

FINAL PROGRAM



***54th Annual Meeting of the
Health Physics Society
(American Conference of Radiological Safety)***



***12-16 July 2009
Hilton Minneapolis
Minneapolis Convention Center
Minneapolis, Minnesota***

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HUMAN HEALTH

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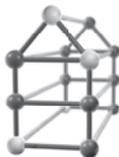
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Headquarters Hotel

Hilton Minneapolis

1001 Marquette Avenue South

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Telephone: 612-376-1000

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Speaker Ready Room

Minneapolis Convention Center Room M101 C

Sunday 2:00-5:00 pm

Monday-Wednesday 8:00-11:00 am; 2:00-5:00 pm

You must check in at the Ready Room (even if you have already submitted your presentation).

See **Page 9** for more information.

HPS Secretariat

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Registration Hours and Location

Registration at the Minneapolis Convention Center
Foyer of Exhibit Hall A

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

Future Annual Meetings

55th 27 June - 2 July 2010 Salt Lake City, UT

Future Midyear Topical Meeting

43rd 24-27 January 2010 Albuquerque, NM

*Look online for future upcoming meeting details:
hps.org/meetings*

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Tara Medich
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**2009 Task Force -
Minneapolis**

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Nicolas Bates
Kathy Brock
Ben Edwards
Robin Hill
Patricia Lee
Bryan Lemieux
Chris Martel
Matt McFee
Tara Medich

Local Arrangements Committee

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Nick Bates
John Bauhs
Travis Beard
Fred Entwistle
Jason Flora
Mary Fox
Kimberly Knight
Mike Lewandowski
Dan Miron
Irene Patrek
Bill Patrek
David Paulu
Janet Silsby
Stephen Simpson
Glenn Sturchio
Bill Turek
Pete Wildenborg

Special thanks for assistance from Anne McGrane

Important Events

Welcome Reception

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

Exhibits

Free Lunch! Free Lunch! – Noon, Monday, 13 July. All registered attendees are invited to attend a complimentary lunch in the exhibit hall.

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

Sessions and Course Locations

Courses on Saturday will take place in the Hilton Minneapolis. All courses and sessions Sunday through Thursday will take place at the Minneapolis Convention Center.

HPS Awards Banquet

An enjoyable evening spent with members of the Health Physics Society. This event will be held in the Hilton Minneapolis Ballroom on Tuesday, 14 July, and is an excellent opportunity to show your support for the award recipients as well as the Society. The awards will be presented after the dinner and the event will last from 7:00-9:00 pm.

HPS Annual Business Meeting

The Business Meeting will be convened at 5:30 pm on Wednesday, 15 July in L100 D/E, Minneapolis Convention Center.

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 on Monday, 1:00-3:00 pm; No other sessions at that time

AAHP Awards Luncheon

The AAHP is sponsoring an Awards Luncheon on Tuesday, 14 July, at Noon, in the Minneapolis Convention Center, Room 200 DEFG. 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 Hilton Minneapolis in Salons ABCD on Tuesday, 14 July from 7:00 - 9:00 pm. The following awards are to be presented:

Distinguished Achievement Award

David Sliney

Elda E.Anderson Award

Susan Jablonski

Founders Award

Kelly Classic

Fellows

Alex Boerner	L. Samuel Keith
Jan Braun	Gregory Komp
Thomas Buhl	Craig Little
A. Wendell Carriker	Stephen McGuire
Douglas Draper	Matthew Moeller

Menu

Headwaters Salad - mesclun greens, frizzled root vegetables with tomatoes, cucumber and basil vinaigrette dressing); Petite Filet Mignon paired with Herb Breast of Chicken, served with Bordelaise sauce; Wild Rice Medley; Chef's Selection of Seasonal Vegetables; Turtle Cheesecake; New York style Cheesecake layered with Caramel and Fudge, topped with Pecans; Coffee, Tea

G. William Morgan Trust Fund

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

G. William Morgan was a Charter member of the Society and during the Society's early years a very active mem-

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

Registration Hours

Registration at the
**Minneapolis Convention Center,
Foyer, Exhibit Hall A**

Saturday 11 July.....2:00-5:00 pm
Sunday 12 July..... 7:00 am-7:00 pm
Monday 13 July..... 8:00 am-4:00 pm
Tuesday 14 July..... 8:00 am-4:00 pm
Wed 15 July 8:00 am-4:00 pm
Thursday 16 July.....8:00 am-Noon

Registration Fees:

Class	Pre-Reg	On-Site
◆HPS Member	\$375	\$450
◆Non-Member**	\$450	\$525
❖Student	\$ 60	\$ 60
◆HPS Emeritus	No Fee	No Fee
◆HPS PEP Lecturer	No Fee	No Fee
●Companion	\$ 65	\$ 65
■Exhibition ONLY	\$ 35	\$ 35
Exhibitor (2/booth)	No Fee	No Fee
Add'l Awards Dinner	\$ 60	\$ 60
AAHP New CHP	Free	Free
AAHP Awards (CHP)	\$ 10	\$ 10
AAHP 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, Sunday-Wednesday Continental Breakfast and afternoon snacks

■Includes Sessions and Exhibition ONLY

**Includes Associate Membership for year 2009-*FIRST TIME MEMBERS ONLY.*

Badge Color Code:

White=HPS Member, NonMember, Student

Blue=Companion

Green=Exhibition Only

Salmon=Exhibitor

Session Location

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

LAC Room

Sunday-Thursday.....M101 B
Minneapolis Convention Center

Activities and Tours

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

Sunday 12 July

Twin Cities Bus Tour 9 AM-Noon

Monday 13 July

Guided Walk #1 7-8 AM

Guided Walk #2 8:15-9:15 AM

Twin Cities Bus Tour 9 AM-Noon

Landscape Arboretum 12:30-5 PM

Open Mic Night 8-11 PM

Tuesday 14 July

5K Run/2K Walk 6-9:30 AM

Guided Walk #3 7-8 AM

Guided Walk #4 8:15-9:15 AM

Stone Arch Bridge, Guthrie Theater, Mill City Museum 9 AM-12:15 PM

Winery Tour, St. Croix River, Stillwater **CANCELLED**

Wednesday 15 July

Guided Walk #5 7-8 AM

Guided Walk #6 8:15-9:15 AM

Gangster Tour **CANCELLED**

Homes/Cathedral Tour 11 AM-5 PM

Annual Pub Crawl 6-11 PM

HPS Night Out 6:30-10:30 PM

Thursday 16 July

Guided Walk #7 **CANCELLED**

Guided Walk #8 **CANCELLED**

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 M101 C in the Minneapolis Convention Center) will be open Sunday from 2-5 pm, Monday through Wednesday from 8-11 am and 2-5 pm. You must check in at the Ready Room (even if you have already submitted your presentation) no later than the following times:

Presentation Time Check-In Deadline

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

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

PEP/CEL Courses

The PEP Ready Room (M101 A) will have hours posted on the door Saturday-Wednesday.

Placement Service

Placement Service listings will be posted in the Exhibit Hall.

Companion Hospitality Room

The Hospitality Room is in the Directors Row 2 Room in the Hilton. Come meet with friends and learn about the available attractions in Minneapolis. 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 Minneapolis and answer any questions you might have. The Monday breakfast will take place in Directors Row 2 Room in the Minneapolis Hilton.

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

Hospitality Room

for Registered Companions
in the Hilton Minneapolis
Directors Row 2 Room

Monday Welcome

8:00-9:00 am

Days/Hours

Sunday	8 am - 3 pm
Monday	8 am - 3 pm
Tuesday	8 am - 3 pm
Wednesday.....	8 am - Noon

Meeting Sponsors

Thank you to the following meeting sponsors

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Health Physics Society Committee Meetings

Friday, July 10, 2009

ABHP BOARD MEETING

8:30 am-5:00 pm *Marquette VIII (H)*

Saturday, July 11, 2009

FINANCE COMMITTEE

8:00 am-Noon *Conrad A (H)*

ABHP BOARD MEETING

8:30 am-Noon *Marquette VIII (H)*

HPS EXECUTIVE COMMITTEE

Noon-4:00 pm *Presidential Suite*

AAHP EXECUTIVE COMMITTEE

1:00-5:00 pm *Marquette VIII (H)*

HP/ORS JOURNAL BOARD MEETING

3:00-6:00 pm *Conrad C (H)*

Sunday, July 12, 2009

HPS BOARD OF DIRECTORS

7:30 am-5:00 pm *Marquette VI (H)*

AAHP EXECUTIVE COMMITTEE

8:30 am-5:00 pm *Marquette VIII (H)*

PROGRAM COMMITTEE

11:00 am-2:00 pm *M101 C (CC)*

Monday, July 13, 2009

NOMINATING COMMITTEE

Noon-5:00 pm *M100 F*

CHAPTER COUNCIL MEETING

1:00-2:00 pm *L100A*

HISTORY COMMITTEE

1:00-3:00 pm *Conrad A (H)*

HPS WEB EDITORS

1:00-5:00 pm *Conrad C (H)*

ANSI/HPS N13.1 REVISION WORKING GROUP

1:30-5:30 pm *Conrad D (H)*

RULES COMMITTEE

2:00-3:00 pm *M100 H (CC)*

AEC SUBCOMMITTEE OF ACCREDITATION

2:00-4:00 pm *M100 I (CC)*

ABHP PART I PANEL OF EXAMINERS PASSING POINT WORKSHOP

2:00-5:00 pm *M100 G (CC)*

HPS SECTION COUNCIL

2:30-3:30 pm *M100 E (CC)*

AAHP NOMINATING COMMITTEE

3:00-4:00 pm *M100 J (CC)*

SCIENTIFIC AND PUBLIC ISSUES COMMITTEE

3:00-4:30 pm *Presidential Suite*

AWARDS COMMITTEE

4:30-5:30 pm *Presidential Suite*

ACCELERATOR EXECUTIVE COMMITTEE

5:30-6:30 pm *Conrad A (H)*

Tuesday, July 14, 2009

DECOMMISSIONING SECTION BOARD MEETING

7:00-8:00 am *Conrad C (H)*

ANSI N13.12

9:00 am-4:00 pm *M100 F (CC)*

LAB ACCREDITATION POLICY COMMITTEE

10:00 am-12:30 pm *M100 G (CC)*

LAB ACCREDITATION ASSESSMENT COMMITTEE

11:30 am-2:00 pm *M100 G (CC)*

HP PROGRAM DIRECTORS ORGANIZATION

Noon-2:00 pm *Marquette V (H)*

**PUBLIC INFORMATION
COMMITTEE**

Noon-2:00 pm M100 H (CC)

**SOCIETY SUPPORT
SUBCOMMITTEE**

1:00-3:00 pm Conrad A (H)

**GOVERNMENT & SOCIETY RELATIONS
COMMITTEE**

1:30-3:30 pm M100 I (CC)

**ANSI/HPSS N13.1 REVISION WORKING
GROUP**

1:30-5:30 pm Conrad D (H)

ANSI N323A/B

2:00-5:00 pm M100 J

CSU RECEPTION - ALL ARE WELCOME

5:30-7:00 pm Duluth Room (H)

Wednesday, July 15, 2009

ANSI N42.320

9:00-11:00 am M100 F (CC)

SCIENCE SUPPORT COMMITTEE

Noon-1:00 pm M100 G (CC)

**INTERNATIONAL COLLABORATIONS
COMMITTEE**

Noon-2:00 pm Conrad D (H)

STUDENT BRANCH MEETING

Noon-2:00 pm M100 F (CC)

**MILITARY HP SECTION EXECUTIVE
BOARD**

Noon-2:30 pm M100 J (CC)

SOCIETY SUPPORT COMMITTEE

Noon-3:00 pm M100 I (CC)

MEMBERSHIP COMMITTEE

12:30-2:30 pm M100 H (CC)

**CONTINUING EDUCATION
COMMITTEE**

1:00-3:00 pm Conrad B (H)

STANDARDS/HPSSC MEETING

1:00-4:00 pm Conrad C (H)

ACADEMIC EDUCATION COMMITTEE

2:00-4:00 pm M100 G (CC)

**HOMELAND SECURITY
COMMITTEE**

4:30-6:00 pm Conrad A (H)

Thursday, July 16, 2009

**LOCAL ARRANGEMENTS
COMMITTEE**

7:30-9:30 am L101 B (CC)

**HPS BOARD OF DIRECTORS
MEETING**

11:00 am-4:00 pm Marquette IV (H)

**HPS BOARD OF DIRECTORS
LUNCH**

Noon-1:00 pm Marquette V (H)

PROGRAM COMMITTEE

Noon-2:00 pm Boardroom I (H)

54th Annual Meeting of the Health Physics Society

Minneapolis, MN, 12-16 July 2009, Final Scientific Program

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

MONDAY

7:00-8:00 AM

M100 A/B

CEL1 Uncertainty, Variability, Bias, Error, and Blunder

Daniel J. Strom

Pacific Northwest National Laboratory

7:00-8:00 AM

M100 D/E

CEL2 Respiratory Protection Refresher for HPs

Gary Kephart

Bechtel Jacobs

8:30 - 11:50 AM

L100 B-I

Plenary

Internal Dosimetry:

Then and Now

Chair: Richard Toohey

8:30 AM

Opening Remarks

Richard Toohey

HPS President

8:40 AM

PL.1

It's All About the Dose. What Dose? - a History of Internal Dosimetry Research

Guilmette, R. (Morgan Lecturer)

Lovelace Respiratory Research Institute

9:15 AM

PL.2

The US Transuranium & Uranium Registries: Reaping the Benefits of Lifetime Follow-up of Plutonium Worker Health and Internal α -Dose

James, A.C. (Landauer Lecturer)

Washington State University

9:50 AM

PL.3

Health Effects of Internally Deposited Radionuclides

Raabe, O.G.

University of California, Davis

10:20 AM

BREAK

10:45 AM

PL.4

Medical Internal Dose Assessment: Progress on Many Fronts

Stabin, M.

Vanderbilt University

11:20 AM

PL.5

ICRP Radiation Protection Recommendations: Impact on US Regulatory Framework

Eckerman, K. (Dade Moeller

Lectureship)

Oak Ridge National Laboratory

Noon-1:00 PM

Exhibit Hall A

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

1:00 - 3:00 PM

Exhibit Hall A

Poster Session

Accelerator

P.1 Detection Limit as a Function of Electron Energy for Delayed Neutron Yields from Photofission of U-238
Ankrah, M., Chandler, K., Hunt, A.

Idaho State University, Pocatello

Biokinetics/Bioeffects

P.2 The Evaluation of Symptom Ringing Disillusion Among Children and Adult Cellular Telephone Users
Kumar, N., Sharma, V.P., Mathur, N., Khan, M.Y., Khan, R.A.

Babasaheb Bhimrao Ambedkar University, India, Indian Institute of Toxicology Research, India

P.3 Effects of Ionizing Radiation Exposure on *Arabidopsis thaliana*
Kurimoto, T., Constable, J.V.H., Huda, A.

German Cancer Research Center (DKFZ), California State University, Fresno

Decommissioning

P.4 Evaluation of Innovative Technology for Decontamination of Contaminated Surfaces

Dua, S., Lagos, L., Calderin, D., Ngachin, M., Colon Mendoza, R.
FIU

P.5 Popularization of Science in the Nuclear Area Focusing on Stakeholders Living Nearby Decommissioned Uranium Mines

Dias, F., M.H.T., T., Edenil, M., Delcy, D.
Brazilian Nuclear Energy Commission, Brazilian Nuclear Industries

P.6 Radioecological Criteria and Norms During Remediation of Shore Infrastructure of Nuclear Fleet

Shandala, N., Seregin, V., Sneve, M., Titov, A., Isaev, D.*
Burnasyan Federal Medical Biophysical Centre, Moscow, Norwegian Radiation Protection Authority, Oslo

Environmental

P.7 Review of Radon Assessment Studies in the City of Tbilisi, Republic of Georgia

Pagava, S., Rusetski, V., Kutelia, G., Shubitidze, N., Dunker, R., Farfan, E., Popp, J., Harris, J., Wells, D., Avtandilashvili, M.*

Tbilisi State University, Idaho State University, Savannah River National Laboratory, York College of the City University of New York

P.8 Radiation Situation Nearby the Uranium Mining Facility

Shandala, N., Filonova, A., Titov, A., Isaev, D., Seregin, V., Semenova, M., Metlyayev, E.G.*

Burnasyan Federal Medical Biological Centre, Moscow

P.9 Effective Method for Simulation of the Radioactive Material Dispersion in Terrestrial Surface Water Bodies

Wang, W., Wang, J., Chang, B., Chen, I.*

Institute of Nuclear Energy Research, Atomic Energy Council

P.10 A Study of Strontium 90 Analysis Method by Liquid Scintillation Counting for the Environmental Samples

Wang, J., Fang, H.

Institute of Nuclear Energy Research, Atomic Energy Council

P.11 Development of the Environmental Gamma Monitoring Network for Emergency Response Purposes in Taiwan

Hong, M.C., Huang, F.C., Kao, M.F., Liu, C.C., Tseng, H.H., Huang, C.C.
Radiation Monitoring Center, AEC, Institute of Nuclear Research, AEC

External Dosimetry

P.12 Investigation of a Model for the Fading of Thermoluminescent Dosimeter Glow Curve Peak Areas in the Presence of Chronic Irradiation

Harvey, J.A., Thomas, E.M., Kearfott, K.J.

University of Michigan, Ann Arbor

P.13 Comparison of Peak-Determined Region of Interest and Glow Curve Peak Fitting Analysis of Thermoluminescent Dosimeter Data

Thomas, E.M., Harvey, J.A., Wu, B.M., Kearfott, K.J.

University of Michigan, Ann Arbor

P.14 Reproducibility of Glow Peak Fading Characteristics of Thermoluminescent Dosimeters

Wu, B.M., Harvey, J.A., Thomas, E.M., Bergen, R.J., Carney, S.E., Newton, J.P., Kearfott, K.J.

University of Michigan, Ann Arbor

Homeland Security

P.15 Wireless Encrypted Ionizing Radiation Monitoring in Cargo/Port Areas

Baumbaugh, J., Clement, R.

SSC-Pacific

Instrumentation

P.16 Alpha 7L Alarm Set Points and Response Times

Wannigman, D., Martinez, A.

Los Alamos National Laboratory

P.17 Monte Carlo Spectral Simulations as Microcalorimeter Gamma-Spectrometer Design Tool

Sassi, E., Johnson, T., Rabin, M., Ulom, J.

Colorado State University, Los Alamos National Laboratory, National Institute of Standards and Technology

Emergency Planning and Response

P.18 Establishing the Mobile Environmental Survey System for Radiological Emergency

Fang, H.

Institute of Nuclear Energy Research, Taiwan

P.19 The Fate of Cesium Resulting from a Radiological Dispersal Device (Rdd) in an Urban Environment and its Effect on Efficacy of a Gross Decontamination Method (Water Wash-Down)

Snyder, E., Lee, S., Barzyk, J., Oudejans, L., Drake, J., McGee, J.

US EPA, Oak Ridge Institute for Science and Education, Arcadis US, Inc.

P.20 Interregional Training of Radiation Emergency Medical Assistance for Developing Countries - Experience of Burnasyan Federal Medical Biophysical Center

Bushmanov, A.U., Kotenko, K.V., Kretov, A.S., Krasnuk, V.I.

FMBC of FMBA of Russia

Internal Dosimetry and Bioassay

P.21 USTUR Case 0102 CT Image Processing Techniques for Voxel Phantom Development

Tabatadze, G., Brey, R., James, T., Theel, D., Todd, S.

Idaho State University - Health Physics, United States Transuranium and Uranium Registries, Richland WA, Portneuf Medical Center, Pocatello ID

P.22 Critical Evaluation of (Pu-239)O₂ Wound and Lymph Node Retention Predicted by NCRP 156's Recommended Biokinetic Transfer Rates

Chelidze, N., Brey, R., James, T.

Idaho State University - Health Physics, United States Transuranium and Uranium Registries

P.23 Development of Calibration Phantoms for Newborns and Small Children

Sinha, V., Harris, J.

Idaho State University

P.24 An Updated Evaluation of Data from the 1980 Statistical Analysis of Plutonium in US Autopsy Tissue
Mecham, D.C, Brey, R.R., Shonka, J.J.

Idaho State University, Shonka Research Associates

P.24A Inhalation of Highly Insoluble Pu: Case Studies from the Rocky Flats Pu Fire

Avtandilashvili, M., Brey, R., James, T., Birchall, A.

Idaho State University - Health Physics, United States Transuranium and Uranium Registries, Health Protection Authority, United Kingdom

P.24B Measurement of Internal Exposure for Nuclear Medicine Workers involved in I-131 Handling in Korea

Cho, W.K., Lim, K.J., Chung, K.H
Korea Institute of Nuclear Safety (KINS), Korea., Korea Radioisotope Association (KRA), Korea

Medical

P.25 Bremsstrahlung Exposure for DNA, RNA and Retina

Bharadwai, H.

Bangalore University

P.26 Site-Specific Skeleton Voxel Model Representing Chinese Reference Adult Man and its Absorbed Dose for Idealized Photon Exposures

Liye, L., Zhi, Z., Junli, L., Binquan, Z., Rui, Q.
Tsinghua University, Fundamental Science for National Defense, China Institute for Radiation Protection

P.27 Organ Dose Estimation for Computed Tomography Examinations

Kim, K.

Kyung Hee University

P.28 Minimization of Radiation Dose to Operators Performing Cardiac Catheterization Procedures

Kim, K., Miller, D.

Kyung Hee University, Uniformed Services University

P.29 Fluoroscopic Event Notification: an Automated Follow-up System

Miller, J., Sturchio, G., Fetterly, K., Schueler, B.

Mayo Clinic

P.30 Early Medical Consequences of Radiation Incidents in the Former USSR Territory

*Ilyin, L., Soloviev, V., Kotenko, K., Bushmanov, A.**

Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

P.31 Small Doses of External Irradiation and Risk of Brain Vascular Illnesses

Torubarov, F., Isaeva, N., Zvereva, Z., Dmitrieva, G.

Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

P.32 Abnormal Head Penetrating Irradiation by High Energy Proton Beam

Torubarov, F., Zvereva, Z., Isaeva, N., Dmitrieva, G.

Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency

P.33 Photochemical Delivery of Bleomycin in Malignant Glioma Cells

Blickenstaff, J., Vo, V., Hirschberg, H., Madsen, S.

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

Operational

P.34 Use of a Database for Accurate Shipment Labeling and Generation of Shipment Forms

Miller, J., Landsworth, R., Classic, K. Mayo Clinic

P.35 Photon Response of Savannah River Site Instrumentation from 38 to 1300 keV

Wagoner, D.A. Savannah River Site

P.36 Dose and Dose Equivalent Rate Calculations from a Solar Energetic Particle Event using Earth-Moon-Mars Radiation Environment Module (EMMREM)

PourArsalan, M., Townsend, L.W., Schwadron, N.A., Kozarev, K., Al-Dayeh, M.

University of Tennessee, Nuclear Engineering Department, Boston University, Astronomy Dept, Southwest Research Institute

P.37 A Review of Programmatic Upgrades Recently Implemented in the Oak Ridge National Laboratory Bioassay Monitoring Program

McLaughlin, D.A., Gillespie, T.J., Perkins, D.E., Benson, J.R. Oak Ridge National Laboratory

P.38 Numerical Solutions for Confidence Intervals when the Sample is Counted an Integer Times Longer Than the Blank

Potter, W., Strzelczyk, J. Consultant, Sacramento, University of Colorado, Denver

P.39 Classification of Radiation Devices for Industrial Application and Measurement of Radiation Dose in Accident Conditions

Cho, W.K., Seo, K.S., Koo, B.C., Kim, C.B.

Korea Institute of Nuclear Safety (KINS), Korea

Power Reactor

P.40 Evaluation of Neutron Flux and Gamma Dose Rates at the Irradiation Cell of the Texas A&M Nuclear Science Center Reactor

Vasudevan, L., Newhouse, J., Remlinger, J., Reece, W.D. Texas A&M University

Waste Management

P.41 Long-Term Performance of Transuranic Waste Inadvertently Disposed in a Shallow Land Burial Trench at the Nevada Test Site

Shott, G., Yucel, V. National Security Technologies, LLC

Works-In-Progress

P.42 Development of Direction Finding Detector for Remote Sensing of Radiation Leakage from Nuclear Facilities

*Kobayashi, Y., Yamano, T., Shirakawa, Y.**

ALOKA Co, Ltd., NIRS

P.43 Progress in Development of a Software Tool for Rapid Direct Radiation Gamma Dose Assessments for Complex Source/Receptor Geometries

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

Southwest Research Institute, Tom Baker Cancer Center, Canada, Institute of Radiation Hygiene, Russia

P.44 A Novel Method to Pinpoint Beam Losses

Marceau-Day, M.L., Teague, R.E., Wangf, W.H.

Louisiana State University

P.45 Elemental Bio-imaging of Actinides and Beryllium in Lymph Nodes of Former Nuclear Workers

Tolmachev, S.Y., Bishop, D., Doble, P., Hare, D., James, A.C.

United States Transuranium and Uranium Registries, University of Technology, Sydney

P.46 The Differences of the Reaction of Hematopoiesis and Bone Tissue Among People with Incorporated Osteotropic Isotope ^{90}Sr

Akleyev, A., Dimov, G. , Akushevich, I., Veremeyeva, G., Varfolomeyeva, T., Ivanov, V., Ukraintseva, S., Yashin, A.*
Urals Research Center for Radiation Medicine, Russia, Duke University

P.47 Modeling of Photon Trajectories in Absorbers to Augment Undergraduate Laboratory Instruction

Fulmer, P.
Francis Marion University

P.48 Key Findings of CDC's Los Alamos Historical Document Retrieval and Assessment Project— Public Exposures from the Trinity Test

Widener, T.E., Flack, S.M., Burns, Jr., R.E., Shonka, J.J., Buddenbaum, J.E.
ChemRisk LLC, NGTS, Inc., Shonka Research Associates, ENSR/AECOM

P.49 Key Findings of CDC's Los Alamos Historical Document Retrieval and Assessment Project— Potential Public Exposures from Early Airborne Plutonium Releases

Widener, T.E., Shonka, J.J. , Burns, Jr., R.E., Buddenbaum, J.E.*

ChemRisk, LLC, Shonka Research Associates, NGTS, Inc., ENSR/AE-COM

P.50 Characterizing a New Technology for External Personnel Dosimetry

*Wright, J., Ujhazy, A., Riesen, H., Dickey, B.**

Dosimetry & Imaging PTY, University of New South Wales, Dosimetry Resources International

P.51 Proliferation, Cell Cycle and Apoptosis in Blood Lymphocytes at Late Time after Chronic Radiation Exposure in Man

Pochukhailova, T., Blinova, E., Akleyev, A.

Russia

P.52 Influence of Polarized Radio-frequency Electromagnetic Fields on Stem Hemopoietic Cells in Mice

Dukhovnaya, N., Tryapitsyna, G., Polevik, V., Akleev, A., Pryakhin, E.

