: The Pressurized Water Reactor Revisited
Schumacher, R.
Westinghouse Electric Co.

10:15 AM **BREAK**

10:45 AM **WAM-C.4**
The US EPR — Continued Improvements from a Health Physics Perspective
Bonsall, R.W., Hudson, F.G., Parece, M.V.
AREVA / Framatome-ANP

11:45 AM **WAM-C.5**
Potential Impact of Changes in USNRC Dose Limits
Hiatt, J.
Bartlett Nuclear, Inc.

Noon **Power Reactor Section Business Meeting**

Wednesday

8:10 AM-Noon Room 551

WAM-D: Accelerator Section Special Session

Co-Chairs: Lorraine Marceau-Day and
Scott Walker

8:10 AM AWARD PRESENTATION

8:15 AM WAM-D.1
Radiation Safety at Radioactive Ion Beam
Facilities
Moritz, L.
TRIUMF University of British Columbia

9:00 AM WAM-D.2
Teaching Accelerator Health Physics to
Nonspecialists in the U. S. Particle
Accelerator School
Cossairt, J.D.
Fermi National Accelerator Laboratory

9:30 AM WAM-D.3
CHELSI: A Portable High-Energy
(>20MeV) Neutron Spectrometer
McLean, T.D., Olsher, R.H., Devine, R.T.,
Romero, L.L., Miles, L.H., Labruyere, A.,
Grudberg, P.
Los Alamos National Laboratory, XIA, LLC

9:45 AM BREAK

10:15 AM WAM-D.4
ANSI N43.1 Draft Standard: Radiation
Safety for the Design and Operation of
Particle Accelerators
Liu, J., Walker, L.
*Stanford Linear Accelerator Center
(SLAC), Los Alamos National Laboratory*

11:15 AM WAM-D.5
Fission Fragment Ion Source Hazards
Baker, S.I., Moore, E.F., Pardo, R.C.,
Savard, G.
Argonne National Lab

11:30 AM WAM-D.6
High Energy Neutron Spectral Unfolding
with As, In, Tb, Ho, Ta, Ir, Au and Bi
Activation Foils
Walker, L.S., Kelsey, C., Oostens, J.
*Los Alamos National Laboratory,
Campbellsville University*

11:45 AM WAM-D.7
Radiation Considerations in the Design of
Hall D at Thomas Jefferson National
Accelerator Facility
Ferguson, C., May, R.
Jefferson National Accelerator Lab

**Noon Accelerator Section Business
Meeting**

2:30-3:30 PM Room 551

WPM-A: Decommissioning

Chair: Ken Krieger

2:30 PM WPM-A.1
Accelerated Decommissioning of
Underground Storage Tanks: Health and
Safety Concerns
Knox, W.
Advanced Systems Technology

2:45 PM WPM-A.2
Co-60 Source Removal from the Neely
Nuclear Research Center at Georgia Tech
Burgett, E., Hertel, N., Blaylock, D.,
Grobb, L., Eby, B.
*Office of Radiological Safety, Georgia
Tech, Neely Nuclear Research Center,
Georgia Tech, Duratek Inc., MWH Inc.*

3:00 PM WPM-A.3
First MARSSIM Decommissioning of
CDC Laboratories
Keith, L., Simpson, P.
*Agency for Toxic Substances and
Disease Registry (ATSDR), Centers for
Disease Control*

Wednesday

3:15 PM **WPM-A.4**
Measurements and Characterization of Neutron and Gamma Dose Quantities in the Vicinity of an Independent Spent Fuel Storage Installation
Darois, E., Keefer, D., Connell, J.
Radiation Safety & Control Services Inc., Maine Yankee Atomic Power Co.

3:30 PM **BREAK**

4:00-4:45 PM **Room 551**

WPM-A2: Special G William Morgan Lecture Session

Chair: Christopher Soares

4:00 PM **WPM-A2.1**
Quality Assurance in Personnel Dosimetry in Germany
Ambrosi, P.
Physikalisch-Technische, Bundesanstalt, Germany

2:30-3:15 PM **Ballroom B**

WPM-B1: Medical Health Physics

Chair: Chris Martel

2:30 PM **WPM-B1.1**
Radiocontaminants in Commercial Microsphere Products
Burkett, D., Stabin, M.
Vanderbilt University

2:45 PM **WPM-B1.2**
Development of a Real-time Optical Fiber in vivo Dosimeter for Radiotherapy
Justus, B., Huston, A., Falkenstein, P., Miller, R., Ning, H., Perle, S., Ushino, T.*
US Naval Research Laboratory, Washington, DC, National Cancer Institute, Global Dosimetry Solutions, Inc.

3:00 PM **WPM-B1.3**
Monte Carlo Modeling of a Medical Linear Accelerator for Secondary Photon and Neutron Calculations
Bednarz, B., Xu, X., Wang, B.
Rensselaer Polytechnic Institute, Cooper University Hospital

3:15 PM **BREAK**

3:30-5:15 PM **Ballroom B**

WPM-B2: Dosimetric Modeling

Chair: Chris Martel

3:30 PM **WPM-B2.1**
Estimates of Total Skeletal Spongiosa Volume for Patient-Specific Scaling of Radionuclide S-Values
Hough, M.C., Brindle, J.M., Bolch, W.E.
University of Florida

3:45 PM **WPM-B2.2**
Modeling Energy Deposition in Trabecular Spongiosa with PENELOPE
Gersh, J.A., Dingfelder, M., Toburen, L.H.
East Carolina University

4:00 PM **WPM-B2.3**
A Skeletal Reference Dosimetry Model for the Adult Female
Kielar, K., Shah, A., Bolch, W.
University of Florida, MD Anderson Cancer Center

4:15 PM **WPM-B2.4**
An Image-Based Skeletal Dosimetry Model for the Pediatric Male
Hasenauer, D., Watchman, C., Shah, A., Bolch, W.
University of Florida, University of Arizona, MD Anderson

4:30 PM **WPM-B2.5**
Use of Realistic Phantoms in Medical Internal Dosimetry
Stabin, M., Brill, A., Segars, W.
Vanderbilt University, Johns Hopkins University

Wednesday

4:45 PM **WPM-B2.6**
Preliminary Effort to include Organ Deformation and Motions in VIP-Man Model
Zhang, J., Xu, X., Shi, C.*
Rensselaer Polytechnic Institute, Cancer Therapy and Research Center, TX

5:00 PM **WPM-B2.7**
Post-implant Dosimetry Analysis of Iodine-125 Permanent Seed Brachytherapy Patients by Delineation of Prostate Volumes Using MR Pre-implant and Post-implant Imaging Modality
Tuttle, D., Mack, C., Taylor, M., Yoshino, M.
University of Nevada Las Vegas, Arizona Oncology Associates, PC, Northwest Permanente PC, Physicians and Surgeons, Southern Arizona Diagnostic Imaging

2:30-5:15 PM **Ballroom D**

WPM-C: Operational Health Physics

Co-Chairs: Glenn M. Sturchio and Robert Cherry

2:30 PM **WPM-C.1**
A Breached Source in our High Exposure Gamma Facility, It Can't Be!
Rolph, J., Murphy, M., Carter, G.
Pacific Northwest National Laboratory

2:45 PM **WPM-C.2**
Decommissioning and Decontamination of a Radiation Generating Device Containing High Activity Sources
Eaton, T.
Pacific Northwest National Laboratory

3:00 PM **WPM-C.3**
Turning Annual Training into a Monthly Radiation Safety Newsletter
Mozzor, M., George, G., High, M.
New York Medical College

3:15 PM **WPM-C.4**
So you Want to be an RSO (Radiation Safety Officer) at an Academic/Biomedical Research Facility?
Johnston, T.
New York Medical College

3:30 PM **WPM-C.5**
Why Not Just Say, "It is Safe!"
Johnson, R.H.
Radiation Safety Academy

3:45 PM **BREAK**

4:15 PM **WPM-C.6**
Radiation Protection in Veterinary Medicine
Evdokimoff, V.
Dade Moeller and Associates

4:30 PM **WPM-C.7**
Field Indicators for Effective Contamination Control at Plutonium Facilities
Lee, M.
Los Alamos National Laboratory

4:45 PM **WPM-C.8**
Aerosol Monitoring Using Personal Impactors During Works Inside the Object Shelter
Aryasov, P., Nechaev, S., Tsygankov, N.
Radiation Protection Institute of Ukraine

5:00 PM **WPM-C.9**
Resolution of Occupational Radio Frequency Exposure Concerns at Woods Hole Oceanographic Institution Using a Collaborative Approach
Reif, R.
Woods Hole Oceanographic Institution

2:30-5:00 PM **Room 552**

Historical Videos and Movies

5:20 PM **Ballroom B**

HPS Business Meeting

Presentation followed by Business Meeting: Thanks for your Patience - Our Renovation is Finished
Dodd, B.
BDC Consulting, HPS President-Elect

Wednesday

6:00-8:00 PM **Narragansett A (W)**

WPM-D: ADJUNCT TECHNICAL SESSION

Aerosol Measurements

Chair: Morgan Cox

6:00 PM **WPM-D.1**
Current Status of ANSI N42 and IEC Standards for Radioactive Air Sampling and Monitoring
Cox, M.
Consultant, Department of Homeland Security

6:15 PM **WPM-D.2**
Aerosol Particle Collection Efficiency Testing of the Bladewerkz Breathing Zone Monitor (BZM) and Sabre Alert at LANL
Moore, M.
Los Alamos National Laboratory

6:30 PM **WPM-D.3**
The ANSI N323C Standard and Status
Johnson, M.
Pacific Northwest National Laboratory

6:45 PM **WPM-D.4**
Status of Current Air Monitoring Evaluations Using Retrospective Multi-point Radioactive Aerosol Sampling
Wannigman, D., Voss, T.
Los Alamos National Laboratory

7:00 PM **BREAK**

7:15 PM **WPM-D.5**
The Role of Coagulation in Aerosol Transport-Theory vs Experimental Observations
Sajo, E.
Louisiana State University

7:30 PM **WPM-D.6**
Status of Current Air Monitoring Evaluations, Implementations and Strategies at Los Alamos National Lab
Lesses, E., Voss, T., Wannigman, D.
Los Alamos National Laboratory

7:45 PM **WPM-D.7**
The New Radioactive Air Sampling and Monitoring Textbook
Group Discussion led by Cox, M., Hoover, M., Maiello, M.
Department of Homeland Security, National Institute for Occupational Safety and Health-Morgantown, Wyeth

Thursday

7:00 - 8:00 AM **Room 551**
CEL-7 Medical Triage and Management of Radiation Terrorism Events
Goans, R.E.; MJW Corporation

7:00 - 8:00 AM **Ballroom B**
CEL-8 Induction, Repair and Biological Consequences of Clustered DNA Lesions
Stewart, R.; Purdue University School of Health Sciences

8:30 AM-Noon **Room: 551**

THAM-A: Regulatory/Legal Issues

Co-Chairs: Louise Buker and Ed Parsons

8:30 AM **THAM-A.1**
Selected Update of US NRC Division 1, 4, and 8 Regulatory Guides
Dehmel, J., Bush-Goddard, S.
US Nuclear Regulatory Commission

8:45 AM **THAM-A.2**
The Health Physics Society Legislation & Regulation Committees Report on Recent Congressional and Federal Regulatory Initiatives
Kirk, J.S.
Oak Ridge Associated Universities

9:00 AM **THAM-A.3**
A New Radon Guideline for Canada
Tracy, B.L., Baweja, A.S., Chen, J., Moir, D., Cornett, J.
Health Canada

9:15 AM **THAM-A.4**
Radiation Safety as an Integral Part of the Transportation Regulations
Brown, D., Woods, S.
Halliburton Energy Services, Inc., TX, Halliburton Energy Services, Inc., OK

9:30 AM **THAM-A.5**
Corrective Action Programs
Walsh, M., Collingwood, B.
W&W RECS Inc., Sharing Solutions Inc.

9:45 AM **THAM-A.6**
Comprehensive Laboratory Audit Documentation: Essential for Regulatory Compliance and Continuous Improvement

Quinn, B., Williamson, M., Dauer, L.
Memorial Sloan-Kettering Cancer Center

10:00 AM **BREAK**

10:30 AM **THAM-A.7**
An Evaluation of DOECAP Audit Findings at Contract Radiochemistry Laboratories: Balancing Requirements with Quality
Shannon, R.
Kaiser Analytical Management Services

10:45 AM **THAM-A.8**
Gross Skin Response to 3.8 Micron Laser Pulses
Johnson, T., Wood, A.
Colorado State University

11:00 AM **THAM-A.9**
Legal Ramifications of the LNT Hypothesis
Scott, R.
Scott & Scott, PC

11:15 AM **THAM-A.10**
Compatibility Issues Regarding Agreement State Regulations for Portable Devices Containing Radioactive Sources
Chapel, S.
Chapel Consulting

11:30 AM **THAM-A.11**
Handling an Allegation of Falsification of Records
Morris, V.
University of Cincinnati

11:45 AM **THAM-A.12**
A Health Physicist Reports Known Fraud and Abuse: Action - Reaction
Knox, W.
Advanced Systems Technology

Thursday

8:15 AM-12:15 PM **Ballroom B**

THAM-B: Homeland Security and Emergency Planning

Co-Chairs: Steven King and Stephen Bump

8:15 AM **THAM-B.1**
Implications of a Terrorist Attack at a Spent Fuel Pool

Favret, D., Stabin, M., Parker, F.
Vanderbilt University

8:30 AM **THAM-B.2**
Overview of the CDC Select Agent and Toxin Program

Johnston, T.
New York Medical College

8:45 AM **THAM-B.3**
Operations Research as a Health Physics Tool in Emergency Response

Goans, R.
MJW Corporation, Buffalo, NY.

9:00 AM **THAM-B.4**
Assaying Lung Contamination After a Radiological Dispersion Device Event

Hutchinson, J., Lorio, R., Wang, Z. *, Hertel, N.

Georgia Institute of Technology

9:15 AM **THAM-B.5**
Development of a Laser Guided Wound Probe for Pinpointing Small Fragments of High Activity Radiation Sources in Victims of a Radiological Dispersal Device (RDD or Dirty Bomb)

Case, J.P., Bushberg, J.T.
University of California, Davis Medical Center

9:30 AM **THAM-B.6**
Spectral Radiation Pagers - a New Equipment Type for Use by Front Line Officers and First Responders

Swoboda, M., Baird, K., Schrenk, M., Arlt, R., Wiggerich, B., Stein, J., Georgiev, A., Majorov, M., Gabriel, F., Wolf, A.

