

# PRELIMINARY PROGRAM



## *51st Annual Meeting of the Health Physics Society*

(American Conference of Radiological Safety)



*June 25-29, 2006*

*Rhode Island Convention Center*

*Providence, Rhode Island*

## Key Dates

Hotel Registration Deadline	May 23
Current Events/Works-In-Progress Deadline	May 29
Social/Technical Preregistration Deadline	May 29
HPS Annual Meeting Preregistration Deadline	May 29
PEP Preregistration Deadline	May 29
Summer School Registration Deadline	May 31
AAHP Courses	June 24
Professional Enrichment Program	June 25-28
HPS 51st Annual Meeting	June 25-29
American Board of Health Physics Written Exam	June 26

## Registration Hours

Registration will take place at the Rhode Island Convention Center:

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

**All Sessions, CELs and PEPs take  
place in the Rhode Island  
Convention Center  
unless otherwise noted**

**HPS Secretariat  
1313 Dolley Madison Blvd.  
Suite 402  
McLean, VA 22101  
(703) 790-1745; FAX: (703) 790-2672  
Email: [hps@burkinc.com](mailto:hps@burkinc.com); Web Page: [www.hps.org](http://www.hps.org)**

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## CURRENT EVENTS/WORKS-IN-PROGRESS

The submission form for the Current Events/Works-in-Progress poster session is on the Health Physics Society web site at <http://hps.org/newsandevents/works.cfm>. The deadline for submissions is Monday, May 29, 2006. All presentations will take place as posters on Monday, June 26, between 1:30-3:30 pm. Individuals will be notified of acceptance of their WIP submissions by the end of May.

For questions regarding WIP submissions, contact Sue Burk or Lori Strong at the HPS Secretariat at 703-790-1745 or [sburk@burkinc.com](mailto:sburk@burkinc.com)/[lstrong@burkinc.com](mailto:lstrong@burkinc.com).

### 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 hour PEP courses are granted 4 CECs each;
- HPS 1 hour CELs are granted 2 CECs each.

<b>Saturday</b>		8:00 AM-5:00 PM 2:00-5:00 PM	AAHP 1, AAHP 2, AAHP 3 Registration			
<b>Sunday</b>		7:00 AM-7:00 PM PEPs 6:00-7:00 PM	Registration 1A -1H: 8-10 am; 2A-2H: 10:30 am-12:30 pm; 3A-3H: 2-4 pm Welcome Reception			
<b>Monday</b>	<b>Events</b>	7:00-8:00 AM 8:00 AM-4:00 PM 8:30 AM-Noon Noon-5:00 PM 12:15-2:15 PM 1:30-3:30 PM	CEL 1, CEL 2 Registration Plenary Session Exhibits Open (Opening Lunch) PEP Classes M1-M5 Poster Session			
			<b>Room 551</b>	<b>Room B</b>	<b>Room D</b>	<b>Room 552</b>
		3:30-5:15 PM	MPM-A: Risk Analysis	MPM-B: Internal Dosimetry and Bioassay	MPM-C: Instrumentation	Historical Videos and Movies
<b>Tuesday</b>	<b>Events</b>	7:00-8:00 AM 8:00 AM-4:00 PM 9:30 AM-5:00 PM NOON-2:15 PM 12:15-2:15 PM 2:30-5:00 PM 7:00-10:00 PM	CEL 3, CEL 4 Registration Exhibits Open AAHP Luncheon PEP Classes T1-T5 NESHAP Meeting ( <i>Room 555B</i> ) Awards Banquet			
			<b>Room 551</b>	<b>Room B</b>	<b>Room D</b>	<b>Room 552</b>
		8:30 AM- Noon	TAM-A: Environmental	TAM-B: Govt Section: Increased Controls for Radioactive...	TAM-C: AAHP Session Radiation Measurement Instrumentation for HPs..	Historical Videos and Movies
	2:30-5:30 PM	TPM-A: RSO Special Session	TPM-B: External Dosimetry	TPM-C: AAHP Session Radiation Measurement Instrumentation for HPs.. <b>5:15 PM AAHP Open Meeting</b>	Historical Videos and Movies	
<b>Wednesday</b>	<b>Events</b>	7:00-8:00 AM 8:00 AM-4:00 PM 9:30 AM-NOON 12:15-2:15 PM 5:20 PM 6:00-8:00 PM 5:00-10:00 PM 7:00-11:00 PM	CEL 5, CEL 6 Registration Exhibits Open PEP Classes W1-W5 HPS Business Meeting ( <i>Room B</i> ) Aerosol Measurements Adjunct Session Ballgame Night Out Bay Queen Night Out			
			<b>Room 551</b>	<b>Room B</b>	<b>Room D</b>	<b>Room 552</b>
		8:10 AM- Noon	WAM-D: Accelerator Section Special Sess	WAM-B: Medical HP	WAMC: Power Reactor Special Session	WAM-A: Decomm. Section Special
	2:30-5:15 PM	WPM-A: Decommissioning Morgan Lecturer	WPM-B1: Medical HP WPM-B2: Dosimetric Modeling	WPM-C: Operational HP	Session Historical Videos and Movies	
<b>Thursday</b>	<b>Events</b>	7:00-8:00 AM 8:00 AM-NOON	CEL 7, CEL 8 Registration			
			<b>Room 551</b>	<b>Room B</b>	<b>Room D</b>	
	8:15 AM- 12:15 PM	THAM-A: Regulatory/Legal	THAM-B: Homeland Security & Emerg.	THAM-C: History		

## Officers

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## 2006 Exhibitors

(as of 3/31)

ADCO Services  
Alpha Spectra  
American Nuclear Society  
Analytics, Inc.  
Atlantic Nuclear  
Bionomics  
Canberra  
Carberra Services  
Chase  
Chesapeake Nuclear Services Inc  
Dade Moeller & Associates  
Duratek  
Ecology Services, Inc.  
Energy Solutions (Sciencetech)  
F & J Specialty Products  
Frham Safety  
Fluke Biomedical  
Framework Scientific  
Gamma Products  
Global Dosimetry  
Health Physics Instruments  
Hi-Q Instruments  
Hopewell Design  
International Isotopes, Inc.  
Isotope Products Laboratories  
J.L. Shepherd  
K & S Associates  
Lab Impex Systems Ltd.  
Lancs Industries, Inc.  
Landauer Inc  
Laser Professionals  
Laurus Systems, Inc.  
Los Alamos National Laboratory  
Ludlum Measurements  
MACTEC  
MGP Instruments  
MJW Corporation Inc.  
Oak Ridge Associated Universities  
Oak Ridge National Lab  
On Site Systems, Inc.  
Ordela Inc.  
ORTEC  
Pacific Northwest National Laboratory  
Perkin Elmer, LAS  
Philotechnics  
Protean Instrument Corporation  
Qal-Tek  
QSA Global  
RADeCO  
Radiac Research Corp  
Radiation Safety and Control Services Inc.  
Radiation Safety Academy  
Radiation Safety Associates  
RSO, Inc.  
S. E. International, Inc.  
Saint-Gobain Crystals & Detectors  
Scionix  
Soltec  
Spectrum Techniques  
Technical Associates  
Teletrix  
Thermo Electron  
XRF Corporation

## Important Events

### Welcome Reception

Please plan on stopping in at the ballroom of the Westin Hotel Sunday, June 25 from 6:00-7:00 pm. The reception will have hors d'oeuvres, passed and in stations, and a cash bar. There will be music and an opportunity to meet friends to start your evening in Providence.

### Exhibits

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

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

### Sessions

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

### AAHP Awards Luncheon

Tuesday June 27  
Noon-2:15 pm

### HPS Awards Banquet

An enjoyable evening spent with co-members of the National Health Physics Society. This event will be held in the ballroom of the RI Convention Center and is an excellent opportunity to show your support for the award recipients as well as the Society. The awards will be presented after the dinner and the event will last from 7:00-10:00 pm.

## Different This Year

Arrive early and enjoy the famed "Waterfire" on Saturday, June 24, night.

See details at website: <http://www.waterfire.org/about/index.html>

There are two options for a Night Out on Wednesday Night

**Pawsox Baseball Game**  
**Dinner Cruise on the Bay Queen**

See pages 11 and 12 for details

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

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

## Things to Remember!

**All Speakers are required to check in at the Speaker Ready Room at least one session prior to their assigned session.**

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

PEP Refund Policy – See page 30

Registration Policy: Unless payment accompanies your form, you will NOT be considered preregistered.

Meeting Refund Policy: Request for refunds will be honored if received in writing by May 29. All refunds will be issued AFTER the meeting and will be subject to a \$50.00 processing fee. NO REFUNDS WILL BE ISSUED AT THE MEETING. Refunds will not be issued to no-shows.

# 51st Annual Meeting, Providence, Rhode Island

## June 25-29, 2006

### WELCOME

The New England Chapter of the Health Physics Society is pleased to invite you to attend the year-end celebration of the Health Physics Society's 50th Anniversary. The 2006 meeting will be held from June 25 - 29 at the Rhode Island Convention Center in Providence, Rhode Island. Come join your colleagues to get a glimpse of the past achievements in radiation safety, and to see what is on the horizon. At this special commemoration event, there will be many historical exhibits on display throughout the meeting. Vendors will also be showcasing their memorabilia from years past.

### PROVIDENCE

Providence was settled in 1636 by Roger Williams as a haven for religious dissenters, and quickly became a "lively experiment" in personal freedom of conscience. The land had belonged to the Narragansett Indians, who were extremely generous in helping Williams establish his town. Starting out as a fishing town, the city of Providence led the United States into the Industrial Revolution as technology for mass production of textiles made its way to America. As the textile industry declined throughout the 20th century, Providence reinvented herself as a center for higher education, healthcare, and culture. The Providence of the 21st century seamlessly blends the urban sophistication of a big city with the graceful charm of a small town.

A powerful example of the spirit of Providence is the annual summer event of WaterFire. WaterFire is a living sculpture of bonfires set ablaze on the city's three rivers, accompanied by classical and world music that blends into the sounds of urban life. Nearly 100 fires are lit and tended over two-thirds of a mile of water. It will be a special treat this year for meeting attendees to be able to see a WaterFire, as there is a lighting scheduled for Saturday, June 24. The fires start shortly after sunset and continue past midnight; this is all located just two blocks from the Westin and Convention Center. If you are able to come to Providence early, do not miss this event.