Urals Research Center of Radiation Medicine, Russia

P.53 Radioactivity and Radiation: Atlanta Chapter's Educational Material and Experience with the Georgia Science Teacher Association

Nichols, M.C., Shonka, J.J., Collins, D.J., Philpotts, D.K., Hardeman, Jr., J.C., Pepper, A.J.

Georgia Power, Shonka Research Associates, US Nuclear Regulatory Commission, Georgia Department of Natural Resources, Georgia Perimeter College

- P.54** I-125 Plaque in Eye Melanoma Treatment: ALARA and Other Considerations
Elder, D.H., Hu, Y.A., Strzelczyk, J. University of Colorado Hospital
- P.55** Evaluation of Skin Dose using GafChromic EBT Film
Thuo, K., Lodwick, C., Hamby, D. Oregon State University
- P.56** Real-Time Continuous Air Monitoring of Plutonium-239 Around a Manhattan Project-Era Nuclear Waste Site
Eisele, W., Hart, O. Los Alamos National Laboratory
- P.57** Risk-based Fee Structure Spreadsheet
Dibblee, M.G. Radiation Health Consulting
- P.58** Urinary Polonium-210 and Lead-210 in a Population of Chinese Smokers and Nonsmokers
Schayer, S., Qu, Q., Wang, Y., Cohen, B. New York University School of Medicine, Peking University Health Science Center, Beijing
- P.59** An Approach to Evaluation of Strontium-90 Spatial Distribution in Calcified Biological Samples Using PCL Method of Digital Autoradiography
Krivoshchapov, V., Shishkina, E. Urals Research Center for Radiation Medicine, Russia
- P.60** Off-site Source Recovery Project - The Most Over Regulated Disposition Pathway?
Tompkins, J. Los Alamos National Laboratory
- P.61** Canadian Source Repatriation - A New Beginning
Manzanares, L. Los Alamos National Laboratory
- P.62** Development and Testing of Gallium Arsenide Photoconductive Detectors for Ultra Fast, High Dose Rate Pulsed Electron and Bremsstrahlung Radiation Measurements
Kharashvili, G., Makarashvili, V., Mitchell, M.D., Beezhold, W., Gesell, T.F., Wingert, W.L. Idaho State University, University of Utah
- P.63** Hematology Physicians Preparing for a Mass Casualty Marrow Toxic Incident
Case, Jr., C., Confer, D., Chao, N., Weisdorf, D., Weinstock, D., Krawisz, R. NMDP, Duke University, University of Minnesota, Harvard, ASBMT
- P.64** Photon and Neutron Iso-dose Contours for LINACs
Khan, S.M., Sherbini, S. Department of Homeland Security, US Nuclear Regulatory Commission
- P.65** Evaluation of Shield Thicknesses for PET/CT Facilities
Ali, S., Ali, M., Shahid, M., Saddique, T. Pakistan Nuclear Regulatory Authority, Pakistan Institute of Engineering and Applied Sciences
- P.66** Implications of Granite Counter Top Construction and Uses
Bernhardt, D., Gerhart, A., Kincaid, L. Consultant, Solid Surface Alliance, Industrial Hygiene Services

3:00 - 4:15 PM

L100 A

MPM-A1: Waste Management

*Co-Chairs: Donald Cool,
Kathryn Brock*

3:00 PM

MPM-A1.1

Safe Sampling and Analysis of Savannah River Site (SRS) High Level Waste (HLW)

Reboul, S.H., Pareizs, J.M., Fleming, K.N.

*Savannah River National Laboratory,
WSRC Liquid Waste Organization*

3:15 PM

MPM-A1.2

Radioactive Waste Issues in South Carolina

Peterson, D.

Francis Marion University

3:30 PM

MPM-A1.3

Compliance for Hanford Waste Retrieval Radioactive Air Emissions

Simmons, F.

CH2M Hill Plateau Remediation Company

3:45 PM

MPM-A1.4

Off-Site Source Recovery at the Customer Site

Brown, D.

Los Alamos National Laboratory

4:00 PM

MPM-A1.5

International Atomic Energy Agency Efforts on Orphan Sources and Radioactively Contaminated Material in the Metal Recycling Industry

Reber, E., Friedrich, V., Jova Sed, L.

International Atomic Energy Agency

4:30 - 5:30 PM

L100 A

MPM-A2: Biokinetics/Bioeffects

Co-Chairs: Brant Ulsh, Matt McFee

4:30 PM

MPM-A2.1

Upgrading the United States Transuranium and Uranium Registries' Pathology Database

McCord, S., James, A.

United States Transuranium and Uranium Registries

4:45 PM

MPM-A2.2

Lung and Systemic Retention of Al and W Nanoparticles Following Inhalation Exposures

Sexton, J., Bolch, W., Jenkins, C.

University of Florida, Air Force Research Laboratory

5:00 PM

MPM-A2.3

Evaluation of Ionizing Radiation Dose Levels That Do Not Cause Stochastic Effects According to Experimental and Epidemiological Data

Kalistratova, V., Buldakov, L., Nisimov, P.

Burnasyan Federal Medical Biophysical Center

5:15 PM

MPM-A2.4

A Complex Study of Actinide Biokinetics for Mini-Pigs at Short Times after Intravenous Administration

Bushmanov, A., Yatsenko, V., Kalistratova, V., Kryuchkov, V., Borisov, N., Broggio, D., Franck, D.

Burnasyan Federal Medical Biophysical Center, Institut de Radioprotection et de Sûreté Nucléaire

**MPM-B: Risk Analysis/
Communication***Co-Chairs: Patricia Milligan,
Stewart Schneider***3:00 PM****MPM-B.1**

Increased Cancer Mortality Risk for NASA's ISS Astronauts: the Contribution of Diagnostic Radiological Examinations

*Dodge, C., Gonzalez, S., Picco, C., Johnston, S., Shavers, M., Van Baalen, M.***University of Houston, College of Health and Human Performance, National Aeronautics and Space Administration (NASA) at Johnson Space Center Houston, Wyle Integrated Science and Engineering Group***3:15 PM****MPM-B.2**

Comparing Predicted Cancer Risks Associated with Ingesting Naturally Occurring Radionuclides in Drinking Water Supplies to Actual County Cancer Rates

*Falta, D.A., DeVol, T.A., Fjeld, R.A. Clemson University***3:30 PM****MPM-B.3**

Highlights of the Capstone Depleted Uranium Aerosol Characterization and Risk Assessment Study

*Parkhurst, M., Guilmette, R. Pacific Northwest National Laboratory, Lovelace Respiratory Research Laboratory***3:45 PM****MPM-B.4**

Cancer Risk Due to Life-Long Exposure to High Background

*Kaye, W.R., Beauvais, Z.S., Kearfott, K.J.**University of Michigan, Ann Arbor***4:00 PM****MPM-B.5**

Becoming Radiation Myth Busters

*Johnson, R.H.**Dade Moeller & Associates***4:15 PM****MPM-B.6**

Current Misconceptions of Radiation Effects in Virginia Related to Potential Uranium Mining

*Wales, P.M., Mastilovic, M., Rautio, J. Virginia Uranium, Inc., Capital Results***4:30 PM****MPM-B.7**

Po-210 in Cigarettes – a National Tragedy

*Moeller, D.**Dade Moeller & Associates***4:45 PM****MPM-B.8**

An Intercultural, Interdisciplinary Experience for Undergraduate Students Involving Radiation Health Assessment and Communication

Kearfott, K.J., Eastman, A., McDade, M.N., Thompson, K.H., Gupta, M., Dickson, I.S., Fetterley, J.A., Newton, J.P., Cassel, A.E., White Face, C.**University of Michigan, Ann Arbor, Oglala Lakota College, Pine Ridge, Defenders of the Black Hills***5:00 PM****MPM-B.9**

Public Reaction to Uranium In-Situ Recovery in Northern Colorado

*Draine, A.E., Johnson, T.E.**Colorado State University***5:15 PM****MPM-B.10**

Hollywood's Perception of Radiation Over the Years

*Krieger, K.V.**Radiation Technology Inc.*

3:00 - 5:00 PM

L100 D/E

MPM-C: Internal Dosimetry and Bioassay A

*Co-Chairs: David Hearnberger,
Stu Hinnefeld*

3:00 PM

MPM-C.1

Canadian National Internal Dosimetry Performance Testing Program: Results of the Pilot Program
*Kramer, G.
Health Canada*

3:15 PM

MPM-C.2

Comparing with Data: ICRP 30 vs. ICRP 66 Respiratory Models
*Harley, N., Fisenne, I.
New York University School of Medicine, Retired USDOE*

3:30 PM

MPM-C.3

Recalibration of the Cameco Mobile Lung Counter
*Kramer, G., Hauck, B., Allen, S.
Health Canada, Cameco Corp*

3:45 PM

MPM-C.4

Investigation of the Effect of Female Breast Size on Lung Counting Efficiency using Virtual Deformable Phantoms
*Hegenbart, L., Mille, M., Na, Y.H., Zhang, J.Y., Ding, A.P., Urban, M., Xu, X.G.
Karlsruhe Institute of Technology, Germany, Rensselaer Polytechnic Institute*

4:00 PM

MPM-C.5

Tissue Weighting Factors: Derivation and Parametric Analysis
*Makinson, K.A., Hamby, D.M.
Oregon State University*

4:15 PM

MPM-C.6

Development of an Exposure Facility for Countermeasures Against Radionuclide Exposure
*Weber, W., McDonald, J., Marshall, E., Guilmette, R.
Lovelace Respiratory Research Institute*

4:30 PM

MPM-C.7

Specific Absorbed Fractions for Internal Photon Emitters Calculated for the RPI-Adult Male and Female Phantoms
*Mille, M., Zhang, B.Q., Xu, X.G.
Rensselaer Polytechnic Institute, China Institute for Radiation Protection*

4:45 PM

MPM-C.8

Radiation Dose Induced from Cigarette Smoking
*Papastefanou, C.
Aristotle University of Thessaloniki, Atomic and Nuclear Physics Laboratory, Greece*

3:00 - 5:00 PM

L100 F/G

MPM-D: Decommissioning

Co-Chairs: Tim Jannik, James Tarzia

3:00 PM

MPM-D.1

Decommissioning of the Salmon River Site
*Watson, B., Rodriguez, R., Conway, K., Evans, R., Katanic, J., Watkins, V.
US Nuclear Regulatory Commission, NASA*

3:15 PM

MPM-D.2

Decommissioning a Major Medical Research Institution
*Morton, A., Elder, D., Safadi, R., Johnson, T.
University of Colorado Denver Hospital*

3:30 PM **MPM-D.3**
Challenges Encountered in
Decommissioning a Radium Watch
Factory
Tarzia, J., Darois, M.
RSCS, Inc.

3:45 PM **MPM-D.4**
History and Decommissioning of the
US Commercial Vessel, NS Savannah
Tarzia, J., Litterer, F.
RSCS, Inc.

4:00 PM **MPM-D.5**
ORISE Experiences in Developing,
Conducting and Evaluating a
Performance Test and Validation Plan
(PTVP)
*Buchholz, M.A., Bailey, E.N., Riley,
W.P., Vitkus, T.J.*
Oak Ridge Associated Universities

4:15 **MPM-D.6**
Use of LaBr₃ with the HMS4 (Hold-
up Measurement System 4) for Non-
Destructive Assay Measurements of
Low Enrichment Uranium
Estes, B.
Oak Ridge Associated Universities
(ORAU)

4:30 PM **MPM-D.7**
Standards and Guidance for the
Use of Non-Destructive Assay in
Characterization for Decommissioning
Riley, W., Chapman, J.
Oak Ridge Associated Universities,
Canberra Industries

4:45 PM **MPM-D.8**
Independent Regulatory Examination
of Radiation Situation at the Areas of
Spent Nuclear Fuel and Radioactive
Waste Storage in the Russian
Northwest
Shandala, N., Isaev, D. , Sneve, M.,
Titov, A., Seregin, V., Filonova, A.,
Kiselev, S.M.*
*Burnasyan Federal Medical Biophys-
ical Centre, Moscow, Norwegian Ra-
diation Protection Authority, Oslo*

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

3:00 - 5:30 PM **L100 H/I**

**MPM-E: Special Session: Stake-
holder Engagement: IRPA Guid-
ing Principles for Radiation
Protection Professionals on
Stakeholder Engagement**
*Co-Chairs: Barbara Hamrick,
Kelly Classic*

3:00 PM
Background: Development of the
Guiding Principles and their Role in
Radiation Protection
President Dick Toohey

3:05 PM **MPM-E.1**
Principle 1: Identifying Opportunities
for Engagement
Jones, C.R.
C.J. Exec Consulting

3:15 PM **MPM-E.2**
Principle 2: Developing a Sustainable
Implementation Plan
Ottmer, T., Andersen, R.; Colorado
Department of Public Health and En-
vironment, Nuclear Energy Institute*

3:25 PM **MPM-E.3**
Principle 3: How to Enable an Open, Inclusive and Transparent Process
Lanza, J.; Florida Department of Health

3:35 PM **MPM-E.4**
Principle 4, 5: Identifying Relevant Stakeholders and Technical Experts and Defining Roles
Classic, K. Mayo Clinic

3:50 PM **BREAK**

4:05 PM **MPM-E.5**
Principle 6, 7: Developing Goals Based on a Shared Understanding and Shared Language
Radonich, M. Cultural Effect Consulting

4:20 PM **MPM-E.6**
Principle 8: Respecting and Valuing Different Perspectives
Johnson, R.H. Dade Moeller & Associates

4:30 PM **MPM-E.7**
Principle 9: Ensuring an Effective Feedback Mechanism to Improve Future Engagement Actions
Jones, C.R. C.J. Exec Consulting

4:40 PM **MPM-E.8**
Summary and Future HPS Action
Hamrick, B. Dade Moeller & Associates

4:45 PM **Open Discussion**
Moderated by B. Hamrick Dade Moeller & Associates

3:00 - 5:30 PM **L100 J**

**MPM-F: Special Session:
Nanotechnology**
*Co-Chairs: Scott Walker,
Mark Hoover*

3:00 PM **MPM-F.1**
Nano Materials – Hope for the Future
Marceau-Day, L. Louisiana State University

3:30 PM **MPM-F.2**
Nano-Particle Health Physics Calculations
Walker, L. Los Alamos National Laboratory

4:00 PM **MPM-F.3**
Current and Future Medical Applications of Nanotechnology
Marceau-Day, L. Louisiana State University

4:30 PM **MPM-F.4**
Risk-Benefit and Ethics in Nanotechnology
Marceau-Day, L. Louisiana State University

5:00 PM **Panel Discussion**

TUESDAY

7:00-8:00 AM **M100 A/B**
CEL 3 The Characterization of Dose
in Computed Tomography
Donovan Bakalyar
Henry Ford Hospital

7:00-8:00 AM **M100 D/E**
CEL4 System of Radiation Safety
Monitoring for the Personnel Working
at the Chernobyl Object Shelter
P. Aryasov, S. Nechaev, J. Hoyt,
A.Dmitrienko
Radiation Protection Institute of
Ukraine, Chornobyl Shelter Imple-
mentation Plan. Project Management
Unit, State Enterprise Chornobyl Nu-
clear Power Plant

8:45 - 11:30 AM **L100 A**

**TAM-A: Environmental Special
Session: 25 Years and
Counting: Indoor
Radon Since Watras**
Co-Chairs: Kenneth Weaver,
Jim Cain

8:45 AM **Introduction**
Johnson, Jan
Tetra Tech

9:00 AM **TAM-A.1**
Work to Save Dose: Contrasting
Effective Dose Rates from Radon
Exposure in Workplaces and
Residences against the Backdrop of
Public and Occupational Regulatory
Limits
Whicker, J., McNaughton, M.
Los Alamos National Laboratory

9:30 AM **TAM-A.2**
Residential Radon Epidemiology
Field, R.
University of Iowa

10:00 AM **BREAK**

10:30 AM **TAM-A.3**
Contemporary Radon Measurement
Techniques
Steck, D.
St. John's University

11:00 AM **TAM-A.4**
EPA and Indoor Radon
Conrath, S.
US Environmental Protection Agency

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

8:30 - 11:45 AM **L100 B/C**

TAM-B: Medical I
Co-Chairs: Ralph Lieto,
Marcia Hartman

8:30 AM **TAM-B.1**
Exposure to the US Population from
Medical Sources in 2006
Thomadsen, B., Bhargavan, M., Gil-
ley, D., Gray, J., Lipoti, J., Mahesh,
M., McCrohan, J., Mettler, F., Yoshi-
zumi, T.
University of Wisconsin, American
College of Radiology, State of Florida,
DIQUAD, LLC, State of New Jersey,
Johns Hopkins Hospital, Center for
Devices and Radiological Health,
New Mexico Veterans Health Care
System, Duke University

8:45 AM **TAM-B.2**
Effects of Lead Shielding on the
Fetal Dose During External-Beam
Radiation Treatment of Pregnant
Patients
Han, B., Xu, X.
Rensselaer Polytechnic Institute

- 9:00 AM** **TAM-B.3**
 Realistic Phantoms for Clinical and Preclinical Dose Calculations
Stabin, M., Emmons, M., Xu, X.G., Segars, W., Fernald, M., Marine, P., Clark, L.
Vanderbilt University, Rensselaer Polytechnic Institute, Duke University
- 9:15 AM** **TAM-B.4**
 Small Animal Dosimetry: Dose Comparison Between AAPM TG-61 and MOSFET-Based Phantom Dosimetry
Abogunde, M., Toncheva, G., Anderson-Evans, C., Craciunescu, O., Steffey, B., Dewhurst, M., Yoshizumi, T.
Duke University
- 9:30 AM** **TAM-B.5**
 Dose Assessments and Quality Assurance in Intensity-Modulated Radiation Therapy
Treas, J.B., Leslie, J.N., Fallahian, N.*
Geisinger Medical Center, Pennsylvania, Bloomsburg University, Pennsylvania
- 9:45 AM** **BREAK**
- 10:15 AM** **TAM-B.6**
 Lens Dose Equivalent Assessment of an Interventional Radiologist
Sturchio, G., Schueler, B., Hindal, M., Landsworth, R., Magnuson, D.
Mayo Clinic
- 10:30 AM** **TAM-B.7**
 Occupational Dose During Intraoperative Injections of Fluorine-18
Williamson, M., Dauer, L., Gollub, M., Akhurst, T.
Memorial Sloan-Kettering Cancer Center
- 10:45 AM** **TAM-B.8**
 Dental Staff Doses for Hand-Held Dental Intraoral X-Ray Units
Bailey, E., Gray, J.
Consultant, DIQUAD, LLC
- 11:00 AM** **TAM-B.9**
 Review: Photon and Neutron Activations to Medical Accelerators Using High Energy Photons
Han, B., Nath, R., Bateman, F., Islam, M., LaFrance, T., Moore, M., Thomadsen, B., Xu, X.
Rensselaer Polytechnic Institute, Yale University, National Institute Of Standards And Technology, Princess Margaret Hospital, Baystate Health Systems, Inc., Philadelphia VA Medical Center, University of Wisconsin
- 11:15 AM** **TAM-B.10**
 Having Problems with your New PET
Williamson, M., Dauer, L., St Germain, J.
Memorial Sloan-Kettering Cancer Center
- 11:30 AM** **TAM-B.11**
 Dosimetric Verification of the Radiotherapy Treatment Planning System Based on the PENFAST Monte Carlo Code for Photon and Electron Dose Calculations
Habib, B., Poumarède, B., Barthe, J.
Commissariat à l'Energie Atomique, Gif-sur-Yvette, France
- 12:00 PM** **Medical Section Business Meeting**

8:30 - 11:15 AM

L100 D/E

**TAM-C: Accelerator Section
Special Session**

*Co-Chairs: Henry Kahnhauser,
Linnea Wahl*

8:30 AM

TAM-C.1

Measurements of High Energy Photon
Dose from an Outdoor Accelerator-
Based Source

*Shannon, M.P., Hertel, N.E.
Georgia Institute of Technology*

8:45 AM

TAM-C.2

A Low Cost High Energy Neutron
Spectrometer Extension to a Bonner
Sphere Spectrometer

*Burgett, E., Hertel, N., Howell, R.
Georgia Institute of Technology, M.D.
Anderson Cancer Center*

9:00 AM

TAM-C.3

Continuous Monitoring and On-line
Analysis of Operational Dose Rates:
Tools to Further Mitigate Radiation
Risks

*Degtiarenko, P.
Jefferson Lab*

9:15 AM

TAM-C.4

Prediction of Doses From Uncontrolled
Beam Losses in Heavy Ion Linacs

*Ronningen, R., Bollen, G., Remec, I.
Michigan State University, Oak Ridge
National Laboratory*

9:30 AM

TAM-C.5

Dose Rate Comparisons Between
National Council on Radiation
Protection - 144 and Monte Carlo
N-Particle Extended Methods for an
Open Installation Linear Accelerator
up to 60 MeV

*Sandvig, M.D., Sterbentz, J.W.
Idaho National Laboratory*

9:45 AM

BREAK

10:15 AM

TAM-C.6

Basis for Elimination of the
High Energy Neutron Dosimetry
Requirement at the LANSCE Proton
Radiography Facility

*Duran, M., Fanning, M., Gulley, M.,
Kelsey, C.*

Los Alamos National Laboratory

10:30 AM

TAM-C.7

New ICRP Reference Phantoms and
Recommendations: How Large a
Difference?

Hertel, N.

Georgia Institute of Technology

10:45 AM

TAM-C.8

Investigation of Shielding
Requirements for Jefferson Lab Free
Electron Laser Upgrade

Vylet, V., Neil, G.

*Thomas Jefferson National Accelerator
Facility*

11:00 AM

TAM-C.9

Accelerator Beam Line Quartz
Window as a Bremsstrahlung
Radiation Source

*Butala, S.W., Pardo, R.C., Vondrasek,
R.C.*

Argonne

11:15 AM

**Accelerator Section
Business Meeting**

8:30 AM - Noon L100 F/G

TAM-D: Power Reactor Special Session: Radiation Protection in a Nuclear

Power Renaissance

*Co-Chairs: Roger Shaw,
Larry Haynes*

8:30 AM TAM-D.1

New Nuclear Build and Evolving Radiation Protection Challenges - An International Perspective
Lazo, E.

OECD Nuclear Energy Agency

9:00 AM TAM-D.2

New Nuclear Build and Evolving Radiation Protection Challenges - the US Perspective
Andersen, R.

Nuclear Energy Institute

9:30 AM TAM-D.3

Nuclear Power as Part of our Energy & Economic Surety Future
Miller, M.

Sandia National Laboratories

10:00 AM BREAK

10:30 AM TAM-D.4

Options to Revise Radiation Protection Regulations
Cool, D., Morgan-Butler, K.

US Nuclear Regulatory Commission

11:00 AM TAM-D.5

Incorporation of Advanced Technologies, Operating Experiences, and Lessons Learned into New Plant Radiation Protection Design and Operation
Kim, K.

Electric Power Research Institute

11:15 AM TAM-D.6

EPRI Radiation Source Term Reduction Program for BWR and PWR Power Reactors
Hussey, D.

Electric Power Research Institute

11:30 AM TAM-D.7

World Class RP Performance to Enhance the Global Nuclear Renaissance
Miller, D., Doty, D.

American Electric Power, Susquehanna Steam Electric Station

11:45 AM TAM-D.8

INPO: Radiation Protection Department Focus Areas
Williams, D.

Institute of Nuclear Power Operations

Noon M100 J

Power Reactor Business Meeting

8:00 AM - Noon L100 H/I

TAM-E: Special Session: Homeland Security, Radioactive Material Monitoring and Security

*Co-Chairs: Bill Rhodes,
Carson Riland*

8:00 AM TAM-E.1

Advanced Detection Techniques to Combat Nuclear and Radiological Terrorism
Duftschnid, K. (Morgan Lecturer)

Technical University Graz, Austria

8:30 AM **TAM-E.2**
Canadian Radiological Emergency
Response Exercise Scenarios
Using Both Sealed and Unsealed
Radioactive Sources
*Erhardt, L., Sparkes, S., Quayle, D.,
Ellaschuk, B., Kenny, P., Morris, R.,
Chaput, J.*
*Defence R&D Canada, Ottawa, De-
fence R&D Canada - Centre for Se-
curity Science, International Safety
Research Inc.*

9:00 AM **TAM-E.3**
International Efforts to Address the
“Dirty Bomb” Threat
Cutler, K.
US Department of State

9:30 AM **BREAK**

10:00 AM **TAM-E.4**
Challenges in Deploying Radiation
Detection Systems Internationally
Ekman, M.E.
Sandia National Laboratories

10:30 AM **TAM-E.5**
Nuclear Critical Infrastructure
Protection
Conklin, W.C.
Department of Homeland Security

11:00 AM **TAM-E.6**
United States Nuclear Regulatory
Commission Initiatives to Enhance
Security of Radioactive Material
Shaffer, M.
US Nuclear Regulatory Commission

11:30 AM **TAM-E.7**
Reevaluation of the List of Radioactive
Sources Sufficient to Create a
Significant Radiological Dispersal
Device or Radiation Exposure Device
Sturz, F.
US Nuclear Regulatory Commission

8:30 AM - Noon **L100 J**

TAM-F: AAHP Special Session
Why Society Needs Health
Physics: Biological Effects and
Challenges

*Co-Chairs: Nancy Kirner,
Thomas S.Tenforde*

8:30 AM **TAM-F.1**
Ionizing Radiation Exposure of the
US Population
*Kase, K., Miller, K., Strom, D., Sulei-
man, O., Thomadsen, B., Quinn, D.,
Rosenstein, M.*

*National Council on Radiation Pro-
tection and Measurements, Pennsyl-
vania State University, Pacific North-
west National Laboratory, US Food
and Drug Administration, University of
Wisconsin, Madison, DAC, Inc*

9:00 AM **TAM-F.2**
Building Bridges in Health Physics
Mossman, K.L.
Arizona State University, Tempe

9:15 AM **TAM-F.3**
Long-term Animal Studies: Past and
New Results Related to Low Dose
and Low-Dose Rate Exposures
*Woloschak, G., Alcantara, M.,
Paunesku, D., Haley, B., Paunesku, T.*
Northwestern University

9:45 AM **TAM-F.4**
Gene Expression and Network
Activation following Bystander and
Low Dose Radiation Exposures
Amundson, S.
Columbia University Medical Center

10:15 AM **BREAK**

10:45 AM **TAM-F.5**
Sensitivity of Human Lymphocytes to
Low-Dose Radiation
Livingston, G.
Oak Ridge Associated Universities

11:15 AM **TAM-F.6**
Applicability of Annual Limit on Intake/
Derived Air Concentration for High
Dose Deterministic Effects
Sorcic, J.
Colorado State University

11:30 AM **TAM-F.7**
Prophylaxis of Damage from Ionizing
and Ultraviolet Radiation by the
Natural Folate 5-Methyltetrahydrofolic
Acid
Bailey, S.W.
University of South Alabama

2:30 - 5:15 PM **L100 A**

TPM-A: Regulatory/Legal

*Co-Chairs: Cynthia Jones,
Andrew Mauer*

2:30 PM **TPM-A.1**
Maturity of FIU Radiation Program
from Infancy to Adulthood
Dua, S., Mwaisela-Rose, J.
FIU

2:45 PM **TPM-A.2**
Conversion of Generally Licensed
Devices to Exempt Devices
Brandon, T.
*International Radiation Safety Con-
sulting, Inc.*

3:00 PM **TPM-A.3**
Common Misconceptions Concerning
US Nuclear Regulatory Commission
Exempt Quantity and Concentration
Regulations
Chapel, S.
IRSC Inc.