Atomic Institute of the Austrian Universities, Austria, International Atomic Energy Agency, Austria, Consultant, Airrobot GmbH, Germany, Target GmbH, Germany, US Oxford, Thermo Electron, Scientific Engineering Center Nuclear Physics Research, St. Petersburg, Research Center Rossendorf, Germany

9:45 AM **THAM-B.7**
Sensitivity of Portable Personnel Portal Monitors: Potential Problems When Dealing with Contaminated Persons

Kramer, G., Capello, K., Hauck, B., Brown, J.
Health Canada, Defence R&D Canada

10:00 AM **BREAK**

10:30 AM **THAM-B.8**
Lessons Learned from an Emergency Exercise that Used Real Sources

Kramer, G.
Health Canada

10:45 AM **THAM-B.9**
Radiological Risk Assessment for a Large Combined Sanitary/Storm Sewer System and Wastewater Treatment Plant

Strom, D., Hickey, E., McConn, Jr., R., Alston, A.
Pacific Northwest National Laboratory, WA, King County Wastewater Treatment Division, WA

11:00 AM **THAM-B.10**
Emergency Response and Radiation Protection Plans for a Large Combined Sanitary/Storm Sewer System and Wastewater Treatment Plant

Hickey, E., Strom, D., Alston, A.
Pacific Northwest National Laboratory, WA, King County Wastewater Treatment Division, WA

Thursday

11:15 AM **THAM-B.11**
OSR Project Provides a Solution to the
Gammator Problem
Tompkins, J.

*Los Alamos National Laboratory - Off-site
Source Recovery Project*

11:30 AM **THAM-B.12**
IAEA and LANL Collaborate on a Solution
to Management of Vulnerable Sealed
Sources on the African Continent
Tompkins, J., Al-Mugrabi, M.

*Los Alamos National Laboratory - Off-site
Source Recovery Project, International
Atomic Energy Agency*

11:45 AM **THAM-B.13**
Life Cycle of Plutonium-239 Sealed
Sources in the United States: Origins,
Inventory, and Final Disposition
Griffin, J.

Los Alamos National Laboratory

12:00 PM **THAM-B.14**
The State of Florida's Radiological
Emergency Preparedness and Response
Program

Lanza, J., Keaton, H.
Florida Department of Health

8:15 AM-12:15 PM

Ballroom D

THAM-C: History

Chair: Ray Johnson

8:15 AM **THAM-C.1**
The History of Radiation Fears
Johnson, R. H.
Radiation Safety Academy

8:45 AM **THAM-C.2**
Radium, President Harding, and Marie
Curie
Lubenau; J. O.
Consultant

9:15 AM **THAM-C.3**
The History of Radiation at the Movies
Krieger; K.
Earth Tech

9:45 AM **BREAK**

10:00 AM **THAM-C.4**
Preserving the Past: An Update on
Historical Archival Activities
Chapman, J.A., Boerner, A.J., Lucas,
A.C.
*Oak Ridge Associated Universities, Lucas
Newman Science and Technologies, Inc.*

10:15 AM **THAM-C.5**
A Video Glimpse of HPS History
Lucas, A.C., Boerner, A.J., Chapman, J.A.
*Consultant, Oak Ridge Associated
Universities*

11:00 AM
Highlights of the Past 50 Years -
Recollections
Panel of Charter Members

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.

AAHP Courses

Saturday, June 24, 2006 - 8 AM-5 PM

AAHP 1 Introduction to Practical Monte Carlo Simulation for Health Physicists

A. Hodgdon, J. Yanch

Framatome, Massachusetts Institute of Technology

Many Health Physicists are starting to use Monte Carlo computer codes like MCNP for shielding and dosimetry calculations. Monte Carlo expands upon the capability of ray tracing codes like Microshield, which approximate particle travel with simple straight lines. While ray tracing works for photons, it doesn't work for scatter, skyshine, streaming, or secondary sources. It also doesn't work for neutrons. On the other hand, Monte Carlo calculates scattered dose by simulating actual particle travel and then statistically sampling detector response. This makes for accurate scatter calculations, and permits the calculation of a broader range of particles, like neutrons, electrons, alphas and protons, as well as secondary neutrons and photons which dominate reactor and accelerator shielding calculations. The first thing you will notice about modern Monte Carlo codes is their geometry packages. These get better every year. They can simulate every imaginable configuration; from a simple point source to a barrel of waste to a full nuclear reactor with individual fuel pins.

Monte Carlo method can calculate dose, flux, heating, foil activation, fission and many other quantities. Thanks to modern personal computers, it can do this on your desktop, even at home. MC codes are cheap to buy (~\$1000,) and come with graphic visualization packages and standard cross-section libraries. In the last ten years, MC has jumped from the national labs onto the laptop of every modern Health Physics student, and, soon onto the desks of your next hire.

But, don't throw out your old methods yet! Consider the following challenges. New users are often tempted to put too much detail into their models, wasting the time to build models and to run them. It's possible (and easy) to bias the results, getting answers that look good, but are wrong. Finally, Monte Carlo takes a relatively long-term commitment to learn.

This course will give you a jumpstart. The course includes practical examples, fundamental steps to setting up an analysis, several demonstrations, and an introduction to basic theory. You will learn how to keep models simple, how to validate results, and how to manage learning. You will get a sense of when you need MC and when you don't. This course is based on a course taught to graduate students and professional nuclear and radiation engineers.

AAHP 2 Security Enhancement for Radiological Facilities and Sealed Sources

Joel P. Grimm, Garry Tittlemore, Mark S. Soo Hoo

US Department of Energy, Sandia National Laboratories

In November 2005, the U.S. Nuclear Regulatory Commission (NRC) issued "Orders for Increased Controls" for certain radioactive materials licensees. The increased controls apply to licensees who possess radioactive materials greater than prescribed quantities of "radionuclides of concern". While licensees are familiar with the radiation protection principles and practices associated with these materials, the NRC Increased Controls are further mandating security measures for high-risk radioactive materials to prevent intentional unauthorized access to the materials. Prior to the issues of the NRC orders, such security measures may not be com-

monly and uniformly applied for the use, storage, and transport of radioactive materials. This course will train licensees on: 1) an awareness of the need to secure radioactive sources; 2) the international efforts under way to improve the security of radioactive sources; 3) common security terminology and technology leading up to a systematic methodology to improve the security of radioactive sources; and 4) suggested enhancements to meet regulatory statutes.

AAHP 3 HPS Lab Accreditation Program and Technical Auditing
Ken Swinth, Sam Keith, Carl Gogolak, Tom Slowey
Consultant, Agency for Toxic Substances and Disease Registry, Consultant, K&S Associates

The objective of this course is to provide an overview of the HPS accreditation program, information on key quality and technical requirements, information on technical auditing and application of auditing principles to the HPS program. The HPS laboratory accreditation program operates under quality requirements based on ISO/IEC 17025 and technical requirements developed by an expert group. Through the accreditation process the HPS program ensures a higher standard of performance than one would expect from a laboratory or facility that simply shows compliance with the ISO 9000 series of quality standards. A key element is the demonstration of compliance with the technical requirements of the program through an audit. The benefits of accreditation for a typical calibration laboratory will be described.

The course will include a description of the evolution of the program which parallels the evolution of the general accreditation process. Specific quality and technical requirements and their relation to ISO/IEC 17025 will be described for both instrument and source manufacturing lab-

oratories. The course will include an overview of proficiency testing and uncertainty analysis as applied to the HPS program. Specific examples of compliant and non-compliant practices will be provided in an exercise.

The presentation element on auditing will be general enough to apply to audits in all health physics areas. A framework around which the auditor can help customers (auditees) improve through the process of technical auditing will be provided. Technical auditing requires an auditor to know what's important in an industry and where to help the auditee focus resources for optimization of the production process. The audit philosophy espoused during this presentation will be that compliance and conformance only form the bedrock from which a business can improve and optimize operations. The participant will learn that the "why" is the most important part of the audit in helping the auditee understand the "how" of improvement. Techniques will be presented to assist auditors to communicate with the team, the customer, interviewees and the sponsoring organization.

Attendees will gain knowledge on the accreditation process and its evolution in recent years, general knowledge on auditing, how a measurement uncertainty is established and general knowledge of the international accreditation standard, ISO/IEC 17025. Technical aspects will be specific to the HPS Laboratory Accreditation Program and attendance will satisfy introductory training requirements for HPS program auditors.

Professional Enrichment Program

Sunday, June 25 through Wednesday, June 28, 2006

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, June 25, 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 Internal Dosimetry -
Harmony in Concepts and Units
Mike Stabin
Vanderbilt University**

Internal dose calculations for nuclear medicine applications or for protection of radiation workers are based on the same fundamental concepts and units. The various systems developed to provide a basis for the needed calculations (e.g. ICRP 30/60, MIRD, RADAR) use equations that appear to be different, but are in fact identical when carefully studied. A current effort is underway to harmonize the defining equations and units employed to provide quantitative analysis for these two general problem areas. This program will

show, from a theoretical standpoint, how all of these systems are identical in concept, and will then show, using practical examples, how each is applied to solve different problems. For nuclear medicine, an overview will be given of the current state of the art and promise for future improvements to provide more patient specificity in calculations and better ability to predict biological effects from calculated doses. For occupational applications of internal dosimetry, an overview will be given of currently applicable models and methods for bioassay analysis and dose assessment, showing a few practical examples.

PEP 1B The Health Physicist as an Expert Witness: The Daubert Procedure

Ralph Johnson

Schmeltzer, Aptaker & Shepard, P.C.

The United States Supreme Court in a series of opinions beginning with its decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 591, 592-93 (1993), significantly increased the probability that lawsuits involving complex scientific issues, such as the typical radiation injury or property damage litigation, will be rationally resolved. These Supreme Court decisions require federal trial judges to serve as evidentiary “gatekeepers” by making certain that would-be expert testimony is reliable and relevant before it can be presented to a jury; that is, the judge must determine whether the expert witness in his proposed testimony employs in the courtroom the same level of intellectual rigor that characterizes the practice of a genuine expert in the relevant field. Although making determinations of scientific validity may present a judge with the difficult task of ruling on matters that are outside of his or her expertise, this is “less objectionable than dumping a barrage of scientific evidence on a jury, who would likely be less equipped than the judge to make reliability and relevance determinations.” *Rider v. Sandoz Pharmaceuticals Corp.*, 295 F.3d 1194 (11th Cir. 2002). Generally, the trial judge determines the reliability and relevance of challenged expert testimony by conducting a “Daubert” hearing during which the expert’s methodology in developing his or her testimony is thoroughly scrutinized through direct and cross-examination. Only after the judge has determined that the expert’s testimony is based on sound scientific principles is the jury allowed to hear the expert’s opinion. The procedure is expressly designed to preclude testimony that is speculative and it requires that an expert show the reliabil-

ity of each of the steps in his reasoning. In sum, the Daubert procedure is fully consistent with the Health Physics Society’s Code of Ethics provision that “Professional statements made by members shall have sound scientific basis.” This course will provide practical guidance to the health physicist who has been called to serve as an expert witness by discussing the pertinent case law, the formulation of expert testimony, the necessary components of an expert witness litigation report, preparation for and participation in the Daubert hearing. Actual, recent state and federal radiation injury and property damage cases will be used to illustrate how the process works to allow protect the integrity of the judicial system.

PEP 1C Calculating and Reporting Fetal Radiation Exposure

Andy Karam

MJW Corporation

When pregnant women are exposed to radiation, especially in a hospital setting, the RSO is usually asked to perform a fetal dose calculation and to provide advice to the women’s physicians. Unfortunately, few physicians really understand the effects of fetal radiation exposure, making the RSO’s job even more important. And, if the pregnancy ends badly in miscarriage or birth defects, there is a tendency to blame the radiation exposure. For this reason, it is essential that these fetal dose calculations be performed in a manner that is scientifically and legally defensible, and that they be reported to the physician in a manner that makes sense, that will help the physician make sound recommendations, and that will help the woman make an informed decision about her pregnancy. In this lecture, we will review some of the standard methodology for determining fetal radiation dose from many medical procedures. We will also discuss the effects of varying

levels of radiation exposure on the developing fetus, including the times of the pregnancy during which the fetus is most vulnerable to radiation exposure. We will then finish by performing a few sample calculations and discussing how this information can be presented to physicians and expectant mothers to help them reach a sound decision.

PEP 1D Radiation Detection Instrumentation: A View of the Past, Present and Future

Morgan Cox

Department of Homeland Security Consultant

This professional enrichment course consists of a series of two contiguous and related presentations. The first part of this course will comprise a summary of the development of radiation detection technology and instrumentation in the nineteenth and twentieth centuries. This course will also review the status of currently available radiation detectors, some of their advantages, applications and needs for more research and development. The increasing needs for the uses of digital signal processing, with faster, more intelligent and smaller instruments with greater overall capability will be discussed. Some currently available instruments will be demonstrated and discussed in some detail. This will be an interactive session with required audience participation.

PEP 1E Brain-Based Learning – Part A, New Approaches for Effective Radiation Safety Training

Ray Johnson

Radiation Safety Academy

Studies in brain-based or brain-compatible learning over the past ten years have shown that the traditional “stand-and-deliver” approach to teaching may not be the best model for optimum learning. As we seek to train radiation workers, first responders, and security personnel

about radiation perhaps we should consider whether we are as effective as we could be. The challenge for teaching first responders, especially, is not just about teaching the technology of radiation sciences, but how to provide a basis for understanding radiation such that they will not revert to an automatic stress response when they encounter radiation in a real incident. How can we best prepare these people to make appropriate decisions for protection of themselves, the public, and property during a nuclear emergency? While knowledge of radiation is vital, successful handling of a nuclear incident will be more a matter of behavioral responses. Will our best radiation safety training provide responders with adequate tools and skills for coping with stress and fears of radiation?

Studies in neurosciences show that learning results from the formation of pathways and interconnections among nerve cells called neurons. Stimulation of multiple pathways and patterns increases the potential for optimum learning. The best learning occurs when the brain is provided with cognitive (thinking), affective (feeling), and psychomotor (physical) information at the same time. People learn better through creative acts that include thought, feeling, and physical action. Memory is enhanced when new information is related to relevant mental, emotional, and physical experience.

Effective radiation safety training with the brain in mind will consider:

- 1) How to use mind-mapping to enhance note-taking and recall
- 2) How the brain learns (left / right brain and stages of learning)
- 3) How to get students ready to learn (rhythms, cycles, and breaks)
- 4) How to enrich the learning environment (colors, peripherals, light, plants)
- 5) How to get the brain’s attention (what is important, downtime, novelty)

PEP 1F Critical Decisions and Tools for First-Time and Experienced Managers (or How I Learned to Love the Org Chart)

Jim Hylko

WESKEM, LLC

Following graduation from a health physics program or related technical field, an individual's training and career development activities typically focus on acquiring additional work experience and enhancing technical problem-solving skills. However, as health physicists advance throughout their careers, managerial duties such as supervising employees and overseeing projects result either through professional advancement or staffing changes within a company. Therefore, as health physicists gain additional experience and years in the profession, they may be required to accept and adapt to the role of a manager. This new role typically requires supervising, guiding and influencing the direction of a department and its employees. Having worked for a variety of managers throughout his career and now supervising an Environmental, Safety and Health (ES&H) Department across four separate projects, the instructor presents first-hand experiences related to the successes and pitfalls while serving as a department manager. Discussion topics and real-life examples will cover defining roles and responsibilities, motivation, communication, reasons for effective leadership, supporting employees during a crisis, as well as allocating resources and budgets. In addition, enhancing your own department's productivity can be achieved with support from other internal organizations (e.g., quality assurance and human resources). Both aspiring and experienced managers will acquire useful information that can be applied immediately in their current work location.