### WEATHER

Rhode Island's average temperature for the entire year is near 50 degrees, with high temperatures in June approaching 76° F. The mean temperature in June is 67° F. Rhode Island has no regular "rainy" or "dry" season, with precipitation fairly evenly distributed throughout the year. As the evenings may get a bit breezy, a light jacket or sweater is suggested. Early summer is delightful with plenty of outdoor activities. Pack comfortable walking shoes. Swimwear is essential with many beaches just a short trip from Providence.

### TRANSPORTATION

Providence is served by both air and rail with convenient schedules for both. T.F. Green Airport is located in Warwick, nine miles from downtown Providence, with taxi and shuttle service available at the airport to all the downtown hotels. Airlines serving Providence include American, Continental, Delta, Northwest, Southwest, United, and US Airways. When booking online, please note that Southwest Airlines usually does not appear on most travel websites as an option. Booking must be made through the airline.

Ground transportation services are located on the lower level of the airport, including rental cars. Shuttle service provided by Airport Taxi and Limousine Service runs from 5:00 AM to 11:00 PM, seven days a week. The shuttle leaves the airport every hour on the hour. From the hotels they leave every hour on the half-hour. After 7:00 PM reservations for the shuttle are required from the city only. The cost of the shuttle is \$9.00 each way. All major rental car agencies are located at T.F. Green airport.

Providence is located on Amtrak's Northeast Corridor between Washington DC/New York City and Boston. High-speed Acela Express train service transports passengers from New York City to Providence in about two and a half hours. For tickets call 800.USA.RAIL or visit [www.amtrak.com](http://www.amtrak.com). The station is located less than one-half mile from the Convention Center and Westin Hotel.

The Massachusetts Bay Transit Authority (MBTA) runs low cost commuter trains to Providence from Boston and other points in Massachusetts. Call 800.392.6100 or visit [www.MBTA.com](http://www.MBTA.com) for schedules and fares.

For information about getting around Providence with public transportation, visit [www.ripta.com](http://www.ripta.com). A bus and seasonal ferry also transport visitors from Providence to Newport.

## LODGING

The host hotel for the 2006 Annual Meeting of the Health Physics Society is the Westin Providence, which is connected to the Rhode Island Convention Center. The hotel is located in the heart of downtown Providence, with easy access to restaurants, shopping, entertainment, and public transportation. The HPS has also made group rate arrangements with the Providence Biltmore, Marriott Courtyard, and Holiday Inn. All are located downtown, within walking distance to the Convention Center, and each hotel has parking for guests; rates vary but are generally around \$20 per day. See box below for reservation details.

### MAKING RESERVATIONS FOR THE MEETING

#### Deadline for hotel reservations is May 23, based on availability

**Westin Hotel**, One West Exchange Street, Providence, RI

Hotel website: <http://www.starwoodmeeting.com/StarGroupsWeb/booking/reservation?id=0601278484&key=B044D>

Rates: \$155 Single/Double.

HPS reservation link: <http://www.starwoodmeeting.com/StarGroupsWeb/booking/reservation?id=0601278484&key=B044D> to make your reservation online. Or you may call 1-401-598-8000 direct and request the Health Physics Society special conference rates.

**The Marriott Courtyard**, 32 Exchange Terrace at Memorial Boulevard, Providence, RI

Hotel website: <http://marriott.com/property/propertypage.mi?marshaCode=PVDDT>

Rates: \$144 Single/Double

For Reservations call 1-888-887-7955 and request the Health Physics Society special conference rates.

**The Providence Biltmore**, 11 Dorrance Street, Providence, RI

Hotel website: <http://www.providencebiltmore.com/>

Rates: \$139 Single/Double.

For Reservations call 1-800-294-7709 or 401-421-0700 and request the Health Physics Society special conference rates.

**Holiday Inn - Providence**, 21 Atwells Avenue, Providence, RI

Hotel website: <http://www.ihotelsgroup.com/h/d/hi/1/en/cwshome/DPRD-6LEMEF/PVDDT>

Rates: \$135 Single/Double.

For Reservations call 1-800-831-3900 and request the Health Physics Society special conference rates.

## HOSPITALITY SUITE

Registered spouses and companions will again enjoy the benefit of a Hospitality Suite in the Library Lounge at the Westin Hotel. The Suite, located on the lobby level, will open at 9:00 am on Sunday, June 25. Local HPS members will be on hand to help with planning day trips or selecting restaurants; newspapers, books, and games will also be available. A continental breakfast will be available Monday through Wednesday mornings for registered companions. On Monday morning from 8:00 am to 9:00 am, we invite all registered spouses, companions and guests to an official welcome from a knowledgeable local person who will provide you with an orientation to the Providence area and who will answer any questions that you may have. Afternoon refreshments will be available Sunday through Tuesday afternoon.

### Hospitality Suite – For Registered Companions

*Library Lounge, Westin Hotel*

Monday Welcome . . . . .8 - 9 am

#### **Days/Hours**

Sunday . . . . .9 am - 3 pm

Monday . . . . .9 am - 3 pm

Tuesday . . . . .8 am - 3 pm

Wednesday . . . . .8 am - 3 pm



## CHILDCARE

Arrangements for childcare are the responsibility of the guest. Rates are dependent upon the childcare situation. No endorsement or responsibility is assumed by HPS for any childcare arrangements. The listed agency is available for childcare services.

Newport Nannies  
42 Sophia Street  
Providence, RI

Phone: 401.270.7247  
<http://www.newportnannies.com/index.html>

Fax: 401.270.7247

### Sign up early for tours!

**If tours are not full by the deadline of May 29, there is a chance that they will be cancelled.**

**Don't get to the meeting and find that the tour you kept meaning to sign up for is now cancelled due to undersubscription.**

### Job Placement Information

Lets face it, everyone is looking for a job at one time or another. But during the Meeting, the job placement center might not be the best way to advertise your résumé, especially if your supervisor is attending the meeting. Also, not all members can make it to the meeting to post their résumé. Therefore, for those of you interested in seeking employment during the meeting, but not brave enough to post your résumé, this form is for you! You don't even have to be present at the meeting to participate.

Every attendee who is interested in seeking employment (and who doesn't want to take advantage of the prepared résumé form), is encouraged to bring his or her résumé to the Placement Center. If you are taking advantage of the prepared form, you should not also post your own résumé.

If you cannot make it to Providence, RI, you can still use either your résumé form or your personal résumé, and we will post it for you. Your résumé form should indicate that you are not at the meeting, so if a company is interested in you, they will call or email David Drupa (see contact information) and he will then contact you. If you are interested in the company, it will be up to you to contact the company. In addition to the résumé form, you can always place an advertisement in the Newsletter under the Health Physicists Seeking Employment section.

#### **For a résumé form, contact:**

David Drupa, HPS Headquarters  
1313 Dolley Madison Blvd., Suite 402, McLean VA, 22101  
Email: [DDrupa@BurkInc.com](mailto:DDrupa@BurkInc.com)

These forms must be sent no later than June 9, 2006. Once these forms are received, a résumé number will be issued and inserted on side one and two. By June 16, 2006, a résumé number will be assigned to all résumé forms and a photocopy of side two (with the résumé number) will be sent back to you. Please remember what résumé number has been assigned to you. A photocopy of side one will be posted at the meeting. The original résumé form will be kept in a book, strictly confidential, for six months after the meeting and then destroyed.

All completed résumé forms (side one) will be posted at the same time and will be up for the duration of the meeting. If an interested company wants more information, such as a more extensive résumé or an on-site interview, they will write a note on the message board in the placement center room. An example would be: "Résumé Numbers 12, 17 and 56 please leave your résumé at the Hotel front desk to the attention of D. A. Smith, XYZ Company," or "Company QRS would like to interview Résumé Numbers 19 and 23, please call J.D. Jones to set up appointment during meeting."

## **SOCIAL TOURS**

### **Saturday, June 24th**

**Foxwoods Casino - CANCELLED**

### **Sunday, June 25th**

#### **Historic Providence**

**1:00 - 3:00 pm**

**Pre Reg/On site: \$34/\$39**

Rhode Island's capital city is truly an historic gem. Travel down Benefit Street's "Mile of History" and view America's most impressive concentration of colonial homes. See some of the city's historic homes, the oldest Baptist church in America and the magnificent Rhode Island State House, as well as Brown University, the Rhode Island School of Design and WaterPlace Park, site of WaterFire and highlight of this Renaissance city and Federal Hill.

**Mohegan Sun Casino - CANCELLED**

### **Monday, June 26th**

#### **Historic Providence**

**9:30 - 11:30 am**

**Pre Reg/On site: \$34/\$39**

See Sunday for information.

#### **Sakonnet Vineyards**

**12:30 - 4:30 pm**

**Pre Reg/On site: \$58/\$63**

Sakonnet has been in operation for 30 years and the grapes grown here include Chardonnay, Pinot Noir, Cabernet Franc and the unique hybrid, Vidal Blanc. The countryside en route is quaint New England and upon arrival at Sakonnet, partake in a tasting featuring six selected wines and a tour of the vineyard. Take home your tasting glass as a remembrance of your visit.



#### **Mystic, Connecticut**

**10:00 am - 4:00 pm**

**Pre Reg/On site: \$30/\$35**

Mystic is rightly described as the center of America's nautical past. Starting as a shipbuilding hub, it is now one of the area's great destinations for lovers of the sea. The motorcoach trip to Mystic will stop at two of the town's main attractions, Mystic Seaport and the Mystic Aquarium, adjacent to Olde Mystick Village shopping area with specialty shops and restaurants. Shuttle times between the two sites will be arranged in advance for the opportunity to visit both areas. For more information on these sites, visit [www.mysticseaport.com](http://www.mysticseaport.com) and [www.mysticaquarium.org](http://www.mysticaquarium.org).

Aquarium admission: adults \$17.50; seniors 65+ 16.50, children 3 - 17 \$12.50

#### **Open Mic Night!**

**8:00 pm - Midnight**

In appreciation of the many musicians in the Health Physics Society, XRF Corporation will host an Open Mic Night at the Rí~Rá Irish Pub in Providence on Monday evening. Come enjoy rhythm & blues music provided by Boston's own, the Barnowls. Join in by playing one of the many spare instruments that will be available for a song of your choice. Entertain your friends and colleagues from the health physics community by participating in this lively event!