3:15 PM **TPM-A.4**
US NRC Regulatory Initiatives
in Enhancing Accountability of
Radioactive Material
Mauer, A.
US Nuclear Regulatory Commission

3:30 PM **BREAK**

4:00 PM **TPM-A.5**
Tritium Exit Signs - the Need for an
Amnesty Program
Moeller, M., Allard, D., Hamrick, B.
*Dade Moeller & Associates, PA De-
partment Bureau of Radiation Protec-
tion*

4:15 PM **TPM-A.6**
Tritium Exit Signs: Regulatory Issues
*Merwin, S., Ikenberry, T., Herrington,
W.*
Dade Moeller & Associates

4:30 PM **TPM-A.7**
The Tritium Exit Sign Dilemma
Kay, S.E., Hampton, S.D., Baker, J.P.
Eli Lilly and Company

4:45 PM **TPM-A.8**
Update on the US Strategy for the
Security and Use of Cesium-137
Chloride Sources - Friend or Foe?
Jones, C.
US Nuclear Regulatory Commission

5:00 PM **TPM-A.9**
Yucca Mountain Repository - Planning
for the Future
Moeller, M.
Dade Moeller & Associates

TPM-B: Medical II

Co-Chairs: *Mary E. Moore,*
Matt Williamson

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

Comparison of CT Organ Doses Calculated from Stylized and Realistic Phantoms

Liu, H., Gu, J., Caracappa, P., Xu, X.G.*

Rensselaer Polytechnic Institute

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

A Monte Carlo Dose Estimation Method using a Voxelized Phantom for Pediatric CBCT

Kim, S., Yoshizumi, T., Toncheva, G., Yin, F., Frush, D.

Duke University

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

The Design of a New PC Software for Estimating Patient Doses from CT Scans

Ding, A., Gu, J., Liu, H., Caracappa, P., Xu, X.G.*

Rensselaer Polytechnic Institute, Institute of Plasma Physics, Chinese Academy of Sciences, Fudan University

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

Estimating Effective Dose (E) Using Dose Length Product (DLP): Effects of Adopting International Commission on Radiation Protection (ICRP) Publication 103, or Changing Tube Potential (kV), as in Dual-Energy Computed Tomography (DECT)

Christner, J., Kofler, J., McCollough, C.

Mayo Clinic

3:30 PM**BREAK****4:00 PM****TPM-B.5**

Evaluation of Three Computer Codes for Diagnostic X-Ray Spectra in CT Dosimetry

Gu, J., Caracappa, P., Xu, X.G.

Rensselaer Polytechnic Institute

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

Evaluation of Radiation Dosing Utilizing Coronary Dual-Source Computed Tomography Angiography in a Community Clinical Setting

McHugh, V., Jafari, M., Kallies, K., Gundrum, J., Ailiani, R., Patel, U.*

Gundersen Lutheran Medical Foundation, Gundersen Lutheran Health System

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

Patient Organ Doses from the Varian On-Board Imager: a Monte Carlo Study using a CT Scanner Model and Adult Patient Phantoms

Gu, J., Xu, X.G.

Rensselaer Polytechnic Institute

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

Assessment of Quality Assurance Compliance in the Use of Computed Tomography Machines in Kenyan Hospitals

Korir, G.K., Wambani, J.S., Mustafa, A.O., Maina, D.M.

University of Massachusetts Lowell, Kenyatta National Hospital, University of Nairobi

2:30 - 3:45 PM L100 D/E

**TPM-C1: Accelerator Section
Special Session**

*Co-Chairs: Henry Kahnhauser,
Linnea Wahl*

2:30 PM TPM-C1.1
Lujan Center Health Physics
Experiment Proposal Reviews and
Experiment Design

*Walker, L.S., Aull, F., Conradson, L.,
Wiemann, P., Llobet, A., Lewis, P.*

*Los Alamos National Laboratory, Mi-
sole*

2:45 PM TPM-C1.2
Experiences from First Top-Off
Injection at the Stanford Synchrotron
Radiation Lightsource

*Bauer, J.M., Prinz, A.A., Liu, J.C.,
Rokni, S.H.*

*SLAC National Accelerator Labora-
tory*

3:00 PM TPM-C1.3
Authorized Limits for Clearance
of Neutron Scattering Experiment
Samples at Oak Ridge National
Laboratory

*Stephens, G.M., Gregory, D.C.,
Schwahn, S.O., Reaves, K.L.*

Oak Ridge National Laboratory

3:15 PM TPM-C1.4
Initial Public Air Dose Estimates
using National Council on Radiation
Protection - 144 Air Activation
Methods for an Open Installation
Linear Accelerator up to 60 MeV

Sandvig, M.D., Rood, A.S.

Idaho National Laboratory

3:30 PM TPM-C1.5
Predictive Modeling of Activation
Decay Rates at the Spallation Neutron
Source

*Schwahn, S.O., Gregory, D.C.,
Reaves, K.L., Craft, D.A.*

Oak Ridge National Laboratory

3:45 PM BREAK

4:15 - 5:15 PM L100 D/E

TPM-C2: Accelerator

*Co-Chairs: Henry Kahnhauser,
Linnea Wahl*

4:15 PM TPM-C2.1
Monte Carlo Simulation of Laser
Compton Scattered X-rays and its
Imaging Applicability

*Naeem, S.F., Chouffani, K., Wells,
D.P., Forest, T.*

*Idaho State University, Idaho Accel-
erator Center*

4:30 PM TPM-C2.2
Using EGS4 to Assess the Maximum
Credible Synchrotron X-ray Dose in
APS Beamline 7ID D-Hutch

Dooling, J.

Argonne National Laboratory

4:45 PM TPM-C2.3
Limitations of Bremsstrahlung
Radiation for Microbeam Radiation
Therapy

*Neba, N.R., Wells, D., Dimitrov, V.,
Hunt, A., Harmon, F., Beezhold, W.*

*Idaho State University, Idaho Accel-
erator Center*

5:00 PM TPM-C2.4
Preliminary Production of Mo-99/
Tc-99m and Cu-67 at the Idaho
Accelerator Center

Sinha, V., Tchelidze, L., Harris, J.,
Wells, D.*

Idaho State University

2:30 - 5:00 PM L100 F/G

TPM-D: Power Reactor Special Session: Radiation Protection in a Nuclear

Power Renaissance

*Co-Chairs: Roger Shaw,
Larry Haynes*

2:30 PM TPM-D.1

Radioactive Waste and Combined License Application Experience

Maisler, J.J.

ENERCON

2:45 PM TPM-D.2

Overview of NRC Part 50 and Appendix I Regulations Update

Dehmel, J., Frye, T.

US Nuclear Regulatory Commission

3:00 PM TPM-D.3

Radiological Environmental and Public Exposure Considerations for Existing and Future Nuclear Power Plants

Harris, J., Miller, D.

Idaho State University, University of Illinois at Urbana-Champaign

3:15 PM TPM-D.4

Development of Radiation Protection Managers

Harris, W.

Exelon Nuclear

3:30 PM BREAK

4:00 PM TPM-D.6

Where O Where Have All the HP Techs Gone? and What're You Gonna Do About It?

Goldin, E., Miller, W., Matthews, R.

San Onofre Nuclear Generating Station, Missouri University, MiraCosta College

4:15 PM TPM-D.7

Cooperative Efforts Between the Bloomsburg University Health Physics Program and the PPL Susquehanna Nuclear Plant

Simpson, D., Smith, R.

Bloomsburg University, PPL Susquehanna

4:30 PM TPM-D.8

Dominion-Central Virginia Community College Partnership - a Pilot Success Story

Tarantino, C.

Dominion Generation, Corporate Office

4:45 PM TPM-D.9

Nuclear Renaissance and/ Industry-Government-Academic/Cooperation to Enhance Workforce Development in Health Physics (HP)/Case of Alcorn State University(ASU) in Mississippi

Aceil, S.M.

Alcorn State University

2:15 - 5:15 PM L100 H/I

TPM-E: Special Session: Homeland Security, Radioactive Material Monitoring and Security

Co-Chairs: Bill Rhodes,

Carson Riland

2:15 PM TPM-E.1

Overview of Global Threat Reduction Initiative Domestic Threat Reduction Efforts

Iliopoulos, I.

National Nuclear Security Administration

2:45 PM **TPM-E.2**
Increased Security Requirements on
State Radiation Control Regulatory
Programs
*Gilley, D., Vause, P., Hamilton, C.,
Passetti, W.*
Florida Bureau of Radiation Control

3:15 PM **TPM-E.3**
Cesium Irradiators In-Device Delay
Security Enhancements
*Tensmeyer, P., Bodnaruk, E., Brooks,
S.*
*National Nuclear Security Administra-
tion, Sandia National Laboratory*

3:45 PM **BREAK**
4:15 PM **TPM-E.4**
Sealed Source Disposal Challenges
and National Security
Cuthbertson, A.
*National Nuclear Security Administra-
tion*

4:45 PM **TPM-E.5**
GTRI Security Enhancements at the
University of Pennsylvania
Forrest, R., Mahoney, A.
University of Pennsylvania

2:30 - 4:30 PM **L100 J**

TPM-F: AAHP Special Session
Why Society Needs Health
Physics: Biological Effects and
Challenges

*Co-Chairs: Nancy Kirner,
Thomas S. Tenforde*

2:30 PM **TPM-F.1**
Health Effects of Ionizing Radiation
Strom, D.
Pacific Northwest National Laboratory

3:00 PM **TPM-F.2**
Indoor Radon Risk: What Do We
Know and How Do We Know It?
Johnson, J.A.
Tetra Tech

3:15 PM **BREAK**

3:45 PM **TPM-F.3**
IAEA New Laboratories Facilities for
Assessing Occupational Exposure
*Cruz Suarez, R., Gann, E., Heiss, J.,
Capote-Cuellar, A., Villarreal, C., De-
boodt, P., Czarwinski, R.*
International Atomic Energy Agency

4:00 PM **TPM-F.4**
Current Situation and Future
Challenges on Occupational
Radiation Protection in Latin-America
*Cruz Suarez, R., Deboodt, P.,
Ramirez, R.*
International Atomic Energy Agency

4:15 PM **TPM-F.5**
The IAEA Pu-240 Incident, Clean-Up
and Lessons Learnt
*Hunt, J.G., Schmitzer, C., Hochmann,
R., Eisenwagner, H., Benesch, T.,
Deboodt, P., Cruz-Suarez, R.*
International Atomic Energy Agency

4:30 PM **AAHP Open Meeting**

Don't forget the
Awards Banquet
7:00-9:00 pm
Hilton Ballroom ABCD

WEDNESDAY

7:00-8:00 AM **M100 A/B**
CEL5 Single Integrated Emergency Response Plan for Hospitals
Tom Morgan
University of Rochester/Strong Memorial Hospital

7:00-8:00 AM **M100 D/E**
CEL 6 Update on Medical Internal Radiation Dosimetry: 2009 MIRDCOMM Recommendations for Unifying MIRDCOMM and ICRP Formulas, Quantities, and Units
Darrell R. Fisher, Wesley E. Bolch
Pacific Northwest National Laboratory, University of Florida

8:15 AM - Noon **L100 A**

WAM-A: Environmental
Co-Chairs: Matthew Barnett,
Kathryn A. Higley

8:15 AM **WAM-A.1**
International Atomic Energy Agency - Environmental Modelling for Radiation Safety Working Group on Reference Methodologies for Controlled Discharges
Stocki, T.
Health Canada

8:30 AM **WAM-A.2**
Modeling of Instantaneous and Latent Doses Due to Hypothetical Atmospheric Dispersals of Radioactive Material at an in Situ Leach Mine
Beauvais, Z.S., Fariz, H.G., Thompson, K.H., Kearfott, K.J.
University of Michigan, Ann Arbor

8:45 AM **WAM-A.3**
Update and Review of the MILDOS-AREA Software for Radiological Dose Estimation of Uranium Mining Activities
Chen, S.Y., Kamboj, S., LePoire, D., Klett, T., Arnish, J., Watson, B., Schwartzman, A.

Argonne National Laboratory, US Nuclear Regulatory Commission

9:00 AM **WAM-A.4**
Application of Multivariate Statistics and Unique Dose Models in the Characterization and Remediation of Properties Contaminated with NORM Waste
Adams, S., Carson, J.
Shaw E&I

9:15 AM **WAM-A.5**
Comparison of Commercial Cosmic Ray Dose Equivalent Codes to Measured Radiation Exposure of Naval Afloats and Civilian Air Travelers
Dobisesky, J.P., Nelson, M.E., Nicholson, J.W., Pisacane, V.L.
US Naval Academy

9:30 AM **BREAK**

10:00 AM **WAM-A.6**
Radiation Doses to Hanford Workers from Natural Potassium-40
Lynch, T., Strom, D., Weier, D.
Pacific Northwest National Laboratory

10:15 AM **WAM-A.7**
External Photon Dose Rates in US Counties Based on Airborne Gamma Spectrometry
Ngachin, M., Strom, D., Napier, B., Seiple, T.
Florida International University, Pacific Northwest National Laboratory

10:30 AM **WAM-A.8**
Variability and Uncertainty in Effective Doses to the US Population from Internal Radionuclides
Watson, D., Strom, D., Stabin, M.
Washington State University, Pacific Northwest National Laboratory, Vanderbilt University

10:45 AM **WAM-A.9**
Uncertainty and Variability in Ubiquitous Background Radiation Doses to the US Population
Strom, D., Birchall, A., Borak, T., Gessel, T., Goldhagen, P., James, A., O'Brien III, K., Puskin, J.
Pacific Northwest National Laboratory, U.K. Health Protection Agency, Colorado State University, Idaho State University, US Department of Homeland Security, US Transuranium and Uranium Registries, Northern Arizona University, US Environmental Protection Agency

11:00 AM **WAM-A.10**
Polonium Transfer and its Dose to the Land Snail *Trachia vittata*
Ross, E.M., Wesley, S.G.

11:15 AM **WAM-A.11**
Radioactive and Non-radioactive Contaminants in Aquifers Post In-Situ Recovery Uranium Mining
Coler, A., Johnson, T.
Colorado State University

11:30 AM **WAM-A.12**
Trace Element Analysis: An Alternative Approach to Developing Environmental Transfer Factors
Higley, K., Bytwerk, D., Fasth, B., Hay, T., Knapp, N., Minc, L.
Oregon State University

11:45 AM **WAM-A.13**
Chlorine-36: An Understudied Nuclide
Higley, K., Bytwerk, D., Shaw, C.*
Oregon State University

8:15 AM - Noon **L100 B/C**

WAM-B: Special Session: Current Topics in Medical Health Physics

Co-Chairs: Ralph Lieto, Terry Yoshizumi

8:15 AM **WAM-B.1**
Ionizing Radiation Exposure of the US Population - Patients and Medical Staff
Kase, K., Thomadsen, B., Miller, K., Strom, D., Suleiman, O., Quinn, D., Rosenstein, M.
National Council on Radiation Protection and Measurements, University of Wisconsin, Madison, Pennsylvania State University, Pacific Northwest National Laboratory, US Food and Drug Administration, DAC, Inc.

9:00 AM **WAM-B.2**
CT Dose Assessments in Clinical Practice: What's Typical, What's Too Much?
*McCullough, C., Kofler, J.**
Mayo Clinic

9:30 AM **WAM-B.3**
Use of an Electronic Personal Dosimeter to Measure Patient-Specific Biological Removal Rates of Iodine-123 and 131 and use in Compliance with Patient Release Criteria
Martel, C.B.
Brigham and Women's Hospital

10:00 AM **BREAK**

10:30 AM **WAM-B.4**
Medical Material Events
Lieto, R.
St. Joseph Mercy Health System, Ann Arbor, MI

11:00 AM **WAM-B.5**
Complying with Increased Control Requirements
Jacob, N.
Rhode Island Hospital/Warren Alpert Medical School of Brown University

11:30 AM **WAM-B.6**
AAPM TG 124- Guide for Developing a Credentialing Program for Fluoroscopy Users
Moore, M.E.
Philadelphia VA Medical Center

8:30 AM - Noon **L100 D/E**

WAM-C: External Dosimetry

*Co-Chairs: Chris Passmore,
Peter Caracappa*

8:30 AM **WAM-C.1**
The new VARSKIN 4 Photon Dosimetry Model of the Skin
*Ryan, M., Lodwick, C. *, Hamby, D.*
Oregon State University

8:45 AM **WAM-C.2**
Measurement of X-Ray Spectra at NIST as Part of a Program to Establish Facility Specific Air-Kerma to Dose Equivalent Conversion Coefficients
Soares, C.G., O'Brien, C.M., Minniti, R.
National Institute of Standards and Technology

9:00 AM **WAM-C.3**
Study of the Linearity, Accuracy, and Precision of Pocket Ionization Chambers
Bergen, R.J., Harvey, J.A., Kearfott, K.J.
University of Michigan, Ann Arbor

9:15 AM **WAM-C.4**
Measurements of Radiation Detectors Made on a Tissue Equivalent Phantom and Free in Air
Minniti, R., Pibida, L.S., Soares, C.G.
National Institute of Standards and Technology

9:30 AM **WAM-C.5**
OSL Albedo Neutron Dosimeter
Passmore, C., Yoder, D.
Landauer, Inc.

9:45 AM **WAM-C.6**
Monte Carlo Modeling of Workers Walking on Contaminated Ground for Accurate Environmental Dosimetry
Han, B., Zhang, J., Na, Y., Caracappa, P., Xu, X.
Rensselaer Polytechnic Institute

10:00 AM **WAM-C.7**
The Impact of the ICRP-103 Recommendations: a Dosimetric Study of External Photon and Neutron Beams
Caracappa, P., Zhang, J., Xu, X.G.
Rensselaer Polytechnic Institute

10:15 AM **BREAK**

10:45 AM **WAM-C.8**
Organ Doses from External Proton Beams Calculated from a Pair of ICRP-89 50th-Percentile Adult Phantoms
*Zhang, J., Na, Y., Han, B. *, Caracappa, P., Xu, X.G.*
Rensselaer Polytechnic Institute

11:00 AM **WAM-C.9**
Organ Doses from External Neutron Beams for a Pair of ICRP-89 50th-Percentile Adult Phantoms
*Zhang, J., Na, Y., Han, B., Caracappa, P. *, Xu, X.G.*
Rensselaer Polytechnic Institute

11:15 AM **WAM-C.10**
Dose Response Modeling for Critical
Organs in Intensity Modulation
Radiation Therapy (IMRT) Treatments
Pyakuryal, A.
*Northwestern Memorial Hospital, Uni-
versity of Illinois at Chicago*

11:30 AM **WAM-C.11**
Neutron and Gamma Measurements
within a Mixed Field at the University
of Massachusetts Lowell Research
Reactor
*Talmadge, M.C., Kegel, G.H.R.,
Bobek, L.*
UMass Lowell

11:45 AM **WAM-C.12**
Radio Frequency (RF) Field Strength
Fluctuation Due to Digital Conversion
of Television Signals: a Pilot Study
Lane, P., Johnson, T.
Colorado State University

8:30 AM - Noon **L100 F/G**

**WAM-D: Special Session:
Federal Government Nuclear
Detonation Preparedness**
*Co-Chairs: John Lanza,
Tammy Taylor*

8:30 AM **WAM-D.1**
An Introduction to Planning Guidance
for Response to a Nuclear Detonation
*Taylor, T., Jackson, K., Ansari, A.,
Aponte, M., Bentz, J., Bowman, D.,
Coleman, N., Daigler, D., DeCair, S.,
Dixon, J.*
*Office of Science and Technology
Policy, Executive Office of the Presi-
dent, Homeland Security Council,
Executive Office of the President,
Centers for Disease Control and
Prevention, Department of Defense,
Department of Energy, Department
of Health & Human Services, Depart-
ment of Homeland Security, Environ-
mental Protection Agency, Centers for
Disease Control & Prevention*

8:45 AM **WAM-D.2**
Nuclear Weapons Effects And
Impacts in the Urban Environment
*MacKinney, J.A., Mercier, C., Bud-
demeier, B.R.*
*US Department of Homeland Secu-
rity, Armed Forces Radiobiology Re-
search Institute, Lawrence Livermore
National Laboratory*

9:15 AM **WAM-D.3**
Responding to the Aftermath of
Nuclear Terrorism; Working with State
& Local Communities
Buddemeier, B.
*Lawrence Livermore National Labo-
ratory*

9:30 AM WAM-D.4

A Zoned Approach to Nuclear Detonation Emergency Response

Taylor, T., Jackson, K., Ansari, A., Coleman, N., DeCair, S., Dixon, J., Hrdina, C., MacKinney, J., Mercier, J., Milligan, P.

Executive Office of the President, Centers for Disease Control and Prevention, Department of Health & Human Services, Environmental Protection Agency, Department of Homeland Security, Department of Defense, Nuclear Regulatory Commission

10:00 AM BREAK

10:30 AM WAM-D.5

Sheltering and Evacuation Recommendations

Poeton, R.W., DeCair, S.D. , Milligan, P.A., Radow, L.*

US Environmental Protection Agency, US Nuclear Regulatory Commission, US Department of Transportation

11:00 AM WAM-D.6

Medical Response Planning Guidance for a Nuclear Detonation

Coleman, C.N., Hrdina, C., Mercier, J. Department of Health and Human Services, Department of Defense

11:30 AM WAM-D.7

Population Monitoring and Decontamination Recommendations

Ansari, A., Dixon, J., Whitcomb, R., Miller, C.

Centers for Disease Control and Prevention

11:45 AM WAM-D.8

A State and Local Community's Perspective Regarding Federal Nuclear Detonation Planning

Kaufman, K., Day, J.
Los Angeles Public Health*

8:30 -11:30 AM L100 H/I

WAM-E: Military Health Physics Session

*Co-Chairs: Richard Rasmussen,
Scott Nichelson*

8:30 AM WAM-E.1

The 101st Airborne Division and the Tuwaitha Nuclear

Melanson, M., Geckle, L., Davidson, B.

Walter Reed Army Medical Center, US Army Center for Health Promotion and Preventive Medicine

9:15 AM WAM-E.2

The Combined Effects of a Nuclear Detonation on Soldier Performance: an Overview of the Methodology Implemented in the Consolidated Human Response Nuclear Effects Model

Bergman, J.J., Millage, K.K., McClellan, G.E., Levin, S.G.

Applied Research Associates, Inc., Technico Southwest, Inc.

9:45 AM WAM-E.3

An Introduction to the Medical CBRN Battlebook (USACHPPM Technical Guide 244)

Falo, G.A., Goodison, S.G.

US Army Center for Health Promotion and Preventive Medicine

10:00 AM BREAK

10:30 AM WAM-E.4

Beyond the Army's Capstone Depleted Uranium Report: Response to the National Academy of Sciences Committee on Toxicology

Alberth, D.P., Szrom, F., Falo, G.A., Roszell, L.E., Melanson, M.A.