PEP 1G EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: Basics of Fire and Life Safety and Risk Management and Insurance

Bob Emery

University of Texas

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 consolations were not accompanied by formal staff training efforts to instill an understanding of the areas now aligned with the radiation safety function. This is unfortunate because, 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 of the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will be discussed. The risk management & insurance portion will address the risks if retrained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle).

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 1H Technical Auditing for Health Physicists

Sam Keith, Scott Schwahn and Ken Swinth

***US Department of Homeland Security/
Environmental Measurements Laboratory***

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

This course provides information to individuals interested in the HPS accredi-

tation program, and is also part 1 of a 2-part course for certifying individuals to audit laboratories for HPS accreditation.

Sunday - 10:30 AM - 12:30 PM

PEP 2A Fundamentals of Neutron Detection and Detection Systems

Jeff Chapman

Oak Ridge Associated Universities

In 1932, James Chadwick published a seminal paper in the Proc. Roy. Society titled "The Existence of a Neutron." 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 2B Changes in Natural Background Radiation Levels over the History of Life

Andy Karam

MJW Corporation

All life on earth is exposed to background radiation levels, and we all suspect that this radiation background used to be higher than it is. In fact, the earliest life was exposed to significantly higher radiation levels than we experience at present, and all sources of background radiation (cosmic, geological, and biological potassium) have all changed in surprising ways over the history of life. On the other hand, atmospheric oxygen levels were so low that this radiation was less damaging to DNA than one might expect. What is fascinating is to explore how factors such as solar evolution, changing

atmospheric chemistry, geochemistry, and other factors have affected the radiation levels to which life has been exposed, and to speculate how these effects might be seen in organisms today. In this lecture, we will discuss all of these factors, and more.

PEP 2C Gamma Spec

Doug Van Cleef, Dan Upp, and Craig Maddigan

ORTEC/Advanced Measurement Technology, Inc

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

PEP 2D Radiation Detection Instrumentation 2) A Review of Current Relevant Standards

Morgan Cox

Department of Homeland Security Consultant

This professional enrichment course consists of a series of two contiguous and related presentations. The second presentation will cover the American National Standards Institute (ANSI) and International Electrotechnical Commission (IEC) standards in effect, being developed and in the planning stage for the various types of radiation detection instruments. The ANSI N42 radiation detection instruments designed for health physics applications, ANSI N42RPI (Radiation Protection Instrumentation), and ANSI N42HSI (Homeland Security Instrumentation) for homeland security applications will be reviewed in some detail. The subject of applicable current

standards will be discussed along with some of the major contributors to these efforts. Several particular standards of particular interest will be discussed. Again audience participation will be required and expected for the success of this course.

PEP 2E Brain-Based Learning – Part B, New Approaches for Effective Radiation Safety Training

Ray Johnson

Radiation Safety Academy

The brain is programmed for survival and under stress it reverts to fight or flight. Thus, our emotions play a key role in what we remember. Our middle brain acts as a switchboard that filters or transmits information to our thinking brain. Information with a positive appeal is transmitted for thinking and processing. Negative emotions, such as fear, anxiety, or stress, may result in suppression of information, which never gets to the thinking brain. If the anxiety is high enough the thinking brain goes blank. The standard “institutionalized” training that we have all experienced may actually inhibit or diminish learning. Learning is enhanced by a variety of approaches that stimulates all of the senses as well as thinking and feeling. Learning is also related to the relevance of the information or experience to the individual.

Radiation safety training may be made more effective by multiple modes of instruction and reducing stress. One way to reduce stress is to make learning fun. Entertainment is a key factor. This does not always have to involve humor. It can include dramatization, surprise, and challenges to curiosity, perceptions, and understanding. Effective instruction gets the students actively involved in the learning process. This requires not only an appeal to their intellect, but also an appeal to their senses. The most effective mode of instruction is often “show-and-tell.”

Effective radiation safety training with the brain in mind will consider:

- 1) How threats and stress affect learning (fight or flight, how to reduce stress)
- 2) How to enhance learning by motivation and rewards (alternatives)
- 3) How emotions affect learning (control by middle brain, engaging the emotions)
- 4) How the mind and body are linked for learning (how to get energized)
- 5) How the brain derives meaning (relevance, emotion, patterning)
- 6) How to enhance memory and recall (associations, aids to memory)

PEP 2F Particle Size and Pulmonary Hazard

Herman Cember

Particle size is the single most important factor that influences the inhalation hazard from any given aerosol. This PEP course will deal with particle size distributions, transport of airborne particles, the structure and function of the respiratory system, pulmonary deposition and clearance of inhaled particles, and the mean lung dose based on the three compartment lung model on which the current 10 CFR 20 inhalation safety standards are based.

PEP 2G EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals

Bob Emery

University of Texas

See overview in PEP 1G

* Part 2 will examine the “Basics of Biological & Chemical Safety and Institutional Security”. During the session, the classification of infectious agents and the various assigned biosafety levels will be discussed. Various aspects of chemical exposures, exposure limits, monitoring and control strategies will be presented. The basics of security as they apply to hospital and university settings will also be

presented, along with the various strategies employed to improve security controls.

PEP 2H HPS Laboratory Accreditation Program Assessor Training

Ken Swinth

***US Department of Homeland Security/
Environmental Measurements Laboratory***

The objective of this professional enrichment program topic is to familiarize HPS Laboratory Accreditation Program technical assessors and others with the requirements of the assessment program. The training will describe the program documentation, incorporated elements of ISO/IEC 17025, the accreditation process, and will specifically address technical requirements for instrument calibration and source manufacturing laboratories. The training is required for all members of the HPS Laboratory Accreditation Assessment Committee and is recommended for facilities interested in accreditation. 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 program 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 2 of a 2-part course for certifying individuals to audit laboratories for HPS accreditation

Sunday - 2:00 - 4:00 PM

PEP 3A The Role of Health Physicists in Various Types of Radiation Litigation

Lynn McKay

Schmeltzer, Aptaker & Shepard, P.C.

This course examines the roles that health physicists and radiation protection professionals play in ensuring compliance with laws, regulations and other profes-

sional standards that apply to work involving radiation and radioactive materials. Some of these roles include designing and implementing field studies, performing dose or risk assessments, preparing recommendations regarding site use and remediation, analyzing dosimetric data, formulating and implementing sound health physics work practices, designing and implementing personal monitoring procedures, and interpreting the positions of various scientific bodies.

Using examples from radiation cases, this course identifies the relevant professional, scientific, and legal standards applicable to tasks performed by health physicists and radiation protection professionals, and invites class participants to examine that work in the context of the technical, regulatory, and legal requirements that apply in each situation. Laws and regulations, and legal actions to enforce them, impact many aspects of our daily lives, particularly at work. The course reviews common challenges and unique problems associated with conducting relatively routine professional tasks in a litigation setting. To aid understanding of performing health physics jobs in a litigation setting, the course includes an explanation of the types of claims that are typically made in litigation involving injuries associated with radioactive materials, and the requisite proof for those claims.

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

Ben Edwards

Duke University

Non-ionizing radiation (NIR) often presents a “final frontier” of the unknown for the practicing health physicist. This paucity of familiarity mirrors the general public’s almost complete lack of understanding of this subject. However, the “fear of the unknown” phenomenon coupled with a plethora of sensationalist mis-

information ensures that most practicing health physicists and other safety professionals will eventually confront distressed workers or members of the public in urgent need of credible, factual information on NIR radiation hazards and control measures.

This course provides a fundamental overview of NIR hazards and biological effects. Course attendees will learn the basic terminology and nomenclature, spectral region designations, regulatory framework, and consensus guidance associated with NIR. The course material will begin at the edge of “ionizing” part of the electromagnetic spectrum and walk participants through a tour of the optical, radiofrequency (including microwave), and extremely low frequency (ELF) portions of the EM range, finally ending with static electric and magnetic fields. The existence of a series of exposure limits covering the entire NIR spectrum forms one of the course’s basic themes. This continuous line of consensus “safe” exposure levels helps establish the concept that NIR dose response curves are at least well-enough understood at all parts of the spectrum to provide a reasonably safe exposure envelop within which we can operate. After completing this course, attendees will be conversant in the major sources and associated hazards in each part of the NIR spectrum, along with the recognized exposure limits and control measures for those sources. Armed with this information, safety professionals can better recognize, evaluate, and communicate the hazards associated with the spectrum of significant NIR sources, and address workers’ concerns in a credible, fact-based, knowledgeable, and professional manner.

PEP 3C Alpha Spec

Doug Van Cleef, Dan Upp, and Craig Maddigan

ORTEC/Advanced Measurement Technology, Inc

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

PEP 3D Power Lines and Politics

Tom Johnson

Colorado State University

Most radiation safety professionals are aware of the large scientific effort to investigate the potential for cancer from electric power lines, microwave ovens, and most recently, cell phones. Key scientific papers from the IEEE, National Academy of Sciences and NIH were ineffective in changing the opinion of many on the effects of electric and magnetic fields. The genesis of this greater than \$25 billion effort will be discussed in detail, along with ancillary investigations that were initiated for non-scientific reasons. Some of the popular literature that initiated this investigation will be discussed as well as its influence on the science. Included will be a basic review of the physics and plausibility of biological effect along with some simplified calculations of the energy associated with non-ionizing radiation. Some of the tantalizing observations of actual effects of nanosecond pulsed on cells and the basis of these effects will be explored.

PEP 3E Infrastructure Issues for Planning Response and Recovery from a Radiological Attack

Dan Strom, Eva Hickey

Pacific Northwest National Laboratory

The May 2003 TOPOFF 2 exercise was held in Seattle. Based on issues raised during that exercise, Pacific Northwest National Laboratory (PNNL) and the King County Wastewater Treatment Division (which treats Seattle's wastewater) performed radiological risk and radiological instrumentation assessments, developed emergency response and recovery plans as well as communication plans for the aftermath of a radiological attack. Large portions of the King County system receive both sanitary sewage and storm water, and one plant treats between 380 and 1,200 million L (100 to 320 Mgal) of wastewater per day, depending on precipitation. We describe the radiological risks anticipated following radiological dispersion events (RDEs) by devices employing explosive and non-explosive means, and dispersals not involving any kind of device. Risks to workers and members of the public are evaluated for direct irradiation, as well as from intakes and ontakes of radioactive material. The plant under study produces four significant waste streams: screenings, grit, biosolids, and treated water. Prior arrangements for radioactive waste management are critical for a wastewater treatment plant. Since no bounding assumptions on the physical and chemical form of dispersed radioactive material can be made, a variety of forms were considered. One form, pellets of ^{60}Co , can result in dangerously high dose rates from the grit waste stream. Using MCNP, PNNL designed and evaluated real-time radiation detectors capable of detecting concentrations of interest and distinguishing medical radionuclides from those likely to be dispersed by an adversary. One rule-of-thumb emerged: 1 MBq/L of dis-

solved ^{60}Co produces a dose rate to water (immersion dose) of ~ 1 mSv/h (1 mCi/gal produces ~ 1 rem/h). This kind of bounding calculation permits rapid estimation of dose rates in the plant. We show that instrumentation can have value for both interdiction of attack as well as recovery from attack. We describe the interim emergency response and radiation protection plans. A radiation protection and ALARA program was developed to keep doses to wastewater treatment workers as low as is reasonably achievable and to minimize contamination of the wastewater infrastructure and wastewater treatment facilities. The program includes the special training needs for wastewater workers involved with managing the influent wastewater from a radiological dispersion event. Special concerns are raised because the workers are not trained as radiological workers and have little or no understanding of radiological risks. There remains much work to do. Action levels for decisions to bypass and to resume treatment of radioactively contaminated wastewater need to be developed. The technical basis for such action levels must be documented. A transport and fate model should be developed for water and wastewater treatment facilities. Planning is needed for rapidly determining where contaminated sewage originated, with the goal of limiting further intakes by members of the public and limiting property damage from contamination. Methods for rapid detection and localization of unexpected contamination should be developed. Such capabilities could preemptively detect some radiological attacks. Finally, a radiation risk communication program has been developed.

*Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC05-76RLO 1830. PNNL-SA-48292.

PEP 3F Characterization of Radioactive Materials for Transportation

Sean Austin

Radiation Safety Academy

When shipping radioactive materials, it is vital that the shipper choose the correct "category". Does the material qualify for a Type A package, or is a Type B required? May I ship the material in an excepted package as a limited quantity or a radioactive instrument or article? Does my material qualify as LSA-I, or LSA-II, or LSA-III? What are the contamination limits for SCO-I and SCO-II? In turn, choosing the proper category drives the selection of packaging, marking, and labeling the package, along with deciding if shipping papers are required. There are many tables a shipper uses to help choose the proper category. For some categories, calculations are required to determine if the material to be shipped fits within the packaging limits imposed. A sound understanding of the steps required to characterize a radioactive item is necessary to choosing the proper category.

PEP 3G EH&S "Boot Camp" for University and Hospital Radiation Safety Professionals

Bob Emery

University of Texas

See overview in PEP 1G

* 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 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 necessary programmatic resources. Radiation protection programs are now expected to readily demonstrate how they add tangi-

ble 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.

PEP 3H Introduction to Uncertainty Calculation

Carl Gogolak, Sam Keith

***US Department of Homeland Security/
Environmental Measurements Laboratory***

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.

Monday, 6/26 - 12:15 - 2:15 PM

PEP M1 Advanced MARSSIM Topics

Eric Albequist

Oak Ridge Institute for Science and Education

Since its publication more than 7 years ago, the MultiAgency Radiation Survey and Site Investigation Manual (MARSSIM) approach has been used at a number of D&D sites for designing final status surveys in support of decommissioning. While a number of these MARSSIM applications have been relatively straightforward, some have challenged the MARSSIM user to seek solutions beyond the simple examples illustrated in the MARSSIM manual. This course will describe the nature of some practical final status survey examples and will offer possible solutions within the MARSSIM framework.

The final status survey design discussion in this course will include examples of how multiple radionuclide contaminants are handled for both building surfaces and land areas. The strategies for

designing surveys when multiple radionuclides are present employ the use of surrogate radionuclides, determination of gross activity DCGLs, and application of the unity rule. One of the more challenging aspects of MARSSIM survey design arises when multiple radionuclides are present in Class 1 survey units. In this situation, the MARSSIM user must assess both the instrument scan MDC and DCGLMDC for the multiple radionuclides present. Final status survey strategies for determining the need for additional soil samples in Class 1 survey units when multiple radionuclides are present will be discussed.