Location: Rí~Rá the Irish Pub & Restaurant, 50 Exchange Terrace, Providence



### **Tuesday, June 27th**

#### **Annual HPS 5K Run/Walk**

**6.30 AM - 8.30 AM**

**Pre Reg/On site: \$25/\$30**



The annual 5K Fun Run will be held on a flat point-to-point course on the beautiful East Bay Bike Path going past the marshes and coves of the East Bay. Awards will be given to the overall and age group winners. A special Chapter fitness award will be given to the Chapter which fields the winning team of four consisting of one runner in each of the following age categories: female less than forty, male less than forty, female 40 and over, male 40 and over. Sign up and join in the fun!

Includes T-shirt, bus transportation, refreshments, race timing, and awards.

# **Tours...Events...Tours...Events...Tours...Events...Tours...Events...Tours**

## **Coastal Rhode Island's Lighthouses**

**9:30 am - 5:00 pm**

**Pre Reg/On site: \$60/\$65**

The Rhode Island coast is home to 21 standing lighthouses, thirteen of which are still active as navigational aids to ships. Beavertail Lighthouse is the site of the third lighthouse built in America, constructed in 1749 and later destroyed. The current granite tower was built in 1856 and from here you have wonderful views of the Atlantic coastline. An octagonal brick building erected in 1816, Point Judith Lighthouse, is the next stop. The last German U-Boat sunk in World War II was just two miles away from this lighthouse. There will be free time for lunch and shopping in the quaint New England town of Wickford.

### **Wednesday, June 28th**

#### **Newport, America's First Resort**

**9:00 am - 5:00 pm**

**Pre Reg/On site: \$68/\$73**

Newport is famous for being the summer playground of America's wealthiest families during the Gilded Age. A narrated driving tour provides an overview of this exciting city-by-the-sea, rich in history and spectacular "summer cottages." See stunning Ocean Drive and Bellevue Avenue with homes of the rich and famous. A guided tour of one of the famous mansions is included. Free time for lunch and shopping at scenic Brick Marketplace and Bannister's Wharf complete the day in this charming city.

#### **Option 1: HPS Night Out...Take Me Out to the Ballgame!**

**5:00 - 10:00 pm**

**Pre Reg/On site: \$35/\$40**

Join us for a night of All-American fun as the Pawtucket Red Sox, minor league Red Sox team, face the Ottawa Lynx, the minor league team for the Baltimore Orioles. Game time is at 7.05 PM, preceded by an all-you-can-eat barbeque at the stadium. The menu includes grilled chicken breast, hamburgers, hot dogs, potato and macaroni salads, cole slaw, potato chips, lemonade, and an ice cream bar for dessert.

Cost includes transportation to stadium, barbeque, and game ticket.



#### **Option 2: HPS Night Out...Have Dinner on the Queen**

**7:00 - 11:00 pm**

**Pre Reg/On site: \$45/\$50**

Enjoy the night out with a Queen. Come join us for dinner on the Bay Queen while she cruises Narragansett Bay.



Begin the evening with a fabulous dinner buffet featuring the chef's specialties and seasonal treats. The selection may include hot roast beef, chef's choice of hand-carved turkey or baked ham or fish; plus hot pasta, potato and vegetables, chef's salad, rolls, butter, coffee and desserts. Naturally, your favorite beverages are available all evening. Dancing to popular music, spectacular vistas and a dazzling view of Newport at night are all part of the festivities.

She will be leaving at 7:00pm touring to Newport and back on Wednesday June 28. She will arrive back at the dock around 11:00pm. The cost including transportation is \$45 per person with dinner and transportation from the Convention Center to Warren RI where the Bay Queen is docked and back. The buses will leave the convention center at 6:00 and return around Midnight.

### **Thursday, June 29th**

#### **Downcity Alive**

**9:00 - 10:30 am**

**Pre Reg/On site: \$29/\$34**

The Providence renaissance has come downtown where everything old is new again in the Victorian city center of

***Tours...Events...Tours...Events...Tours...Events...Tours...Events...Tours***

Rhode Island's capital city. Most of the commercial center of Providence is listed on the National Register of Historic Places – a unique honor. Here there is a fascinating mix of architecture, public art, waterfront revitalization, college life, cart paths turned into glorious streets, and hard luck and good luck stories galore. Downtown Providence is an award-winning urban neighborhood. This tour demonstrates why.



# Technical Tours...**Technical Tours**...Technical Tours...**Technical Tours**

## TECHNICAL TOURS

### Monday, June 26th

#### Rhode Island Hospital Gamma Knife

2:00 - 4:00 pm

Pre Reg/On site: \$10/\$15



The Gamma Knife is a precise and powerful tool for treating certain tumors and vascular malformations in the brain. The instrument, constructed based on the principles of stereotactic radiosurgery, emits 201 finely focused beams of gamma radiation through portals in a collimator helmet. All 201 beams cross at a single point, and it is only there that enough radiation is delivered to affect the diseased tissue, sparing nearby healthy tissue. We will be provided a special tour of these active medical facilities. Children under 16 must be accompanied by an adult.

Shuttles will be provided from the Convention Center to Rhode Island Hospital and back, and the shuttle fare is part of the fee. More information about the gamma knife can be found at <http://www.lifespanspan.org/services/gammaknife/rih.htm>. Limited to the first 30 people who register.

### Tuesday, June 27th

#### Juliett 484 Russian Submarine Tour

9:30 am - 1:00 pm

Adult Pre Reg/On site: \$12/\$17  
Ages 6-17 Reg/On site: \$9/\$14

This cruise missile attack submarine was built by the Soviet Union in the 1950s. It is the diesel equivalent of the nuclear powered Echo Class of Soviet submarines, and one of the largest non-nuclear submarines ever built. In the 1960s, its principle mission was to serve as a land-attack platform, primarily targeting cities along the east coast of the United States. Later, the mission evolved into an anti-ship platform, targeting capital ship assets of the US Navy. We will be provided a special tour of the submarine. Guests may not wear high heels, flip-flops or open-toed shoes. Children under 6 are not allowed, and children under 12 must be accompanied by an adult. You must be able to pass through 32-inch hatches in the sub's interior.

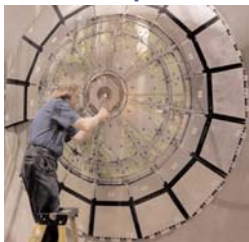
Shuttles will be provided from the Convention Center to Collier Point Park and back, and the shuttle fare is part of the fee. More information about the Juliett can be found at <http://www.juliett484.org/juliett/>. Limited to the first 60 people who register.



#### Brown University's "Magic and Mystery of Physics"

2:00 - 4:00 pm

Pre Reg/On site: \$15/\$20



Laboratory Physicist Dean Hudek and Manager of Demonstrations Jerry Zani will tweak your curiosity and tickle your funny bone as they perform some of Brown's more counter-intuitive, thought-provoking and impressive physics lecture demonstrations. With equipment as common as a coat hanger to equipment as exotic as a Scanning Tunneling Microscope, this "techno-twosome" will keep you smiling while you're scratching your head in wonder. So put your thinking caps on and join in the fun!

Shuttles will be provided from the Convention Center to Brown University and back. Limited to the first 150 people who register. There are no age restrictions for this tour.

**Extra Bonus for the first twenty people who sign up.** Time permitting, the first twenty people who sign up will be able to visit the Visualization CAVE at Brown. See details at this website: <http://graphics.cs.brown.edu/research/cave/home.html>

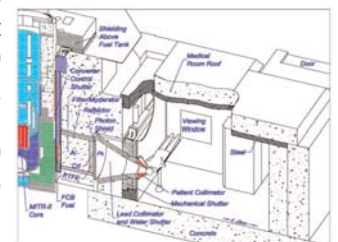
### Wednesday, June 28th

#### MIT Reactor, Magnet Lab, and Plasma Science and Fusion Center

9:00 am - 5:00 pm

Pre Reg/On site: \$27/\$32

The MIT Reactor is a 5 MW reactor used for research, including that for GenIV reactors, the Next Generation Nuclear Plants, and Boron Neutron Capture Therapy. The Francis Bitter Magnet Lab contains ten NMR spectrometers, with fields ranging from 0.23 - 14.1 T and with bores up to 40 cm. The Alcator C-Mod tokamak fusion facility uses the highest magnetic field of any major plasma confinement device. We will be provided a special tour of these three facilities. In addition, we will also visit the MIT Museum (<http://web.mit.edu/museum/index.html>) where you can explore over 150 years of education and research at the forefront of science, engineering, and technology. The Museum's galleries present an exciting array of ongoing and changing exhibitions on science and technology, architecture and design, and oceanography and ship design. You'll find high-tech artifacts, intriguing scientific instruments, historic photographs, amazing holograms, even ingenious kinetic sculptures. Lunch may be obtained at the MIT student center, during which you can visit other MIT galleries and exhibits.



## Technical Tours...**Technical Tours**...Technical Tours...**Technical Tours**

Bus transportation is a part of the fee. Guests may not wear high heels, flip-flops or open-toed shoes. There are no age restrictions for this tour, but adults must have a government issued ID. More information about these facilities can be found at <http://mit.edu/nrl/www/index.html>. Limited to the first 50 people who register.

### **Thursday, June 29th**



#### **Woods Hole Oceanographic Institute**

**9:30 am - 5:00 pm**

**Pre Reg/On site: \$32/\$37**

The Woods Hole Oceanographic Institution and Exhibit Center is located on Cape Cod in the Village of Woods Hole. We will be provided a special tour of the center to learn about the Institution's ocean and science research and the vessels and tools developed by the WHOI engineers and scientists, including exploration of the Titanic wreckage and deep-sea hydrothermal vent sites. In addition, the National Marine Fisheries Aquarium is next door. While half the group tours WHOI, the other half may tour the Fisheries Aquarium and the WHOI Exhibit Center. The groups will switch venues afterward. Lunch may be obtained at the seaside village, and bus transportation to and from Cape Cod is a part of the fee. More information about WHOI may be found at <http://www.whoi.edu/>. Limited to the first 30 people who register.

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## **ACTIVITIES & EVENTS IN THE AREA**

The following events will be taking place in the Providence area during the HPS Meeting:

#### **The 11th Annual Newport Flower Show**

**June 23 - 25, 2006**

This annual show features artistic and horticultural classes and a garden marketplace on the beautiful grounds of Rosecliff, one of America's most romantic mansions.