US Army Center for Health Promotion and Preventive Medicine, Walter Reed Army Medical Center

11:00 AM **WAM-E.6**
Joint Publication 3-11: Department of
Defense Guidance for Radiological
Composite Risk Management
*Goodison, S., Falo, G.**
USACHPPM

8:30 AM - Noon **L100 J**

**WAM-F: Special Session: Case
Studies in Health Physics, Stu-
dent Reports from the Masters
in Health Physics Program at
the
Illinois Institute of Technology**
Chair: Laurence Friedman

WAM-F.1 Human Factors at Three
Mile Island
Hanson, R.
IIT

WAM-F.2 Irradiator Source Jams
Buzzell, J.
IIT

WAM-F.3 Operation Morning Light
Hull, S.
IIT

WAM-F.4 TMI Vessel Investigation
Project
Keene, R.
IIT

WAM-F.5 Broken Cobalt-60 Check
Source
Miller, W.
IIT

2:30 - 5:15 PM **L100 A**

**WPM-A: NESHAPs -
Radioactive Air Meeting**
*Co-Chairs: Matthew Barnett,
Gustavo Vazquez*

2:30 PM Introduction
Matthew Barnett

2:45 PM **WPM-A.1**
EPA Overview
Rosnick, R.
EPA-HQ

3:15 PM **WPM-A.2**
Department of Energy Subpart H
Summary Report
Vazquez, G.
Department of Energy

3:45 PM **BREAK**

4:15 PM **WPM-A.3**
Standards, Guides and Directives
Relevant to Airborne Radioactive
Emissions
Glissmeyer, J.
Pacific Northwest National Laboratory

4:45 PM **WPM-A.4**
NESHAP Rad Air Special Session -
Technical Items Discussion
Smith, L., Scofield, P., Wahl, L.
*Oak Ridge National Laboratory, Law-
rence Berkeley Laboratory*

2:30 - 5:00 PM **L100 B/C**

WPM-B: Movies

2:30 - 3:30 PM **L100 D/E**

WPM-C1: External Dosimetry
*Co-Chairs: Jack Fix,
Robert Scherpelz*

2:30 PM **WPM-C1.1**
External Dosimetry Studies of Mayak
Workers
*Scherpelz, R.I., Vasilenko, E.K.,
Gorelov, M.V., Strom, D.J., Smetanin,
M.Y.*
*Pacific Northwest National Labora-
tory, Mayak Production Association*

2:45 PM **WPM-C1.2**
A Unified Approach to Uncertainty for
Mayak Worker Dosimetry
Strom, D., Scherpelz, R. , Napier, B.*
Pacific Northwest National Laboratory

3:00 PM **WPM-C1.3**
Neutron Dose Reconstruction
Methods at Mound under Part B of the
Energy Employees Compensation
Act
*Morris, R.L., Faust, L.G., Smith, B.P.,
Chew, M.H., Fix, J.J., Ulsh, B.A.*
*M.H. Chew & Associates, Inc., Dade
Moeller & Associates, National In-
stitute for Occupational Safety and
Health*

3:15 PM **WPM-C1.4**
Retrospective Evaluation of Hanford
Plutonium Facility Occupational
Neutron Dose
*Fix, J., Glover, S., Taulbee, T., Ma-
cievic, G.*
*Dade Moeller & Associates, National
Institute of Occupational Safety and
Health, Office of Compensation Anal-
ysis and Support*

3:45 PM **BREAK**

4:00 - 5:00 PM **L100 D/E**

**WPM-C2: Internal Dosimetry
and Bioassay B**

*Co-Chairs: Tim Kirkham,
Wayne Gaul*

4:00 PM **WPM-C2.1**
A Method to Correct Direct, in Vivo
Measurement Results of Am-241 in
the Lungs for Interference Caused by
Activity Deposited in Other Organs
Lobaugh, M., Glover, S., Spitz, H.
University of Cincinnati

4:15 PM **WPM-C2.2**
A Review of Wound Cases from the
DOE Hanford Site
*Antonio, C., Carbaugh, E., McClellan,
J.*
*Battelle-Pacific Northwest National
Laboratory*

4:30 PM **WPM-C2.3**
Predicting Internal Dose from Air
Sampling Results from a Radiological
or Nuclear Event
Lohaus, J.H., Krieger, K.V. , Semler,
K.A.*
*USAF, Texas A&M, NUEN Depart-
ment, Dycor Technologies Ltd*

4:45 PM **WPM-C2.4**
Recent Study on the Metabolism of
Po-210 in Rats - a Preliminary Report
*Li, C., Sadi, B., Wyatt, H., Priest, N.,
Kramer, G.*
*Health Canada, Atomic Energy Can-
ada Limited*

2:30 - 5:00 PM **L100 F/G**

WPM-D: Homeland Security

*Co-Chairs: Paul Stansbury,
Jim Barnes*

2:30 PM **WPM-D.1**
Using the Inspector1000 and
Falcon5000 for Demonstrating SNM
Safeguards Measurements for the
Nuclear Science Merit Badge, Boy
Scouts of America
Chapman, J.
Canberra Industries

2:45 PM **WPM-D.2**
Cf-252 Characterization for Testing
Instrumentation - per Homeland
Security Requirements
Hogue, M., Morgan, B.W.
*Savannah River Nuclear Solutions,
LLC, Bartlett Nuclear, Inc.*

3:00 PM **WPM-D.3**
Update on the Revision of ANSI/HPS
N43.17 Radiation Safety for Personnel
Security Screening Systems Using
X-ray or Gamma Radiation
Kassiday, D.
US Food and Drug Administration

3:15 PM **WPM-D.4**
Update on the Development of
American National Standards Institute
N43.16, Radiation Safety for X and
Gamma Ray Cargo and Vehicle
Security Screening Systems (Up To
10 MeV)
*Jones, C.R., Szrom, F., Kassiday,
D.F.H., Cerra, F.*
*US Army Center for Health Promotion
and Preventive Medicine, US Food
and Drug Administration, Center for
Devices and Radiological Health, Na-
tional Institute of Standards and Tech-
nology (Retired)*

3:30 PM **BREAK**

4:00 PM **WPM-D.5**
Establishing an Operational Area
Boundary around Cargo and Vehicle
Inspection Systems
*Jones, C.R., Szrom, F., Kassiday,
D.F.H., Cerra, F.*
*US Army Center for Health Promotion
and Preventive Medicine, US Food
and Drug Administration, Center for
Devices and Radiological Health, Na-
tional Institute of Standards and Tech-
nology (Retired)*

4:15 PM **WPM-D.6**
The Challenges of Radiological
Scanning of Ship-to-Rail Intermodal
Stansbury, P., Reichmuth, B.
Pacific Northwest National Laboratory

4:30 PM **WPM-D.7**
ITTF/IDOT Radiation Detection Pilot
Program
Dunn, W., Korty, T.
*PROTECT-US, Inc., Illinois Depart-
ment of Transportation*

4:45 PM **WPM-D.8**
Proposed Design for a Mobile Active
Neutron Interrogation System
*Whetstone, Z.D., Zak, T., Lehnert,
A.L., Kearfott, K.J.*
University of Michigan

2:30 - 4:00 PM **L100 H/I**

**WPM-E: Military Health Physics
Session**
*Co-Chairs: Richard Rasmussen,
Bob Cherry*

2:30 PM **WPM-E.1**
Overview of the US Army's Depleted
Uranium Bioassay Screening
Program
*Szrom, F., Falo, G.A., Alberth, D.P.,
Hamilton, D.S., Melanson, M.A.*
*US Army Center for Health Promo-
tion and Preventive Medicine, Walter
Reed Army Medical Center*

3:00 PM **WPM-E.2**
Ultra Low Level Quantitation and Ratio
Determination of Uranium Isotopes in
Human Urine Using Isotopic Dilution
Inductively Coupled Plasma Mass
Spectrometry
*Kurk, D.N., Kurk, C., Spence, S.E.,
Swatski, R.J., Beegle, T.E.*
*United States Army Center for Health
Promotion and Preventive Medicine*

3:30 PM **WPM-E.3**
Overview of the DOD Laser System
Safety Working Group (LSSWG)
Mikulski, H.T., Komp, G.
US Army Safety Office

4:00 PM **BREAK**

4:30 PM **Military Health Physics
Section Business Meeting**

2:30 - 5:00 PM **L100 J**

**WPM-F: Special Session: Case
Studies in Health Physics, Stu-
dent Reports from the Masters
in Health Physics Program at
the Illinois Institute of
Technology**

Chair: Laurence Friedman

WPM-F.1 Chernobyl
Kohut, T.
Illinois Institute of Technology

WPM-F.2 NASA Radiation Safety
Program for Human Space Flight
Picco, C.
Illinois Institute of Technology

WPM-F.3 Health Physics Train-
ing Simulator

5:30 PM **L100 D/E**

HPS Business Meeting

6:00 - 8:00 PM **Minneapolis Hilton**

**WPM-G: ADJUNCT TECHNICAL
SESSION**

Aerosol Measurements

Chair: Morgan Cox

WPM-G.1 A Method for Optimizing
the Performance of an Alpha-7
Continuous Monitoring System
Wannigman, D.L., Thompson, K.P.
Los Alamos National Laboratory

WPM-G.2 Radiation Detection in
the 21st Century: Basics, Sources,
Applications, Hazards and Challenges
Cox, M.
Safety and Ecology Corporation

WPM-G.3 Final Progress Report
on the Book Radioactive Air Sampling
Methods
Maiello, M.L., Hoover, M.D.
Wyeth Labs, NIOSH-Morgantown

WPM-G.4 Radiation Research
Needs for Direct-Reading Exposure
Assessment Methods: Update from
the 2008 NIOSH Workshop
Hoover, M.D.
*National Institute for Occupational
Safety and Health*

WPM-G.5 Evaluation of Filter
Media for Alpha Continuous Air
Monitoring in the Ultrafine Particle
Size Range
*Hoover, M.D., Baltz, D., Eimer, B.C.,
Rengasamy, S.*
*National Institute for Occupation-
al Safety and Health, WV and PA,
Bladewerx LLC, EG&G Technical
Services, Inc*

THURSDAY

7:00-8:00 AM **L100 A**
CEL7 Radiation Safety Guidelines
for Contraband Detection Systems
Siraj M. Khan
US Department of Homeland Security

7:00-8:00 AM **L100 J**
CEL 8 Complexity Science and Ra-
diation Risk Communication
Mark D Radonich
Cultural Effect Consulting

8:15 AM - Noon **L100 B/C**

THAM-A: Operational

Chair: Nick Bates

8:15 AM **THAM-A.1**
Evaluation of the Neutron Dose Rates
at LLNL in View of the Revised 10
CFR 835
Radev, R.
*Lawrence Livermore National Labo-
ratory*

8:30 AM **THAM-A.2**
Radiological Design Review of Cold
Neutron Instruments at the Oak Ridge
National Laboratory's High-Flux
Isotope Reactor
Mei, G.T.
Oak Ridge National Laboratory

8:45 AM **THAM-A.3**
Radiological Safety Enhancements
During Stabilization of the Chernobyl
Shelter Object
*Hoyt, J., Andreev, V., Kulishenko, B.,
Kelly, D.*
*Battelle Memorial Institute, State Spe-
cialized Enterprise Chernobyl Nuclear
Power Plant*

9:00 AM **THAM-A.4**
A Study of Operational Exposure at
the Waste Isolation Pilot Plant Using
Electronic Personnel Dosimeters
*Goff, T., Hayes, R.**
Washington TRU Solutions, LLC

9:15 AM **THAM-A.5**
Application of the Department
of Energy's Amended Radiation
Protection Regulations to Facility
Design
McConn Jr, R., Pryor, K., Strom, D.
Pacific Northwest National Laboratory

9:30 AM **THAM-A.6**
Low Energy X-Ray Field
Characterization Around a High
Current Low Voltage Projectile Device
*Burgett, E., Hertel, N., Quintrell, B.,
Sheffield, S., Pearson, M., Cowan, R.*
Georgia Institute of Technology

9:45 AM **BREAK**

10:00 AM **THAM-A.7**
Evaluation of Skyshine from a Line
Source
Willison, J., Lonchar, S.
*Washington Safety Management So-
lutions, Washington Safety Manage-
ment Solutions*

10:15 AM **THAM-A.8**
Future Directions in Air Monitoring at
Los Alamos National Laboratory
Voss, J.T.
Los Alamos National Laboratory

10:30 AM **THAM-A.9**
Soil Concentration Guidelines for Use
in Determining Soil Contamination
Areas at the Savannah River Site
Jannik, G.T., Crase, K.W.
*Savannah River National Laboratory,
Savannah River Nuclear Solutions*

10:45 AM **THAM-A.10**
Experience in the Control and Removal of Damaged Tritium Exit Signs
Ikenberry, T., Barton, C., Stewart, D., Ellis, J., Herrington III, W.
Dade Moeller & Associates

11:00 AM **THAM-A.11**
A NORM Survey in an Oil and Gas Field
Scott, A.G.
Arthur Scott and Associates, Missis-auga

11:15 AM **THAM-A.12**
A Method for Determining the Nominal Ocular Hazard Zone for Gaussian Beam Laser Rangers with a Firmware Controlled Variable Focal Length
*Picco, C., Shavers, M., Victor, J., Duron, J., Bowers, W., Gillis, D., Van Baalen, M.**
University of Houston, Wyle Integrated Science and Engineering Group, Houston, Jacobs Technology, Houston, National Aeronautics and Space Administration (NASA) at Johnson Space Center Houston, University of Texas Medical Branch, Galveston

11:30 AM **THAM-A.13**
Strengthening our Radiation Protection Paradigm
Gallagher, R.
Applied Health Physics

11:45 AM **THAM-A.14**
The Medical X-Ray Technologist: a Potential Source of Health Physicists or Radiation Safety Officers?
Cunningham Beckfield, F., Johnson, T.
Colorado State University

8:15 AM - Noon **L100 D/E**

THAM-B: Emergency Planning and Response

*Co-Chairs: Craig Marianno,
Tom O'Connell*

8:15 AM **THAM-B.1**
Preparedness for Responding to the Aftermath of Radiological and Nuclear Terrorism: a Guide for Decision Makers (New NCRP Report)
Groves, K., Poston, Sr., J.
S2-Sevorg Services, LLC, Texas A&M University

8:30 AM **THAM-B.2**
Risk Based Response-Development of a Manual for First Responders
O'Connell, T.
International Atomic Energy Agency

8:45 AM **THAM-B.3**
Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident
Domotor, S., Wallo, A., Yu, C.
Department of Energy, Argonne National Laboratory

9:00 AM **THAM-B.4**
RESRAD-RDD - A Computer Code for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident
Cheng, J., Kamboj, S., Yu, C., Klett, T., Domotor, S., Wallo, A.
Argonne National Laboratory, US Department of Energy

9:15 AM **THAM-B.5**
Application, Testing, and Verification of RESRAD-RDD Methodology and Software
Yu, C., Cheng, J.-J., Kamboj, S., Domotor, S., Wallo, A.
Argonne National Laboratory, Department of Energy

9:30 AM **THAM-B.6**
A Coupled Computational Fluid Dynamics Monte Carlo Radiation Transport Approach To Radioactive Particle Transport Problems
Ali, F., Waller, E.
University of Ontario Institute of Technology

9:45 AM **BREAK**
10:00 AM **THAM-B.7**
Conveying Uncertainty in Map Products for Radiological Events
Marianno, C.
National Securities Technologies

10:15 AM **THAM-B.8**
Evaluation of Radiation Instrumentation for Rapid Screening of Internal Contamination Following a Radiological Event
Juneja, B., Lee, C., Bolch, W.
University of Florida

10:30 AM **THAM-B.9**
Using the Thermo IdentifINDER Handheld Spectrometer as a Internal Contamination Screening Tool Following an RDD Event
Burgett, E., Hertel, N.
Georgia Institute of Technology

10:45 AM **THAM-B.10**
Evaluation of Internal Contamination Levels after a Radiological Dispersion Device Using Portal Monitors
Manger, R.P., Palmer, R.C., Hertel, N.E.
Georgia Institute of Technology

11:00 AM **THAM-B.11**
Quantitative Triage Assessment Indicators and Risk Aversion Models for Radionuclide Intake and Incorporation
Waller, E., Wilkinson, D.
University of Ontario Institute of Technology, Defence R&D Canada, Ottawa

11:15 AM **THAM-B.12**
Nuclear Cleanup Triage: Planning Reoccupation and Initial Cleanup after an Improvised Nuclear Device Explosion
Glines, W.M., McBaugh, D., Poeton, R.W.

US Department of Energy, Richland Operations Office, Washington State Department of Health, Office of Radiation Protection, US Environmental Protection Agency, Region 10

11:30 AM **THAM-B.13**
Issues and Need for Developing Late-Phase Response to Terrorist Events Involving Radiological Material
Chen, S.Y., Tenforde, T.S.
Argonne National Laboratory, National Council on Radiation Protection and Measurements

11:45 AM **THAM-B.14**
Gap Analysis of Readiness to Respond to a Radiological Terrorist Event: What Agency Should Take the Lead?
Dibblee, M.G., Anastas, G., Stewart-Smith, D.A.
Radiation Health Consulting, Past-President HPS, 3S Consulting Stewart-Smith Science

8:30 - 11:45 AM **L100 F/G**

THAM-C: Instrumentation

*Co-Chairs: Gary Kramer,
Tom Mohaupt*

8:30 AM **THAM-C.1**
Self-Absorption Effects of H-3 and Ni-63 in Liquid Scintillation Counting
Zhu, S., Sedgwick, C.W.
US Army

8:45 AM **THAM-C.2**
Use of BC-523a Liquid Scintillator for Simultaneous Neutron Spectroscopy and Gamma Counting with the Implementation of a Neutron History Reconstruction Algorithm
Frey, W., Hamby, D.
Oregon State University

9:00 AM **THAM-C.3**
Particle Detection - a New Mindset, MACTEC's Detector Research and Testing Facility
McDonald, M., Lopez, A., Marcial, M.
MACTEC Development Corp, Grand Junction, CO

9:15 AM **THAM-C.4**
Novel Beta/Gamma Dosimeter Design and Experimental Results
Cazalas, E.J., Hamby, D.M., Farsoni, A.T.
Oregon State University

9:30 AM **THAM-C.5**
Development of a Photonic Device for Radiation Detection
*Reano, R.M., Blue, T.E. *, Ruege, A.C., Baas, L.B.*
The Ohio State University

9:45 AM **BREAK**

10:15 AM **THAM-C.7**
Improved Wide Range Gamma Detector for Telescoping Poles
Iwatschenko, M., Trost, N.
Thermo Fisher Scientific

10:30 AM **THAM-C.8**
HML's Whole Body Counter: Measuring Highly Radioactive Persons
Kramer, G., Capello, K., Chiang, A., Hauck, B.
Health Canada

10:45 AM **THAM-C.9**
Using PHITS to verify and calibrate the RAD instrument
Krieger, K.V., Guetersloh, S., Zeitlin, C., Hassler, D.
Texas A&M University, Southwest Research Institute, Boulder, CO

11:00 AM **THAM-C.10**
Management of Large Data Sets
Frazier, R., Johnson, T.
Colorado State University

11:15 AM **THAM-C.11**
Using Log-Probability Plotting to Analyze Large Amounts of Data
Miller, M.
Sandia National Labs

11:30 AM **THAM-C.12**
Experimental Determination of Correction Factors for Alpha Artificial Radioactivity in Filters; Simulating the Environmental Radioactivity Monitoring
Geryes, T., Monsanglant-Louvet, C., Gehin, E.
Institut de Radioprotection et de Sûreté Nucléaire, Université Paris-Est

8:15 AM - Noon **L100 H/I**

THAM-D: Environmental
Co-Chairs: Kimberlee Kearfott,
Deborah A. Falta

8:15 AM **THAM-D.1**
Overview of the Low Dose-Rate Irradiation Facility at the Savannah River Site: Past, Present, and Future
Jannik, T., Farfan, E., Coughlin, D., Hinton, T.
Savannah River National Laboratory, Institute of Radiation and Nuclear Safety

- 8:30 AM** **THAM-D.2**
 US DOE Office of Environmental Management Collaborative Work with the International Radioecology Laboratory
Jannik, T., Farfan, E., Marra, J.
Savannah River National Laboratory
- 8:45 AM** **THAM-D.3**
 Global Practices in C-14 Monitoring at NPPs
Haque, M., Miller, D.
University of Illinois
- 9:00 AM** **THAM-D.4**
 Plutonium Transport in Plants: Experimental Determination of Transport Velocity in Live Plants and Sorption to Plant Xylem
Thompson, S.W., Fjeld, R.A., Molz, F.J., Kaplan, D.I.
Clemson University, Savannah River National Laboratory
- 9:15 AM** **THAM-D.5**
 Quantative Analysis of Some Radioisotopes in Local Well-Water Samples
Epps, J., Chang, Z.
South Carolina State University
- 9:30 AM** **THAM-D.6**
 A Case Study Where the Treatment of a Contaminate in a Ground Water Plume Could Have Resulted in the Introduction of New Radiological Contaminates and Increased the Total Risk
Myers, J., Adams, S.
Shaw E&I
- 9:45 AM** **THAM-D.7**
 Optimization of Microprecipitation as a Sample Preparation Method for Alpha Spectroscopy
Kelly, L., Faye, S., Sudowe, R.
Rensselaer Polytechnic Institute
- 10:00 AM** **BREAK**
- 10:15 AM** **THAM-D.8**
 Radiation from Granite: What is NORM doing in the Kitchen?
Steck, D., Harrison, D.
St. John's University
- 10:30 AM** **THAM-D.9**
 Radon on the Reservation: a Novel Approach to Radon Screening Test Distribution Through Coupling to Lakota Educational Programs
Eastman, A., Carney, S.E., Newton, J.P., Thompson, K.H., Dickson, I.S., Fetterley, J.A., Lehnert, A.L., Harvey, J.A., Kearfott, K.J., White Face, C.*
Oglala Lakota College, University of Michigan, Ann Arbor, Defenders of the Black Hills
- 10:45 AM** **THAM-D.10**
 A Model for the Calibration of Radon Charcoal Canister Screening Measurements
Lehnert, A.L., Thompson, K.H., Kearfott, K.J.
University of Michigan, Ann Arbor
- 11:00 AM** **THAM-D.11**
 An Intercomparison Study of Two Separate, Simultaneous Radon Screening Measurements
Zak, T., Ambers, S.D., Thompson, K.H., Newton, J.P., Carney, S.E., Fetterley, J.A., Lehnert, A.L., Harvey, J.A., Miklos, J.A., Kearfott, K.J.*
University of Michigan, Ann Arbor
- 11:15 AM** **THAM-D.12**
 The Effects of Sealing and the Number of Canisters Placed in a Small Radon Chamber Used for Educational Purposes
Thompson, K.H., Lehnert, A.L., Carney, S.E., Newton, J.P., Harvey, J.A., Kearfott, K.J.
University of Michigan, Ann Arbor

11:30 AM **THAM-D.13**
Post-Measurement Buildup of
Progeny in and Leakage of Radon
from Charcoal Canisters used for
Home Screening
*Newton, J.P., Thompson, K.H., Car-
ney, S.E., Lehnert, A.L., Harvey, J.A.,
Kearfott, K.J.*
University of Michigan, Ann Arbor

11:45 AM **THAM-D.14**
Uranium Mining and the Lakota
People: Past, Present, and Future
*Dickson, I.S., Thompson, K.H., New-
ton, J.P., Fetterley, J.A., Kearfott, K.J.*
University of Michigan, Ann Arbor

AAHP Courses

Saturday 11 July 2009 - 8 AM-5 PM

AAHP 1 Time - Saving Spectroscopy Models

A.C. Lucas
LNST, Inc.

Methods for deconvolution of spectra having distributed fingerprints will be presented in detail. Principle methods apply to thick sample alpha spectroscopy, recursive gamma ray spectroscopy, and recursive beta ray spectroscopy. Emphasis will be placed on sensitive measurement of natural radionuclide chains so as to minimize time and cost in widespread sampling in environmental decommissioning operations.

Thick sample alpha spectroscopy will be developed from fundamental principles to operational procedures. Models will be demonstrated which account for infinite thickness with estimating methods for sample thicknesses intermediate between infinite and thin. Examples of field results and lab intercomparisons will be presented.

The fundamentals of recursive gamma ray spectroscopy will be presented. The nature of recursion and the importance of the several, both simple and advanced, recursion methods will be discussed. The importance of the method in reducing calibration assumptions and dependence on strict spectrometer performance will be discussed. Examples of deconvolution of spectra from natural radionuclide chains, enriched uranium, depleted uranium, and disequilibrium will be presented.

In a similar manner, deconvolu-

tion of mixed beta ray spectra will be discussed. Examples of both laboratory and field samplings will be presented. In particular, extraction for surveys involving both uranium and thorium daughters, technicium in the environment, and searches for strontium/yttrium in the environment will be presented.

AAHP 2 8-hour HAZWOPER Refresher Course

Wayne Gaul
Chesapeake Nuclear Services, Inc.

The 8 hour HAZWOPER course will be designed to refresh the student in topics relevant to hazardous waste operations in accordance with 29 CFR 1910.120(e)(8). The course is designed to fulfill the annual 8 hour training requirements and will include a short exam and the student will receive a Course Certificate upon successful completion of the course. Items covered will include, but not be limited to, review of applicable regulations, health and safety plans, job safety analysis, emergency response, personnel protective equipment, hazard communication, TLV-PEL updates, confined space, fundamentals of chemical hazards, air sampling for chemicals, spill control, engineering controls and decontamination techniques. Additional topics may be covered to update the student on new or upcoming regulatory changes.

Professional Enrichment Program (PEP)

Sunday 12 July through Wednesday 15 July

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

On Sunday 12 July, 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 preregistration deadline will be sent confirmation of their PEP course registration.

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

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

Please Note!!

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

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

Sunday - 8:00-10:00 am

PEP 1-A EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series

Bob Emery

The University of Texas Health Science Center at Houston

It is currently quite rare for organizations to maintain stand-alone radiation safety programs. Resource constraints and workplace complexities have served as a catalyst for the creation of comprehensive environmental health & safety (EH&S) programs, which include among other health and safety aspects, radiation

safety programs. Unfortunately, many of these consolidations were not accompanied by formal staff training efforts to instill an understanding of the areas now aligned with the radiation safety function. This situation is unfortunate because when armed with a basic understanding of the other safety programs, the radiation safety staff can provide improved customer service and address many simple issues before they become major problems. This unique Professional Enrichment Program (PEP) series is designed to address this shortcoming by providing an overview of a number

of key aspects of EH&S programs, from the perspective of practicing radiation safety professionals who now are involved in a broader set of health and safety issues. The PEP series will consist of three 2 hour segments. See PEP 2-A and PEP 3-A for additional details.

Part 1 will address the “Basics of Fire & Life Safety” and “Risk Management & Insurance.” Included in the fire & life safety segment will be a discussion on the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will also be discussed. The risk management & insurance portion of the session will address the issues of retained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle), and how these aspects impact EH&S operations.

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 1-B Status of ANSI N42 Standards for Health Physics Instrumentation

Morgan Cox, CHP

This presentation covers the current status of American National Standards Institute (ANSI) N42 standards for radiation protection instrumentation in two distinct parts:

1) This portion includes the discussion of some seventeen ANSI N42 standards for Radiation Protection Instrumentation (RPI) including those for portable radiation detectors, ANSI N42.17A for normal environmental conditions and ANSI N42.17C for extreme environmental conditions; ANSI N42.323A and B for test and calibration of portable instruments in the normal range and for near background measurements; for alarming personnel monitors in ANSI N42.20; for airborne radioactivity monitors in ANSI N42.30, ANSI N42.17B, ANSI N42.18, and ANSI N323C; for instrument communication protocols in ANSI N42.36; for in-plant plutonium monitoring in ANSI N317; for reactor emergency monitoring in ANSI N320; for carbon fiber personnel dosimeters in ANSI N322; for installed radiation detectors in ANSI N323C; ANSI N42.26 for personnel warning devices; for radon progeny monitoring in ANSI N42.50; and for radon monitoring in ANSI N42.51.

2) This portion includes the discussion of seventeen ANSI N42 standards recently developed or being developed for Homeland Security Instrumentation (HSI) including those for personal radiation detectors in ANSI N42.32; portable radiation detectors in ANSI N42.33; portable

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

Audience participation in these courses is important to the success of these.

PEP 1-C Medical Internal Dose Calculations – Concepts, Methods, and Examples

Mike Stabin

Vanderbilt University

Internal dose calculations are routinely performed for medical applications using input data from animal or human studies. Calculation of these dose estimates requires understanding of important principles and relationships in kinetic analysis and dose assessment, and knowledgeable use of available models and soft-

ware tools. Adjustments to traditional dose calculations based on patient-specific measurements are routinely needed, especially in therapy calculations, for marrow activity (based on measured blood parameters), organ mass (based on volumes measured by ultrasound or Computed Tomography (CT)), and other variables. This program will give an overview of current concepts, methods and tools in common practice in internal dose assessment in nuclear medicine. Practical examples worked out in several important areas of application and use of important internet resources and software tools will be demonstrated. Current issues in radiation biology that are pertinent to the interpretation of calculated dose estimates will also be briefly discussed.

PEP 1-D Operational Accelerator Health Physics I

L. Scott Walker, Robert May

***Los Alamos National Laboratory,
Thomas Jefferson National Accelerator Facility***

The Operational Accelerator Health Physics I class covers an overview of medium and high energy accelerators, Electron accelerators configuration, Electron Accelerator radiation production, electron accelerator shielding, electron accelerator radioactive material production, and Electron accelerator environmental impacts. The class then begins to focus on proton accelerator configuration, proton accelerator radiation production, accelerator produced isotopes, accelerator interlock systems, general health physics practices at accelerators, general accelerator health

physics rules of thumb, high energy radiation physics for the health physicist, and useful references.

PEP 1-E Laser Safety for Health Physicists.

Ben Edwards

Duke University Medical Center

This course provides an overview of laser physics, biological effects, hazards, and control measures, as well as a concise distillation of the requirements in the ANSI Z136.1-2007 Standard for the Safe Use of Lasers. Non-beam hazards, emerging issues, and accident histories with lessons learned will also be covered. Course attendees will learn practical laser safety principles to assist in developing and conducting laser safety training, performing safety evaluations, completing hazard calculations, and effectively managing an institutional laser safety program. While some knowledge of laser hazards will be helpful, both experienced and novice health physicists with laser safety responsibilities will benefit from this course. Students will also find bringing their own copy of ANSI Z136.1-2007 a helpful reference.