Additional topics in this course will include 1) double sampling—collecting additional samples from the survey unit after the survey unit fails to pass the statistical test, and 2) survey strategies for alpha and beta contamination on building surfaces. The COMPASS code (MARSSIM software) will be used to illustrate the survey designs for these examples.

PEP M2 Radiation Detection for Homeland Security, including Detectors and Algorithms and Such
James Ely

Pacific Northwest National Laboratory

In the past twenty years or so, there have been significant changes in the strategy and applications for security. With the fall of the former Soviet Union and the tragic events of 9/11, significant efforts have been aimed at deterring and interdicting terrorists and associated organizations. This is a shift in the normal paradigm of deterrence and surveillance of a nation and the 'conventional' methods of warfare to the 'unconventional' means that terrorist organizations resort to. With that shift comes the responsibility to monitor international borders for weapons of mass destruction, including radiological weapons.

As a result, countries around the world are deploying radiation detection instrumentation to interdict the illegal shipment of radioactive material crossing international borders. These efforts include deployments at land, rail, air, and sea ports of entry in the US and in European and Asian countries. Radioactive signatures of concern include radiation dispersal devices (RDD), nuclear warheads, and special nuclear material (SNM). Radiation portal monitors (RPMs) are used as the main screening tool for vehicles and cargo at borders, supplemented by handheld detectors, personal radiation detectors, and x-ray imaging systems.

Some cargo contains naturally occurring radioactive material (NORM) that triggers "nuisance" alarms in RPMs at these border crossings. Individuals treated with medical radiopharmaceuticals also produce nuisance alarms as well as legitimate shipments of industrial radioactive sources. The operational impact of handling these nuisance alarms can be significant. Methods have been developed and are continually being improved to reducing this impact without affecting the requirements for interdiction of radioactive materials of interest.

This presentation will discuss some of the programs associated with the detection and interdiction of illegal movement of radioactive material. The role of the relatively new Department of Homeland Security with the different projects and programs will be presented. Experience with RPMs for interdiction of radioactive materials at borders will be discussed including nuisance alarms and the methods to alleviate their impact. Finally, an overview of some current and future plans in this area will be discussed.

PEP M3 Developments in Radiation Litigation

Doug Poland

LaFollette Godfrey & Kahn

2005 was a very active year for lawsuits in which radiation exposure was claimed to have injured people or damaged property. Among the notable trials that occurred within the past year were those involving releases of radioactive materials from former facilities at Hanford and Rocky Flats. This class will discuss those trials and developments in other cases and judicial opinions from the past year involving allegations of physical injury or property damage caused by radiation exposure or environmental releases. The issues and judicial opinions that will be covered include the structure of the court systems in which radiation-related legal claims typically are brought; the types of legal claims that are most often alleged and what is required to prove those claims; legal standards for determining whether any particular exposure was the cause of a particular injury; differences in the standards of conduct that apply to contractors and licensees under state and federal law (through the Price-Anderson Act); and exposure-based claims such as medical monitoring and emotional distress.

PEP M4 Red Bead Experiment

Steve Prevette

Fluor Hanford Inc.

The "Red Bead Experiment" was an interactive teaching tool that Dr. Deming made use of in his four-day seminars. In the experiment, a corporation is formed from "willing workers", quality control personnel, a data recorder, and a foreman. The corporation's product is white beads, which are produced by dipping a paddle into a supply of beads. The paddle has 50 holes in it, and each hole will hold one bead. Unfortunately, there are not only white beads in the bead supply, but some defective red beads. The production of the

beads is strictly controlled by an approved procedure. Various techniques are used to ensure a quality (no red bead) product. There are quality control inspectors, feedback to the workers, merit pay for superior performance, performance appraisals, procedure compliance, posters and quality programs. The foreman, quality control, and the workers all put forth their best efforts to produce a quality product. The experiment allows the demonstration of the effectiveness (or ineffectiveness) of the various methods. Some humor is also included along the way. Describing the Red Bead Experiment has all the dangers of writing a good movie review. One does not want to give out the complete plot line in the description. Suffice it to say that at the end of the experiment, a Statistical Process Control chart is utilized to examine the results of the experiment. What is discovered is that several of the actions taken (which are commonly seen every day in the workplace) were detrimental to the employees and the workplace, and had no improving effect on the process. The concluding comments point out the hazards of misuse of performance data, and how to properly use performance data in a quality environment in order to achieve continual improvement. At Department of Energy presentations, the Red Bead experience is reviewed in the context of the Guiding Principles and Core Functions of the Integrated Environment, Safety and Health Management System (ISMS).

PEP M5 Skin Dosimetry and Varskin 3

James Durham

Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute

The skin is the primary target organ during personnel contamination events. In August 2004, an upgraded computer code for modeling the dose to skin from skin contamination was released. Varskin

3 Version 2.2 was written for the US Nuclear Regulatory Commission in FORTRAN and Visual Basic. Several errors were discovered in Version 2.2 that have since been corrected in Version 3.0. The Windows-based code models both infinitely-thin and particulate sources either directly on the skin or on a cover material such as protective clothing. Adding radionuclides to the Varskin 3 library has been greatly simplified, and data entry is accomplished on a single screen. This presentation will discuss the biological effects of radiation on skin at both high and low doses and will provide a demonstration of Varskin 3 with hands-on examples. Attendees will receive an instructional version of Varskin 3 Version 3.0 and electronic copies of the Users Manual and QA documentation.

Tuesday, 6/27 - 12:15 - 2:15 PM

PEP T1 Public Health Response to a Nuclear/ Radiological Emergency

Armin Ansari

Centers for Disease Control and Prevention

An overview of public health issues and challenges involved in responding to a major nuclear/radiological incident is presented. Lessons learned from previous radiation incidents, the National Response Plan, and CDC's roles and responsibilities in a nuclear/radiological incident are described. Other specific topics of discussion include: population monitoring issues and challenges; use of hospital medical equipment to support population monitoring activities in the immediate phase of the response; the radiation pharmaceuticals in the Strategic National Stockpile (SNS) and other drugs commonly referred to as "anti-radiation" drugs, an overview of their potential benefits and limitations; and the roles of health physicists and medical physicists in public health response to such emergencies.

PEP T2 Shielding Design for PET and PET/CT Clinics

Robert Metzger

Radiation Safety Engineering

The number of Positron Emission Tomography (PET) centers has been growing rapidly. Many of the new facilities have been retrofitted into existing imaging centers and hospitals. Space in the facilities is often cramped, resulting in the hot lab, patient quiet rooms, and the scanners frequently being placed in close proximity to uncontrolled areas where non-occupational dose limits apply. Shielding design is difficult due to the mobile nature of the source (dosed patient).

In this PEP, the function and typical layouts for PET or PET/CT clinics will be discussed and the shielding design issues associated with these layouts will be reviewed. The AAPM guide for shielding design of PET clinics will be reviewed in detail and examples of typical shielding calculations will be presented using both point kernel and Monte Carlo methods. Finally, advanced MCNP and Mercurad shielding design methods for layered floor and ceiling shielding will be shown.

PEP T3 The Scientific Basis of Dose Reconstruction

Dick Toohey

Oak Ridge Associated Universities

This presentation will begin with a 30-minute overview and update of the NIOSH dose reconstruction project for claims under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). The remainder of the presentation will identify the scientific issues involved in dose reconstruction, and how they have been addressed for EEOICPA claims. One hundred and eighty seven issues were identified by a comprehensive review of the literature, other dose reconstruction programs, NIOSH project documents, worker input, internal audits, Advisory Board comments, and findings of the Advisory Board's inde-

pendent oversight contractor. Issues could be divided into three broad categories: data issues, dosimetry issues, and compensation issues, which account for 12%, 74%, and 14% of the total, respectively. Not surprisingly, half of the dosimetry issues were related to internal dose estimates.

Almost all issues had been adequately addressed in project documents or the open literature, but a few required further development, including the use of classified data in dose reconstructions that are public documents, the determination of "completeness" of monitoring records, and the establishing the appropriate balance of scientific detail and timeliness in claim processing.

Finally, the unique needs of dose reconstruction for a compensation program will be identified and discussed, in contrast to dose reconstruction for litigation, epidemiology studies, accident management, and dose of record.

PEP T4 Leading with Leading Indicators

Steve Prevette

Fluor Hanford Inc.

This paper documents Fluor Hanford's application of Leading Indicators, management leadership, and statistical methodology in planning and decision making. These methods have improved safe performance of D&D work at the Hanford site. These safety improvements were achieved during a period of transition to D&D.

Leadership, Leading Indicators, statistical methodology, and worker-supervisor teaming are playing a key role in safety and quality at what has been called the world's largest environmental cleanup project. The U.S. Department of Energy's (DOE) Hanford Site played a pivotal role in the nation's defense beginning in the 1940s when it was established as part of the Manhattan Project. After more than 50

years of producing nuclear weapons Hanford, which covers 580 square miles in southeastern Washington state, is now focused on three outcomes:

1. Restoring the Columbia River corridor for multiple uses.
2. Transitioning the central plateau to support long-term waste management.
3. Putting DOE assets to work for the future.

The integration of data, leadership, and teamwork pays off with more efficient cleanup, better safety performance and higher credibility with the customer. Specific management theories covering Systems Thinking from Deming, Senge, and Ackoff have been applied to Fluor Hanford's operations. The U.S. OSHA Voluntary Protection Program has been an effective method to focus management leadership and employee involvement in the D&D effort. The use of Statistical Process Control, Pareto Charts, and Systems Thinking and their effect on management decisions and employee involvement are discussed. Included are practical examples of choosing leading indicators and how they apply to risk reduction. A new, statistically based color-coded dashboard presentation system methodology is provided. This new dashboard methodology provides strong benefits over traditional "rainbow" charts while maintaining the direct and simple message of red, yellow, and green color codes. These tools, management theories and methods, coupled with involved leadership and employee efforts, directly led to significant improvements in worker safety and health, and environmental protection and restoration at one of the nation's largest nuclear cleanup sites.

PEP T5 Uncertainty Assessment in Atmospheric Dispersion Computations

Erno Sajo

Louisiana State University

Atmospheric dispersion models based on elementary statistical theory (such as the Gaussian plume model) compute time-averaged concentrations at fixed points downwind. It is well-known that the model predictions entail uncertainties. Most often, this is expressed in terms of factor of validity, but it may also be shown as a spatial uncertainty interval about the location of the computed mean. Most of the computer models, however, including all widely used NRC and EPA regulatory models, do not incorporate any type of uncertainty handling, and in most cases they do not warn the user of the fluctuations in the predicted values of dose or local concentration. In 40 CFR 51 EPA recognizes the importance of estimating the prediction uncertainties, and it makes it the modeler's responsibility to advise the decision maker of this fact, and to provide an assessment of these uncertainties, both in space and in magnitude, and their impact on the evaluation of hazard zones. Because EPA does not give guidance on specific methods of implementation, and because most regulatory, emergency, and release reconstruction models do not sanction any uncertainty handling, it is a serious challenge to meet the spirit of the regulations. This lecture will give an overview of the fundamentals in uncertainty estimation both in magnitude and in spatial location of the predicted mean concentration. Application of a computer code that addresses some of the uncertainties will be shown. Practical methods will be given to assess the uncertainties even when the computer model does not provide this information explicitly.

Wednesday, 6/28 - 12:15 - 2:15 PM

PEP W1 ALARA for Radioactive Effluents: Regulatory History and Application for Next Generation Power Reactor Licensing

J. Stewart Bland

Chesapeake Nuclear Services, Inc.

The Federal Regulations governing the implementation of ALARA for radioactive effluents for nuclear power reactors are contained in Title 10 of the Code of Federal Regulations, Chapter 50, Appendix I. The ALARA concept for radioactive effluents was originally promulgated in December 3, 1970, with the final rule issued May 5, 1975. These regulations not only address allowable releases of radioactive effluents during operations but also specify radwaste system design requirements. It has been 30 years since the rule was promulgated and 20 years since NRC last implemented these regulations for the initial licensing of a nuclear power plant. Since that time, there have been two (2) major changes in dosimetric modeling (ICRP-30 and ICRP-68) as well as improvements in environmental modeling and radwaste processing capabilities. This course will provide a brief overview of regulatory requirements, a historical perspective on the development of the 10CFR50, Appendix I rule and a perspective of what it may mean for the licensing of the next generation nuclear power plants.

PEP W2 Detection, Measurement, and Decision

Joe Alvarez

Auxier & Associates

Making a decision requires asking a question then collecting enough data to support the decision. Measurement (collecting enough data) is a quantitative process while detection is generally considered qualitative. Clear decisions require quantitative data beyond the

region of Type I and Type II errors. While detection may be described as optimizing the region of error, quantitative measurement is data with the smallest amount of error. Decision is not as fundamental as either detection or measurement, but includes value-based weighting of data. Decision, therefore, requires prior investigation of outcomes considering the cost and consequences of wrong decisions. For this reason decision theory incorporates Bayesian probability theory.

Most control and monitoring systems in radiological safety and site survey expect non-detects or measurements below the control or decision threshold. Since non-detects are the norm most established programs are insensitive to false positives and have sufficient conservatism to ignore false negatives. When action is necessary for each measurement, such as for highly visible cleanup or anti-terrorist activities, the consequences of a decision may be critical. Strategies such as measurement in depth may be necessary.

This course will present detection theory for small total counts; measurement theory including total propagation of error and error estimation; and decision theory based on value weighting and Bayesian methods. Simple practical examples will be included.

PEP W3 Principles of Physical Security for Radioactive Sources

John Pelletier

NNSA DOE (Sandia)

This session will describe the basic Physical Protection methodology, employed by the Department of Energy/National Nuclear Security Office of Global Radiological Protection in providing radiological source security enhancements internationally and domestically. The key concepts of threat based design, detection, delay and response along with cost effective security

upgrades, and administrative procedures will be discussed.

PEP W4 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 W5 New Homeland Security Instrument Performance Standards

Michelle Johnson

Pacific Northwest National Laboratory

During this course, participants will become familiar with instrument performance standards recently developed to address performance requirements for instrumentation used by Department of Homeland Security. Two of the four standards recently developed will be discussed: ANSI N42.32, American National Standard Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security and ANSI N42.33, American National Standard for Portable Radiation Detection Instrumentation for Homeland Security. The presenter will

spend time discussing test methods used to evaluate an instrument performance against the criteria in the standards. Individuals interested in developing a deeper understanding of the requirements in these standards and in how instruments are evaluated will benefit from attending the course.

Continuing Education Lectures

Monday, June 26 through Thursday, June 29, 2006 - 7:00-8:00 AM

Included in Registration Fee

Monday - 7:00-8:00 AM

CEL1 The High Background Radiation Area in Ramsar Iran

Andy Karam

MJW Corporation

The city of Ramsar Iran has the highest measured radiation levels of any populated part of the world, due to very interesting geology and geochemistry. While many health physicists have heard of Ramsar, few in the US have had the opportunity to visit it themselves, and there are many who wonder if the reports of high radiation levels are to be trusted (and where the radiation levels come from). In this lecture, we will try to put these doubts to rest! We will discuss the unique geology and geochemistry that has given rise to Ramsar's extraordinarily high levels of background radiation and the radiation levels measured by our lecturer during a visit to this area in November, 2000.