**Rosecliff**, 548 Bellevue Avenue, Newport  
401.847.1000

[www.newportmansions.org](http://www.newportmansions.org)

#### **The 9th Annual Snapple Sunset Music Festival**

**June 23 - July 2, 2006**

The Sunset Music Festival benefits the Rhode Island Autism Project. Enjoy nationally renowned musicians under the intimate waterfront tent with 2,000 reserved seats offering sunset views.

**Newport Yachting Center**, Commercial Wharf, Newport  
401.846.1600

[www.newportfestivals.com](http://www.newportfestivals.com)

#### **Narragansett Arts Festival**

**June 24 & 25, 2006**

More than 100 artists exhibit fine art in a park overlooking Narragansett Bay. Oils and acrylics, watercolors, drawings, photography, sculpture and 3-D artworks exhibited.

**Veteran's Memorial Park at the Towers**, Ocean Road, Narragansett  
401.783.7713

[www.wakefieldrotary.com](http://www.wakefieldrotary.com)

#### **Rhode Island National Guard Airshow**

**June 24 & 25, 2006**

An annual airshow featuring professional teams from the United States armed forces as well as groups from throughout the world. The latest military technology will be on display in the air and on the ground. Historic aircraft displays and many interactive activities provide a full day of fun and entertainment. A \$10 parking donation directly supports Hasbro Children's Hospital. No pets or coolers.

**Quonset Air National Guard Base**, 7 Flightline Drive, North Kingstown  
401.275.4110

[www.riguard.com](http://www.riguard.com)

#### **Wine and Food Festival**

**June 25, 2006**

Wine and food tasting with a dozen star chefs from around the country showcasing their culinary talents. To complement the chefs' fare, Sakonnet wines will be featured. Reservations required.

**Sakonnet Vineyards**, 162 West Main Road, Little Compton  
401.635.8486

[www.sakonnetwine.com](http://www.sakonnetwine.com)

#### **The 61st Annual 2006 U.S. Women's Open**

**June 29 - July 2, 2006**

The 61st U.S. Women's Championship will be played at historic Newport Country Club. Top-ranked players such as 2004 U.S. Women's Open champion Meg Mallon and past champions including Annika Sorenstam, Se Ri Pak and Karrie Webb will lead an international field in pursuit of the most prestigious title in women's golf. The athletes will be put to the test at a course rich in USGA history, which served as the host of the first U.S. Open, held in 1895.

## **Tours...Events...Tours...Events...Tours...Events...Tours...Events...Tours**

**Newport Country Club**  
280 Harrison Avenue, Newport  
401.843.USGA

[www.2006uswomensopen.com](http://www.2006uswomensopen.com)

### **THINGS TO DO ON YOUR OWN**

Efforts have been made to ensure the accuracy of this information, however, please contact the facility directly for details and ticket purchasing instructions.

#### **Roger Williams Park**

[www.rwpzoo.org/visit/parkattractions.cfm](http://www.rwpzoo.org/visit/parkattractions.cfm)

Roger Williams Park was designed by Horace Cleveland in 1878 and was largely developed by 1896. The Park grounds include a zoo, Victorian carousel, paddleboats, canoes and kayaks, greenhouses, a museum of natural history, and a planetarium. A Park Pass is \$14 and includes one-day zoo & museum admission. The Park is open 9 AM - 5 PM every day.

#### **Boston Day Trips**

[www.bostonusa.com](http://www.bostonusa.com)

Boston is a one-hour train ride from Providence, and the MBTA commuter train arrives at Boston's South Station, right in downtown. From there, you can continue your travel through the city on the "T", or start walking your way through the city's many neighborhoods and historic sites. The Freedom Trail, which is a red line painted on the sidewalks, guides visitors to sixteen historically significant sites - and you won't get lost! Visit [www.thefreedomtrail.org](http://www.thefreedomtrail.org) for more details.

#### **Splash Duck Tours**

[www.splashducktours.com](http://www.splashducktours.com)

The duck tour is a one-hour narrated tour of Providence by land and water. Tickets are available on the day that you wish to take your tour, with no advance sales. Adult price is \$20.

#### **La Gondola**

[www.gondolari.com](http://www.gondolari.com)

Authentic Venetian gondolas glide along the Providence and Woonasquatucket Rivers, providing a unique vantage point of Providence. Gondolas can accommodate up to six passengers, and reservations are strongly recommended to retain the gondola exclusively for your party. A complimentary selection of cheese & crackers, ice, glasses, and Italian music is provided to make this an experience for all senses. Don't forget to bring a bottle of wine!

#### **Golfing**

[www.rigolf.com](http://www.rigolf.com)

The closest public course to downtown Providence is Triggs Memorial Golf Course, on the outskirts of the city. The course was designed in 1930 by Donald Ross, and the 18-hole bent grass course has water coming into play throughout the layout. Tee times can be scheduled two weeks in advance.

#### **Providence Place Mall**

In the mood to do a little shopping? Providence Place has over 170 stores and eight restaurants to satisfy your appetite. It is conveniently connected to the Westin hotel and Convention Center via Skybridge, and features entertainment as well as some of the area's finest retail establishments.

#### **Dave and Buster's**

Famous for its adult playground atmosphere, Dave & Buster's is situated right in Providence Place. Come eat, drink, and play games 'til your heart's content! The Million Dollar Midway features action, driving, sports, and classic video games for non-stop fun. Paired with a dining room and two bars, it's a perfect place to spend an evening with friends.

#### **Feinstein IMAX Theatre**

[www.imax.com/providence](http://www.imax.com/providence)

Also located in Providence Place, the IMAX theatre is a powerful experience that puts you right in the middle of the movie. Both IMAX documentaries (45 minutes to one hour) are shown, as well as IMAX DMR digitally remastered Hollywood feature films. Adult tickets start at \$9.75, children ages 3 - 12 are \$7.75, and seniors 60+ are \$8.75.

#### **Area Beaches**

<http://www.visitrhodeisland.com/recreation/index.aspx>

The Providence Visitor Center is located on the ground floor of the Convention Center. The Visitor Center is open Monday - Saturday from 9 AM - 5 PM. The website is [www.ProvidenceNightandDay.com](http://www.ProvidenceNightandDay.com). Phone toll-free 800.233.1636.

**51st Annual Meeting of the Health Physics Society**  
**Providence, Rhode Island, June 25-29 - Preliminary Scientific Program**

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

**Monday**

**7:00 - 8:00 AM** **Room 551**  
**CEL-1** The high background radiation area in Ramsar Iran  
*Karam, A., Rochester Institute of Technology*

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

**8:30 am-Noon** **Room A**

**PL1: Plenary Session 1**

Chair: Ruth McBurney

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

**9:15 am** **PL.2**  
TBD  
*Margaret V. Federline*  
*U. S. Nuclear Regulatory Commission*

**10:00 am** **Break**

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

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

**P: POSTER SESSION**

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

**ENVIRONMENTAL**

**P.1** Use of Trace Radioactivity to Identify Recent Sedimentation Rate in Persian Gulf  
*Beitollahi, M., Ghiassi-Nejad, M., Amidi, J., Dunker, R.*  
*Idaho State University, Pocatello, Tarbiat Modares University, Tehran-Iran, Iranian Nuclear Regulatory Authority, Tehran-Iran*

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

**P.3** Rapid Determination of Sr-90 using 3M Empore Strontium Rad Disks and Cerenkov Counting in Water Samples  
*Ngazimbi, R., Dunker, R., Brey, R., Farfan, E.*  
*Idaho State University*

**EXTERNAL DOSIMETRY**

**P.4** Comparison of Effective Doses from Pediatric Stylized and Tomographic Phantoms for External Photon Beams  
*Lee, C., Lee, C., Bolch, W.*  
*University of Florida*

**P.5** Fluctuation of Organ Doses in Tomographic Phantoms for External Photon Irradiation  
*Lee, C., Nagaoka, T.*  
*University of Florida, NICT, Japan*

**P.6** A Monte Carlo Photon Simulation Code Using Excel® VBA Programming  
*Cummings, F.M., Keller, M.F., Schwahn, S.O.\**  
*Idaho State University*

**P.7** Evaluation of Neutron Dose-Equivalent Type Survey Meters in a Pulsed, Linear Accelerator-Produced Neutron Field  
*Anderson, E., Brey, R., Claver, K., Dunker, R.*  
*Idaho State University*

**P.8** Comparison of ESR Dosimetry in Human vs. Sus Scrofa Domestica Tooth Enamel  
*Heiserman, C., Johnson, T., Zimbrick, J.*  
*Colorado State University*

**HOMELAND SECURITY & EMERGENCY RESPONSE**

**P.9** Radiological Event Preparedness Registry (REPR): A Database for Radiation Experts to Assist Local First Responders A Report on the First Years Progress  
*Meltz, M.L.*  
*University of Texas Health Science Center at San Antonio*

**P.11** Nuclear and Radiological Incident Scenarios  
*Donnelly, E., Fallahian\*, N., Farfan, E.*  
*Centers for Disease Control and Prevention, Idaho State University*

**INSTRUMENTATION**

**P.12** Monte Carlo Calculations of the National Institute of Standards and Technology Heavy-Water-Moderated Cf-252 Sphere  
*Clement, R., Heimbach, C., Thompson, A.*  
*National Institute of Standards and Technology*

**P.13** Long Double Precision Computer Code for Exact Detection Limits and Errors of the Second Kind when the Blank Count Time is an Integer Number of Times Greater than the Sample Count Time  
*Potter, W.E., Strzelczyk, J.*  
*Consultant, Sacramento, CA University of Colorado Health Science Center, CO*

**P.14** Cost Effective Geiger Mueller Detectors for the Teaching Environment  
*Estes, B., Simpson, D.*  
*Bloomsburg University*

**P.15** Study of GaAs Photo Conductive Detectors (PCDs)  
*Kharashvili, G., Beezhold, W., Brey, R., Gesell, T., Hunt, A.*  
*Idaho State University*



## Monday

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

*Balzer, M., Brey, R., Hunt, A., Gesell, T.  
Idaho State University*

### INTERNAL DOSIMETRY

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

*Ozcan, I., Farfan, E.  
Idaho State University*

**P.18** Determining Probabilistic Distributions for Gastrointestinal Track Transfer Rates

*Ankrah, M., Farfan, E.  
Idaho State University*

**P.19** Selecting USTUR Cases to Test ICRP Models Probabilistically

*Timilsina, B., Farfan, E.  
Idaho State University*

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

*McCord, S., Brey, R., Ruhter, P., Anderson, B.  
Idaho State University, Idaho National Laboratory*