PEP 1-F Monitoring Strategies for Uranium Recovery Facilities

Jim Cain

Canon City Milling Facility

Regulatory guidance for occupational and environmental monitoring programs is primarily provided in Nuclear Regulatory Commission Guides 8.22, 8.30, 8.31, 4.14 and 4.15. Practical experience over 30 years for an operating uranium mill as well as supporting remedial programs and dismantling and decommissioning activities provides the basis for

providing flexible radiation protection program procedures to support these activities. The presentation will focus on the interaction between Training, ALARA, Occupational and Environmental Monitoring Programs. These programs are designed to minimize dose to the individual worker, to the public and minimize impact on the environment. The critical aspects of effective programs are management support, employee training, ALARA committee, laboratory support and quality assurance.

Key elements

Training Program: Initial and periodic training of personnel. Topics are Regulations, Hazard and Risks, Protective Measures, ALARA Program, Occupational and Environmental Monitoring Programs and Worker habits

ALARA Program: ALARA Review Committee which consists of the RSO, Assistant RSO, Safety Supervisor, Operational Foreman and workers from operations, maintenance and utility. Functions are to do weekly inspections, monthly and quarterly reviews with management, establish goals and be advocates in the workplace.

Occupational Monitoring Program: Airborne particulate monitoring and radon progeny may be done using fixed sampling locations as well as breathing zone personnel monitoring. Mixtures of uranium and decay products as well as solubility can be quite variable, for instance, uranium product areas generally have soluble uranium with minimal decay products whereas tailings areas may be dominated by Thorium-230. Bioassay for

uranium in urine and chest counting may be used to verify the confinement of particulates. External Dosimetry may be measured using TLDs and supplemented by periodic surveys. Contamination control may be verified by surveys especially for lunchrooms and or control rooms. Dose estimation may be done using daily tracking of work locations in conjunction with air monitoring data and TLD results. Doses are sometimes modified based on bioassay results.

Environmental Program: Airborne particulate monitoring (24/7) may be done using fixed sampling locations including Radon and TLD; soil sampling may be done annually as well as vegetation. A 24/7 meteorological station may be maintained. Groundwater and surface water sampling may be done at selected locations generally quarterly. Stack sampling may be done monthly or quarterly. Radon Flux may be done on tailings beaches annually. Dose compliance may be determined utilizing the MILDOS computer code which uses stack emissions, area source emissions based on soil sampling and meteorological data. Estimated concentrations from this model may be compared to measured air, soil and vegetation concentrations.

PEP 1-G High Reliability Operations in Nuclear Settings

Michael Ford

B&W Pantex, LLC

Systems failures can lead to catastrophe. Not all catastrophes involve explosions, or spectacular structural collapses. Some catastrophes occur when an organization ceases to exist due to a loss of public

confidence, trust and accountability, especially when the terms “radiation”, “radioactive”, “nuclear” or “plutonium” are involved.

In today's business climate, many businesses involved with high hazard or high consequence operations realize the consequences of a mishap are so devastating that they employ a high reliability organization (HRO) systems approach to minimize the vulnerability of human error. To paraphrase Karlene Roberts (2003), a professor in the Haas School of Business at the University of California at Berkeley and a pioneer of HRO theory: “An HRO is an organization that conducts relatively error free operations over a long period of time, making consistently good decisions that result in high quality and reliable operations.”

Many businesses throughout the world, because of their high hazard operations, have no choice but to strive to achieve high reliability in all aspects of their business. Striving to become a High Reliability Organization (HRO) requires taking a systems approach to avoiding catastrophic accidents, because we cannot rely upon humans to have a perfect day, every day.

Becoming an HRO is not easy. It requires strong leadership in focusing an organization on the ultimate goal for any high hazard operation – avoiding the systems accident. It also requires a firm understanding and exercising of the four HRO practices that students will be introduced to in this class: (1) Manage the System, Not the Parts, (2) Reduce System Variability, (3) Foster a Strong Culture of

Reliability, and (4) Learn and Adapt as an Organization.

High Reliability Operations may be applied to any process large or small, from reactor control rooms to radioanalytical counting rooms, and from well-logging operations in the oil field to gamma knife operations in the oncology clinic.

PEP 1-H Introduction to Monte Carlo Methods for the Health Physicist

Peter F. Caracappa
Rensselaer Polytechnic Institute

Monte Carlo techniques are extensively used in computer calculations of radiation transport in matter. Of interest to Health Physicists is the ability to determine values such as absorbed dose or dose equivalent distributions in a variety of applications. The more complex the problem, the greater the need for computer simulations, and it is desirable for the health physicist to have some understanding of their basis. The purpose of this course is to provide the attendees with a feel for what Monte Carlo techniques are, how they are applied in health physics work, and what their reliability and limitations may be.

The course will begin with a theoretical overview of radiation transport and methods for estimating the radiation flux or dose using Monte Carlo. We will walk through the steps of a Monte Carlo simulation history and discuss the needs in geometry, nuclear data, tallies and variance reduction that are used. The application of Monte Carlo for analyzing a radiation shielding problem using MCNP will be presented.

Sunday - 10:30 am - 12:30 pm

PEP 2-A EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series

Bob Emery

The University of Texas Health Science Center at Houston

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

PEP 2-B ANSI N42 Standards

Morgan Cox

See description 1-B

PEP 2-C Neutrons- A Primer

Jeff Chapman
Canberra

As a result of several comments received during the last few years of PEP sessions on neutrons, we have decided to offer a primer on neutrons. This PEP will be very introductory in nature, for the HP who simply has not had the opportunity to work in operations involving neutrons. This Primer will identify all source terms for neutrons, common methods of detection, as well as radiation protection regulations, detector calibration, and dosimetry.

PEP 2-D Operational Accelerator Health Physics II

***L. Scott Walker, Robert May
Los Alamos National Laboratory,
Thomas Jefferson National Accelerator Facility***

Operational Accelerator Health Physics II focuses on specific medium and high energy accelerator related design, control and health physics problems. The topics include: Spallation targets, handling high dose rate targets, beam dump design, isotope production, cooling water systems, shutters, radiation detection instrumentation, personnel dosimetry, high dose dosimetry (measuring radiation damage to equipment), high energy neutron spectroscopy, skyshine, releases of airborne radionuclides accelerator related electrical hazards, and the accelerator health physics program.

PEP 2-E Quality Implementation in Internal and External Dosimetry Programs

***Gus Potter
Sandia National Laboratory***

Of all data collected as part of a radiation protection program, that with the highest expectation of quality is personnel dosimetry data. Radiological workers, companies, and regulators rely on the data and subsequent calculations to be as accurate as possible and, as such, to be the result of a high quality process. Regulatory requirements and standards related to quality programs such as DOELAP and NVLAP define quality requirements and recommendations that, if implemented, are expected to encourage or result in a high quality environment.

Quality is more than this. It is a commitment to excellence in each step of a process, whether administrative or technical. A quality program begins with an understanding of the difference between quality assurance and quality control, how to implement quality control in each process, and how to design and implement an overarching quality assurance program.

In this class, we will describe quality assurance and quality control and discuss the elements of each. We will discuss how the elements are applied to internal and external dosimetry, how they are documented, and how metrics are developed. Examples will be used to show how quality programs are developed and how poor quality can result in unexpected results. Some discussion of quality improvement processes will also be included.

PEP 2-F Filtration and Flow-Control Fundamentals for Sampling Airborne Nanoparticles and Other Ultrafine Aerosols

***Mark D. Hoover
National Institute for Occupational Safety and Health, Morgantown, WV***

Sampling by filtration is an important method for collecting and evaluating any type of airborne material, including nanoparticles and other ultrafine aerosols such as radon decay products. Given the considerable current interest in characterizing and controlling risks to worker health from potential exposures to engineered nanoparticles, this course will present fundamentals of inertia (efficient collection for large particles) and diffusion (efficient collection for very small

particles) that affect the efficiency and most penetrating particle size (MPPS) of filters; efficiency and MPPS for the various filter types that can be used for collection of nanoparticles; and issues for selection of filters with appropriate collection efficiency, MPPS, durability, pressure drop, and surface characteristics. A series of practical problems will also be presented on how to avoid common errors in flow calibration and control when rotameters are used to monitor and control the sampling flow rate. Because rotameters are typically located downstream of a filter or other sampling device, the internal rotameter pressure is lower than the ambient atmosphere from which the sample is being drawn. Depending on the pressure drop conditions (perhaps 1 psi for a filter and perhaps several psi for other sampling instruments such as a cascade impactor) the errors can exceed the 5% level recommended for making a correction. It will be emphasized that both the rotameter equation and the ideal gas law must be used to determine the actual flow rate associated with a given scale reading in relation to the calibrated flow rate for that scale reading. Course problems will demonstrate how confusion can be eliminated by defining and using a multiple-frame-of-reference scheme involving the following conditions of temperature and pressure: (1) calibration, (2) operation (inside the rotameter), and (3) ambient (typically the actual conditions where the worker is located and the sample is being taken), as well as two types of reference conditions (4) normal or standard ambient (760 mm Hg and either 20 degrees Celsius or 25 Celsius), and

(5) standard (760 mm Hg and either 0 degrees Celsius for chemists or 25 degrees Celsius for ventilation specialists). This system clarifies that the rotameter equation is only to be used for the correction between calibration and the operation, and that the ideal gas law is to be used for corrections among all other combinations of the frames of reference. An Excel spreadsheet with detailed examples and calculations will be demonstrated and provided to course participants.

PEP 2-G NORM and TENORM at Drinking Water Treatment Facilities

Philip Egidi

Colorado Department of Public Health and Environment

Drinking water is treated before distribution for a variety of potential biological and chemical insults that can result in inadvertent concentrations of natural radioactivity to build up in process equipment and residuals. Uranium and radium (and its progeny) are the primary isotopes of concern (thorium is less of a problem in most areas). There are a variety of regulatory issues that cross over among water quality, solid waste, and radiation regulations. Since this industry did not plan on (or want radioactive materials), their programs usually do not meet the standard of care for licensed activities, nor do the facilities have the resources to implement comprehensive radiation management programs (nor are they necessary in most cases). Disposal of residuals can be very problematic. The course will present an overview of regulations pertaining to drinking water treatment and disposal of residuals, treatment options and resulting residuals, sampling and

analysis methods and suggested paths forward for dealing with these residuals.

PEP 2-H Introduction to Monte Carlo Methods for the Health Physicist (Part II - Practical Applications)

Peter Caracappa

Rensselaer Polytechnic Institute

See description 1-H.

Sunday - 2:00 - 4:00 pm

PEP 3-A EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals: A Unique 3 Part PEP Course Series

Bob Emery

The University of Texas Health Science Center at Houston

Part 3 will focus on “Measuring and Displaying Radiation Protection Program Metrics That Matter (to Management)”. Radiation protection programs typically accumulate data and documentation so that regulatory officials can assess compliance with established regulations. The implicit logic associated with this activity is that compliance equates to an acceptable level of safety. But in this era of constricted resources, mere regulatory compliance is no longer sufficient to justify all necessary programmatic resources. Radiation protection programs are now expected to readily demonstrate how they add tangible value to the core missions of an organization. The demonstration of this value is expected to be in the form of some sort of performance metrics, but this is an area in which many radiation safety professionals have not been trained. The issue is further compounded by the need to

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

PEP 3-B Field Application of the IAEA’s EPR-First Responders 2006 “Manual for First Responders to a Radiological Emergency”

Thomas F. O’Connell

Massachusetts Department of Fire Services

There are a number of excellent documents and guides that have been published on the subject of radiological response, including the International Atomic Energy Agency’s EPR-First Responders 2006 Manual for First Responders to a Radiological Emergency.

However, most emergency response guidance documents do not come with an owner’s manual to show you how to apply the guidance in the field nor the practical roles and duties that a person with health physics expertise would perform.

The EPR-First Responders manual covers the initial and early phase response to a radiological emergency. This also includes the various health physics positions, from field radiological monitors to national radiological assessors, which would be needed during radiological emergen-

cies. The guidance contained within this manual is being used globally by Member States to develop response plans and to train responders at the local and national levels.

This session will cover the structure of the EPR-First Responders 2006 manual and the practical application of the guidance through a scenario based workshop. Participants will use the action guides and instructions contained within the manual, along with the portable digital version of the manual for PDAs and smart phones, to apply the guidance to field a response to a radiological emergency. Participants will leave with a CD that contains the electronic versions of all the documents used during the session.

PEP 3-C Fundamentals of Neutron Detection and Detection Systems for Assay of Nuclear Material

Jeff Chapman
Canberra

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 3-D Fundamentals of Gamma Spectroscopy

Doug Van Cleef
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. The course is two hours in duration and the American Academy of Health Physics will grant 4 Continuing Education Credits for completion.

Upon completion of this course, student will have a working knowledge of radioactive decay schemes, radiation emissions, gamma radiation detection, and the principles of the laboratory gamma spectroscopy process.

PEP 3-E Health Physics at Commercial Nuclear Power Reactors – Environmental and Occupational Issues

Jason Harris
Idaho State University

This course will present an overview of the current issues facing health physics professionals at commercial nuclear power reactors. The presentation will be divided into two succinct areas of radiation protection found at these reactors – environmental (public) and occupational exposure. Topics of environmental exposure will

focus on radioactive effluent technical specifications and radiological environmental monitoring programs (RETS-REMP). In particular, ground water monitoring and protection initiatives, tritium, and regulation updates and changes will be presented.

For the occupational and in-plant portion of the lecture, radiation exposure management will be presented in the context of radiation protection practice and radiation field control. ALARA initiatives and benchmarking will primarily be addressed for the former subject. Where applicable, comparisons will be made between plant type (BWR and PWR). Radiation protection practices in different countries related to these areas will also be discussed.

PEP 3-F Heat Stress for Health Physicists

***Grant Ceffalo, Gary Kephart
Bechtel National, Bechtel Jacobs***

Work in radiological facilities often presents unique situations that limit the utilization of effective engineering controls. This situation in turn can drive a heavy reliance on personnel protective equipment. As a consequence, well-conceived radiological contamination control strategies can often contribute to heat stress concerns. This course will provide an intermediate level review of heat stress including the symptoms, physiology, the industrial hygiene measures, confounding factors, and ACGIH and NIOSH-recommended controls. The presentation will include alternative PPE fabrics and other innovations as well as the special circumstance of the totally encapsulating (level A) suit. Personal cooling and personal moni-

toring equipment will be reviewed with discussion of challenges and opportunities each presents for radiological applications.

PEP 3-G OSL Applied Concepts Training

***Chris Passmore
Landauer***

Bench top InLight and microStar analytical systems were designed for personal dosimetry using optical stimulated luminescence (OSL) techniques. InLight and microStar systems were designed to bring OSL technology to laboratories wanting to perform their own dosimetry. These systems allow OSL measurements to be made with very little depletion of signal from the radiation dosimeter. OSL leads to many fundamental shifts in external dosimetry paradigm. In this course, students will explore fundamental properties of OSL and how these concepts can change the way health physicist approach radiation dosimetry. The training will be a mixture of lecture and laboratory with a heavy focus on applied concepts. Health Physicists will perform hands on testing of OSL properties including re-readability, annealing, and depletion. In addition, health physicists will perform reader intercomparison testing and study OSL radiation response matrix to determine the radiation field used to dose the dosimeter.

PEP 3-H Assessment of Internal Exposure For Workers In Hospitals And Universities

***Tom Morgan
University of Rochester, Strong
Memorial Hospital***

Exposure of occupational workers at hospitals and universities to

internally deposited radioisotopes is a rare event. This presentation will provide a step by step approach designed to assist the Radiation Safety Officer or physicist in developing an appropriate program, setting investigational alert levels, and developing procedures for estimating exposure. The focus will be on evaluating risks, maximizing the use of existing equipment and facilities, and knowing when and how to seek outside assistance.

Monday - 12:15 - 2:15 pm

PEP M-1 A Systems-engineering Approach to Establishing Quality Assurance

Bruce Thomadsen

University of Wisconsin

Quality assurance (QA) has been an important part of most health physics programs. Conventionally, QA has been determined by thinking of what could be checked and defining ways of checking those things. This approach neither assures that everything that should be checked is, nor that resources are allocated in the most efficacious manner for providing protection against things that could go wrong. Systems engineering provides tools that help establish a QA program that effectively provides depth in protection from errors. Some examples are failure modes and effects analysis, fault trees and QA tools power analysis. This presentation will demonstrate the tools in a walk through an example procedure.

PEP M-2 Making Meaning of Health Physics: For Us and Them
Mark D Radonich
Cultural Effect Consulting

Developing a working knowledge from objective data can be referred to as “second nature” for radiation science professionals. To develop a personal knowing relies on the experience, learning, and context within which each Health Physicist lives. It is incumbent on each of us to stay aware of these subjective frameworks, in addition to the fact or objectified phenomena we seek to understand in our professional work. The maturation of meaning for scientists can be described generally: Facts and observed phenomena build knowledge; knowledge builds collective wisdom, and wisdom informs a personal truth about a matter. Sharing these truths may seem simple; evidence shows that it is difficult for us. Using a different communications framework than our education and practices often model can help share the meaning that we spend our professional lives gaining in a more productive way. This is a profound and important task that we can each be better prepared to execute.

Without access or education to personally glean the facts or data, lay audiences can rely on our meaning making skills and practices to come to agreement and common understandings about phenomena. Developing this desirable “common sense” among audiences who are not radiation science professionals has proven to be much more elusive. In many circumstances, this wider sense-making or agreement is necessary to carry forward the resulting output of our

PEP M-3 When Legacy Sources Become Front and Center; How to Implement a Program after 40 years

Greg Komp

United States Army

In the 1960s, depleted uranium was commonly used for added weight. The US Army used a 20 millimeter spotting round containing depleted uranium to mimic the trajectory of the larger caliber round. At the time the Atomic Energy Commission licensed the Army to manufacture and distribute to field units for use. No controls were placed on the rounds, and their use was forgotten. Almost 40 years after the last round was fired, they were rediscovered during range construction activities.

This PEP will walk the student through the process the Army used in identifying the round, determining the locations and quantities and establishing appropriate controls as required by the Nuclear Regulatory Commission. It will include how one site model will be used to complete a risk assessment for other Army sites.

PEP M-4 Uses and Misuses of Dosimetric Terms in Radiation Protection

Cari Borrás

Radiological Physics and Health Services Consultant, Washington DC

In March 2007, the International Commission on Radiological Protection (ICRP) approved a new set of fundamental recommendations on radiological protection¹ to replace the

Commission's previous recommendations from 1990. The dosimetric terms to be used for radiological protection are equivalent dose, effective dose, committed dose and collective effective dose, all based on mean absorbed dose with its distributions in time and in linear energy transfer (linear collision stopping power). Their definition is the same as in the 1990 Recommendations, but some of the factors that convert absorbed dose to equivalent dose and effective dose, w_R and w_T , have changed, due to new scientific evidence. Values of w_R are unchanged for photons and alphas, but have changed for neutrons (w_R is now a continuous and not a discrete function vs energy), protons (which is now 2 instead of 5), and a value ($w_R = 2$) has been assigned to charged pions, which had not been considered before. w_T are different for the gonads (the value has decreased from 0.20 to 0.08), the breast (it has increased from 0.05 to 0.12) and the "remainder" (the treatment of which has also changed); the number of tissues has increased to 14. Since both equivalent dose and effective dose cannot be measured directly, to determine external exposure, the ICRP relies on the operational quantities, defined by the International Commission on Radiation Units and Measurements, Inc. (ICRU): ambient dose equivalent, $H^*(10)$, and directional dose equivalent, $H'(0.07, \Omega)$, for area monitoring, and personal dose equivalent, $H_p(d)$, for individual monitoring. Any statement of personal dose equivalent should include a specification of the reference depth, d , the depth below a

¹ International Commission on Radiological Protection, ICRP Publication 103: *Recommendations of the ICRP*. Annals of the ICRP

specified point, usually where the dosimeter is worn. For the assessment of effective dose, this depth is taken as 10 mm, $H_p(10)$. For the skin dose and for the dose to the extremities, the depth is 0.07 mm, $H_p(0.07)$. The dose to the lens of the eye could be monitored with $H_p(3)$, at a depth of 3 mm, but no such dosimeter exists in practice. Compliance with dose limits can be ascertained with the use of dosimeters if properly worn. To link the protection and operational quantities to physical quantities (such as tissue absorbed dose, air kerma free-in-air and particle fluence) that characterize the radiation field, the ICRU computed conversion coefficients. To assess internal exposure, the ICRP recommends the use of activity quantities in combination with dose coefficients based on physiological models and 4-D computations. The unit for all the ICRP and ICRU quantities listed above is the sievert (Sv). Effective dose should be used only for occupationally exposed workers and members of the public, where doses are assumed to be low, well below 100 mSv, where stochastic effects are considered. At doses above about 0.5-1 Sv, where tissue reactions (deterministic effects) may occur, the dosimetric quantity to use is the absorbed dose in the irradiated tissue modified by the radiobiological effectiveness of the radiation for the biological endpoint of concern. The unit is the gray (Gy). Effective dose should not be used for retrospective evaluation of exposed populations or to assess individual risks, as is the case in medical exposures, which are not subject to dose limitations. Exposures in radiotherapy

are clearly expressed in absorbed dose to the irradiated tissue. Since both the irradiation conditions and the exposed group of patients are known, exposures to individual patients from medical imaging, even those at low levels, should also be expressed as absorbed doses to the irradiated organs, as the ICRU² recommends.

PEP M-5 Uranium Mining and Milling

Thomas Johnson

Colorado State University

Recently the price of uranium has gone up dramatically from approximately \$10 per pound to well over \$100 per pound, causing a resurgence in interest in uranium mining. The purpose of this presentation is to provide an overview of some of the radiation hazards as well as the mining and milling process associated with uranium. In situ leach (ISL) or in situ recovery (ISR) mines are the most common types of uranium mines today, while open pit mines and underground mines are not currently operational in the United States. There are currently six ISR mines operating in Wyoming, Nebraska, and Texas today. ISR mines typically operate at a lower cost because the requirement for milling and extensive processing of the ore upon removal is not required. After the uranium has been removed from open pit or underground mines, it requires milling to remove unwanted minerals and to purify it for use in the nuclear fuel cycle. Milling also results in tailings,

2 International Commission on Radiation Units and Measurements. *Patient dosimetry for x rays used in medical imaging*. ICRU Report 74. (2005).

which require additional radiological controls and resources. This overview of the “front end” of the fuel cycle will provide health physicists with the general information needed to begin to understand the radiation hazards associated with mining.

Tuesday - 12:15 - 2:15 pm

PEP T-1 How to Become a Radiation Myth Buster

Ray Johnson

Dade Moeller & Associates

Throughout our careers in health physics we have all been confronted by workers, the public, and the media reacting from their beliefs in radiation myths. The media perpetuate radiation mythology by continuing to define radiation as “deadly radiation.” People have heard these two words together for so long (more than 60 years) that they are now accepted as the basis for understanding radiation. With such myths firmly ingrained, it is little wonder that people so often react to radiation with fears that seem out of proportion to the risks as we would know them. Radiation myths abound in the areas of health effects, what is safe, nuclear power, radioactive waste, nuclear medicine, cancer treatment, x-rays and CT, fertility, effects on DNA, effects on children (genetic effects), measurements, atomic bombs, WMDs, food irradiation, baggage x-ray scanning, concerns for individual radionuclides (such as uranium, radium, plutonium), cell phones, Chernobyl, and Three Mile Island. Radiation mythology and folklore about radiation have led to widespread beliefs that there is no safe

level and every atom of radioactive material should be removed for safety. Opposition to nuclear technology and safe uses of radiation is typically built on radiation myths. Radiation myths may actually be harming public health. People have not been told how to evaluate the risk of radiation (steps from cause to effect) and commonly assume that if it is there, it is automatically bad for you.

While countering the radiation myths and urban legends with better information can be helpful, a better way may be to educate people on how to make their own evaluations.

We will review radiation myths in all of the areas above and strategies for countering these myths and urban legends.

PEP T-2 Radiation Science and Public Discourse: A Risk Communication Approach to Agreement and Understanding

Mark Radonich

Cultural Effect Consulting

Professional Health Physicists are trained and committed to the highest level of technical prowess. This professionalism calls upon the scientific processes of the pursuit and verification of theories, best practices and innovation in supporting technologies, and the scientific method in applying knowledge into what we believe to be true and correct. Objectified information and replicable methodology are the content and currency of our journals as we disseminate scientific discoveries and discuss results among peers. It is from this body of knowledge that we, as professionals, make meaning for ourselves out of work – that we come to conclusions,

agree on assumptions, accept certain findings, or we are asked to apply our knowledge to the social or organizational challenge of safety or risk management. A difficult and confounding challenge is sharing our meaning with others who are not Health Physicists. The same information or argument that helped develop our understanding does not seem to create mutual understandings among lay audiences; if we're unlucky it magnifies or solidifies opposing understandings among the lay audience on the personally-held risk/safety decision spectrum. Many professionals claim that a lack of scientific education is the primary hurdle to achieving a consensus of understanding across the expert-lay "gap." While raising scientific literacy is a noble and useful enterprise, appreciable progress would take time, and may be difficult to achieve.

In any case, a lack of scientific education should not be considered the barrier to creating wider and better understandings. The barrier is: the limitations of our own method of developing understandings as is related to non-technical or lay individuals and audiences by us, the professionals. Preparing technical professionals (e.g. health physicists, researchers, nuclear engineers, from students to emeritus members) is tenable and immediately helpful to create more credible, trustworthy, and common understandings about their work. We must fundamentally improve on two professional development fronts: 1) understanding others' belief systems and 2) sharing our meaning with others' using personal communication methods. We must discover, individually

develop, and adapt our work references/commentary to the landscapes of personal belief systems. This preparation includes learning how our own values and beliefs (scientific, social, personal) are formed and how they influence personal decision-making where a health or environmental risk exists. Secondly, the relationship of objectified data to an individual's intrinsically subjective communication practice must be better understood and applied. Including personal beliefs in how we talk about our work and acknowledging the subjective nature of interpersonal communication will prepare us better to create a shared context for understanding among all audiences.

PEP T-3 Introduction to HLS Radiation Detection

K. E. Duftschmid

Technical University Graz, Austria

After September 11 nuclear terrorism is considered a "prime national security threat" in USA and now also world-wide. Nuclear weapons and other radioactive materials, if used for „dirty bombs“ may create a nightmare of terror, panic and economic disaster. „Orphan sources“ entering the public domain are an additional growing concern. For these reasons nuclear and other radioactive materials, illegally crossing borders or showing up at strategic points or Major Public Events, may create a radiological hazard, a proliferation hazard and a tremendous terrorist threat. To combat the risk of nuclear terrorism we need:

Preventive measures, i.e. physical protection, accounting and control for nuclear and other radioactive materials

Efficient intelligence networks based on close cooperation between scientific, regulatory and law enforcement organizations (Customs, Police, Intelligence Agencies etc.)

Advanced technical means of monitoring radioactive materials at borders and other strategic locations

The course describes the details of state-of-the-art radiation detection technologies, technical requirements and specifications for this kind of equipment, the different instrument categories and their applications, solutions for the problem of “innocent alarms”, and the practical operation of such monitoring systems in the field.