CEL2 Radiation Safety for Security Based Applications: The U.S. Customs and Border Protection Methodology

Rick Whitman

US Customs and Border Protection

The historical first mission of US Customs Service, from 1789 to 2003, was to protect the interests of the nation by collecting tariffs and duties, protecting trade and health screenings of immigrants. Over time, the mission grew to include the detection of contraband. In March 2003, as part of the creation of the Department of Homeland Security, the US Customs Service was reorganized into US Customs and Border Protection (CBP). The number of employees grew as substantial por-

tions of the Immigration and Naturalization Service and the US Department of Agriculture were merged into the old US Customs Service. Also added, but maintaining its historical uniforms and mission, was the US Border Patrol.

As part of this expansion, CBP placed many more non-intrusive inspection scanning machines at Ports of Entry to examine cargo for contraband, examination of manifest against actual conveyances and now to look for weapons of mass destruction. These machines range from gamma and x-ray to higher MeV accelerators and some neutron applications. This presentation elaborates on the extensive steps taken by CBP to ensure that all employees and the public are protected below the radiation levels authorized the general public.

Tuesday - 7:00-8:00 AM

CEL3 The Lions, Rhinos and Reactors of South Africa

Dave Allard

Pennsylvania Department of Environmental Protection Bureau of Radiation Protection

This presentation is an overview of a recent trip to South Africa by the author and his wife. The technical portion of the talk will cover an introduction to the past and current nuclear programs in the country, including their conventional light water power reactors, uranium production and a new gas-cooled pebble bed nuclear reactor. The Pebble Bed Modular Reactor (PBMR) is being developed in conjunction with other offshore nuclear organizations, with the hope of breaking ground and constructing a prototype in

South Africa beginning in 2008. A brief discussion of the country's past nuclear weapons program, an IAEA verified dismantlement of that program, and current non-power reactor nuclear technology program will be included. Though the mine site wasn't visited, a side-bar overview of the natural reactor at the Oklo site in Gabon, Africa is included. No doubt the most interesting aspect of the presentation will be a photo slide show covering the natural and cultural beauty of this fascinating country. Photos include scenes from Cape Town and surroundings (i.e., the V&A Waterfront, District 6 museum, Robben Island, Company's Gardens, Table Mountain and Cape of Good Hope, local vineyard), Johannesburg and the amazing Pilanesberg Game Park. Lastly, South Africa made a presentation at the last IRPA meeting, indicating their desire to host the IRPA-13 meeting in 2012. This author wishes them the best with their bid - as it is an incredible venue for such a meeting!

CEL4 Internal Dose Issues in Pregnancy

Mike Stabin

Vanderbilt University

The radiosensitivity of the developing embryo and fetus presents unique problems in the protection of pregnant workers and the pregnant medical patient. This CE will review current models and methods for radiation dose calculations to the embryo and fetus from radioactive materials incorporated into the body and give an overview of current practice and knowledge in this area. For workers, a review of international practices on approaches to the protection of pregnant workers and their offspring will be given. For nuclear medicine patients, available dose estimates for a number of important radiopharmaceuticals will be studied, and

particular problems related to fetal dosimetry (e.g. fetal thyroid uptake of radioiodines) will also be discussed. A brief overview of current knowledge on radiation effects on the embryo and fetus will also be provided.

Wednesday - 7:00-8:00 AM

CEL5 A Review on Distribution of Radiopharmaceuticals: Implication on Radiation Therapy and Protection

Lanka Venkata

University of Medicine and Dentistry of New Jersey, Newark, New Jersey

To perform internal dose calculations, the nuclear medicine assumes uniform distribution in an organ, sub-organ or tissue levels. It calculates the mean absorbed dose. The calculations involve energy emitted per radioactive decay, the fraction of the energy absorbed in various tissues/organs and the effective half-life and predicts the biological response. From a review of recent research articles, it is evident that the administered radiopharmaceuticals are distributed non-uniformly in tissue. Although, it appears that the radiopharmaceuticals uniformly distribute through out the tissue at the macroscopic level, at a closer look at the cellular level (microscopic level) shows that the radiopharmaceuticals distribute non-uniformly. The mean absorbed dose to a tissue element is no more suitable to predict biologic effect due to the non-uniform distribution. Since the average absorbed dose to the kidneys using single-region dosimetric model can misrepresent the dose to local substructures of the kidney, the MIRD committee of the Nuclear Medicine developed a MIRD pamphlet No. 19 entitled "Absorbed Fractions and Radionuclide S values for six Age-Dependent Multiregion Models of the Kidney," to address this issue. In addition, the

bystander effects should also be considered to accommodate the non-uniform distribution of radiopharmaceuticals. This presentation will review various aspects of uniform and non-uniform distributions in tissue and overall consideration to look into the basis for radiation therapy and radiation protection.

CEL6 Saxton Nuclear Reactor Decommissioning

Rodger Granlund

The Saxton Nuclear Reactor was a 23.5 MWt pressurized water test reactor built by Westinghouse on the site of a coal-fired power plant in Saxton, PA. It went critical in 1962 and operated for 10 years. Ideas, such as boron shim, Pu mixed-oxide fuel, and the laminated steel pressure vessel were investigated at Saxton. It was also used to train reactor operators for many of the early nuclear power plants. The fuel was removed after the shutdown in 1972 and sent to Savannah River. The control building and other structures were partially decommissioned in 1972-74. Decontamination and removal of the outbuildings was accomplished in 1987-1992. Final decommissioning of the containment vessel and other parts of the site was started in 1996 and finished in 2005. One of the components of the final decommissioning was the Independent Inspection Program. Penn State University was contracted for this program by GPU and Rodger Granlund, University Health Physicist, served as the Independent Inspector. The Independent Inspector was given free access to the site and reported to the Bedford County Commissioners and the Saxton Citizens Taskforce on the progress of the decommissioning. The decommissioning was one of the first projects completed under the new NRC decommissioning rules. It took much

longer and was much more expensive than expected, but resulted in unrestricted release of the site and license termination in Nov 2005. Rodger will discuss the major aspects of the decommissioning and the Independent Inspection Program and some of the reasons for the unanticipated costs and time to complete the project.

Thursday - 7:00-8:00 AM

CEL7 Medical Triage and Management of Radiation Terrorism Events

Ronald E. Goans

MJW Corporation

Hospital emergency personnel should expect to triage victims of an RDD incident using traditional medical and trauma criteria. Victims from an RDD event may have trauma from the conventional explosive and these injuries should be addressed first. Early identification of the isotope is crucial in the medical management of the acute phase of the incident. Decorporation therapy in the ED is primarily used to mitigate the stochastic effects of radiation dose. A terrorism scenario is presented where mass casualty radiological triage decision levels are based on a bioassay threshold of 0.25 Annual Limit of Intake (ALI) for infants and children less than 15 years of age and 5 ALI for adults. Expert opinion in the field of radiation medicine suggests a factor of 5 higher sensitivity in infants and children to the long-term effects of radiation. The decision threshold of using 0.25 ALI for infants and children as noted above is therefore conservative at a factor of 20. From medical experience with industrial radiation accidents, decorporation therapy is generally recommended for intake >5-10 ALI, and certainly for intake > 10 ALI. High-level external dose and the resultant neutropenia and sepsis will be treated according to current guidelines for

treatment of the Acute Radiation Syndrome (ARS) and consistent with Guidelines of the Infectious Diseases Society of America (IDSA).

CEL8 Induction, Repair and Biological Consequences of Clustered DNA Lesions

Rob Stewart

Purdue University School of Health Sciences

The passage of ionizing radiation through living organisms initiates physical and chemical processes that create clusters of damaged nucleotides within one or two turns of the DNA. These clusters are widely considered an important initiating event for the induction of other biological endpoints, including cell killing and neoplastic transformation. The mechanisms and types of DNA damage induced by low and high linear energy transfer (LET) radiations will be reviewed, as will the mechanisms responsible for the repair of clustered DNA lesions. Results from Monte Carlo simulations of the induction and repair of DNA damage will be presented for energetic electrons and light ions. The Monte Carlo computer programs and sample input and output files will be made available to course participants.

2006 Exhibit Hall Floorplan

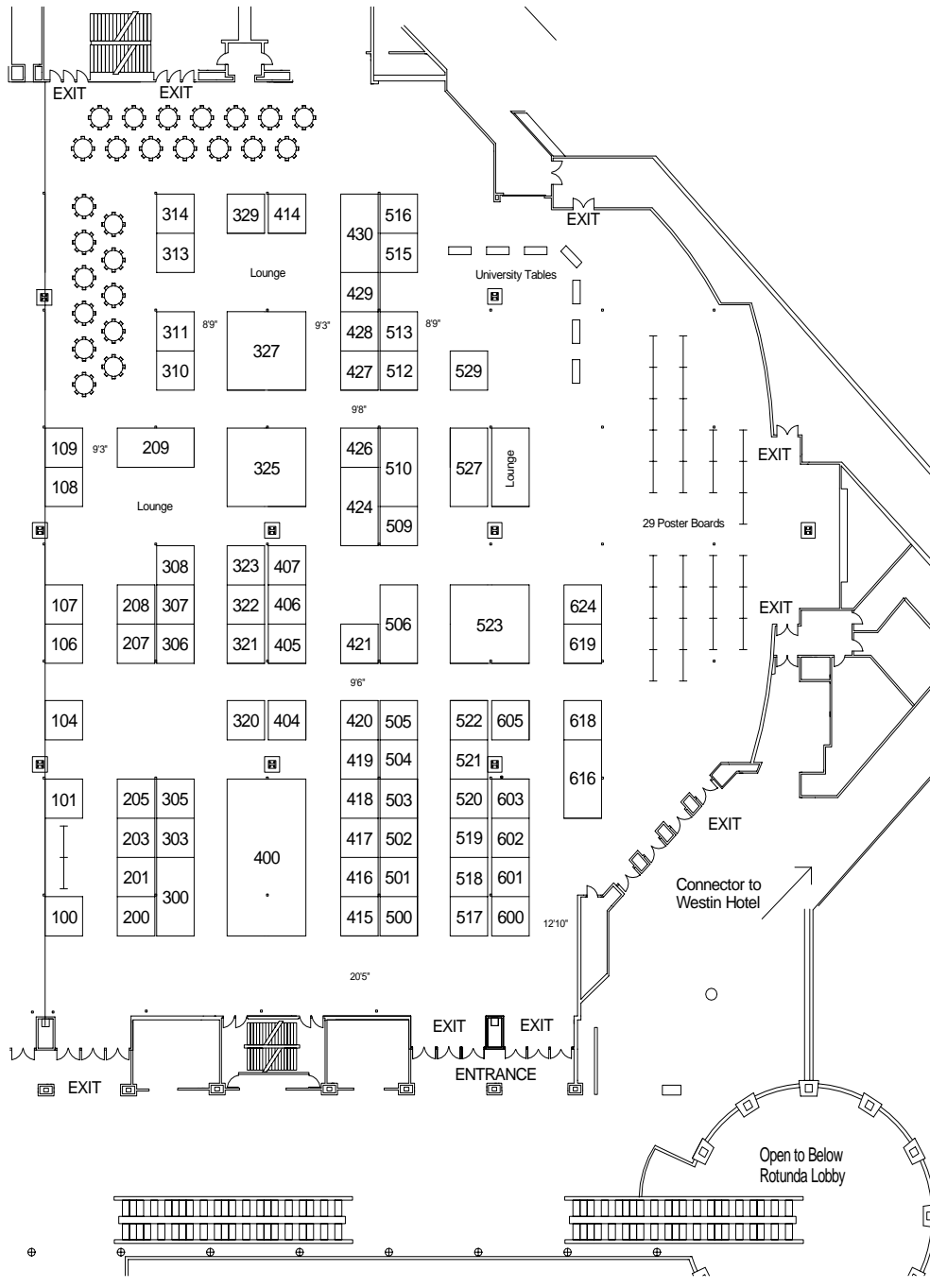


Exhibit Hall Hours

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

2006 Exhibitors

2007 ANNUAL MEETING - PORTLAND, OR **BOOTH: 203**

2007 MIDYEAR MEETING - KNOXVILLE, TN **BOOTH: 205**

AAHP/ABHP **BOOTH: 200**

ADCO SERVICES, INC. **BOOTH: 414**

Adco Services, Inc. handles the brokering for processing and disposal of radioactive, hazardous, and non-hazardous wastes.

ALPHA SPECTRA, INC. **BOOTH: 518**

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: 310**

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: 417**

Supplier of NIST-traceable radioactivity standards for the calibration of alpha, beta, and gamma-ray detectors. Provider of performance evaluation programs for effluent and environmental monitoring programs.

ANTKOWIAK AND MAHONEY ENTERPRISES, INC. **BOOTH: 515**

Antkowiak and Mahoney Enterprises Inc. offers health physics services. We have become successful because of our adherence to our basic premise - if we provide a quality service, then our customers will be more than satisfied, they will be HAPPY!

APANTEC LLC **BOOTH: 605**

Apantec LCC with extensive field-proven experience is pleased to offer a comprehensive line of cost-effective, innovative .net ready radiation monitoring technology including: - MCA-based, network-ready, lightweight/portable, Liquid, Area, and Air radiation monitors (Alpha, Beta, Gamma, Neutron, Tritium) - Fixed nuclear plant systems for Area, Continuous Air and Liquid effluents (safety and non-safety alike) - Digital Pocket Radiation Dosimeters - Comprehensive Software for collecting, converting, integrating, and analyzing data from all sources - P.E.T. Center/Accelerator-based radiation monitoring instrumentation - Homeland Security - Emergency Response Instrumentation

ARROW-TECH INC. **BOOTH: 207**

Arrow-Tech, Inc. is one of the few companies in the world that maintains the technology to manufacture the Direct-Reading Dosimeter. Arrow-Tech, Inc. maintains customers throughout the world, providing quality, reliable, durable products and service. We also handle a full line of radiation detection equipment.

ATLANTIC NUCLEAR GROUP **BOOTH: 618**

Radiation Detection, Shielding, and, Radiation Safety Products.

BARTLETT **BOOTH: 320**

Bartlett has over twenty-six years of experience providing radiation safety, decontamination, maintenance, janitorial, professional and other managed staff augmentation services to nuclear, industrial and government facilities nationwide. Bartlett also offers equipment and technologies including automated monitoring systems, portable ventilation systems and Excel modular scaffolding.

BERKELEY BOOTH: 521
NUCLEONICS CORPORATION
POLINUCLEONICS

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: 314

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.

CABRERA BOOTH: 321
SERVICES, INC.

Cabrera Services is a small business providing full-service environmental remediation services for hazardous, toxic and radioactive waste (HTRW) sites. Cabrera's capabilities include Environmental/Radiological Remediation, Remedial Construction, Radiological Engineering, Radioactive & Mixed Waste Management, Environmental Engineering, Munitions and Explosives of Concern (MEC) Response & Range Support.