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

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

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

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

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

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

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

*Furler, M., Bednarz, B., Xu, X.G.  
Nuclear Engineering and Engineering Physics, Rensselaer Polytechnic Institute, New York*

### MEDICAL HEALTH PHYSICS

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

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

**P.26** Alpha Particle Transport in Voxelized Trabecular Bone Images

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

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

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

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

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

**P.29** Accurate Estimate of Activation Products and a Decay Time for HAVAR<sup>®</sup> Entrance Foils of a GE<sup>®</sup>PETtrace Medical Cyclotron

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

### OPERATIONAL HEALTH PHYSICS

**P.30** Radiological Toolbox

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

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

*Caracappa, P.  
Rensselaer Polytechnic Institute*

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

*Knox, W.  
Advanced Systems Technology*

### INTERNATIONAL POSTERS

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

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

**P.35** Comparison Between Two Protocols Trs 277 and Trs 398 for the Determination of Absorbed Dose to Water in External Radiotherapy: Experiences of Madagascar

*Ramanandraibe, M.J., Randriantsizafy, R. D., Andriambololona, R., Rolland, R.  
Institut National des Sciences et Techniques Nucléaires, Madagascar*

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

*Ridone, S., Arginelli, D., Berton, G., Bortoluzzi, S., Canuto, G., Montalto, M., Nocente, M., Vegro, M.  
Italian National Agency for New Technologies, Energy and Environment-ENEA, Research Centre of Saluggia, Institute of Radiation Protection ION-IRP, Italy*

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

*Banzi, F.P., Msaki, P.  
Tanzania Atomic Energy Commission, University of Dar Es Salaam, Tanzania*

## Monday

**P.38** Radiological Surveillance of Foods in Cuba  
*Fernández Gómez, I.M., Rodríguez Castro, G.V., Carrazana González, J.A., Capote Ferrera, E., Martínez Ricardo, N.*  
*Center for Radiation Protection and Hygiene, Cuba*

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

**P. 40** Cancer Incidence in Female Health Care Workers Occupationally Exposed to Ionising Radiation, 1982-2002\*  
*Matisane, L.*  
*Riga Stradins University, Latvia*

**P.41** New Large Area Gas Proportional Detectors  
*Olshvanger, B., Bofordzki, G.*  
*Canberra Company, Canada*

**P.42** Comparisons of Activity Measurements with Radionuclide Calibrators - A Tool for Quality Assessment and Improvement in Nuclear Medicine  
*Oropesa, P., Hernández, A.T., Serra, R., Varela, C.*  
*Centro de Isótopos (CENTIS), Cuba, Centro de Control Estatal de Equipos Médicos (CCEEM), Cuba*

**P.43** Some Results of a Simulated Test for Administration of Activity in Nuclear Medicine  
*Oropesa, P., Hernández, A.T., Serra, R.A. Varela, C., Woods, M.J.*  
*Centro de Isótopos (CENTIS), Cuba, Centro de Control Estatal de Equipos Médicos (CCEEM), Cuba, Ionising Radiation Metrology Consultants Ltd, UK*

**P.44** Nuclear Energy From 1945 to 2005. Combating Nuclear and Radiological Terrorism  
*Puig, D.E.*  
*High Studies National Centre (Ministry of Defence), Uruguay*

**P.45** An Instrumental Method for the Assessment of Gamma Dose Due to FPNG Releases Using Gamma Tracer Probe  
*Rao, D.D., Vanave, S.V., Hegde, A.G., Joshi, M.L.*  
*Tarapur Atomic Power Station, India, Health Physics Division, BARC, Mumbai*

**P.46** Spectra and Dosimetric Features of Isotopic Neutron Sources  
*Vega-Carrillo, H.R., Gallego, E., Lorente, A.*  
*Unidad Académica de Estudios Nucleares de la UAZ, México, Universidad Politécnica de Madrid, Spain*

**P.47** Neutron Dosimetry Using Artificial Neural Networks  
*Vega-Carrillo, H.R., Perales-Muñoz, W. A., Gallego, E., Lorente, A.*  
*Unidad Académica de Estudios Nucleares de la UAZ, México, Universidad Politécnica de Madrid, Spain*

**P.48** Neutron Fluence Rate Measured Through Prompt Gamma Rays  
*Vega-Carrillo, H.R.*  
*Unidad Académica de Estudios Nucleares de la UAZ, México*

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

**Room 551**

### MPM-A: Risk Analysis

Chair: Patricia Lee

**3:30 PM** **MPM-A.1**  
Radiation and Breast Cancer in Ukraine following the Chernobyl Accident: A Case-Control Study  
*Khyrunenko, L.I., Anspaugh, L.R., Gryshenko, V.G., Gulak, L.O., Fedorenko, Z.P.*

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

**3:45 PM** **MPM-A.2**  
Revised Prioritization of LANL Nuclear Material for Repackaging and Stabilization  
*Hoffman, J., Smith, P.*  
*Los Alamos National Laboratory*

**4:00 PM** **MPM-A.3**  
Laboratory Risk Assessment Inspection Procedure  
*Dua, S., Mwaisela, J., Hevia, R., Knowles, T., Youngblut, W.*  
*Florida International University*

**4:15 PM** **MPM-A.4**  
Determining the Bioavailability of Soil-Associated Radium Using In Vitro Methodology  
*Tack, K., Bytwerk, D. Higley, K.*  
*Oregon State University*

**4:30 PM** **MPM-A.5**  
Radon Risk Assessment Reviewed  
*Conrath, S.*  
*US Environmental Protection Agency*

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

**Room B**

### MPM-B: Internal Dosimetry and Bioassay

Co-Chairs: James Griffin and Thomas La Bone

**3:30 PM** **MPM-B.1**  
Pushing the Envelope: Four Potential Plutonium Intakes Detected by Low-Level Routine Bioassay  
*Carbaugh, E., Antonio, C.*  
*Pacific Northwest National Laboratory*

**3:45 PM** **MPM-B.2**  
Estimation of Median Lethal Intakes for Radionuclide Ingestion  
*Langsted, J.*  
*Shaw Environmental & Infrastructure, Inc.*

**4:00 PM** **MPM-B.3**  
Radiation Dose from Cigarette Tobacco  
*Papastefanou, C.*  
*Aristotle University of Thessaloniki, Atomic and Nuclear Physics Laboratory, Greece*

**4:15 PM** **MPM-B.4**  
Radon and Thoron Equilibrium Factors: Calculation and Experimental Values  
*Harley, N., Chittaporn, P.*  
*New York University School of Medicine*

## Monday

**4:30 PM** **MPM-B.5**  
Localized Deposition Patterns of Molecular Phase Po-218 in Lung Bifurcations  
*Gutti, V., Tompson, R., Loyalka, S.*  
*University of Missouri - Columbia*

**4:45 PM** **MPM-B.6**  
A Compartmental Model For Natural Uranium Transferred Into Human Hair After A Chronic Intake Of Uranium-Rich Water  
*Li, W., Muikku, M., Salonen, L., Wahl, W., Hoellriegl, V., Roth, P., Rahola, T., Oeh, U.*  
*GSF-National Research Center for Environment and Health, STUK-Radiation and Nuclear Safety Authority*

**5:00 PM** **MPM-B.7**  
Energy-Lost Distribution in a Thin Layer of Tissue  
*Moussa, H., Townsend, L., Eckerman, K.*  
*University of Tennessee, Oak Ridge National Laboratory*

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

### **MPM-C: Instrumentation**

Chair: Jeri Anderson

**3:30 PM** **MPM-C.1**  
Performance of a Portable, Electromechanically Cooled HPGe Detector For Site Characterization  
*Keyser, R., Hagenauer, R.*  
*ORTEC*

**3:45 PM** **MPM-C.2**  
Lowering the Minimum Detection Limits of a Gamma Spectrometry System  
*Hoffman, C., Harker, Y., Wells, D.*  
*CWI, Idaho State University*

**4:00 PM** **MPM-C.3**  
Single Photon Emission Computed Tomography (SPECT) for Imaging Fissionable Material in Waste Barrels  
*Naeem, S.F., Wells, D.P., White, T., Roney, T.*  
*Idaho State University, Idaho Accelerator Center, Idaho National Laboratory*

**4:15 PM** **MPM-C.4**  
A New Wide-Energy Efficiency Curve for GE Based Detection Systems  
*Kramer, G.*  
*Health Canada*

**4:30 PM** **MPM-C.5**  
The HPS Quest for NACLA Recognition  
*Keith, L., Wu, C., Cummings, R. Swinth, K., O'Connell, T. Alvarez, J.*  
*Agency for Toxic Substances and Disease Registry (ASTDR), US Department of Energy, Consultant, MA, Auxier Associates*

**4:45-5:15 PM** **Room D**

### **MPM-D: Special History Presentation**

**4:45 PM** **MPM-D**  
Historical Personnel Monitoring Practices Throughout the DOE Complex  
*Griffin, J., Hinnerfield, S.*  
*MJW Corporation, National Institute for Occupational Safety and Health (NIOSH)*

## Tuesday

**7:00 - 8:00 AM** **Room 551**  
**CEL-3** The Lions, Rhinos and Reactors of South Africa  
*Allard, D.; Pennsylvania Department of Environmental Protection Bureau of Radiation Protection*

**7:00 - 8:00 AM** **Room B**  
**CEL-4** Internal Dose Issues in Pregnancy.  
*Stabin, M.; Vanderbilt University*

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

### TAM-A: Environmental

Co-Chairs: Matthew Barnett and H. Robert Meyer

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

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

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

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

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

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

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

**10:15 AM** **BREAK**

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

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

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

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

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

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

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

Chair: Cynthia Jones

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

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

**9:30 AM** **BREAK**

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

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

## Tuesday

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

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

**Noon** **Government Section Business Meeting**

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

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

Chair: Frazier Bronson

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

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

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

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

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

**10:00 AM** **BREAK**

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

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

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

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

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

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

### **TPM-A: RSO Special Session**

Co-Chairs: Jim Schweitzer and Robert Gallagher

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

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

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

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

**3:30 PM** **BREAK**

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

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

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

**4:45 PM** **TPM-A.8**  
Circumstances Surrounding a Laser Injury at Purdue University  
*Handy, M.*  
*Purdue University*