PEP T-4 Nuclear Power as Part of Our Energy Surety & Economic Security Future

Mark Miller

Sandia National Laboratory

World energy demand (and competition for it) will continue to grow and nuclear power is poised for growth world-wide – energy security without greenhouse gas emission. The U.S. must help shape a global nuclear fuel services supply system that provides the benefits of nuclear energy to all nations while discouraging production of materials having nuclear proliferation concern, which addresses the national (and international) security imperative. We must create partnerships among nuclear supply states to improve the safety, reliability and security of these systems. Our own country's survival (as well as the entire world's) may depend on the path we choose in the near future.

PEP T-5 Training First Responders on Radiological Dispersal Devices (RDDs) and Improvised Nuclear Devices (INDs) Events

K.L. “Ken” Groves

President, S²-Sevorg Services, LLC

This PEP will present an overview of the current training the author is presenting to First Responders (firefighters, emergency medical technicians, law enforcement and others) who may encounter either a Radiological Dispersal Device (RDD or Dirty Bomb) or an Improvised Nuclear Device (IND) as a part of their Emergency Response activities. The emphasis of the training is putting the radiological/nuclear material in perspective as compared with other Weapons of Mass Destruction (WMD) materials such as chemical and/or biological weapon agents. A goal of the training is to help this First Responder Community understand that under almost all conditions, they can perform their primary mission of “putting out fires, rescuing and treating injured persons, and chasing bad guys” even in the presence of relatively large amount of radiological/nuclear contamination. The rare cases of high activity unshielded sources will be reviewed and explained. Current National/International guidance on dose “limits” will be discussed. The use of information contained in NCRP Commentary #19, “Key Elements of Preparing Emergency Responder for Nuclear and Radiological Terrorism” and the CRCPD “First Responders Handbook” will be used extensively in the presentation.

A discussion of the use of Time, Distance and Shielding as well as ap-

appropriate Personal Protective Clothing and how it will provide the needed protection while immediate actions take place early in an RDD/IND event will be reviewed. The use of appropriate radiation detection instrumentation, documented Standard Operating Procedures along with realistic training, drills and exercises are the key to a successful response to an RDD/IND event for this community of critical emergency responders.

Wednesday - 12:15 - 2:15 pm

PEP W-1 8,000 Interactions and Counting - What We Learned and What You Can Learn About Public Communication from the HPS ATE Program

***Kelly Classic, Genevieve Roessler
Mayo Clinic, HPS***

For eight years, the Health Physics Society has responded to public questions on radiation via a section on our Web site called “Ask The Experts” or ATE. During this time, over 8,000 questions have been asked and answered by many volunteer experts within the Society (and some outside the Society). What we have learned most is that people are very grateful to have someone “listen” to their concerns and answer their questions in a direct manner. Getting to this point; however, was a large learning curve. Many of those who answered questions initially felt inclined to answer questions with in-depth, reference-laden, numbers-laden answers. Part of this is due to the nature of a health physicist (quantitative) and part due to the fact that experts believed they needed to offer some level of knowl-

edge to the questioner so the questioner believed they were an expert. What we have learned includes truly listening to the question (reading, re-reading to gain knowledge of the real issue and the person’s knowledge of radiation), getting them their answer in a brief first sentence (yes or no), and offering some level of detail in an understandable manner to support our answer. We will share various experiences with you and offer tips you can use in your communications.

PEP W-2 Fundamentals of Alpha Spectroscopy

Doug Van Cleef

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. The course is two hours in duration and the American Academy of Health Physics will grant 4 Continuing Education Credits for completion.

Upon completion of this course, student will have a working knowledge of radioactive decay schemes, radiation emissions, alpha radiation detection, and the principles of the laboratory alpha spectroscopy process.

PEP W-3 47 CFR Part 15 Radio Frequency Devices

Don Haes

BAE Systems

This new millennium has seen an exponential growth in science and technology, especially with the application of Radio Frequency (RF) in devices. It is too easy for today's HP to recognize safety conformity with cursory "evaluations" of low power RF device exclusions, and overlook the increasingly arduous regulatory compliance with the Federal Communications Commission (FCC) rules. With RF devices, the role of the HP is to not only perform product safety evaluations, but provide information relative to device interference to decision and policy makers at all levels. By the nature of our training, HPs frequently assume "radiation safety" ends the compliance quest. However, this short-sightedness may put their company at a greater risk than realized. This talk focuses on the growing challenges facing HPs in the domain of RF device compliance, and examines 47 CFR Part 15.

PEP W-4 Health Physics Concerns of Neutron Exposures, Criticality Safety and Criticality Accidents

Dave Simpson

Bloomsburg University

For most Health Physicists, neutron exposure is, at most, only a minimal issue in their workplace. However, with the potential terrorist threats of the use of nuclear materials, including weapons grade materials; it is important that all Health Physicists have at least some understanding of neutron exposures, dosimetry and criticality

safety. In this presentation, a brief introduction will be given describing sources of neutrons and the biological effects of neutron exposures. Next, a review of criticality safety will be given with special emphasis on areas where the Health Physicist may play a role, such as safely handling large quantities of special nuclear materials, spill control, etc. Finally, several criticality accidents will be reviewed and methods discussed on how neutron doses can be estimated based on both biological and physical neutron activation of materials from the exposed individuals.

PEP W-5 Future Directions In Air Monitoring At Los Alamos National Laboratory

Tom Voss

Los Alamos National Laboratory

Three fields of investigation and evaluation have led to planned improvements in the air monitoring program at LANL.

One of those fields is in the area of better air sampling flow control methods. The venturi flow control orifice (also known at the Critical Flow Venturi – CFV) has been investigated to the extent that we are able to specify the mechanical design of the venturi flow control orifice to meet the requirements of any air sampling system.

A second field of evaluation has been in the area of air sample filter media. Our evaluation of many different types of filter media for several operational parameters has allowed us to be able to specify a filter type to meet individual requirements.

Perhaps the most important field of evaluation has been in the area of

a new Continuous Air Monitor (CAM) for monitoring radioactive aerosols. This area of evaluation involved side-by-side evaluation of several different manufacturers' products. The evaluation covered more than 100 separate criteria.

The use of all three of the items in these fields of investigation and evaluation are planned to be implemented.

Continuing Education Lectures (CEL)

Monday 13 July through Thursday 16 July

Monday 7:00-8:00 AM

CEL1 Uncertainty, Variability, Bias, Error, and Blunder

Daniel J. Strom

Pacific Northwest National Laboratory

There have been many advances and refinements in the definitions of uncertainty, variability, and error, as well as substantial progress in computational and inferential approaches to handling problems dealing with these concepts. The longer you have been out of school, the more surprised you are likely to be with the current state of affairs. The profession of health physics can be viewed as risk-informed actions to keep radiation exposures and releases of radioactive materials to the environment as low as reasonably achievable. Health physics incorporates methods or results of many scientific disciplines, in particular in measurements of radiation and radioactive materials. Health physics uses estimates of health effects of radiation derived from epidemiology, radiation biology, and dose assessment. In each of these areas, the concepts of uncertainty, variability, and error are crucial for understanding and correct inference. How do uncertainty, variability, error, and blunder differ? The 1995 ISO Guide to the Expression of Uncertainty in Measurement decisively addressed metrology issues, but was silent on modeling issues and decisions based on metrology and modeling. The 2009 National Research Council Report addresses modeling and

decision-making. Bayesian statistical inference has replaced classical inference in more and more areas of interest to health physicists, such as determining whether activity is present in a sample, what a detection system can be relied on to detect, and what can be inferred about intake and committed dose from bioassay data. The distinction between Berkson and classical errors, and how to deal with the resulting uncertainty has moved to the forefront of dose reconstruction for radiation epidemiology. The critical difference between shared and unshared uncertainties has led, over the past two decades, to a state-of-the-art practice using two-stage Monte Carlo calculations as pioneered by the Hanford Environmental Dose Reconstruction project. Autocorrelation over time of doses to individuals leads to a requirement to explicitly incorporate covariance into calculations, such as those in NIOSH's Interactive RadioEpidemiological Program (IREP). Variability of quantities of interest to health physicists over time and space, over ages and between sexes, and with lifestyle factors continues to require our attention. This presentation introduces and discusses these concepts, and speculates about their future in health physics.

Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC05-76RL01830. PNNL-SA-64767

CEL2 Respiratory Protection Refresher for HPs

Gary Kephart

Bechtel Jacobs

This Continuing Education Lecture will review the fundamental spirometry parameters with their respective inter-relationships and acronyms (e.g., forced vital capacity, FVC; Tidal volume, TV; etc.). This review will be interspersed with references to key findings from the industrial hygiene literature regarding how these lung functions are impacted by the use of respiratory protection. The objective is to refresh experienced health physicists on the myriad physiological stresses associated with use of respiratory protection in radiological control.

Tuesday

7:00-8:00 AM

CEL 3 The Characterization of Dose in Computed Tomography

Donovan Bakalyar

Henry Ford Hospital

Over the past few years there has been an increased awareness of radiation dose in Computed Tomography (CT) resulting in efforts by manufacturers to improve design and by practitioners to more effectively tailor the study to the patient. Concurrently, the methods used for specifying dose in CT have been re-examined with an eye toward not only correcting but streamlining and possibly replacing standard dose indicators such as CTDI and DLP. Though the basic principles underlying these indicators are fundamentally sound, their implementation has sometimes taken a circuitous route sometimes

resulting in confusion and misinterpretation.

Part of the purpose of this presentation is to carefully review the parameters used in determining patient dose and to clarify and simplify wherever possible their meaning. Part of the challenge in tackling this problem is that the CT community is still struggling over vocabulary. For example, the name “effective mAs” is used by two CT manufacturers to describe the mAs per rotation divided by the pitch. A third manufacturer calls this same parameter “mAs/slice” and a fourth doesn’t use it at all. (Even the word “pitch” has been ambiguous until recently.) Until the vocabulary is standardized, it is important that the words used in describing CT parameters are phrased so that their meaning is definite.

The dose delivered by a machine to a standard phantom is ordinarily characterized by a parameter called CTDI_{vol} which in turn can be multiplied by the scan length to yield another standard parameter called the DLP which is often used as a crude indicator of patient dose. The motivation, limitations and shortcomings of these parameters will be discussed along with some of the proposed remedies for correcting them, simplifying them and extending their range of validity.

Despite the aforementioned limitations, when properly interpreted, these standard dose indicators can be very helpful in streamlining the use of more sophisticated dose estimation techniques such as the ImPACT dose calculator. (ImPACT has its own limitations, well understood

and described by its developers.) CTDIvol and DLP, often given by the manufacturer for the specific study at hand, can be used as an aid in using the ImpACT dose calculator. This in turn can yield specific organ doses along with effective dose. Though not be the final answer it may point in the right direction.

CEL4 System of Radiation Safety Monitoring for the Personnel Working at the Object Shelter

P. Aryasov, S. Nechaev, J. Hoyt, A. Dmitrienko

Radiation Protection Institute of Ukraine, Chernobyl Shelter Implementation Plan. Project Management Unit, State Enterprise Chernobyl Nuclear Power Plant

Shelter Implementation Plan (SIP) was initiated in 1997. The main goal of SIP is transformation of the destroyed 4-th unit of Chernobyl Nuclear Power Plant (Object Shelter - OS) into ecologically safe system. The first stage of SIP v ?Stabilization stage! was completed in 2008. At present time the ?Construction stage! v works regarding construction of the New Safe Confinement (NSC) is in process. Most of the works are carried out in the contaminated areas and rooms of the OS. The radioactive situation in work areas has been formed during the accident and characterized by high dose rate levels and radioactive aerosol concentration in the air.

Any activities at the OS (including all SIP activities) are supervised from the point of view of radiation protection by Radiation Safety Department according to the corresponding

instructions, guidance, and regulatory documents.

Given lecture/work presents the structure and description of the operating at present time at the OS radiation safety monitoring system and its main components, namely: individual dose monitoring (IDM) of external and internal exposure of the personnel, work area monitoring, sanitary barriers and zoning of contaminated areas, overall and so on. The efficiency of the system at the whole, potential and technical possibilities and characteristics, separate technical problem issues is presented and analyzed on the example of SIP works.

Wednesday 7:00-8:00 AM

CEL5 Single Integrated Emergency Response Plan for Hospitals

Tom Morgan

University of Rochester/Strong Memorial Hospital

Joint Commission Accreditation standards require hospitals to develop and deploy emergency response plans for a variety of natural or man-made disasters. The University of Rochester/Strong Memorial Hospital has developed a single integrated response plan that is flexible and responsive to the needs of the community in the event of a disaster. This plan will discuss the details of the plan and how it can be easily modified to accommodate various scenarios.

CEL 6 Update on Medical Internal Radiation Dosimetry: 2009 MIRDC Committee Recommendations for Unifying MIRDC and ICRP Formulas, Quantities, and Units
Darrell R. Fisher and Wesley E. Bolch

Pacific Northwest National Laboratory, University of Florida

The scientific foundations underlying the MIRDC schema for medical internal dosimetry and the general framework established by the International Commission on Radiological Protection (ICRP) for occupational internal dosimetry are mathematically similar, even though they appear outwardly to be substantially different. The 2009 recommendations of the MIRDC Committee (Pamphlet No. 21) provide a revised framework for unifying the ICRP and MIRDC equations, models, and terminology. The result is a general schema for internal dosimetry, consistent for both nuclear medicine and radiation protection, using standardized formulas, nomenclature, quantities, and units. The 2009 MIRDC recommendations clarify the application of absorbed dose for deterministic effects in patients (organs, tissues, tumors, and the whole body) from medically administered radiopharmaceuticals. The radiation protection quantities equivalent dose and effective dose are reserved for evaluating stochastic risks in groups of patients and health care workers. A new quantity and unit are proposed for comparing deterministic effects (such as cell death, impaired organ function, and tumor response) following high doses, high dose-rates, and high-LET radiation qualities associat-

ed with targeted radionuclide therapy (particularly for alpha emitters and Auger-electron emitters). Unifying the MIRDC and ICRP structural framework should help eliminate confusion and the mixing of units such as quality factor (Q), relative biological effectiveness (RBE), and radiation weighting factor (wR) for expressing the biologically relevant dose. This course is relevant to health physicists who use internal dosimetry for retrospective dose assessment, prospective treatment planning, and risk analysis. In addition to practicing medical physicists, this course is also recommended for regulators and administrators responsible for radiation safety in medical centers and for the safe use of radiopharmaceuticals.

Thursday 7:00-8:00 AM

CEL7 Radiation Safety Guidelines for Contraband Detection Systems

Siraj M. Khan

US Department of Homeland Security

This CEL lecture presents guidelines for radiation safety of workers and members of the general public from contraband detection systems (in use or planned) for Homeland Security. In this context, contraband includes drugs, explosives and special nuclear materials (SNM). These systems include radiographic imaging systems using radioisotopic sources such as Co-60 and electron linear accelerators (LINACS) producing bremsstrahlung with end-point energies of 6 and 9 MeV, and active interrogation systems using the

Cf-252 radioisotopic source, neutron generators using (d,d) and (d,T) reactions and electron linear accelerators (LINACS) producing bramsstrahlung with energies from 6 to 15 MeV. These systems can be categorized as “open” or “closed” based on the mode of deployment. Methods to determine the radiation safety exclusion zone for an “open” system and shielding calculations for a “closed” system will be presented. The issue of dose to an undocumented alien (stowaway) will also be discussed. Finally, work in this area by American National Standards Institute (ANSI) and the International Electrotechnical Commission (IEC) will be described.

CEL 8 Complexity Science and Radiation Risk Communication

Mark D Radonich

Cultural Effect Consulting

Risk communication is an interdisciplinary skill that we must each use more skillfully in our profession. Radiation Risk Communication is most often a complex endeavor in western and industrialized cultures. Perceived and actual failures in this activity often stem from an oversimplification or misunderstanding of all the issues in communication planning and execution. Understanding theories of complexity and all the dimensions of public communication can improve efforts in every facet of our work, and beyond the simple static effects of the specific messages. Using and recognizing uncertainty and agreement or agreeability are the key factors in any given context to determine whether the organizing communication framework should be simple, complicated, complex, or

even chaotic. In parallel, messages themselves are often treated as the only qualitative entity. We know that message development is only one of the five dimensions of communication to address – the others are perception/interpretation, psychological or cultural attributes, information flow, and communication processes. Health physicists and their organizations often leave communication to “other” professionals – abdicating our position of expertise and encouragement, and thereby leaving the effects of our work to be managed and led by others.

2009 Exhibit Hall Floor Plan

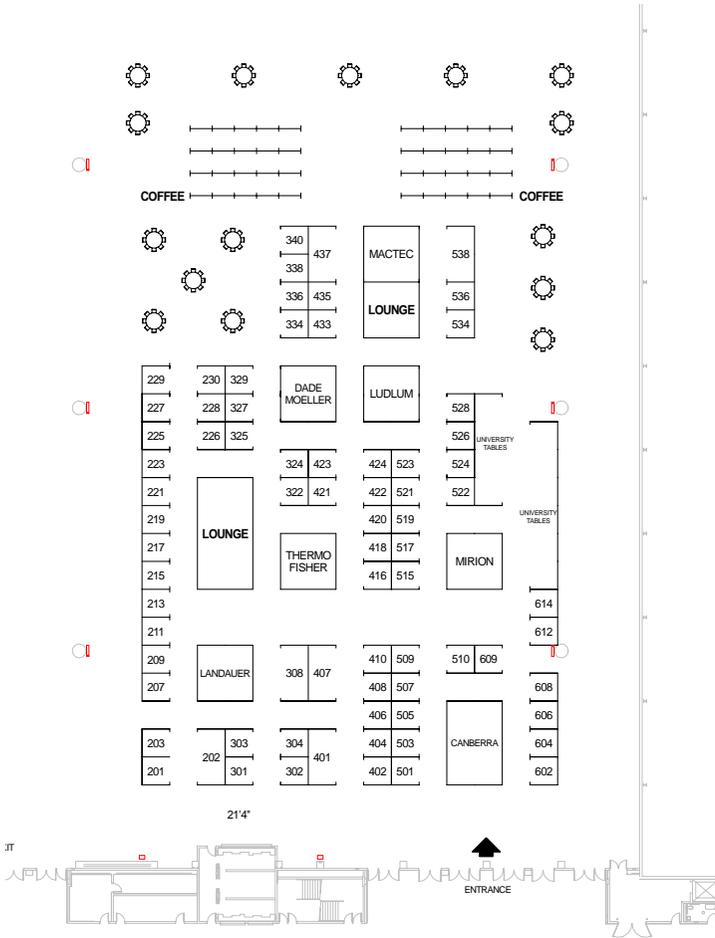


Exhibit Hall Hours	
Monday	11:50 am - 5:00 pm
Tuesday	9:30 am - 5:30 pm
Wednesday	9:30 am - Noon

2010 ANNUAL MEETING SALT LAKE CITY, UT **BOOTH: 604**

2010 MIDYEAR MEETING ALBUQUERQUE, NM **BOOTH: 606**

AAHP/ABHP **BOOTH: 608**

AIR FORCE RECRUITING SERVICES **BOOTH: 329**

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) **BOOTH: 422**

AMERIPHYSICS, LLC BOOTH: 421
Ameriphysics is a full-service radiological and waste solutions provider. Our personnel exhibit a wide variety of radiation protection and waste management experience. From simple laboratory surveys to complex cyclotron removals and MARSSIM-based decommissioning projects; Ameriphysics has the experience necessary to complete your project on time and within budget.

APANTEC LLC AND FUJI ELECTRIC SYSTEMS **BOOTH: 401**

Fuji Electric Systems and Apantec LLC will jointly display an Access Control System designed for detection and monitoring radiation exposure to personnel working in restricted areas of nuclear power stations and nuclear facilities. Demonstarions of the APD (NRF Series) dosimeter sytem, computer with dosemeter reader with an entrance/exit turnstile, and a hand and foot monitor will be featured.

ARROW-TECH INC. BOOTH: 536
Arrow-Tech, Inc. is the manufacturer of the Direct-Reading Dosimeter. Arrow-Tech handles a full line of Radiation Detection equipment and maintains customers throughout the world providing quality, reliable, durable products and service. Industries served include the Health Physics, Homeland Security, NDI, Industrial & Medical Radiology and 1st Responders. Arrow-Tech provides calibration services.

BIONOMICS, INC. BOOTH: 510
Radioactive and Mixed Waste Disposal Services.

BLADEWERX LLC BOOTH: 609
Bladewerx and its subsidiairy Shieldwerx provide instrumentation, custom software, neutron and gamma shielding, and neutron activation foils to the radiation protection and measurement industry.

CANBERRA BOOTH: 502
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.

CBI POLYMERS BOOTH: 435

CBI Polymers provides DeconGel™ which is the leading decontamination solution currently available for the radiological and chemical clean-up and spills. It is safe, user-friendly, and is able to effectively contain, trap, encapsulate and decontaminate a broad range of radioisotopes and chemicals on different substrates in a simple, easy, no-preparation process.

CHASE BOOTH: 416
ENVIRONMENTAL GROUP INC.

Chase Environmental Group, Inc. is a full-service, decontamination, decommissioning, remediation, and waste management firm, providing safe, high quality, practical, cost effective solutions to your environmental needs.

CHESAPEAKE BOOTH: 217
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.

CONFERENCE OF BOOTH: 215
RADIATION CONTROL PROGRAM
DIRECTORS, INC.

Conference of Radiation Control Program Directors, Inc. is a nonprofit, non-governmental professional organization that promotes consistency in addressing and resolving radiation protection issues, encourages high standards of quality in radiation protection programs, and provides leadership in radiation safety and education.

CROWE AND BOOTH: 534
COMPANY, LLC

DADE MOELLER BOOTH: 427
& ASSOCIATES

Dade Moeller & Associates (www.moellerinc.com) is a nationally-recognized consulting firm specializing in radiological & nuclear safety, public & environmental health protection, occupational safety & health, and radiation safety training. We provide the full range of professional and technician services in radiation protection, health physics, and worker safety to government and commercial nuclear clients.

ECKERT & BOOTHS: 515, 517
ZIEGLER ANALYTICS

Eckert & Ziegler Strahlen- und Medizintechnik AG, headquartered in Berlin, is a globally active isotope technology and holding company for a number of specialized subsidiaries that process radioisotopes as well as develop, manufacture and sell isotope technology components, medical technology equipment and related products.

Eckert & Ziegler Analytics, located in Atlanta, GA and Eckert & Ziegler Isotope Products, located in Valencia, CA supply high quality, NIST-traceable radioactive reference and calibration sources and standardized solutions for the calibration of radiation measurement instruments. Radiochemical performance evaluation samples are provided quarterly for effluent and environmental monitoring programs.

The recent acquisition of Nuclitec GmbH, Braunschweig, Germany, formerly QSA Global GmbH and Nuclitec, Inc., Burlington, MA, formerly part of QSA Global, Inc. added the Isotrak brand product range. Isotrak products include high quality anodized wide area reference sources and a range of instruments including the Teletector 6112B/M Eckert & Ziegler is the world's largest supplier of high quality NIST-traceable radioactive standards. We operate 3 accredited calibration laboratories, 2 in the USA and one in Germany.

ECKERT & ZIEGLER BOOTH: 519 IPL

Eckert & Ziegler Isotope Products, established in 1967, supplies quality control standards for nuclear imaging, reference and calibration, health physics, and industrial applications. Featured are solutions, mutinuclide, large volume and particle standards and sources for research applications.

ENERGY SOLUTIONS INC. BOOTHS: 437, 439

EnergySolutions, LLC is the largest nuclear oriented services company in the U.S. We provide

radiological services and solutions, including surveys, health physics consulting, and radioactive waste management, treatment, and disposal to commercial and government organizations dealing with radioactive material.

FEMTO TECH BOOTH: 219

Femto-TECH, INC. is a leader in the design and manufacture of continuous radon monitors and real time tritium instrumentation.

F&J SPECIALTY PRODUCTS, INC. BOOTH: 325

F&J is a manufacturer of traditional and microprocessor controlled air sampling systems, airflow calibrators, accessories and consumables. Products include High Volume, Low Volume and PAS air samplers, filter media and radioiodine collection cartridges. Most instruments comply with ANSI/UL electrical safety standards

FLUKE BIOMEDICAL BOOTH: 509

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. Our highly accredited Global Calibration Laboratory provides a one-stop service for all radiation, calibration and repair needs.

G/O CORPORATION BOOTH: 327

G/O Corporation is a supplier of both nuclear and industrial safety

equipment. G/O provides health physics supplies, rad-waste reduction items, many custom signage and barrier products

GAMMA PRODUCTS, INC. BOOTH: 221

Alpha/Beta counting systems, sample changers and shields.

HEALTH PHYSICS INSTRUMENTS BOOTH: 420

Health Physics Instruments manufactures instruments and detectors that measure gamma, neutron, beta, and alpha radiation. The product line includes portable Geiger-counters through sophisticated fixed monitors and includes rem meters, dosimeters, and multichannel analyzers. HPI has been serving the Health Physics community for over 35 years.

HEALTH PHYSICS JOURNAL BOOTH: 612

HEALTH PHYSICS NEWS & WEB REG AREA

HI-Q ENVIRONMENTAL PRODUCTS CO. BOOTH: 410

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: 507

Founded in 1994, Hopewell Designs, Inc. provides systems and solutions for irradiation applications, instrument calibration, and radiation shielding. We offer standard products and custom designs to meet our customers' stringent requirements. Our customers include government laboratories, universities, nuclear power producers and manufacturing.

ICx RADIATION BOOTH: 322

ICx Radiation develops leading edge radiation detection and identification devices. Our handheld systems can locate, measure and identify specific radioactive sources as well as discriminate between naturally occurring, medical related and harmful sources. Our stationary, high performance spectral systems detect, monitor and analyze possible radiation sources either covertly or overtly.

INTERNATIONAL ATOMIC ENERGY AGENCY/BNL BOOTH: 505

The Brookhaven National Laboratory (BNL) recruits for the International Atomic Energy Agency (IAEA) located in Vienna, Austria. The IAEA is a science and technology-based organization that serves as the global focal point for nuclear cooperation. This organization is responsible for preventing the spread of nuclear weapons employing specialized safeguards technologies to accomplish its mission.

ITECH INSTRUMENTS BOOTH: 528

Itech Instruments manufactures alpha and gamma spectroscopy

instrumentation along with a variety of software solutions for data acquisition and analysis. InterWinner software includes modules for gamma spec, alpha spec, gross A/B, multi-channel scaling and customized research and OEM applications.

Our new line of NIM and standalone instruments include a digital tube base for NaI, multi-input ADC/MCA, standalone spectrometers and research instruments.

**J. L. SHEPHERD BOOTH: 304
& ASSOCIATES**

Biological research, blood component, sterilization and process irradiators. Gamma, beta and neutron instrument calibration facilities. Automated computer controls and databases. Irradiator/Calibrator IC security upgrades, service, repair, relocations and decommissioning. Hot cell manipulators, windows and lead glass available

K & S ASSOCIATES BOOTH: 226

K & S Associates, Inc. is accredited by the American Association of Physicists in Medicine, The Health Physics Society, and the American Association of Laboratory Accreditation which includes therapy, brachy, diagnostic and survey instrumentation, TLD measurements, etc. We also offer the DIAMOND software for 2nd check patient dose calculations.