CANBERRA INDUSTRIES BOOTH: 400

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: 517
ENVIRONMENTAL GROUP INC

Radioactive and mixed waste brokerage, processing and disposal. Radioactive and chemical hazard remediation and decommissioning. Sealed source recovery/recycle service available.

CHESAPEAKE BOOTH: 109
NUCLEAR SERVICES INC

Licensed to perform radiological surveys and decommissioning activities nationwide. MARSSIM practitioners. Program management, licensing support. Technology applications for effluents, tritium-in-groundwater, operational and environmental gamma spectral characterization. Proprietary wireless radionuclide detection/mapping system - MARSS Responder - for characterization and emergency response.

DADE MOELLER BOOTH: 510
& ASSOCIATES

Dade Moeller & Associates is an award-winning, employee-owned business specializing in occupational and environmental health sciences. We provide professional consulting services for assessing, preventing, and controlling harmful exposures from radiation and hazardous substances that affect workers, the public and the environment. Dade Moeller & Associates employs more than 25 Certified Health Physicists and has close, long-standing affiliations with national and international health physics organizations. Please visit us at www.moellerinc.com

DEPARTMENT OF HOMELAND SECURITY'S OFFICE OF GRANTS & TRAINING

BOOTH: 201

The U.S. Department of Homeland Security in coordination with the Department of Energy, the U.S. Navy, and the Health Physics Society is pleased to provide the following update on the Homeland Defense Equipment Reuse (HDER) Program. The HDER Program provides responder agencies across the nation access to a substantial inventory of excess radiological detection instrumentation and other equipment, training and technical support, all at no cost. The equipment available through the program includes: hand-held dose rate meters, electronic pulsers, count rate meters, pocket ionization chambers, instrument probes, personal protective equipment, and miscellaneous safety equipment. The HDER Program is constantly evolving and growing in order to better meet the needs of the first responder community and new equipment items will continue to be available as the program expands and matures.

ECOLOGY SERVICES, INC.

BOOTH: 513

Ecology Services, Inc. provides a variety of health physics services and front-end support to waste generators including waste characterization, tracking, packaging and shipment preparation. We support the requirements of both large and small generators.

ENERGY SOLUTIONS (SCIENTECH)

BOOTH: 405

Scientech has more than 31 years of experience providing health physics and decommissioning services to academia, DOE and commercial clients. From simple one laboratory decommissioning to full scale turnkey D&D projects-Scientech does it all.

FEMTO-TECH, INC.

BOOTH: 100

Manufacturer of continuous air and process radiation instrumentation.

FLUKE BIOMEDICAL

BOOTH: 600

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 SCIENTIFIC

BOOTH: 503

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: 529

Frham Safety Products, Inc. is a leading supplier of both Nuclear and Industrial safety equipment throughout North America. Serving both Commercial and Governmental facilities, Frham offers innovative radiation and contamination protection, health physics supplies, rad-waste reduction items, and custom manufacturing.

GAMMA PRODUCTS, INC.

BOOTH: 307

GasLess Alpha/Beta Counting System the Mini T.

GLOBAL DOSIMETRY SOLUTIONS, INC **BOOTH: 424**

Global Dosimetry Solutions provides radiation monitoring services to many industries. Crucial for managing the risks of cumulative radiation exposure, our solutions ensure the safety of individuals worldwide.

HEALTH PHYSICS INSTRUMENTS **BOOTH: 520**

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 multi-channel analyzers. HPI has been serving the Health Physics community for over 30 years.

HI-Q ENVIRONMENTAL PRODUCTS CO. **BOOTH: 500**

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: 505**

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: REGISTRATION AREA**

ILLINOIS INSTITUTE OF TECHNOLOGY **BOOTH: 322**

Internet-based program leading to a Masters Degree in Health Physics. No thesis Required.

INTERNATIONAL ISOTOPES, INC. **BOOTH: 512**

Cobalt source manufacture & recycling and provider of radiological services such as wipe test analysis and transportation support.

ISOTOPE PRODUCTS LABORATORIES & ANALYTICS, INC. **BOOTH: 416**

Isotope Products Laboratories is a NIST traceable laboratory supplying radioactive standards, sources and nuclides for counting room use, instrument calibration and environmental monitoring, specializing in custom requirements.

J. L. SHEPHERD & ASSOC. **BOOTH: 108**

Gamma, beta and neutron instrument calibration and dosimeter irradiation facilities, gamma research irradiators, process irradiators, and blood component irradiators with remote local and computer controls including calibration databases. Source/device decommissioning. Source/device decommissioning.

JP LABORATORIES, INC. **BOOTH: 323**

JP Laboratories introduces RADTriage™, the only dual-sensor (0-50 and 0-1,000 rads) personal radiation dosimeter with false positive/negative and expiration indicators. Recipient of R&D-100 and Frost & Sullivan Awards. Contact Fred Lucci, GF Distribution Services, Salem, CT @ 860 859 3806.

K & S ASSOCIATES **BOOTH: 624**

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 SYSTEMS LTD. BOOTH: 306

Stack area monitoring systems for aerosol, gas and liquid effluent measurement applications.

LANCS INDUSTRIES, INC. BOOTH: 419

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 BOOTH: 209

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 INSTITUTE OF AMERICA BOOTH: 501

Laser Institute of America is the professional society dedicated to fostering lasers, laser applications and laser safety worldwide. For three decades, LIA has served the laser community through conferences, symposia, publications and courses. The LIA is the secretariat and publisher of the ANSI Z136 series of laser safety standards. The LIA provides continuing education credits, ABIH CM points and BLS CM points for all our laser safety training courses which include in-house training.

LASER-PROFESSIONALS INC. BOOTH: 602

Laser-Professionals Inc. designs, produces and presents Laser Safety Training Programs, Services and Products for the Laser Safety Officer by Hands-on laser users with decades of

experience building lasers, using lasers and teaching people about lasers and laser safety. Services offered include: Onsite and Public venue Laser Safety Training Courses, * Laser Safety Training Videos, * Laser Hazard Analysis Software Tools, * Laser and Laser Safety Program Audits and Audit Training.

LAURUS SYSTEMS, INC. BOOTH: 407

LAURUS Systems specializes in the sales and service of quality radiation detection instruments to emergency responders, the nuclear industry, health physics, military and homeland security. LAURUS is a private, 100% woman-owned small business concern that also provides MJW software solutions, training and calibration services

LOS ALAMOS NATIONAL LABORATORY BOOTH: 106

The LANL - OSR Project is the DOE/NNSA focal point for removal of sealed sources from the public sector to reduce the potential threat. Under NNSAs Office of Global Threat Reduction, OSR has removed over 14,000 sealed sources from the commercial & educational institutions in the USA.

LUDLUM MEASUREMENTS, INC. BOOTH: 616

Ludlum Measurements, Inc. will be displaying a varied array of portable instruments, as well as Area Monitors, Portal Monitors, and other specialized monitoring systems. We will also have some historical units from the past on display.

MACTEC, INC. BOOTH: 430

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**

MGP Instruments designs, develops, markets and supports operational survey equipment and measurement systems in order to protect people, facilities and the environment against technological hazards and threats.

MJW CORPORATION BOOTH: 104

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.

**MJW TECHNICAL BOOTH: 603
SERVICES INC.**

MJW Technical Services, Inc. provides high quality and timely calibrations for all types of radiation detection equipment. MJWTS is the Ludlum Measurements Authorized Eastern U.S. Service Center so with our new state-of-the-art calibration facility strategically located in the northeastern U.S. we can quickly and efficiently service our customers. In addition to instrument calibrations MJWTS also provides customers with a source leak testing service and recognizes that a well-trained staff is a productive and safe staff so MJWTS offers a suite of technical training courses in key areas of OSHA compliance and communication. Other professional radiological services are

also available, check out our website at www.mjwts.com or call toll free 1-866-300-3MJW for more information.

NRRT BOOTH: 101

To encourage and promote the education and training of radiation protection technologists and, by so doing, promote and advance the science of health physics.

**OAK RIDGE BOOTH: 308
ASSOCIATED UNIVERSITIES**

ORAU provides a variety of services in the radiological sciences: training, environmental surveys, decommissioning, epidemiology, and emergency response.

**OAK RIDGE BOOTH: 305
NATIONAL LABORATORY-ENVIRONMENTAL EFFECTS LABORATORY**

The Environmental Effects Laboratory is part of the Engineering, Science, and Technology Division of Oak Ridge National Laboratory in Oak Ridge, Tennessee. Located on ORNL's main campus, testing capabilities include normal to extreme atmospheric conditions, and electromagnetic and mechanical environments.

ON SITE SYSTEMS, INC. BOOTH: 519

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 Assistant helps the RSO efficiently meet federal, state and local requirements for managing the safe use of radioactive material.

**ONYX/VEOLIA BOOTH: 516
ENVIRONMENTAL SERVICES**

Onyx/Veolia Environmental Services is a full-service waste management company. Our low-level radioactive services consist of radioactive and mixed

waste management from the point of generation through to treatment and disposal. This includes identification, classification, approval at a licensed treatment facility, audits of these treatment facilities for environmental and financial liability purposes, packaging, transportation and preparation of all necessary shipping documents. In addition, we provide on-site services where we manage our customers' (the licensed entity) waste directly on their site until it is ready to be shipped. We also provide consulting services and training.

ORDELA INC. BOOTH: 418

ORDELA, Inc. produces a line of alpha spectrometry instrumentation including the PERALS alpha-liquid scintillation spectrometer Frish-grid alpha spectrometer and 1000sq.cm windowless, ultra-low background gas flow proportional counters.

ORTEC BOOTH: 327

ORTEC has over forty years of experience providing solutions for a wide variety of Nuclear Detection Applications. Our team of highly qualified scientists and engineers are dedicated to providing measurement system solutions for Homeland Security, Waste Management, Personal Monitoring, In-Situ measurements, and Radiochemistry Laboratory Applications. Visit our booth today and allow us to assist you with your Nuclear Detection needs.

PACIFIC NORTHWEST NATIONAL LAB BOOTH: 313

Pacific Northwest National Laboratory (PNNL), operated by Battelle for the US Department of Energy offers radiological calibration and testing services. These services include dosimeter irradiations, instrument repair and calibration, instrument type testing, alpha and beta source recertification, transfer standard calibration, medical seed evaluations, research irradiations, and high dose irradiations in excess of 40,000 Rad/h. To learn

more about our services please visit us at http://environment.pnl.gov/resources/resource_description.asp?id=91&type=labs; <http://cra.pnl.gov> or call Michelle Johnson at (509) 376-4014.

PERKIN ELMER LIFE AND ANALYTICAL SCIENCES BOOTH: 300

Microbeta and Victor Z liquid scintillation counters.

PERMA-FIX ENVIRONMENTAL SERVICES BOOTH: 303

Perma-Fix Environmental Services provides turnkey hazardous, low-level radioactive and mixed waste treatment services at our fully licensed and permitted facilities. These services offer our customers with the most comprehensive hazardous, radioactive and mixed waste treatment services capabilities in the U.S.

PHILOTECHNICS, LTD. BOOTH: 522

LLRW and Mixed Waste brokerage services, HP services including D&D, license terminations, etc., and industrial hygiene services.

PROTEAN INSTRUMENT CORPORATION BOOTH: 404

Protean Instrument Corporation is the leading supplier in high performance alpha/beta counting systems and the only company 100% dedicated to the manufacture of these systems. We manufacture a wide range of models, including automatic, manual, single detector, multi-detector, windowed and windowless. We deliver twice the performance!

QSA GLOBAL BOOTH: 506

Formally trading as AEA Technology QSA, QSA Global's Isotrak brand manufactures high quality sources for the calibration of radiation measurement instruments. Isotrak offers the complete range of NIST-traceable Reference Sources for Homeland Security applications (ANSI N42.35/38) and a range of instruments for dose measurements like the Automess Teletector.

RADECO **BOOTH: 527**

Air sampling equipment and filter media.

RADIAC **BOOTH: 406**
ENVIRONMENTAL SERVICES

Radiac Research Corp. is the only licensed radioactive waste broker/transporter with a Low-Level Radioactive waste storage facility in the Northeastern United States. Radiac's impeccable safety record, responsible waste management practices and highly qualified staff provide cost effective disposal alternatives for some of the most challenging Radioactive and Mixed Waste streams.

RADIATION SAFETY **BOOTH: 426**
& CONTROL SERVICES INC.

RSCS specializes in: Health Physics Consulting, Decommissioning Support, Groundwater Investigations, Training, Survey Instrument Calibration & Repair, Source Leak Testing, Equipment Sales & Leasing, Radiation Safety Program Audits, Specialty/ Standard Field Measurements, License Application-Amendments. Software: Radiation Safety Manager, ISOMIX, and custom applications.

RADIATION SAFETY **BOOTH: 420**
ACADEMY

For those who want the best understanding and assurance of radiation safety. We have four Certified Health Physicists with over 75 years of combined experience. We provide training in all aspects of radiation safety from Radiation Awareness, Instruments, Regulations, Transportation, Radiation Safety Officer, to CHP Exam Preparation and others. We offer the best source of online training (www.RadTrainONline.com) and will even design courses specifically to meet your company's needs. Our CHPs can provide consultation for all types of radiation safety needs including; license application and amendments, sealed source and device registrations, on-site audits, radiation safety program development, effective

safety communications, and expert witnesses. Partner with the Radiation Safety for success and receive your free radiation safety program review.

RADIATION SAFETY **BOOTH: 428**
ASSOCIATES

Radiation consulting services, radiochemical analysis/lab services, instrument calibration & repair, decontamination & decommissioning, professional publications (journals & reference books) and software and detection equipment for HPs.

S. E. INTERNATIONAL, INC. BOOTH: 427

The Radiation Alert[®] product line offering handheld ionizing radiation detection instruments including Geiger counters, dosimeters, and multi-channel analyzers for surface and air contamination. Proven to be reliable in environmental, industrial, research, Health Physics and educational fields.

SAIC **BOOTH: 502**

SAIC will display its state-of-the-art dosimeters, dose management systems, personnel monitoring systems, and our modular suite of instruments with associated electronic survey mapping capability. All SAIC's manufactured products are built in the USA and are backed with over 30 years of expertise.

SAINT-GOBAIN **BOOTH: 421**
CRYSTALS SCINTILLATION PRODUCTS

Gas-filled radiation detectors; Scintillation crystals, including our exclusive Brilliance[™] crystals; Cast plastic and liquid scintillators; Plastic scintillating fibers; CdZnTe.

SANDIA NATIONAL **BOOTH: 107**
LABORATORIES

Sandia National Laboratories Security Specialists will be available to demonstrate technology and provide consultation/training related to Physical Protection design principles used in creating an effective security system for protecting high-risk radioactive sources.

SCIONIX **BOOTH: 415**

Scionix produces custom made detectors employing Scintillation Crystals and Materials. Our key themes are a quick interaction on new scientific developments regarding materials and detection techniques with a close collaboration with the end users.