**5:00 PM** **TPM-A.9**  
An Evaluation of Radiation Safety Staff Response to a Fire in a Radiation Use Facility  
*Wang, W.-H., Matthews II, K.L.*  
*Louisiana State University*

**5:15 PM** **TPM-A.10**  
Radiation Safety Program in a Veterinary Teaching Hospital  
*Schweitzer, J.*  
*Purdue University*

## Tuesday

5:30 PM RSO Section Business Meeting

2:30-5:30 PM Room B

### TPM-B: External Dosimetry

Co-Chairs: Jack Fix and David Hearnberger

2:30 PM TPM-B.1

DOE Mayak Study External Dosimetry Database  
*Teplyakov, I., Gorelov, M.V., Knyazev, V.A., Vasilenko, E.K., Fix, J.J. \*, Scherpelz, R.I.*  
*Mayak Production Association, Dade Moeller & Associates, Pacific Northwest National Laboratory*

2:45 PM TPM-B.2

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

3:00 PM TPM-B.3

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

3:15 PM TPM-B.4

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

3:30 PM TPM-B.5

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

3:45 PM TPM-B.6

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

4:00 PM BREAK

4:30 PM TPM-B.7

Exploratory Project to Integrate CAD in MCNP Geometry Modeling  
*Furler, M., Bednarz, B., Xu, X.*  
*Rensselaer Polytechnic Institute*

4:45 PM TPM-B.8

Development of Organ-Specific External Dose Coefficients for Dose Reconstruction for Medical Personnel  
*Simon, S., Seltzer, S.*  
*National Cancer Institute, National Institute of Standards and Technology*

5:00 PM TPM-B.9

A Revised Method of Estimating Red Bone Marrow Dose in Image-Based Computational Models  
*Caracappa, P., Xu, X.*  
*Rensselaer Polytechnic Institute*

5:15 PM TPM-B.10

Characterization of a Low Dose Rate Facility Using Radiochromic Film  
*Sirisalee Magers, T., Ullrich, R., Johnson, T.*  
*Colorado State University*

2:30-5:15 PM Room D

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

Chair: Frazier Bronson

2:30 PM TPM-C.1

The Evolution of Laboratory Instrumentation for Operational Health Physicists  
*Bronson, F.*  
*Canberra Industries*

3:00 PM TPM-C.2

Alpha-Beta Counting Instrumentation\* (UCRL ABS-218200)  
*Radev, R.*  
*Lawrence Livermore National Laboratory*

3:15 PM TPM-C.3

Liquid Scintillation Counters and Measurements Today  
*Passo, Jr., C.*  
*PerkinElmer Life and Analytical Sciences*

3:30 PM TPM-C.4

Two New Scintillators: LaCl<sub>3</sub> and LaBr<sub>3</sub>  
*Rozsa, C., Mayhugh, M.*  
*Saint-Gobain Crystals*

3:45 PM BREAK

4:15 PM TPM-C.5

Solid State Detectors  
*Shah, K.*  
*Radiation Monitoring Devices, Inc.*

4:30 PM TPM-C.6

Multichannel Analyzers Based on Digital Signal Processing  
*Jordanov, V.*  
*Yantel, LLC*

4:45 PM TPM-C.7

In Vivo Measurement Instrumentation  
*Lynch, T.*  
*Pacific Northwest National Laboratory*

5:00 PM TPM-C.8

General Industry Developments that Affect Health Physics Instrumentation  
*Kasper, K.*  
*Envirocare of Utah, LLC*

5:15 PM AAHP Business Meeting

2:30-5:00 PM Room 555B

NESHAP Meeting

## Wednesday

7:00 - 8:00 AM

Room 551

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

7:00 - 8:00 AM

Room B

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

8:45-11:15 AM

Room 552

### WAM-A: Decommissioning Section Special Session

Co-Chairs: Tim Vitkus and Joe Shonka

8:45 AM

WAM-A.1

Update on N13.59 Characterization of Land Areas and Structures in Support of Decommissioning  
*Abelquist, E.*  
*Oak Ridge Associated Universities (ORAU)*

9:00 AM

WAM-A.2

Empirical Versus Theoretical Determination of Total Instrument Efficiency for Assessing Natural Thorium Surface Activity During Decommissioning  
*Vitkus, T., Condra, D.*  
*Oak Ridge Institute for Science & Education (ORISE)*

9:15 AM

WAM-A.3

Radiological Aspects of the D&D of a Radiosurgery Facility  
*Bump, S.*  
*Dade Moeller & Associates*

9:30 AM

BREAK

10:00 AM

WAM-A.4

Rigorous Application of Signal Detection Theory to Field Measurements  
*Shonka, J.J.*  
*Shonka Research Associates, Inc.*

10:30 AM

WAM-A.5

Improving Scanning Detection Capabilities Using Gamma Spectral Techniques for Decommissioning Surveys  
*Bland, J.S., Doan, J., Gaul, W., Nardi, A.J.*  
*Chesapeake Nuclear Services, Westinghouse Electric Company*

10:45 AM

WAM-A.6

Estimating the Uncertainty of Surface Activity Measurements Using the ISO Guide to the Expression of Uncertainty in Measurement  
*Gogolak, C.*  
*Consultant*

11:15 AM Decommissioning Section Business Meeting

8:30 AM-Noon

Room B

### WAM-B: Medical Health Physics

Co-Chairs: John Jacobus and Michael Stabin

8:30 AM

WAM-B.1

Dealing with a Case of Deliberate Misuse of Radioactive Materials  
*King, S.H., Miller, K.L.*  
*M.S. Hershey Medical Center*

8:45 AM

WAM-B.2

Photodynamically Inflicted Biomolecular Damage and Cell Death of Malignant Melanoma Cells in Culture  
*Mamoon, A., Telivala, T., Smith, R., Wang, Q., Miller, L.*  
*Egyptian Atomic Energy Authority (EAEA), Brookhaven National Laboratory*

9:00 AM

WAM-B.3

Struggling with Radiation when the Subject is your Child  
*Fellman, A.*  
*Radiation Safety Academy, Inc.*

9:15 AM

WAM-B.4

New Jersey's Quality Assurance Regulations: A Physicist's Perspective  
*Garellick, I.*  
*St. Barnabas Medical Center, Livingston, NJ*

9:30 AM

WAM-B.5

Training Program for Occupational Dose Reduction in a Positron Emission Tomography (PET) Imaging Facility  
*Schleipman, A.R.*  
*Brigham and Women's Hospital*

9:45 AM

WAM-B.6

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

10:00 AM

BREAK

10:30 AM

WAM-B.7

Calibration of Radiochromic Films for Patient Dosimetry in Interventional Radiology  
*Al-Haj, A., Chantziantoniou, K., Lobriguito, A., Iqeilan, N., Lagarde, C.*  
*King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia*

10:45 AM

WAM-B.8

Occupational Radiation Dose in Stress Myocardial Perfusion Imaging: Comparison Between <sup>82</sup>Rb and <sup>99m</sup>Tc-MIBI  
*Schleipman, A.R., Castronovo, Jr., F.*  
*Brigham and Women's Hospital, Brigham and Women's Hospital, Harvard Medical School*

11:00 AM

WAM-B.9

Factors Influencing the Radiation Doses in Pediatric CT Procedures  
*Al-Haj, A., Lobriguito, A.*  
*King Faisal Specialist Hospital & Research Centre, Saudi Arabia*

11:15 AM

WAM-B.10

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

11:30 AM

WAM-B.11

Radioactive Scorpion Venom Therapy  
*Jackson, A., Harkness, B.*  
*Henry Ford Health System*

## Wednesday

11:45 AM

WAM-B.12

Iodine-131 Therapy And The Dialysis Patient  
*Bohan, M.J., Richardson, R.L.*  
*Yale-New Haven Hospital*

Noon

Medical HP Section Business Meeting

8:30 AM-Noon

Room D

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

Co-Chairs: Larry E.Haynes and Ralph Andersen

8:30 AM

WAM-C.1

The Future of Nuclear Power in the US  
*Andersen, R.*  
*Nuclear Energy Institute*

9:15 AM

WAM-C.2

AP1000 by Westinghouse: The Pressurized Water Reactor Revisited  
*Schumacher, R.*  
*Westinghouse Electric Co.*

10:15 AM

BREAK

10:45 AM

WAM-C.3

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

11:45 AM

WAM-C.4

Potential Impact of Changes in USNRC Dose Limits  
*Hiatt, J.*  
*Bartlett Nuclear, Inc.*

Noon

Power Reactor Section Business Meeting

8:10 AM-Noon

Room 551

### WAM-D: Accelerator Section Special Session

Co-Chairs: Lorraine Marceau-Day and Scott Walker

8:10 AM

AWARD PRESENTATION

8:15 AM

WAM-D.1

Radiation Safety at Radioactive Ion Beam Facilities  
*Moritz, L.*  
*TRIUMF University of British Columbia*

9:00 AM

WAM-D.2

Teaching Accelerator Health Physics to Nonspecialists in the U. S. Particle Accelerator School  
*Cossairt, J.D.*  
*Fermi National Accelerator Laboratory*

9:30 AM

WAM-D.3

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

9:45 AM

BREAK

10:15 AM

WAM-D.4

ANSI N43.1 Draft Standard: Radiation Safety for the Design

and Operation of Particle Accelerators

*Liu, J., Walker, L.*

*Stanford Linear Accelerator Center (SLAC), Los Alamos National Laboratory*

11:15 AM

WAM-D.5

Fission Fragment Ion Source Hazards

*Baker, S.I., Moore, E.F., Pardo, R.C., Savard, G.*  
*Argonne National Lab*

11:30 AM

WAM-D.6

High Energy Neutron Spectral Unfolding with As, In, Tb, Ho, Ta, Ir, Au and Bi Activation Foils

*Walker, L.S., Kelsey, C., Oostens, J.*

*Los Alamos National Laboratory, Campbellsville University*

11:45 AM

WAM-D.7

Radiation Considerations in the Design of Hall D at Thomas Jefferson National Accelerator Facility

*Ferguson, C., May, R.*

*Jefferson National Accelerator Lab*

Noon

Accelerator Section Business Meeting

2:30-3:30 PM

Room 551

### WPM-A: Decommissioning

Chair: Ken Krieger

2:30 PM

WPM-A.1

Accelerated Decommissioning of Underground Storage Tanks: Health and Safety Concerns