**LAB IMPEX BOOTH: 302
SYSTEMS LTD.**

Instruments for Alpha-Beta Continuous Air Monitoring (the SmartCAM), Area Gamma Monitoring, Noble Gas Monitoring and

Iodine Monitoring. Complete systems for Stack and Duct Monitoring and Facility wide networks. Applications within Nuclear, Industrial and PET.

LANDAUER INC. BOOTH: 208

Landauer is the world's largest provider of radiation dosimetry services. NVLAP accredited. Landauer's service includes Luxel photon and beta dosimetry, neutron dosimetry, dosimetry management applications, a turnkey onsite analysis system (InLight™) and future medical application for OSL technology. Landauer's comprehensive diagnostic evaluation and reporting is backed by over 50 years experience.

LND, INC. BOOTH: 303

Nuclear Radiation Detectors including, GM Tubes, Proportional Counters, He-3 and BF-3 Neutron Detectors, Ionization Chambers. Worlds leading detector manufacturer.

**LUDLUM BOOTH: 428
MEASUREMENTS, INC.**

Ludlum Measurements, Inc. has been designing, manufacturing and supplying radiation detection and measurement equipment in response to the worlds' need for greater safety since 1962. Throughout its nearly five decade history, it has developed radiation detection technologies and instruments in support of enhancing the safety of personnel, the environment and securing borders.

**MACTEC, INC. BOOTHS: 438, 440,
537, 539**

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Works-In-Progress Abstracts

P.42 Development of Direction Finding Detector for Remote Sensing of Radiation Leakage from Nuclear Facilities

Kobayashi, Y., Yamano, T., Shirakawa, Y.; ALOKA Co, Ltd., NIRS*

A monitoring station is continuously working for the environmental radiation measurement around a nuclear facility in Japan. Measured dose rate can be sometimes higher than the usual values because of rainfall, and so on. In this case, it is necessary to judge whether the radiation leakage has occurred in the nuclear facility or not. The effective method is to know the direction of incident radiation. We have developed direction-finding detectors to know the incident direction of gamma-ray. The detector is constructed of three pieces of NaI(Tl) scintillators. The principle and performance have been examined by both computer simulations and laboratory experiments. The results show that the detector can measure incident direction of gamma-ray and keep the direction error within 3 degrees. We also confirm the developed measurement device can apply to Japanese Industrial Standard (JIS Z 4325 Equipment for continuously monitoring gamma radiation in the environment)

In the near future, we will use more than two detectors and will be able to obtain the information of source location with the incident direction. Moreover, we think the detector will be useful for homeland security.

P.43 Progress in Development of a Software Tool for Rapid Direct Radiation Gamma Dose Assessments for Complex Source/receptor Geometries

Povetko, O. Kouznetsov, A., Golikov, S. Benke, R.; Southwest Research Institute, Tom Baker Cancer Center, Canada, Institute of Radiation Hygiene, Russia

The purpose of this study is to develop (i) a software prototype for direct radiation dose assessment that combines the advantages of deterministic and stochastic methods and (ii) a user-friendly interface that will allow this method to be widely used in health physics, environmental, medical, and educational applications. The hybrid approach combines recent advances in three-dimensional object representation methods and a novel chord distribution approach to accelerate the computation of dose inside the receptor body for complex radiation source and receptor geometries. Several generations of emitted, scattered, and newly born particles are modeled to develop secondary sources. The method then uses stochastic simulation of the photon interaction data on the chord distribution to compute absorbed radiation dose. This project demonstrates a computational method faster than pure stochastic methods and sufficiently accurate for a wide class of applications. This hybrid approach was incorporated into prototype software, which was copyrighted under the name

RADCOG® developed on the Microsoft® Visual Studio® platform. The software implements a multilevel hierarchy of nested three dimensional elements. The user-friendly framework interface allows the user to develop or import various three-dimensional objects generated by external graphic editors in commonly used digital formats. The user may specify radiation source characteristics by either arbitrary space-energy-angular distributions or concentrations of built-in isotopes. The receptor absorbed dose is calculated for the complex object assembled on the screen. The software was validated for gamma-ray radiation fields. The calculated numerical dose values agree well with the results calculated by an industry-standard Monte Carlo N-Particle (MCNP) code and with literature data based on the results of several different stochastic codes for receptors of simple and complex geometries irradiated by internal and external sources emitting gamma rays between 20 Kev and 10 Mev. The RADCOG® software calculated doses 2 – 50 times faster than MCNP code with comparable statistical errors. Furthermore, the computational time gains increase with increasing complexity of the geometry.

* The abstract is based on work funded by Southwest Research Institute®.

P.44 A Novel Method to Pinpoint Beam Losses

Marceau-Day, M.L., Teague, R.E., Wangf, W.H.; Louisiana State University

Following a shutdown at the Center for Advanced Microstructures and Devices, a synchrotron research facility, of Louisiana State University, elevated radiation levels were observed after the wiggler was removed. Although the beam position monitors indicated that the beam was in the correct position, this finding persisted and was characterized by a strong forward directed peak with a cone-shape pattern that was produced by the beam interacting with the beam pipe that was subsequently identified. In order to investigate this elevated radiation level, an easy and effective method using the ordinary photographic film was developed. Several rolls of commercially available ISO 400 film (35 mm with 24 exposures) were purchased. The ISO 400 film is considered a faster film with larger silver halide grain sizes as compared with ISO 100 film which contains a layer of finer silver halide crystals. Both types of film were utilized in this project and worked equally well. Film was removed from the canisters. The length of the ISO 400 film was approximately 114.3 cm (45 inches). The ISO 100 film was cut to desirable length, as needed. Four rolls of ISO 400 film were joined together, alternating the natural curl of the film to make a relatively straight piece of film assembly (45 inches) marked as a ruler with one-half inch increments. This film "Ruler" was

then placed over the suspected area of the high-energy electron beam loss. The ISO 100 film was arranged in the same manner. In addition, Canberra Dosicards were hung adjacent to the area to obtain a real time readings during operations. Once the accelerator was turned off, the readings on the Dosicards were recorded and the film was collected. The exposed film was laid on a flat table and a Ludlum Model 3 survey meter with a pancake probe was used to scan the exposed film. When a section of film was found to be radioactive, it indicated that the silver in the silver halide grain had been activated from Ag-107 to Ag-108 (T $1/2 = 2.39$ min). A pinhole of 0.25 cm diameter was cut into a 0.16 cm thick of a lead plate. With the lead shield between the pancake probe and the exposed film, it was possible to resolve the highest radiation reading on the film. The film was then placed back in its original exposure position. The location of the hot spot was marked on the exterior surface of the beam pipe, indicating the point of the electron beam interacting with the beam pipe. Even though the beam position monitors upstream and downstream of the beam interaction point continued to suggest that the beam was in the correct position, the measurements prompted a re-evaluation of the vertical position of the beam pipe. It was found that the beam pipe was 0.635 cm too low. Thus the beam was lost when hitting the upper portion of the beam pipe. The beam pipe was realigned and additional shielding was put into place. The radiation dose

equivalent in the concerned area fell from 72 milliSv to 38 microSv. This proposed method to determine the location of the beam losses proved to be an effective approach with easy and rapid measurements and significantly low operational cost.

P.45 Elemental Bio-imaging of Actinides and Beryllium in Lymph Nodes of Former Nuclear Workers

Tolmachev, S.Y., Bishop, D., Doble, P., Hare, D., James, A.C.; United States Transuranium and Uranium Registries, University of Technology, Sydney

This study explored the application of laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) to elemental bio-imaging (EBI) of actinides [thorium (Th), uranium (U), plutonium (Pu), and americium (Am)] and beryllium (Be) in samples of human tissue. The tissue samples were from occupationally exposed 'nuclear weapons site' workers, who had voluntarily donated their tissues to the U.S. Transuranium and Uranium Registries (USTUR). This EBI technique provides two-dimensional mapping of the concentration of elements in the surface layer of a sectioned tissue (by isotopic number). For this exploratory study, single sections of thoracic (respiratory tract) lymph nodes from five individual workers were mapped for actinide isotopes and 9Be . In all cases where the isotopic distribution was detectable, this was highly localized, suggesting that the materials were still present (many years after intake) as discrete particles, and not 'leached' by dissolution and subsequently

chemically diffused throughout the tissue. In all cases, whether or not they were exposed occupationally to U, the concentration distribution of ^{238}U was measurable. In the case with occupational exposure to uranium, the concentration distribution of ^{235}U was measurable. None of the cases were occupationally exposed to Th, yet the concentration distribution of background ^{232}Th was measurable in all cases. The distribution of ^9Be was measurable in only one of the three cases with 'self-reported' exposure to Be. Neither ^{239}Pu nor ^{241}Am was detectable in the thoracic lymph node from a case whose Pu exposure had been by skin wound. Also as expected, based on the limit of detection for actinides using quadrupole ICP-MS, the concentration distributions of ^{239}Pu and ^{241}Am were not measurable in the thoracic lymph node from a case exposed by inhalation to insoluble Pu. In this case, the mass concentrations estimated from external low background gamma-spectrometry were 65 pg/g (0.15 Bq/g) and 3.3 pg/g (0.42 Bq/g), respectively. In all cases, the concentration distribution of the major elements (Ca, P, Mg and Si) were measured. All of these distributions were non-uniform, i.e., they exhibited the characteristics of localized 'foreign' materials. The implications of these findings for dose assessment and industrial hygiene are discussed.

P.46 The Differences of the Reaction of Hematopoiesis and Bone Tissue Among People with Incorporated Osteotropic Isotope ^{90}Sr

Akleyev, A., Dimov, G., Akushevich, I., Veremeyeva, G., Varfolomeyeva, T., Ivanov, V., Ukraintseva, S., Yashin, A.; Urals Research Center for Radiation Medicine, Russia, Duke University*

The population of the Techa riverside villages has been chronically exposed to radiation in a wide range of doses as a result of releases of radioactive waste into the river. About 87% of accumulated bone surface dose of internal irradiation was contributed by ^{90}Sr . The target tissue for this long-living nuclide is red bone marrow (mean cumulative red bone marrow dose at 1956 was 333.6 ± 4.6 mGy, at 2005 – 493.9 ± 0.01 mGy) and the layer of osteogenic cells (mean cumulative bone surface dose at 2005 was 1470 ± 0.04 mGy). The analysis of about 3,200 hemograms for inhabitants of the Techa Riverside villages measured over years (1951-1956) of chronic exposure to ionizing radiation with gradual decrease of dose rate showed a gradual increase in frequency of cytopenias with increasing the dose rate value. Over the years 4 to 8 after the onset of radiation exposure some clinical and morphological changes in bone tissues of primarily dystrophic character were noted among individuals with the highest doses to the bone tissue up to 2000 mGy and higher with significantly increased frequency (Akleyev and Kisselyov 2002). In the late period after the

start of chronic radiation exposure (50 years later) the incidence of neutropenia, lymphopenia and thrombocytopenia did not exceed that seen in the control group. The elevation of degenerative and dystrophic alterations in bones and joints was observed in the later period after ^{90}Sr intake. About a half of people with ^{90}Sr incorporation and control group have changes in bone tissue expressed by different stages of osteoporosis. The age is a determinative factor of bone tissue involution in women while some tendency of ^{90}Sr influence on the intensity of osteoporosis is revealed in male group. The differences of the reaction of hematopoiesis and bone tissue on chronic radiation exposure due to incorporated ^{90}Sr are determined by the type of cell kinetics in these tissues.

P.47 Modeling of Photon Trajectories in Absorbers to Augment Undergraduate Laboratory Instruction

Fulmer, P.; Francis Marion University

Senior undergraduate health physics students at Francis Marion University take a course in nuclear radiation physics, where the interactions of charged particles, photons, and neutrons are examined in depth. As part of this class, students are instructed in the use of Monte Carlo techniques, particularly as they are applied to photon interactions. In the laboratory session for this class, students modify and use a Monte Carlo program written in Visual Basic as part of Microsoft Excel. This program has been discussed previously in its

ability to simulate elementary photon interactions while allowing students to understand the foundational principles for the preparation of a Monte Carlo program. In its newest incarnation, students assisted in modifying the program to show the trajectories of photons within an absorber. This allows the students to see the simulated path of photons within the absorber. Because of the difference in the interaction coefficients depending on material type, it is instructional for students to see the projected photon paths in different absorbers as a function of material type and photon energy. This experience helps students to understand the photon interactions more completely. Inspection of trajectories helps students see under what conditions the photoelectric effect is dominant; in addition, the scatter angles of photons that undergo the Compton effect can be seen visually and explained on the basis of the Klein-Nishina cross section. This work presents the results of various simulations for a variety of absorbers and photon energies along with the source code for the program so that others can benefit from a visual representation of the photon trajectories following interactions in various materials.

P.48 Key Findings of CDC's Los Alamos Historical Document Retrieval and Assessment Project—Public Exposures from the Trinity Test

Widner, T.E., Flack, S.M., Burns, Jr., R.E., Shonka, J.J., Buddenbaum, J.E.; ChemRisk LLC, NGTS, Inc, Shonka Research Associates, ENSR/AECOM

Because of the complexity of the implosion-assembled bomb developed at Los Alamos, a test was considered necessary. The Trinity test conducted near Socorro, NM on 16 July 1945 fell within the scope of the Los Alamos Historical Document Retrieval and Assessment (LAHDRA) project led by the Centers for Disease Control and Prevention (CDC). To preserve the secrecy of the atomic bomb mission and avoid claims against the Army, residents of New Mexico were not warned before the blast or informed of residual health hazards afterward, and no residents were evacuated. The device was detonated close to the ground, causing much soil to be drawn into the fireball and form radioactive fallout. Exposure rates measured up to 15 or 20 R/h in public areas about 20 mi northeast of ground zero. Field teams used instruments that were crude, ill suited to field use, and incapable of measuring about 4.8 kg of unfissioned plutonium that was dispersed. Vehicle shielding and contamination were not corrected for. Terrain and air flow patterns caused “hot spots” in and around what became known as “Hot Canyon” and on Chupadera Mesa. Key residential areas were unknown to monitoring

teams and were not visited on test day. Ranchers reported that fallout “snowed down” for 4-5 d after the blast. Many residents collected rain water off their metal roofs into cisterns for drinking. It rained the night of test day, so fresh fallout was likely consumed. Most ranches had one or more dairy cows and a ranch near Hot Canyon maintained a herd of 200 goats. All evaluations of public exposures from Trinity published to date have been incomplete in that they have not reflected the internal doses that were received by residents from intakes of airborne radioactivity and contaminated water and foods. Too much remains undetermined about exposures from the Trinity test to put the event in perspective as a source of public radiation exposure or to defensibly address the extent to which people were harmed.

P.49 Key Findings of CDC's Los Alamos Historical Document Retrieval and Assessment Project—Potential Public Exposures from Early Airborne Plutonium Releases

Widener, T.E., Shonka, J.J. , Burns, Jr., R.E., Buddenbaum, J.E. ChemRisk, LLC, Shonka Research Associates, NGTS, Inc., ENSR/AE-COM*

Under the Los Alamos Historical Document Retrieval and Assessment (LAHDRA) project led by the Centers for Disease Control and Prevention (CDC), airborne plutonium releases were prioritized based on historical release totals for DP West Site's Building 12 stacks published by Los Alamos National Laboratory (LANL) in the 1970s. Values for 1948-55 were adjusted upward by the LAHDRA

team (by roughly a factor of 20) based on a study conducted by Lab industrial hygienists in 1955-56. In that study, stack releases were measured with improved, isokinetic stack sampling systems that were operated alongside the original systems. Correction factors were determined and applied to releases previously reported for 1948-55. All values from 1948-75 were adjusted further by the LAHDRA team using sample line loss and filter burial correction factors based on assessments performed by LANL staff. No effluent data were located for the wartime processing of plutonium in D Building, and LANL's release estimates include no contribution from D Building during its 10 y of operations or from DP West Site plutonium processing 1945-47. If plutonium releases from the Building 12 stacks 1948-55 were as high as the 1956 documents indicate, LANL's releases could easily have exceeded independently reconstructed airborne plutonium release totals from the production plants at Hanford, Rocky Flats, and Savannah River combined, even without the other sources and other years at LANL included. Residential areas were built closer to production areas at LANL than at any other major Manhattan Project, AEC, or DOE site. A screening assessment using the methodology of National Council on Radiation Protection and Measurements (NCRP) Report No. 123 was performed for releases from DP West Site Building 12 stacks during 1949, the apparent year of peak emissions. Through screening at Levels I, II, and III, results indicate that public exposures from airborne

plutonium releases warrant further evaluation.

P.50 Characterizing a New Technology for External Personnel Dosimetry

*Wright, J., Ujhazy, A., Riesen, H., Dicey, B. *; Dosimetry & Imaging PTY, University of New South Wales, Dosimetry Resources International*

This study evaluates the response to radiation of the "Optically Excited Luminescent" OEL compound Barium Chlorofluoride doped with Samarium, (BaFCl:Sm). An advanced reader was developed by A/Prof H Riesen, University of New South Wales.

BaFCl:Sm was tested at several facilities in Australia using ARPANSA calibrated sources, providing calibrated data for ¹³⁷Cs, X-Rays, ^{99m}Tc and 6/18MV photons, demonstrating high sensitivity from 60kVp to 18MV. Further testing is underway to characterize response to other radiations. BaFCl:Sm is sensitive to very low levels of radiation - 60 nGy (X-ray) and 15µGy (662 keV). Energy-independent linear response is observed from 10uGy (70kVp) to 10Gy (6MV).

There is extremely low loss of signal through repeated reads. BaFCl:Sm has application in patient dose monitoring, homeland security and occupational dosimetry..

The system meets key test criteria:

1. Wide energy range.
2. Dose rate independent
3. Very low signal loss.
4. Superior sensitivity.
5. Stable & repeatable chemistry.

P.51 Proliferation, Cell Cycle and Apoptosis in Blood Lymphocytes at Late Time after Chronic Radiation Exposure in Man

Pochukhailova, T., Blinova, E., Akleyev, A.; Russia

The aim of the study was to assess proliferative activity, cell cycle delays and the level of apoptosis in peripheral blood lymphocytes among chronically exposed subjects with long-term leucopenia.

For residents of localities contaminated with radionuclides in Chelyabinsk oblast, the hemopoietic system represents a critical link due to a high radiosensitivity of the red bone marrow and bone-seeking properties of ⁹⁰Sr. A long-term exposure to low-dose rate radiation resulted in reduced counts of mature peripheral blood cells (leucopenia, thrombocytopenia), both in the early and the late period of exposure.

Assessment of proliferative activity of peripheral blood lymphocytes was conducted based on contents of ki-67 protein, that of delays in cell cycle was based on contents of Chk2 protein using flow-cytometry. The level of apoptotic cells was measured using the TUNEL technique.

Exposed individuals with leucopenia manifested an increase in the baseline levels of lymphocytes with a delayed cell cycle, apoptotic cells and proliferating cells in the peripheral blood. Following stimulation of cells to division, subjects with leucopenia demonstrated a lower rate of dividing cells as compared to that seen in unexposed subjects. Increased percentage of apoptotic cells under additional external exposures

(incubation, in vitro irradiation) can only be observed on comparing exposed individuals with leucopenia to exposed individuals without leucopenia. It can be suggested that the results of this study are indicative of changes in radiosensitivity of peripheral blood lymphocytes which may be associated in subjects with leucopenia with long-term low-dose rate radiation exposure.

P.52 Influence of Polarized Radiofrequency Electromagnetic Fields on Stem Hemopoietic Cells in Mice

Dukhovnaya, N., Tryapitsyna, G., Polevik, V., Akleev, A., Pryakhin, E.; Urals Research Center of Radiation Medicine, Russia

At the present time engineering development has led to essential electromagnetic environmental contamination. There are not enough data to completely resolve a problem of danger of such influence on human health.

In our experiments we estimated influence of electromagnetic radiation of various polarization on hematopoietic system in mice using a method of endogenous colony-formation in a spleen.

Following schemes of exposure were used: once or daily within 3 days animals were exposed to radiofrequency electromagnetic field (RF-EMF) (600 seconds exposition, EMF carrier frequency 925 MHz, frequency modulation 217 Hz; 1.2 mW/cm² - that corresponds to a maximum permissible power exposition (200 μ W*h/cm²) accepted in Russia for RF-EMF). Through 5h after EMF influence animals were exposed to

the external total α -irradiation (6 Gy, dose rate 0.7 Gy/min). At 9th day quantity of colony-forming units in a spleen (CFU-S), quantity of nuclear cells in bone marrow were defined.

After one-time irradiation, as well as after 3 days of exposition in all experimental groups average CFU-S quantity was less than in control group. Effects of RF-EMF with right polarization were the most expressed. Quantity changes of CFU-S in group of animals subjected to influence of RF-EMF with left polarization were less expressed, the effects of RF-EMF with linear polarization were intermediate. It is possible to explain observable effects through functional changes of stem hemopoietic cells such as decrease stem cells pool because of their proliferation and transit to pool of committed progenitor cells.

Then, spatial polarization of radiofrequency electromagnetic radiation may lead to modification of the biological effects.

P.53 Radioactivity and Radiation: Atlanta Chapter's Educational Material and Experience with the Georgia Science Teacher Association

Nichols, M., Shonka, J.J., Collins, D.J., Philpotts, D.K., Hardeman, Jr, J.C., Pepper, A.J.; Georgia Power, Shonka Research Associates, US Nuclear Regulatory Commission, Georgia Department of Natural Resources, Georgia Perimeter College

The HPS Atlanta Chapter (ACHPS) has embarked on a long-term plan to stabilize our past efforts supporting education. This effort involves obtaining funding; coordinating with

state level agencies, and using a web based approach to ease the tasks of revising, maintaining and distributing materials, as well as providing technical support to teachers who elect to incorporate the material into their classrooms. To obtain the most teacher participation, significant effort was devoted to the development of ready to use educational units compliant with Georgia physical science performance criteria. In order to assess the readiness of the material, our Science Teacher Workshop Committee assembled lesson plans, supporting material, and equipment for hands-on demonstrations during the 2009 Georgia Science Teacher Association meeting. Materials provided in the workshop and outlined in this presentation include handouts addressing educational criteria, lesson plans, reference materials, directions for demonstrations, and links to additional resources for equipment, materials, and additional information. ACHPS contact information for continuing support was provided. Each teacher was also provided with a (CD) survey meter. This effort builds on previous workshops by incorporating material now available on the Internet. Results of follow-up surveys of participants and lessons learned are presented.

P.54 I-125 Plaque in Eye Melanoma Treatment: ALARA and Other Considerations

Elder, D.H., Hu, Y.A., Strzelczyk, J.; University of Colorado Hospital

While ocular melanoma is a rare cancer, its treatment presents numerous challenges. Among the factors that determine the appropriate

approach are the size and stage of cancer, and the likelihood of saving the eye and preserving vision. Several options are available for small and medium size ocular melanomas; they include surgery, radiation and laser therapy. Large melanomas are usually treated by extensive surgery that may involve enucleation (removal of the eyeball). Some medical centers have begun to treat these melanomas by irradiation with charged particles or with plaque brachytherapy utilizing Ru-106 or I-125 seeds. Considering better cure rate and in the interest of ALARA, ophthalmologists and radiation oncologists in our institution opted to utilize I-125 seeds in conjunction with eye applicators developed for the Phase III national study (COMS), Collaborative Ocular Melanoma Study. In addition to clinical and radiation safety aspects, medical and health physicists addressed technical, dosimetric and logistical considerations. They included questions such how to assure that occupational exposures for personnel preparing, transporting and handling the plaque remain ALARA, who should be placing the implant in the surgical field, and what precautions to take to assure that the general public exposure limits are not exceeded.

P.55 Evaluation of Skin Dose using GafChromic EBT Film

Thuo, K., Lodwick, C., Hamby, D.

Hot particle skin contamination can produce highly localized doses from gamma and beta radiations. Although photon dosimetry is often not critical in hot-particle contamination,

it may be significant because of beta-emission characteristics and/or the presence of protective clothing between the source and skin. The energy released by photons is a straightforward calculation; however, KERMA will overestimate the true absorbed dose at shallow depths during the buildup of electronic equilibrium. GafChromic EBT film is used to directly quantify this buildup of dose at shallow depths. The self-developing properties of GafChromic film, along with its effective Z of 6.8, make the film ideal to evaluate dose to tissue. Isotopes of various energies, ranging from 200keV to 3MeV, are used to evaluate dose to the skin at depths of 70, 100, 300 and 1000 microns. Dose is assessed using combinations of clothing thickness and air gaps (between clothing and skin). The film is layered at depths so as to provide data at the points of interest. Following the film exposure, each layer is scanned on an EPSON 10,000 XL flatbed scanner and analyzed by ISP FilmQA software. Estimates of dose are also made for the same scenarios using a photon/electron Monte Carlo transport method (MCNP5).

P.56 Real-Time Continuous Air Monitoring of Plutonium-239 around a Manhattan Project-Era Nuclear Waste Site

Eisele, W., Hart, O.; Los Alamos National Laboratory

A commercially available, portable, lightweight alpha environmental continuous air monitor (ECAM) coupled with cell phone modem communications and in-house developed data acquisition

and display software has been implemented for the remote monitoring of plutonium-239 in air around a Manhattan-era project waste site during remediation activities which are to start in the summer of 2009. This system has been developed and implemented to provide situational awareness of potential airborne releases from the remediation activities to the public located only 20 meters away downwind of the waste site. This is especially important because historical waste disposal records are not available and the actual inventory of plutonium-239 in waste and soil is unknown. Environmental air sampling stations have been deployed along the perimeter of the waste site, however, the turnaround time between the start of the sampling period and receipt of isotopic air sampling data is on the order of 4 to 6 weeks. The ECAM system should provide a more rapid, but less sensitive, means of identifying inadvertent releases of plutonium-239 to the environment than the air sampling stations. The ECAM itself has a vendor-developed curve fit algorithm to parse out counts due to short-lived radon progeny from plutonium-239 counts. Software has been developed to remotely acquire various types of data, e.g., concentration, dose, pump flow rate, raw counts, alpha energy spectra, from each ECAM on a periodic basis via a cell phone modem communications protocol. This data is then available for analysis and display via a web-based interface that is available from any desktop

computer with appropriate access privileges. Thus far, 3 ECAMs have been deployed in the field and have collected data for approximately 6 months during the pre-operational phase of the remediation project.

P.57 Risk-based Fee Structure Spreadsheet

Dibblee, M.; Radiation Health Consulting

Using a simple Excel spreadsheet, operational data from a materials program can be entered to test a desired "bottom line". The spreadsheet calculates hours worked (person-hours), numbers of licenses or facilities or devices, and inspection and licensing hours. Fees incorporate a risk factor for each license type.