SPECTRUM **BOOTH: 504**
TECHNIQUES

Radioisotope check sources, GM counting equipment, scintillation spectrometers.

TECHNICAL **BOOTH: 208**
ASSOCIATES

Recent additions to TA's Health Physics instrument line include air and area monitors, which are smarter, more sensitive and more rugged than previously available, in addition to pipe and plume and the latest advances in portables.

TELETRIX **BOOTH: 619**
CORPORATION

Teletrix manufactures the country's leading line of radiation training equipment. Uniquely designed, our various product lines are totally simulated with highly realistic interfaces using absolutely no radiation for safe training environments.

THERMO ELECTRON **BOOTH: 523**
CORPORATION

Thermo Electron Corporation, Environmental Instruments, manufactures air quality instruments for environmental compliance and water analysis products to radiation instrumentation systems for nuclear and homeland security markets.

TSA SYSTEMS, LTD. **BOOTH: 601**
Radiation Detection Equipment

UNITECH **BOOTH: 429**

UniTech is the world leader in radiological laundering and provider of a full line of protective clothing, including our signature "ProTech" garments. We also will be featuring Personal Climate sys-

tems for heat stress and information on our computerized, inventory controlled, Mobile Safety Stores.

U.S. NUCLEAR **BOOTH: 311**
REGULATORY COMMISSION

The mission of the U.S. Nuclear Regulatory Commission is to regulate the civilian use of nuclear power and nuclear materials to protect the health and safety of the public, the environment, and the nation. NRC monitors, enforces, and protects nuclear power plants that generate electricity as well as universities and hospitals that use nuclear materials.

XRF CORPORATION **BOOTH: 329**

XRF Corporation provides the finest hand held radionuclide identifiers and sensors available for homeland security, first responder, nuclear power, environmental and medical applications. The rugged and compact ICS-4000 product line utilizes unique Cadmium Zinc Telluride (CZT) detectors providing high-resolution instruments with superior identification capabilities.

PLENARY ABSTRACT

PL.1 Integrating Risk Analysis and Communication

Fischhoff, B.; Carnegie Mellon University, Pittsburgh

The fate of individuals, communities, and industries can depend on how well people understand the risks and benefits of activities and technologies producing radiation (as a goal or unwanted byproduct). Typically, most people can understand the critical facts well enough to make reasonable choices – if they receive them in a clear, concise form, before positions are set. Achieving this goal requires an integrated approach, drawing on four kinds of expertise: (a) subject matter specialists, for providing authoritative knowledge about the processes producing the risks and benefits; (b) risk and decision analysts, for extracting the decision-relevant facts from that knowledge; (c) behavioral scientists, for identifying beliefs and values in the target audience and evaluating the effectiveness of communications; and (d) communication specialists, for guiding the design and dissemination of messages. The health physics community has members with expertise spanning this set, hence is well-positioned to ensure that all are brought to bear, in a coordinated manner.

WORKS-IN-PROGRESS ABSTRACTS

P.49 Radiation Health and Safety of a Radioisotope Powered Micro-Fuel Cell

Maloy, K., Palmer, T.; *Oregon State University*

Radiation health and safety issues associated with a plutonium-powered radioisotope powered micro fuel cell (RMFC) were evaluated. The RMFC converts water into its component elements by radiolysis and the resultant hydrogen is used to power the fuel cell. This device is under development and is being considered for possible deployment with unattended sensing devices. In addition to emitting alpha particles from the decay of

plutonium, the RMFC produces secondary neutrons via (α, n) reactions. Several exposure scenarios were examined in order to assess the potential radiological impact from an intact and breached device. The scenarios include dose to personnel 30 cm from an RMFC, implanting one in the chest cavity, and accidentally ingesting the device. All exposure scenarios with the intact RMFC resulted in total effective dose equivalent rates of less than 2.5 rem per year. Exposure scenarios with a damaged RMFC considered inhalation of the radioisotope and resultant dose at acute (1-day) and committed/chronic (50-year) time frames. Inhalation dose coefficients (Sv/Bq) from Federal Guidance Report 11 were used to determine the resultant committed effective dose equivalent (CEDE) and relative risk due to the inhalation of the radionuclide. NUREG/CR-4214 guidelines for deterministic effects of acute exposure were used to examine the risk and possible lethality from high dose-rate acute exposures. These exposure scenarios were considered conservative, because it assumed no mitigating features are incorporated into the design of the RMFC. Mitigating features can reduce the amount of neutrons from (α, n) reactions and limit the amount of the radioisotope that will be available for atmospheric dispersion in the event the device is breached. The final analysis concludes that the dose to individuals living in a zone where the device has been breached will not receive more than 50 mrem in any one year following a dispersion event.

Although the RMFC is not necessarily designed to operate under the proposed exposure scenarios, a comprehensive evaluation of possible modes of exposure is informative and prudent. Particularly because the device employs radioactive material and applications of this technology demand the highest rigor in evaluating any plausible normal opera-

tion, or accident exposure scenario. This analysis will aid in the ongoing development of the RMFC prototype.

P.50 Determination of Enrichment Parameters after Reduction of Synthetic Tritiated Samples in a Proton Exchange Membrane Electrolyzer

Soreefan, A.M., DeVol, T.A.; *Clemson University*

Tritium enrichment of aqueous samples was conducted with a proton exchange membrane (PEM) electrolyzer and compared with conventional alkaline electrolysis. Tritium enrichment of water samples by alkaline electrolysis is well characterized and has been used over 40 years to determine environmental levels of tritium present in natural waters. As a result of the progress of fuel cell technology, development of PEM electrolyzers has occurred to the point where they are commercially available. PEM electrolyzers present advantages over classical electrolytic cells, which are: the simplicity of design and operation, compactness, no electrolyte solution needed, and the limitation of corrosion issues. The objective of the presented work is to determine the enrichment parameters of a commercially available proton exchange membrane electrolyzer. The knowledge of those parameters will determine the extent by which PEM electrolytic cells can be used for enrichment as well as to produce!

tritium gas for subsequent admission in a gas proportional counter. Fractionation factor B, recovery factor R and enrichment factor E were determined after synthetic tritiated water samples at a concentration near 740 Bq/L were reduced with a PEM electrolyzer. Results show that tritium enrichment is limited in the PEM electrolyzer relative to conventional electrolyzers. Lower values of both the enrichment and fractionation factors, relative to conventional electrolysis, are attributed to lower tritium recovery factors obtained with the PEM electrolyzer. Those findings

indicate that the PEM electrolyzer can be promisingly used as a reduction device for production of tritium gas, which can be subsequently counted with a gas counting system.

P.51 Large Size Chambers used for Calibrating a Cesium-137 Gamma-Ray Beam Irradiator

Minniti, R.; *National Institutes of Standards and Technology (NIST)*

A ¹³⁷Cs gamma-ray beam irradiator has been calibrated in terms of air-kerma using large-volume chambers. The range of air-kerma rates available are between 5.3 mGy/h (0.6 R/h) down to 1.8 uGy/h (0.2 mR/h). The four ion chambers used are spherical in shape. Two of the chambers are sealed to the atmosphere and pressurized with argon gas; their walls are made of stainless steel and their nominal volume is 8 L. The other two chambers are open to the atmosphere and therefore filled with air; their walls are made of air-equivalent plastic and have nominal volumes of 0.8 L and 3.3 L. These chambers have proved to be suitable despite their different characteristics. For example, the energy response of the chambers with different wall materials is significantly different. The two chambers with air-equivalent plastic walls have a relatively constant response, within 5 %, over a broad range of average photon energies between 60 kV and 662 keV. The chambers with stainless steel walls have a relatively constant response between approximately 300 keV and 662 keV, but the response decreases drastically, by about 40 %, as the average photon energy drops from 300 keV to 100 keV. This work shows that very good agreement can be obtained among measurements performed with such different types of chambers. For the lowest level air-kerma rates, agreement to within 0.3 % is observed among the different chambers, and much better agreement can be expected for higher air-kerma rates.

P.52 Derivation of Absorbed Fractions and External Dose Conversion Factors for Selected Reference Organisms Being Considered by the ICRP

Kamboj, S., Yu, C., Domotor, S.;
*Argonne National Laboratory, US
Department of Energy*

The International Commission on Radiological Protection (ICRP) is considering a set of Reference Animals and Plants (RAPs) for assessing radiation effects in nonhuman organisms. The RAPs under consideration include adult deer, rats, ducks, frogs, trout, flatfish eggs, bees, crabs, earthworms, pine tree trunks, grass, and seaweed. This work was performed in support of the RAP Dosimetry Modeling Task Group to ICRP Committee 5. The energy-dependent absorbed fractions for photons and electrons for selected RAPs (flatfish egg, pine tree trunk, adult deer, and duck) were calculated by using the Monte Carlo N Particle (MCNP) transport code. For deriving absorbed fractions, it was assumed that radionuclides were uniformly distributed in both the source medium and the exposed organism. The external dose rates from monoenergetic photons were calculated by using the MCNP for the rat and earthworm for the in-soil geometry, which assumed that the soil was homogeneously contaminated to a depth of 50 cm and that the organism was at a depth of 25 cm. The external dose rates for monoenergetic photons for the rat, earthworm, and pine tree trunk were also calculated for an on-soil geometry. In this case, it was assumed that the soil was uniformly contaminated to a depth of 10 cm and that an organism was on top of the soil. The approach taken in deriving absorbed fractions was generally consistent with the approach taken for reference organisms and geometries contained in the RESRAD-BIOTA code. In addition to supporting the ICRP in its consideration of appropriate RAPs, the products from this

work, upon their review and with consensus from appropriate government organizations, may be incorporated into the U.S. Department of Energy's (DOE's) RESRAD-BIOTA code to broaden the set of RAPs that the code already provides.

* Work supported by the U.S. Department of Energy, Office of Environmental Policy and Assistance and Office of Environmental Management, under Contract W-31-109-Eng-38.

P.53 A Comparison of Dose-Based Residual Contamination Levels Estimated for Five Geologically and Environmentally Distinct Locations

Tabriz, M., Bak, A., Higley, K.; *Oregon State University*

As part of a class project in radioecology, allowable residual soil contamination levels for Cs-137 were computed for five distinct environmental locations. Hypothetical contamination events were examined at three locations in the United States: Point Hope, Alaska; Hanford, Washington; and, Aiken, South Carolina. Two additional sites, near Pripjat, Ukraine, and on Enewetak Atoll in the Marshall Islands were also examined. Site-specific exposure scenarios were developed based on the environmental conditions unique to each site. These included farming, fishing, hunting, and other practices. The computer program RESRAD, developed by Argonne National Laboratories, was used to estimate the residual contamination levels. Contamination sufficient to deliver a 25 mrem/year dose rate at 1, 10, and 100 years were calculated. Residual soil concentrations ranged from 8000 Bq/m² in Pripjat, Ukraine, at 10 years time interval, to 4.0E10 Bq/m² in Point Hope, Alaska, after 100 years. The exercise illustrated the importance of defining both the likely pathways of exposure as well as the environmental setting in order to estimate an allowable contamination level.

P.54 A Preliminary Investigation Into The Dependence of Radiosensitivity On Mass Across A Range Of Phyla

Bytwerk, D., Higley, K.; *Oregon State University*

The results of a review of six decades of existing literature for 50% lethal dose data across a range of phyla are presented. The collected 50% lethal dose data is limited to adult organisms subjected to acute doses of gamma radiation. The data collected is examined to determine whether useful allometric relationships relating lethal dose and body size can be established. Comparative radiosensitivity is examined where the mechanism of death is the same, and across broader scales where the mechanism of death varies. Various power law fits to graphs of lethal dose vs. mass show a clear increase of radiosensitivity with mass across a number of orders of magnitude, but within an order of magnitude in mass it is difficult to make any useful predictions. The conclusion of this preliminary investigation is that allometric relationships can be useful in providing order of magnitude estimates of radiosensitivity based on mass, but must be used carefully and only as indicators of a general trend.

P.55 Estimation of Work-Related Medical X-ray Dose for the Multi-Site Leukemia Case Control Study

Anderson, J.L., Daniels R.D.; *National Institute for Occupational Safety and Health (NIOSH)*

Although many workers at nuclear facilities were required to have work-related medical x-ray examinations, doses from these examinations were not included in official individual dose monitoring records. Some examinations, such as photofluorographic chest x-rays resulted in significant doses relative to the worker's cumulative external occupational radiation dose. To reduce misclassification of dose in a multi-site leukemia case-control study,

annual bone marrow doses from work-related medical x-ray examinations were estimated for 1284 cases and controls from five U.S. nuclear facilities. The study group consisted of 257 leukemia cases, each age-matched to four randomly selected controls. Only active bone marrow dose from photofluorographic chest x-rays and lumbar spine x-ray examinations were included. Uncertainties in estimated bone marrow doses were also examined. Calculated bone marrow doses for photofluorographic chest x-ray examinations ranged from 1.0 to 1.4 mGy per exposure, with an arithmetic mean of 1.2 and a standard deviation of 0.2. Bone marrow doses for the lumbar spine views ranged from 0.21 mGy for the AP view to 0.5 mGy for the lateral view. Mean and median cumulative bone marrow doses from work-related x-rays for each of the five sites ranged from 2.0 to 14 mGy and 2.1 to 8.8 mGy, respectively. Numerous factors contributed to the uncertainty in bone marrow dose calculations including lack of specific information for some examination parameters and absence of medical records for some subjects. Assumptions made regarding the site medical programs, time period of use of photofluorographic and lumbar spine x-rays at the sites, and examination frequency introduced significant uncertainty in the bone marrow dose estimates relative to uncertainty introduced by the imputation of examination parameters in dose calculations.

P.56 Application Of Classical Versus Bayesian Statistical Methods To Online Radiological Monitoring Data

Attardo, A., French, P.D., DeVol, T.A.; *Clemson University, ADA Technologies, Inc.*

The on-line monitoring for illicit radioactive material with a minimum number of false positives is a critical need for homeland security. However, statistical fluctuations in the detector

signal, low detection times, long source to detector distances, and shielding effects make distinguishing between a radiation source and natural background particularly difficult. The primary objectives of this work are to apply both Bayesian and classical statistical process control chart techniques to the monitoring of radiological data and to then compare the Type I and Type II error incidence rates. Experimental radiological time series data was collected using a NaI(Tl) based gamma-ray dose and dose rate monitor (FH41P First Response, Thermo Electron, Santa Fe, NM) under various simulated conditions. Experimental parameters include radionuclide (gamma-ray energy), activity, density thickness (source to detector distance and shielding), time and temperature. All statistical algorithms were developed using Matlab version 7.1. The Shewhart, or three-sigma, control chart and the cumulative sum control chart are the classical procedures adopted, while a Bayesian technique employed is the Shiriyayev-Roberts control chart. Bayesian statistics provides a framework for monitoring unlike classical statistical procedures, and a comparison of the various methods will be presented.