*Knox, W.*

*Advanced Systems Technology*

2:45 PM

WPM-A.2

Co-60 Source Removal from the Neely Nuclear Research Center at Georgia Tech

*Burgett, E., Hertel, N., Blaylock, D., Grobb, L., Eby, B.*

*Office of Radiological Safety, Georgia Tech, Neely Nuclear Research Center, Georgia Tech, Duratek Inc., MWH Inc.*

3:00 PM

WPM-A.3

First MARSSIM decommissioning of CDC laboratories

*Keith, L., Simpson, P.*

*Agency for Toxic Substances and Disease Registry (ATSDR), Centers for Disease Control*

3:15 PM

WPM-A.4

Measurements and Characterization of Neutron and Gamma Dose Quantities in the Vicinity of an Independent Spent Fuel Storage Installation

*Darois, E., Keefer, D., Connell, J.*

*Radiation Safety & Control Services Inc., Maine Yankee Atomic Power Co.*

3:30 PM

BREAK

4:00-4:45 PM

Room 551

### WPM-A2: Special G. William Morgan Lecture Session

4:00 PM

WPM-A2.1

Quality Assurance in Personnel Dosimetry in Germany

*Ambrosi, P.*

*Physikalisch-Technische, Bundesanstalt, Germany*

## Wednesday

2:30-3:15 PM

Room B



## WPM-B1: Medical Health Physics

Chair: Chris Martel

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

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

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

**3:15 PM** **BREAK**

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

## WPM-B2: Dosimetric Modeling

Chair: Chris Martel

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

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

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

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

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

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

**5:00 PM** **WPM-B2.7**  
Post-implant Dosimetry Analysis of Iodine-125 Permanent Seed Brachytherapy Patients by Delineation of Prostate Volumes

Using MR Pre-implant and Post-implant Imaging Modality

*Tuttle, D., Mack, C., Taylor, M., Yoshino, M.*

*University of Nevada Las Vegas, Arizona Oncology Associates, PC, Northwest Permanente PC, Physicians and Surgeons, Southern Arizona Diagnostic Imaging*

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

**Room D**

## WPM-C: Operational Health Physics

Co-Chairs: Glenn M. Sturchio and Robert Cherry

**2:30 PM** **WPM-C.1**  
A Breached Source in our High Exposure Gamma Facility, It Can't Be!

*Rolph, J., Murphy, M., Carter, G.*  
*Pacific Northwest National Laboratory*

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

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

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

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

**3:45 PM** **BREAK**

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

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

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

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

**Wednesday**

## HPS Business Meeting

Presentation followed by Business Meeting

Thanks for your Patience - Our Renovation is Finished  
*Dodd, B.*

*BDC Consulting, HPS President*

**Thursday**

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

**Room 551**

**6:00-8:00 PM**

**Room: Narragansett A**

### **WPM-D: ADJUNCT TECHNICAL SESSION Aerosol Measurements**

Chair: Morgan Cox

**6:00 PM** **WPM-D.1**

Current Status of ANSI N42 and IEC Standards for  
Radioactive Air Sampling and Monitoring

*Cox, M.*

*Consultant, Department of Homeland Security*

**6:15 PM** **WPM-D.2**

Aerosol Particle Collection Efficiency Testing of the  
Bladewerkz Breathing Zone Monitor (BZM) and Sabre Alert  
at LANL

*Moore, M.*

*Los Alamos National Laboratory*

**6:30 PM** **WPM-D.3**

The ANSI N323C Standard and Status

*Johnson, M.*

*Pacific Northwest National Laboratory*

**6:45 PM** **WPM-D.4**

Status of Current Air Monitoring Evaluations Using  
Retrospective Multi-point Radioactive Aerosol Sampling

*Wannigman, D., Voss, T.*

*Los Alamos National Laboratory*

**7:00 PM** **BREAK**

**7:15 PM** **WPM-D.5**

The Role of Coagulation in Aerosol Transport-Theory vs  
Experimental Observations

*Sajo, E.*

*Louisiana State University*

**7:30 PM** **WPM-D.6**

Status of Current Air Monitoring Evaluations,  
Implementations and Strategies at Los Alamos National  
Lab

*Lesses, E., Voss, T., Wannigman, D.*

*Los Alamos National Laboratory*

**7:45 PM** **WPM-D.7**

The New Radioactive Air Sampling and Monitoring  
Textbook

*Group Discussion led by Cox, M., Hoover, M., Maiello, M.*

*Department of Homeland Security, National Institute for  
Occupational Safety and Health-Morgantown, Wyeth*

**CEL-7** Medical Triage and Management of Radiation Terrorism Events  
*Goans, R.E.; MJW Corporation*

**7:00 - 8:00 AM** **Room B**  
**CEL8** Induction, Repair and Biological Consequences of Clustered DNA Lesions  
*Stewart, R.; Purdue University School of Health Sciences*

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

### **THAM-A: Regulatory/Legal Issues**

Co-Chairs: Louise Buker and Ed Parsons

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

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

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

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

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

**9:45 AM** **THAM-A.6**  
Comprehensive Laboratory Audit Documentation: Essential for Regulatory Compliance and Continuous Improvement  
*Quinn, B., Williamson, M., Dauer, L.*  
*Memorial Sloan-Kettering Cancer Center*

**10:00 AM** **BREAK**

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

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

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

**11:15 AM** **THAM-A.10**  
Compatibility Issues Regarding Agreement State Regulations

for Portable Devices Containing Radioactive Sources  
*Chapel, S.*  
*Chapel Consulting*

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

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

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

### **THAM-B: Homeland Security and Emergency Planning**

Co-Chairs: Steven King and Stephen Bump

**8:15 AM** **THAM-B.1**  
Implications of a Terrorist Attack at a Spent Fuel Pool  
*Favret, D., Stabin, M., Parker, F.*  
*Vanderbilt University*

**8:30 AM** **THAM-B.2**  
Overview of the CDC Select Agent and Toxin Program  
*Johnston, T.*  
*New York Medical College*

**8:45 AM** **THAM-B.3**  
Operations Research as a Health Physics Tool in Emergency Response  
*Goans, R.*  
*MJW Corporation, Buffalo, NY.*

**9:00 AM** **THAM-B.4**  
Assaying Lung Contamination After a Radiological Dispersion Device Event  
*Hutchinson, J., Lorio, R., Wang, Z.\*, Hertel, N.*  
*Georgia Institute of Technology*

**9:15 AM** **THAM-B.5**  
Development of a Laser Guided Wound Probe For Pinpointing Small Fragments of High Activity Radiation Sources in Victims of a Radiological Dispersal Device (RDD or Dirty Bomb)  
*Case, J.P., Bushberg, J.T.*  
*University of California, Davis Medical Center*

**9:30 AM** **THAM-B.6**  
Spectral Radiation Pagers - a New Equipment Type for Use by Front Line Officers and First Responders  
*Swoboda, M., Baird, K., Schrenk, M., Arlt, R., Wiggerich, B., Stein, J., Georgiev, A., Majorov, M., Gabriel, F., Wolf, A.*  
*Atomic Institute of the Austrian Universities, Austria, International Atomic Energy Agency, Austria, Consultant, Airrobot GmbH, Germany, Target GmbH, Germany, US Oxford, Thermo Electron, Scientific Engineering Center Nuclear Physics Research, St. Petersburg, Research Center Rossendorf, Germany*

**Thursday**  
**9:45 AM** **THAM-B.7**

Sensitivity of Portable Personnel Portal Monitors: Potential Problems When Dealing with Contaminated Persons

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

*Health Canada, Defence R&D Canada*

**10:00 AM**

**BREAK**

**10:30 AM**

**THAM-B.8**

Lessons Learned from an Emergency Exercise that Used Real Sources

*Kramer, G.*

*Health Canada*

**10:45 AM**

**THAM-B.9**

Radiological Risk Assessment for a Large Combined Sanitary/Storm Sewer System and Wastewater Treatment Plant

*Strom, D., Hickey, E., McConn, Jr., R., Alston, A.*

*Pacific Northwest National Laboratory, WA, King County Wastewater Treatment Division, WA*

**11:00 AM**

**THAM-B.10**

Emergency Response and Radiation Protection Plans for a Large Combined Sanitary/Storm Sewer System and Wastewater Treatment Plant

*Hickey, E., Strom, D., Alston, A.*

*Pacific Northwest National Laboratory, WA, King County Wastewater Treatment Division, WA*

**11:15 AM**

**THAM-B.11**

OSR Project Provides a Solution to the Gammator Problem

*Tompkins, J.*

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

**11:30 AM**

**THAM-B.12**

IAEA and LANL Collaborate on a Solution to Management of Vulnerable Sealed Sources on the African Continent

*Tompkins, J., Al-Mugrabi, M.*

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

**11:45 AM**

**THAM-B.13**

Life Cycle of Plutonium-239 Sealed Sources in the United States: Origins, Inventory, and Final Disposition

*Griffin, J.*

*Los Alamos National Laboratory*

**12:00 PM**

**THAM-B.14**

The State of Florida's Radiological Emergency Preparedness and Response Program

*Lanza, J., Keaton, H.*

*Florida Department of Health*

## THAM-C: History

Chair: Ray Johnson

**8:15 AM**

**THAM-C.1**

The History of Radiation Fears

*Johnson, R. H.*

*Radiation Safety Academy*

**8:45 AM**

**THAM-C.2**

Radium, President Harding, and Marie Curie

*Lubenau, J. O.*

*Consultant*

**9:15 AM**

**THAM-C.3**

The History of Radiation at the Movies

*Krieger, K.*

*Earth Tech*

**9:45 AM**

**BREAK**

**10:00 AM**

**THAM-C.4**

Preserving the Past: An Update on Historical Archival Activities

*Chapman, J.A., Boerner, A.J., Lucas, A.C.*

*Oak Ridge Associated Universities, Lucas Newman Science and Technologies, Inc.*

**10:15 AM**

**THAM-C.5**

A Video Glimpse of HPS History

*Lucas, A.C., Boerner, A.J., Chapman, J.A.*

*Consultant, Oak Ridge Associated Universities*

**11:00 AM**

Highlights of the Past 50 Years - Recollections

*Panel of Charter Members*

# AAHP Courses

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

## AAHP 1 Introduction to Practical Monte Carlo Simulation for Health Physicists

*A. Hodgdon, J. Yanch*

*Framatome, Massachusetts Institute of Technology*

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

Monte Carlo method can calculate dose, flux, heating, foil activation, fission and many other quantities. Thanks to modern personal computers, it can do this on your desktop, even at home. MC codes are cheap to buy (~\$1000,) and come with graphic visualization packages and standard cross-section libraries. In the last ten years, MC has jumped from the national labs onto the lap-top of every modern Health Physics student, and, soon onto the desks of your next hire. But, don't throw out your old methods yet! Consider the following challenges. New users are often tempted to put too much detail into their models, wasting the time to build models and to run them. It's possible (and easy) to bias the results, getting answers that look good, but are wrong. Finally, Monte Carlo takes a relatively long-term commitment to learn.