P.58 Urinary Polonium-210 and Lead-210 in a Population of Chinese Smokers and Nonsmokers

Schayer, S., Qu, Q., Wang, Y., Cohen, B.; New York School of Medicine, Peking University Health Science Center, Beijing

In recent years, there has been renewed interest in the ^{210}Po and ^{210}Pb concentrations in cigarettes. We measured the ^{210}Po and ^{210}Pb levels in popular brands of Chinese cigarettes (mean=23 mBq/cig), and hypothesized that urinary ^{210}Po and ^{210}Pb levels could be used as tracers of exposure to cigarette smoke. Urine samples (24-hr) collected from 250 volunteers in suburban areas of Beijing were assayed for ^{210}Po and ^{210}Pb . The median(range) ^{210}Pb activity of 9(4-17) mBq in nonsmokers was statistically less (pP.58 An Approach To Evaluation

Of Strontium-90 Spatial Distribution In Calcified Biological Samples Using PCL Method Of Digital Autoradiography

P.59 An Approach to Evaluation of Strontium-90 Spatial Distribution in Calcified Biological Samples Using PCL Method of Digital Autoradiography

Krivoshchapov, V., Shishkina, E.; Urals Research Center for Radiation Medicine, Russia

Knowledge of a radionuclide distribution in biological tissues is an actual problem in medicine, experimental physiology and radiobiology. A special attention in such investigations is paid to detection of Strontium-90 concentration in the calcified tissues because this radionuclide is a metabolic analogue of calcium and can be used as a biological marker. The method of digital autoradiography based on Image Plates of Photo Stimulable Luminescence (PSL) is usually applied for qualitative evaluations of spatial distribution of a radionuclide in samples. This study was aimed at development of a method for conversion of arbitrary results of Strontium-90 measurements in environmental samples to units of energy deposition that correspond to Strontium-90 concentration. Measurement of a sample contaminated by Strontium-90 with use of PSL image plates was simulated with MCNP 4Cb code. Response in a PSL plate obtained numerically was processed statistically and a smoothing functional approximating the data was obtained. Comparative analysis of the results numerical

experiments and published data allows verification of the model and calculation of a normalization factor for conversion of relative units of the PSL response to Strontium-90 concentrations.

The study shows that method of digital autoradiography using the PSL plates can be successfully applied for quantitative evaluation of two-dimensional distribution of Strontium-90 in macro samples.

P.60 Off-site Source Recovery Project - The Most Over Regulated Disposition Pathway?

Tompkins, J.; Los Alamos National Laboratory

In 1999, the Off-site Source Recovery Project (OSRP) at Los Alamos National Laboratory began accepting radioactive sealed sources from the US licensed sector. As the need for sealed source disposition evolved the project evolved into what maybe the most regulated disposition pathway in the US. As an operational Project at LANL, a DOE facility that performs work in the public sector, OSR Project incorporates DOE, NNSA, LASO, NMED, NRC, DOT, EPA, LWA, State, and guidance and regulation in its many processes to find compliant disposition pathways for excess and unwanted radioactive sealed sources. The process of assessing excess sealed sources for final disposition by OSRP is complex and fraught with issues. From initial assessment, on-site packaging, shipment, visual examination, and final disposition there is a maze of regulatory minutia to navigate. Just like a steamer on a river, occasionally the steamer hits a sandbar, and has

to be pulled off. This poster session describes the regulatory pathway via a decision tree network in order to gain all necessary approvals for final source disposition. The decision network illuminates the problem of multiple and conflicting regulators, and how OSR Project has adapted to satisfy all stakeholder requirements.

P.61 Canadian Source Repatriation - A New Beginning

Manzanares, L.; Los Alamos National Laboratory

In 2008, the Off-site Source Recovery Project (OSRP) at Los Alamos National Laboratory was contacted by the University of Ottawa (U of O), Ontario, Canada seeking to repatriate a US origin PuBe source. The source, a 32 gram PuBe produced by Nuclear Materials and Equipment Corporation (NUMEC) over 30 years ago, was excess and unwanted. In order to lower the security profile of the University the RSO was seeking disposition. The first attempt at disposition was for long term storage at a cost of \$500,000 CAD. The high cost for longterm storage of these sources encouraged the RSO to seek any other less expensive disposition pathway.

High cost was only the initial barrier for U of O in their efforts to disposition this unwanted source. As they quickly discovered, their efforts were complicated due to a lack of documentation on the source, and a lack of Type AF shipping containers in Canada.

OSRP was a likely international partner for disposition of these US origin sealed sources, since OSRP

had already participated in several international recoveries of PuBe & AmBe sources and had hardware ready to solve the problems presented. This poster discusses the operational requirements, problems, and outcome of the successful recovery operation.

P.62 Development and Testing of Gallium Arsenide Photoconductive Detectors for Ultra Fast, High Dose Rate Pulsed Electron and Bremsstrahlung Radiation Measurements

Kharashvili, G., Makarashvili, V., Mitchell, M.D., Beezhold, W., Gesell, T.F., Wingert, W.L.; Idaho State University, University of Utah

Real time radiation dose measurements are challenging in high dose rate environments such as those used for studying radiation effects on electronic devices or biological agents. Dosimetry needs at particle accelerator facilities require development of devices with fast (10s of picoseconds) response to pulsed radiation, linear response over a wide range of dose rates (up to E+11 Gy/s), high resistance to radiation damage, and successful operation in mixed gamma and neutron environments. Operation of GaAs PCDs (gallium arsenide photoconductive detectors) in pulsed electron and bremsstrahlung radiation fields is investigated. Neutron irradiation was used to cause displacement damage in crystalline lattice of GaAs. Creation of stable defect complexes introduces effective recombination and trapping centers, causing decrease in the charge carrier mobility and life time,

hence improving time-response characteristics of these devices at the expense of their sensitivity. PCDs were fabricated from 3 different size, VGF (vertical gradient freeze) grown single crystal wafer samples with 3 different neutron irradiation levels (0, $\sim E+14$, and $5 E+15$ n/cm² (1-MeV (GaAs) equivalent). Detector operation was studied under 7 to 38-MeV electron pulses produced by linear accelerators operating at the S-band frequency of 2.8-GHz and L-band frequency of 1.3-GHz, and a 32-ns long, 7-MeV maximum energy bremsstrahlung pulses produced by a pulse-power accelerator. Improvement of the detector speed at the expense of its sensitivity as a function of neutron irradiation level is shown. Dose-rate ranges of application of the PCDs are determined (up to $E+8$ Gy/s) and calibration curves are presented.

This work is funded by the DoD under contract # FA8650-04-2-6541. Special thanks to Dr. John Rauch and Dr. Miriam Rauch of Nu-Trek Inc. for their contributions.

P.63 Hematology Physicians Preparing for a Mass Casualty Marrow Toxic Incident

Case, Jr., C., Confer, D., Chao, N., Weisdorf, D., Weinstock, D., Krawisz, R.; NMDP, Duke University, University of Minnesota, Harvard, ASBMT

The NMDP in partnership with the American Society for Blood and Marrow Transplantation (ASBMT) provides leadership for the Radiation Injury Treatment Network® (RITN) (www.RITN.net), which consists of 56 bone marrow transplant centers, bone marrow donor centers and

cord blood banks that are preparing to treat victims of a marrow toxic mass casualty incident (such as injuries received from exposure to ionizing radiation or mustard gas). If marrow toxic injuries are sustained, all victims would require specialized intensive medical care and many of the victims would need to identify an unrelated marrow or cord blood match on the National Marrow Donor Program's Registry. Since RITN's formal inception in 2005 it has conducted annual tabletop exercises, developed plans for responding to a marrow toxic incident and educated over 1700 medical professionals about their role in responding to a mass casualty incident resulting in victims with marrow toxic injuries. It is important to educate hematology and oncology professionals about their role in a marrow toxic mass casualty incident because marrow toxic injuries are a unique medical scenario where the patients require specialized intensive medical care. Marrow toxic incidents include exposure to ionizing radiation and mustard gas; victims exposed to these hazards may develop Acute Radiation Syndrome (ARS) a type of marrow toxic injury, or symptoms that mimic ARS, both require intensive supportive care from hematology or oncology medical specialists whom have expertise in its treatment.

P.64 Photon and Neutron Isodose Contours for LINACs

Khan, S., Sherbini, S.; DHS, NRC

It is necessary to map the photon and neutron radiation fields around the electron LINACs, which were originally developed for the radiation

therapy applications but which are now beginning to see applications in the non-intrusive inspection (NII) technology for the screening of cargo and vehicles in homeland security and force protection. This paper presents results of MCNPX simulations of photon and neutron iso-dose contours around 10-to-20 MV LINACs so that this data can be used to determine the radiation safety exclusion zones for the protection of workers and members of the general public. Results of the radiation dose to undocumented aliens (stowaways) in the vehicles will also be presented.

P.65 Evaluation of Shield Thicknesses for PET/CT Facilities

Ali, S., Ali, M., Shahid, M., Saddique, T.; Pakistan Nuclear Regulatory Authority, Pakistan Institute of Engineering and Applied Sciences

The objective of this task was to investigate the methods of calculating the shield thicknesses of PET/CT facilities. The ultimate goal was to evaluate the shield thicknesses of PET/CT facilities in Shaukat Khanum Memorial Cancer Hospital (SKMCH) and Institute of Nuclear Medicine and Oncology (INMOL) in Lahore, Pakistan. Shielding calculations for PET/CT facilities are based on two reports; first report is TG-108, and the second report is NCRP-147. Proposed shield thicknesses were compared with the calculated shield thicknesses. It is concluded that, using the proposed shield thicknesses from the above references, some rooms required additional shielding whereas other rooms are over shielded as in the case of a PET/CT suite. The

proposed shield of a cyclotron vault is similar with calculated shield and measured dose rate profiles through the shield that satisfies the regulatory dose limits.

P.66 Implications of Granite Counter Top Construction and Uses

Bernhardt, D., Gerhart, A., Kincaid, L.; Consultant, Solid Surface Alliance, Industrial Hygiene Services

Granite is a term for natural stones such as pegmatites, migmatites, gneisses, and schists used for residential countertops, and other indoor trim. Some granites are anatectic alaskites similar to the Rossing uranium deposits. Uranium and thorium concentrations range from those similar to normal soil (roughly 0.04 Bq/g, 1 pCi/g) to over 15 Bq/g of uranium; with lower concentrations of thorium. Regulations in the European Community and Canada exclude elevated stone from these markets. In the U.S. radiation screening limits by some companies (0.2 to 0.3 μ Gy/hr) and the supply have resulted in limiting the installations of elevated stone to a fraction of the total market being installed in homes, but elevated slabs are still installed. The primary health risk to workers is due to airborne dust, from sawing and milling granite slabs which contain free silica, heavy metals, and uranium and thorium. Depending on work-place controls, the primary risk may be silicosis, but there are also potential risks from other toxin materials (e.g., beryllium) and radiation exposure. Potential health risks to consumers

using granite are primarily due to the increased concentration of indoor radon and external gamma dose from the uranium and thorium in the granite. The presentation will provide assessments for workers and estimates of the elevated indoor radon and gamma dose for consumers. Assessments using controlled chambers, modeling, and indoor measurements indicate that some granite slabs similar to the screening levels can increase the indoor ^{222}Rn concentration by about 40 Bq/m^3 (1 pCi/l), with higher concentrations for more elevated slabs. Granite counter tops with elevated gamma exposure rates of about $1 \text{ } \mu\text{Gy/hr}$ result in potential gamma doses that are a significant fraction of 1 mSv/yr , a basic criterion for the general population.

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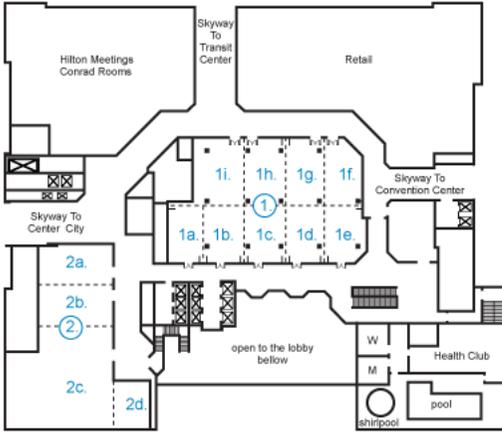
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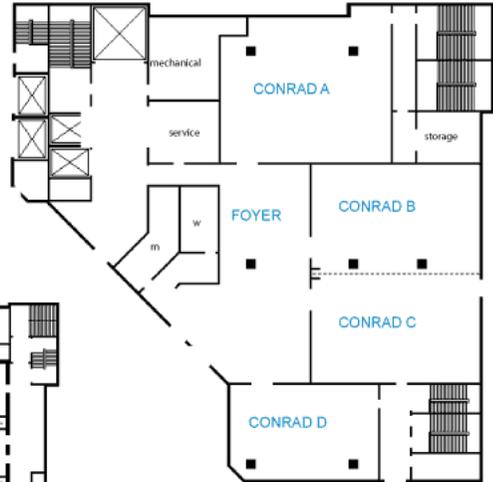
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VAN CLEEF, D.	PEP3D, PEPW2	WU, B.M.	P.13, P.14
VARFOLOMEYEVA, T.	P.46	WYATT, H.	WPM-C2.4
VASILENKO, E.	WPM-C1.1	-X-	
VASUDEVAN, L.	P.40	XU, X.	MPM-C.4, MPM-C.7, TAM-B.2, TAM-B.3, TAM-B.9, TPM-B.1, TPM-B.3, TPM-B.5, TPM-B.7, WAM-C.6, WAM-C.7, WAM-C.8, WAM-C.9
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VO, V.	P.33	YOSHIZUMI, T.	TAM-B.1, TAM-B.4, TPM-B.2
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WATSON, B.	MPM-D.1, WAM-A.3		

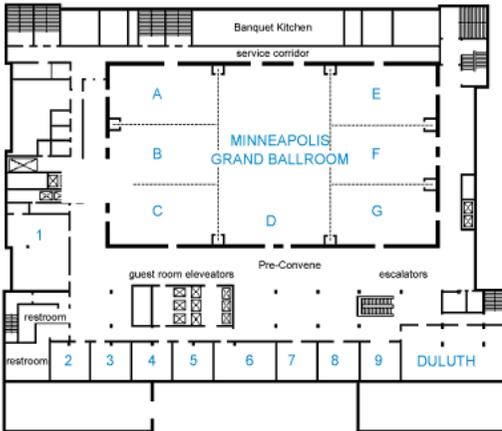


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|-----------------------|---------------------------|
| 1. MARQUETTE BALLROOM | 2. SYMPHONY BALLROOM |
| 1a. MARQUETTE I | 2a. SYMPHONY BALLROOM I |
| 1b. MARQUETTE II | 2b. SYMPHONY BALLROOM II |
| 1c. MARQUETTE III | 2c. SYMPHONY BALLROOM III |
| 1d. MARQUETTE IV | 2d. SYMPHONY BALLROOM IV |
| 1e. MARQUETTE V | |
| 1f. MARQUETTE VI | |
| 1g. MARQUETTE VII | |
| 1h. MARQUETTE VIII | |
| 1i. MARQUETTE IX | |

Hilton Minneapolis
Second Floor

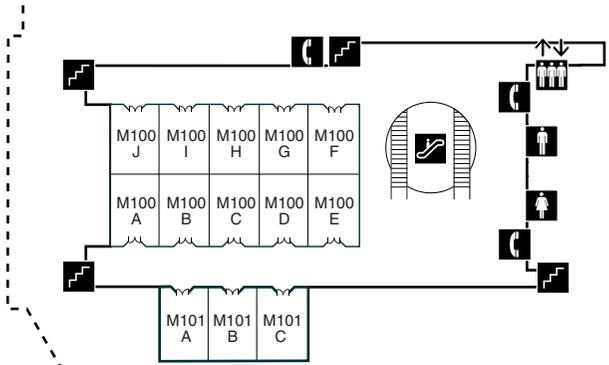


Hilton Minneapolis
Conrad Rooms Second Floor

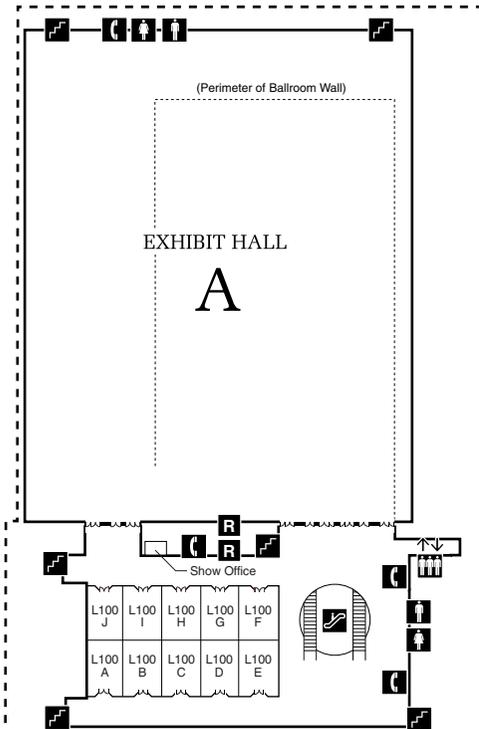


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|---------------------|---------------------|
| 1. ROCHESTER | 7. DIRECTOR'S ROW 2 |
| 2. BOARD ROOM 1 | 8. DIRECTOR'S ROW 3 |
| 3. BOARD ROOM 2 | 9. DIRECTOR'S ROW 4 |
| 4. BOARD ROOM 3 | |
| 5. DIRECTOR'S ROW 1 | |
| 6. RED WING ROOM | |

Hilton Minneapolis
Third Floor



Minneapolis Convention Center
Mezzanine Level



Minneapolis Convention Center
Lower Level

Notes

Saturday 11 July

Both AAHP Courses are in the
Hilton Minneapolis Hotel

AAHP1 Time-Saving Spec-
troscopy Models

8:00 AM-5:00 PM Salon E (H)

AAHP2 8-hour HAZWOPER
Refresher Course

8:00 AM-5:00 PM Salon F (H)

Sunday 12 July

**All Sunday PEPs are at the
Convention Center**

PEP 1-A thru 1-H

8:00-10:00 AM

PEP 2-A thru 2-H

10:30 AM-12:30 PM

PEP 3-A thru 3-H

2:00-4:00 PM

Sunday PEP Rooms:

A - M100 A

B - M100 B

C - M100 C

D - M100 D

E - M100 E

F - M100 F

G - M100 G

H - M100 H

Welcome Reception

6:00-7:00 PM

Salons ABCD, Minneapolis
Hilton (H)

*All Events are in the
Convention Center unless
noted as
Hilton Minneapolis (H)*

Section Business Meetings**Monday**

Decommissioning

L100 F/G 5:00 PM

Tuesday

Accelerator

L100 D/E 11:15 AM

Environmental/Radon

L100 A 11:30 AM

Medical

L100 B/C Noon

Power Reactor

M100 J Noon

Wednesday

Military Health Physics

L100 H/I 4:30 PM

Monday 13 July

CEL1 Uncertainty, Variability, Bias,
Error, and Blunder

7:00-8:00 AM M100 A/B

CEL2 Respiratory Protection Re-
freshers for HPs

7:00-8:00 AM M100 D/E

ABHP Exam - Part I

8:00-11:00 AM Symphony I, II (H)

Plenary

Internal Dosimetry: Then & Now

8:30 - 11:50 AM L100 B-I

Lunch in Exhibit Hall for Registrants
and Opening of Exhibits

Noon-1:00 PM Exhibit Hall A

PEP Program

12:15-2:15 PM

PEP M1 A Systems-Engineering Ap-
proach to Establishing Quality Assur-
ance M100 A

PEP M2 Making Meaning of Health
Physics: For Us and Them M100 B

PEP M3 When Legacy Sources Be-
come Front and Center; How to Im-
plement a Program ... M100 C

PEP M4 Uses & Misuses of Dosi-
metric Terms in Rad Prot M100 D

PEP M5 Uranium Mining and
Milling M100 E

ABHP Exam - Part II

12:30-6:30 pm Symphony I, II (H)

HPS Chapter Council

1:00-2:00 pm L100 A

Poster Session

1:00 - 3:00 PM Exhibit Hall A

MPM-A1 Waste Management

3:00 - 4:15 PM L100 A

MPM-A2 Biokinetics/Bioeffects

4:30 - 5:30 PM L100 A

MPM-B Risk Analysis/Comm

3:00 - 5:30 PM L100 B/C

MPM-C Internal Dosimetry and Bio-
assay A

3:00 - 5:00 PM L100 D/E

MPM-D Decommissioning

3:00 - 5:00 PM L100 F/G

MPM-E Special Session: Stakehold-
er Engagement: IRPA Guiding Prin-
ciples for Radiation Protection Profes-
sionals on Stakeholder Engagement

3:00 - 5:30 PM L100 H/I

MPM-F Special Session:

Nanotechnology

3:00 - 5:30 PM L100 J

Student Reception

5:30-6:30 PM Seasons

Tuesday 14 July

CEL3 The Characterization of Dose in
Computed Tomography

7:00-8:00 AM M100 A/B

CEL4 System of Radiation Safety Moni-
toring for the Personnel Working at the
Chernobyl Object Shelter

7:00-8:00 AM M100 D/E

TAM-A Environmental Special Session: 25
Years and Counting: Indoor Radon Since
Watras

8:45 - 11:30 AM L100 A

TAM-B Medical I

8:30 - 11:45 AM L100 B/C

TAM-C Accelerator Section Special Ses-
sion

8:30 - 11:15 AM L100 D/E

TAM-D Power Reactor Special Session:
Radiation Protection in a Nuclear Power
Renaissance

8:30 AM - Noon L100 F/G

TAM-E Special Session: Homeland Se-
curity, Radioactive Material Monitoring and
Security

8:00 AM - Noon L100 H/I

TAM-F AAHP Special Session Why Soci-
ety Needs Health Physics: Biological Effects
and Challenges

8:30 AM - Noon L100 J

AAHP Awards Luncheon

Noon-2:15 PM 200 DEFG

PEP Program

12:15-2:15 PM

PEP T1 How to Become a Radiation Myth
Buster M100 A

PEP T2 Radiation Science & Public Dis-
course: A Risk Comm Approach M100 B

PEP T3 Introduction to HLS Radiation
Detection M100 C

PEP T4 Nuclear Power as Part of our
Energy Surety & Economic Security
Future M100 D

PEP T5 Training First Responders on Rad
Dispersal Devices (RDDs) and Improvised
Nuclear Devices (INDs) Events M100 E

TPM-A Regulatory/Legal

2:30 - 5:15 PM L100 A

TPM-B Medical II

2:30 - 5:00 PM L100 B/C

TPM-C1 Accelerator Sect Special Session

2:30 - 3:45 PM L100 D/E

TPM-C2 Accelerator

4:15 - 5:15 PM L100 D/E

TPM-D Power Reactor Special Session:
Radiation Protection in a Nuclear Power
Renaissance

2:30 - 5:00 PM L100 F/G

TPM-E Special Session: Homeland Secu-
rity, Rad Material Monitoring and Security

2:15 - 5:15 PM L100 H/I

TPM-F AAHP Special Session Why Soci-
ety Needs HP: Bio Effects and Challenges

2:30 - 4:30 PM L100 J

AAHP Open Meeting

4:30-5:30 PM L100 J

HPS Awards Dinner & Recep

7:00-9:00 PM Salons ABCD (H)

Wednesday 15 July**CEL5** Single Integrated Emergency Response Plan for Hospitals

7:00-8:00 AM M100 A/B

CEL6 Update on Med Internal Radiation Dosimetry: 2009 MIRD Comm Recommendations for Unifying MIRD and ICRP Formulas, Quantities, and Units

7:00-8:00 AM M100 D/E

WAM-A Environmental
8:15 AM - Noon L100 A**WAM-B** Special Session: Current Topics in Medical Health Physics

8:15 AM - Noon L100 B/C

WAM-C External Dosimetry
8:30 AM - Noon L100 D/E**WAM-D** Special Session: Fed Government Nuclear Detonation Preparedness

8:30 AM - Noon L100 F/G

WAM-E Military HP Session
8:30 -11:30 AM L100 H/I**WAM-F** Special Session: Case Studies in Health Physics, Student Reports from the Masters in Health Physics Program at the Illinois Institute of Technology

8:30 AM - Noon L100 J

PEP Program

12:15-2:15 PM

PEP W1 8,000 Interactions and Counting - What We Learned and What You Can Learn About Public Communication from the HPS ATE Program M100 A**PEP W2** Fundamentals of Alpha Spectroscopy M100 B**PEP W3** 47 CFR Part 15 Radio Frequency Devices M100 C**PEP W4** Health Physics Concerns of Neutron Exposures, Criticality Safety and Criticality Accidents M100 D**PEP W5** Future Directions In Air Monitoring At LANL M100 E**WPM-A** NESHAPs - Radioactive Air Meeting

2:30 - 5:15 PM L100 A

WPM-B Movies
2:30 - 5:00 PM L100 B/C**WPM-C1** External Dosimetry
2:30 - 3:30 PM L100 D/E**WPM-C2** Internal Dos. & Bioassay B
4:00 - 5:00 PM L100 D/E**WPM-D** Homeland Security
2:30 - 5:00 PM L100 F/G**WPM-E** Military HP Session
2:30 - 4:00 PM L100 H/I**WPM-F** Special Session: Case Studies in HP, Student Reports from the Masters in HP Program at the Illinois Inst of Tech
2:30 - 5:00 PM L100 J**HPS Business Meeting**

5:30 PM L100 D/E

WPM-G Adjunct Technical Session
Aerosol Measurements

6:00 - 8:00 PM Marquette IX (H)

Thursday 16 July**CEL7** Radiation Safety Guidelines for Contraband Detection Systems

7:00-8:00 AM L100 A

CEL8 Complexity Science and Radiation Risk Communication

7:00-8:00 AM L100 J

THAM-A Operational
8:15 AM - Noon L100 B/C**THAM-B** Emergency Planning and Response

8:15 AM - Noon L100 D/E

THAM-C Instrumentation
8:30 - 11:45 AM L100 F/G**THAM-D** Environmental
8:15 AM - Noon L100 H/I**Registration Hours***Registration is Outside Hall A
Convention Center*

Saturday 2-5 PM

Sunday 7 AM-7 PM

Monday 8 AM-4 PM

Tuesday 8 AM-4 PM

Wednesday 8 AM-4 PM

Thursday 8 AM-Noon

Exhibit Hall Hours

Monday 12:15 - 5:00 PM

Tuesday 9:30 AM - 5:00 PM

Wednesday 9:30 AM - Noon

Meeting SponsorsThank you to the following
meeting sponsors**Energy Solutions = Silver
Canberra = Bronze**

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

NOTE FOR CHPs

The American Academy of Health Physics has approved the following meeting-related activities for Continuing Education Credits for CHPs:

- * Meeting attendance is granted 2 CECs per half day of attendance, up to 12 CECs;
- * AAHP 8 hour courses are granted 16 CECs each;
- * HPS 2 PEP courses are granted 4 CECs each;
- * HPS 1 hour CELs are granted 2 CECs each.