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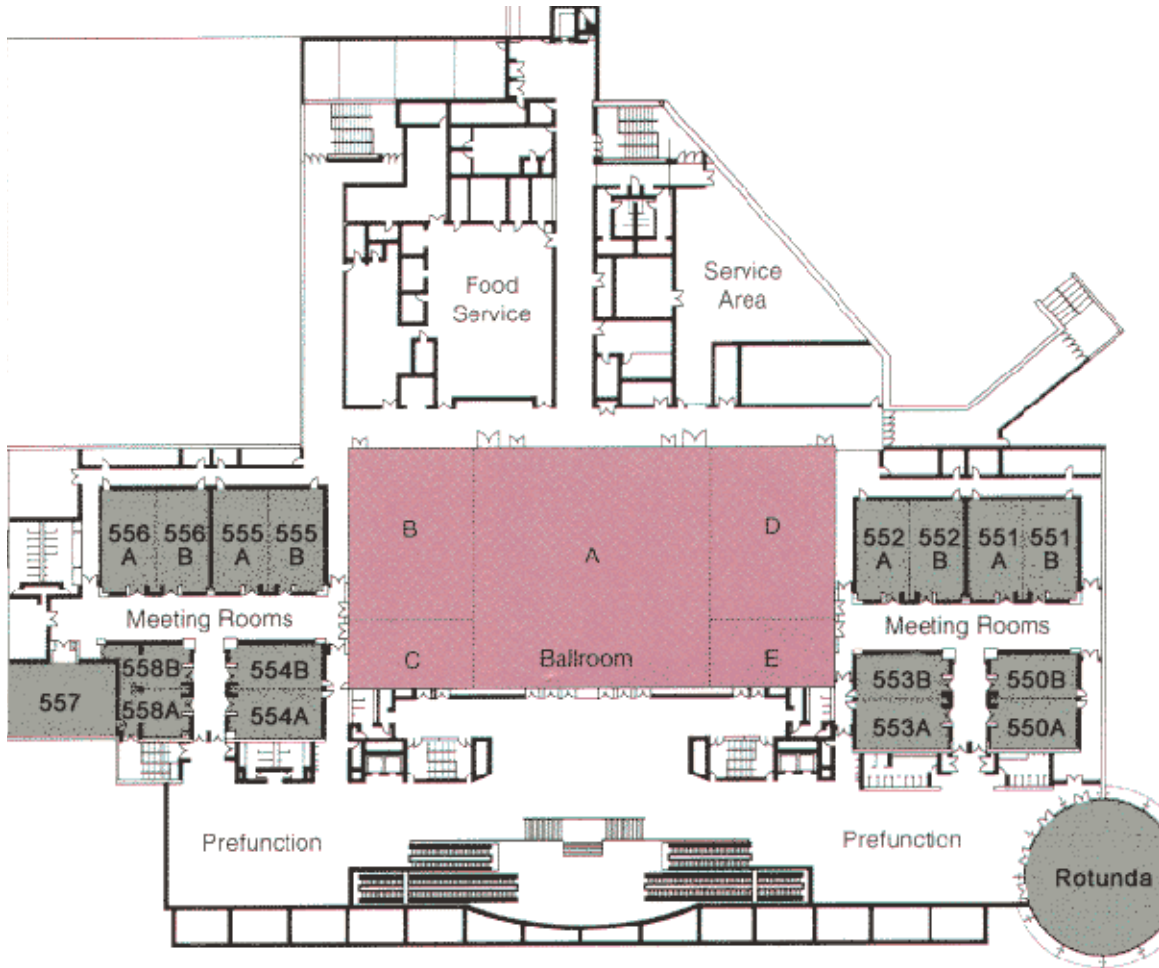
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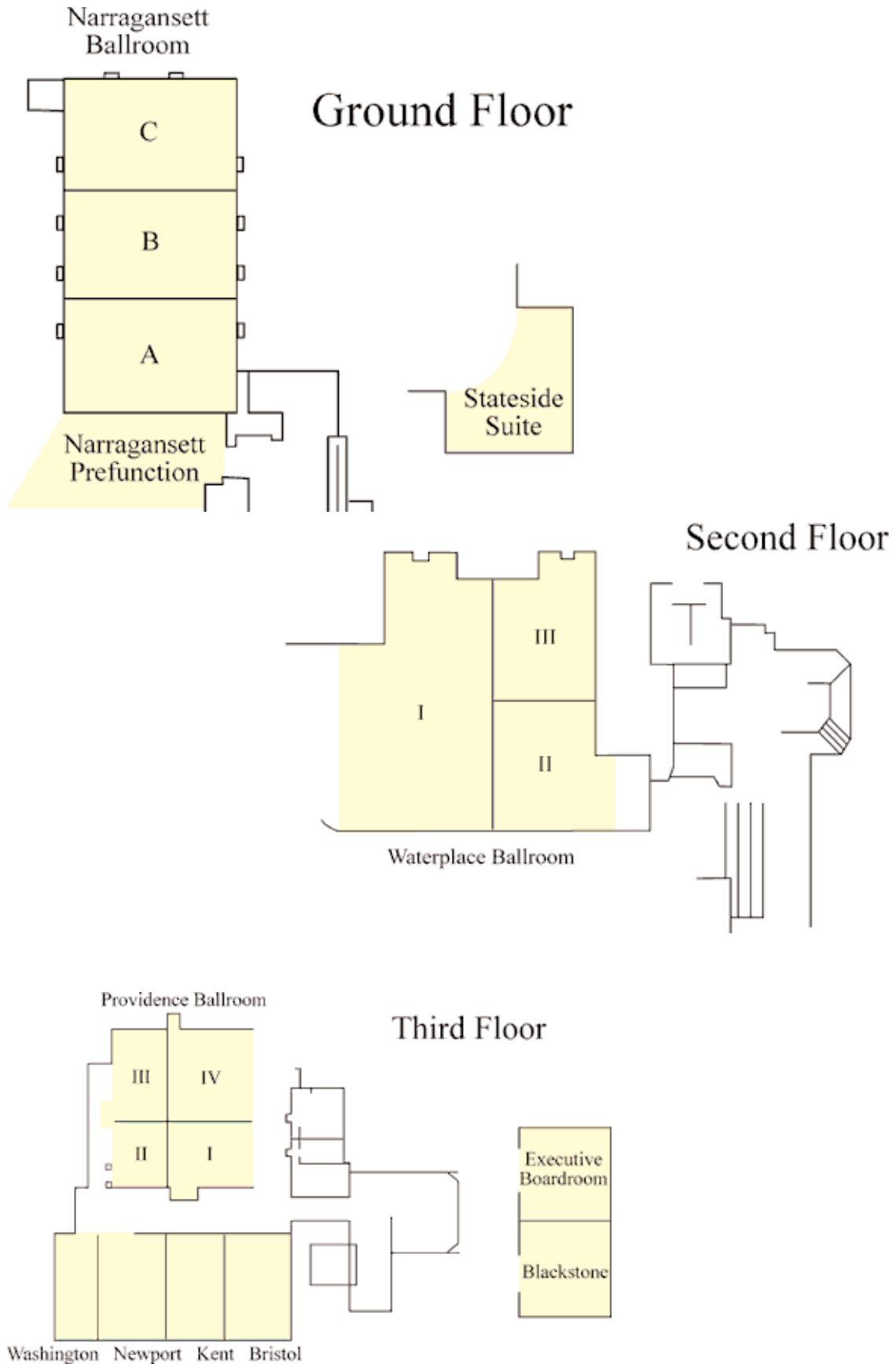
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Rhode Island Convention Center Floorplan



Westin Hotel Floorplans



Saturday, June 24	Monday, June 26	Tuesday, June 27
<p>AAHP 1 Introduction to Practical Monte Carlo Simulation for Health Physicists 8:00 am-5:00 pm <i>Providence I/IV (W)</i></p> <p>AAHP 2 Security Enhancement for Radiological Facilities and Sealed Sources 8:00 am-5:00 pm <i>Providence II/III (W)</i></p> <p>AAHP 3 Lab Accreditation Program and Technical Auditing 8:00 am-5:00 pm <i>Bristol/Kent (W)</i></p>	<p>CEL 1 The High Background Radiation Area in Ramsar Iran 7:00-8:00 am 551</p> <p>CEL2 Radiation Safety for Security Based Applications: The U.S. Customs and Border Protection Methodology 7:00-8:00 am <i>Ballroom B</i></p> <p style="text-align: center;">ABHP Exam - Part I 8:00 - 11:00 am <i>Narragansett A (W)</i></p> <p>PL1 Plenary Session 8:10 am-Noon <i>Ballroom A</i></p> <p style="text-align: center;">Lunch in Exhibit Hall for all Registrants and Opening of Exhibits <i>Exhibit Hall</i></p> <p style="text-align: center;">PEP Program 12:15-2:15 pm</p> <p>M1 Advanced MARSSIM Topics</p> <p>M2 Radiation Detection for Homeland Security, including Detectors and Algorithms and Such</p> <p>M3 Developments in Radiation Litigation</p> <p>M4 Red Bead Experiment</p> <p>M5 Skin Dosimetry and Varskin 3</p> <p style="text-align: center;">ABHP Exam - Part II 12:30-6:30 pm <i>Narragansett A (W)</i></p> <p style="text-align: center;">HPS Chapter Council 1:00-2:00 pm <i>Ballroom D</i></p> <p style="text-align: center;">Poster Session 1:30-3:30 pm <i>Exhibit Hall</i></p> <p>MPM-A Risk Analysis 3:30-4:45 pm 551</p> <p>MPM-B Internal Dosimetry and Bioassay 3:30-5:15 pm <i>Ballroom B</i></p> <p>MPM-C Instrumentation 3:30-4:45 pm <i>Ballroom D</i></p> <p>Historical Videos and Movies 3:30-5:00 pm 552</p> <p style="text-align: center;">Student Reception 5:30 - 6:30 pm <i>Waterplace I (W)</i></p>	<p>CEL-3 The Lions, Rhinos and Reactors of South Africa 7:00-8:00 am 551</p> <p>CEL-4 Internal Dose Issues in Pregnancy 7:00-8:00 am <i>Ballroom B</i></p> <p>TAM-A Variation of Dissolved Radon Concentration in Private Wells 8:30 am - Noon 551</p> <p>TAM-B Government Section Session 8:30 am-Noon <i>Ballroom B</i></p> <p>TAM-C AAHP Session 8:30 am-Noon <i>Ballroom D</i></p> <p style="text-align: center;">Historical Videos and Movies 8:30 am-Noon 552</p> <p style="text-align: center;">Gov't Section Business Mtg Noon <i>Ballroom B</i></p> <p style="text-align: center;">AAHP Awards Luncheon Noon-2:15 pm <i>Narragansett A (W)</i></p> <p style="text-align: center;">PEP Program 12:15-2:15 pm</p> <p>T1 Public Health Response to a Nuclear/Radiological Emergency</p> <p>T2 Shielding Design for PET and PET/CT Clinics</p> <p>T3 The Scientific Basis of Dose Reconstruction</p> <p>T4 Leading wit Leading Indicators</p> <p>T5 Uncertainty Assessment in Atmospheric Dispersion Computations</p> <p>TPM-A RSO Special Session 2:30-5:30 pm 551</p> <p>TPM-B External Dosimetry 2:30-5:30 pm <i>Ballroom B</i></p> <p>TPM-C AAHP Session 2:30-5:15 pm <i>Ballroom D</i></p> <p style="text-align: center;">NESHAP Meeting 2:30-5:00 pm 555B</p> <p>RSO Section Business Meeting 5:30 pm 551</p> <p style="text-align: center;">Historical Videos and Movies 2:30-5:00 pm 552</p> <p style="text-align: center;">AAHP Business Meeting 5:15 pm <i>Ballroom D</i></p> <p style="text-align: center;">HPS Awards Dinner & Reception 7:00-10:00 pm <i>Ballroom A/B/C</i></p>
<p>Sunday, June 25</p>		
<p>PEP 1-A thru 1-H 8:00-10:00 am</p> <p>PEP 2-A thru 2-H 10:30 am-12:30 pm</p> <p>PEP 3-A thru 3-H 2:00-4:00 pm</p> <p style="text-align: center;">Welcome Reception 6:00-7:00 pm <i>Ballroom A, Convention Center</i></p>		
<p>All Events are in the Convention Center or Westin Hotel (W)</p>		

Wednesday, June 28	Thursday, June 29	Registration Hours
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CEL-5 A Review on Distribution of Radiopharmaceuticals: Implications...
7:00-8:00 am 552

CEL-6 SAXTON Nuclear Reactor Decommissioning
7:00-8:00 am Ballroom B

WAM-A Decommissioning Section Special Session
8:45-11:15 am 552

WAM-B Medical Health Physics
8:30 am - Noon Ballroom B

WAM-C Power Reactor Special Session
8:30 am-Noon Ballroom D

WAM-D Accelerator Section Special Session
8:10 am-Noon 551

Decomm Section Bus Mtg
11:15 am 552

Medical HP Section Business Mtg
Noon Ballroom B

Power Reactor Business Mtg
Noon Ballroom D

Accelerator Section Business Mtg
Noon 551

PEP Program
12:15-2:15 pm

W1 ALARA for Radioactive Effluents: Regulatory History...

W2 Detection, Measurement, and Decision

W3 Principles of Physical Security for Radioactive Sources

W4 RDD/IND Awareness Training for First Responders

W5 New Homeland Security Instrument Performance Standards

WPM-A Decommissioning
2:30-3:30 pm 551

WPM-A2 Special G. William Morgan Lecture Session
4:00-4:45 pm 551

WPM-B1 Medical Health Physics
2:30-3:15 pm Ballroom B

WPM-B2 Dosimetric Modeling
3:30-5:15 pm Ballroom B

WPM-C Operational Health Physics
2:30-5:15 pm Ballroom D

Historical Videos and Movies
2:30-5:00 pm 552

HPS Business Meeting
5:20 pm Ballroom B

Aerosol Measurements
6:00-8:00 pm Narragansett A (W)

CEL7 Medical Triage and Mgmt of Radiation Terrorism Events
7:00-8:00 am 551

CEL8 Induction, Repair and Biological Consequences of Clustered DNA Lesions
7:00-8:00 am Ballroom B

THAM-A Regulatory/Legal Issues
8:30 am-Noon 551

THAM-B Homeland Security and Emergency Planning
8:15 am-12:15 pm Ballroom B

THAM-C History
8:15 am-12:15 pm Ballroom D

All Registration takes place at the Rhode Island Convention Center
Saturday 2:00 - 5:00 pm
Sunday 7:00 am - 7:00 pm
Monday 8:00 am - 4:00 pm
Tuesday 8:00 am - 4:00 pm
Wednesday 8:00 am - 4:00 pm
Thursday 8:00 - 10:00 am

Exhibit Hall Hours

Exhibit Hall
Monday Noon - 5:00 pm
Tuesday 9:30 am - 5:00 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