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

## AAHP 2 Security Enhancement for Radiological Facilities and Sealed Sources

*Joel P. Grimm, Garry Titemore, Mark S. Soo Hoo*

*US Department of Energy, Sandia National Laboratories*

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

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

## AAHP 3 HPS Lab Accreditation Program and Technical Auditing

*Ken Swinth, Sam Keith, Carl Gogolak, Tom Slowey*

*Consultant, Agency for Toxic Substances and Disease Registry, Consultant, K&S Associates*

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

The course will include a description of the evolution of the program which parallels the evolution of the general accreditation process. Specific quality and technical requirements and their relation to ISO/IEC 17025 will be described for both instrument and source manufacturing laboratories. The course will include an overview of proficiency testing and uncertainty analysis as applied to the HPS program. Specific examples of compliant and non-compliant practices will be provided in an exercise.

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

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

# Professional Enrichment Program

Sunday, June 25 through Wednesday, June 28, 2006

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

On Sunday, June 25, a series of **24** courses will be offered between 8:00 am - 4:00 pm.

In addition to the above-mentioned sessions for Sunday, five PEP lectures are scheduled on Monday, Tuesday, and Wednesday afternoons from 12:15 - 2:15 pm.

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

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

utes 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.

## Refund policy

Requests for PEP refunds will be honored if received in writing by May 29. All refunds will be issued AFTER the meeting. Exceptions will be handled on a case by case basis.

### SUNDAY - 8:00-10:00 AM

#### PEP 1A Internal Dosimetry - Harmony in Concepts and Units

*Mike Stabin*

*Vanderbilt University*

Internal dose calculations for nuclear medicine applications or for protection of radiation workers are based on the same fundamental concepts and units. The various systems developed to provide a basis for the needed calculations (e.g. ICRP 30/60, MIRD, RADAR) use equations that appear to be different, but are in fact identical when carefully studied. A current effort is underway to harmonize the defining equations and units employed to provide quantitative analysis for these two general problem areas. This program will show, from a theoretical standpoint, how all of these systems are identical in concept, and will then show, using practical examples, how each is applied to solve different problems. For nuclear medicine, an overview will be given of the current state of the art and promise for future improvements to provide more patient specificity in calculations and better ability to predict biological effects from calculated doses. For occupational applications of internal dosimetry, an overview will be given of currently applicable models and methods for bioassay analysis and dose assessment, showing a few practical examples.

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

*Ralph Johnson*

*Schmeltzer, Aptaker & Shepard, P.C.*

The United States Supreme Court in a series of opinions beginning with its decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 591, 592-93 (1993), significantly increased the probability that lawsuits involving complex scientific issues, such as the typical radiation injury or property damage litigation, will be rationally resolved. These Supreme Court decisions require federal

trial judges to serve as evidentiary "gatekeepers" by making certain that would-be expert testimony is reliable and relevant before it can be presented to a jury; that is, the judge must determine whether the expert witness in his proposed testimony employs in the courtroom the same level of intellectual rigor that characterizes the practice of a genuine expert in the relevant field. Although making determinations of scientific validity may present a judge with the difficult task of ruling on matters that are outside of his or her expertise, this is "less objectionable than dumping a barrage of scientific evidence on a jury, who would likely be less equipped than the judge to make reliability and relevance determinations." *Rider v. Sandoz Pharmaceuticals Corp.*, 295 F.3d 1194 (11th Cir. 2002). Generally, the trial judge determines the reliability and relevance of challenged expert testimony by conducting a "Daubert" hearing during which the expert's methodology in developing his or her testimony is thoroughly scrutinized through direct and cross-examination. Only after the judge has determined that the expert's testimony is based on sound scientific principles is the jury allowed to hear the expert's opinion. The procedure is expressly designed to preclude testimony that is speculative and it requires that an expert show the reliability of each of the steps in his reasoning. In sum, the Daubert procedure is fully consistent with the Health Physics Society's Code of Ethics provision that "Professional statements made my members shall have sound scientific basis." This course will provide practical guidance to the health physicist who has been called to serve as an expert witness by discussing the pertinent case law, the formulation of expert testimony, the necessary components of an expert witness litigation report, preparation for and participation in the Daubert hearing. Actual, recent state and federal radiation injury and property damage cases will be used to illustrate how the process works to allow protect the integrity of the judicial system.

## **PEP 1C Calculating and Reporting Fetal Radiation Exposure**

**Andy Karam**

**Rochester Institute of Technology**

When pregnant women are exposed to radiation, especially in a hospital setting, the RSO is usually asked to perform a fetal dose calculation and to provide advice to the women's physicians. Unfortunately, few physicians really understand the effects of fetal radiation exposure, making the RSO's job even more important. And, if the pregnancy ends badly in miscarriage or birth defects, there is a tendency to blame the radiation exposure. For this reason, it is essential that these fetal dose calculations be performed in a manner that is scientifically and legally defensible, and that they be reported to the physician in a manner that makes sense, that will help the physician make sound recommendations, and that will help the woman make an informed decision about her pregnancy. In this lecture, we will review some of the standard methodology for determining fetal radiation dose from many medical procedures. We will also discuss the effects of varying levels of radiation exposure on the developing fetus, including the times of the pregnancy during which the fetus is most vulnerable to radiation exposure. We will then finish by performing a few sample calculations and discussing how this information can be presented to physicians and expectant mothers to help them reach a sound decision.

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

**Morgan Cox**

**Department of Homeland Security Consultant**

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

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

**Ray Johnson**

**Radiation Safety Academy**

Studies in brain-based or brain-compatible learning over the past ten years have shown that the traditional "stand-and-deliver" approach to teaching may not be the best model for optimum learning. As we seek to train radiation workers, first responders, and security personnel about radiation perhaps we should consider whether we are as effective as we could be. The challenge for teaching first responders, especially, is not just about teaching the technology of radiation sciences, but how to provide a basis for understanding radiation such that they will not

revert to an automatic stress response when they encounter radiation in a real incident. How can we best prepare these people to make appropriate decisions for protection of themselves, the public, and property during a nuclear emergency? While knowledge of radiation is vital, successful handling of a nuclear incident will be more a matter of behavioral responses. Will our best radiation safety training provide responders with adequate tools and skills for coping with stress and fears of radiation?

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

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

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

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

**Jim Hylko**

**WESKEM, LLC**

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

as allocating resources and budgets. In addition, enhancing your own department's productivity can be achieved with support from other internal organizations (e.g., quality assurance and human resources). Both aspiring and experienced managers will acquire useful information that can be applied immediately in their current work location.

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

**Bob Emery**

**University of Texas**

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

\* Part 1 will address the “Basics of Fire & Life Safety and Risk Management & Insurance. Included in the fire & life safety segment will be a discussion of the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will be discussed. The risk management & insurance portion will address the risks if retrained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle).

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

### **PEP 1H Technical Auditing for Health Physicists**

**Sam Keith, Scott Schwahn and Ken Swinth**

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

The objective of this professional enrichment program topic is to provide a framework around which the participant can help customers (auditees) improve through the process of technical auditing. Technical auditing requires an auditor to know what's important in an industry and where to help the auditee focus resources for optimization

of the production process. The audit philosophy espoused during this training will be that compliance and conformance only form the bedrock from which a business can improve and optimize operations. The participant will learn that the “why” is the most important part of the audit in helping the auditee understand the “how” of improvement. The audit process is presented around the Plan-Do-Study-Act model. Techniques will be presented to assist auditors in communicating with the team, the customer, interviewees and the sponsoring organization. The presentation is general enough to apply to audits in all health physics areas.

This course provides information to individuals interested in the HPS accreditation program, and is also part 1 of a 2-part course for certifying individuals to audit laboratories for HPS accreditation.

**Sunday, 6/25**

**10:30 AM - 12:30 PM**

### **PEP 2A Fundamentals of Neutron Detection and Detection Systems**

**Jeff Chapman**

**Oak Ridge Associated Universities**

In 1932, James Chadwick published a seminal paper in the Proc. Roy. Society titled “The Existence of a Neutron.” 73 years later we rely on a number of detection processes to provide neutron dosimetry for personnel, to confirm operational shielding design requirements, and to measure special nuclear materials (SNM). This PEP session will focus on the fundamentals of neutron detection and an overview of devices used to detect SNM. The following topics will be covered: fast neutron detectors; thermal neutron detectors; neutron moderation and absorption; passive neutron counting with SNAP detectors; passive neutron coincidence and multiplicity counting; active neutron interrogation; and portal monitors.

### **PEP 2B Changes in Natural Background Radiation Levels over the History of Life**

**Andy Karam**

**Rochester Institute of Technology**

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



## **PEP 2C    Gamma Spec**

*Doug Van Cleef, Dan Upp, and Craig Maddigan  
ORTEC/Advanced Measurement Technology, Inc*

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

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

*Morgan Cox  
Department of Homeland Security Consultant*

This professional enrichment course consists of a series of two contiguous and related presentations. The second presentation will cover the American National Standards Institute (ANSI) and International Electrotechnical Commission (IEC) standards in effect, being developed and in the planning stage for the various types of radiation detection instruments. The ANSI N42 radiation detection instruments designed for health physics applications, ANSI N42RPI (Radiation Protection Instrumentation), and ANSI N42HSI (Homeland Security Instrumentation) for homeland security applications will be reviewed in some detail. The subject of applicable current standards will be discussed along with some of the major contributors to these efforts. Several particular standards of particular interest will be discussed. Again audience participation will be required and expected for the success of this course.

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

*Ray Johnson  
Radiation Safety Academy*

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

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

their intellect, but also an appeal to their senses. The most effective mode of instruction is often “show-and-tell.”

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

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

## **PEP 2F    Particle Size and Pulmonary Hazard**

*Herman Cember*

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

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

*Bob Emery  
University of Texas*

See overview in PEP 1G

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

## **PEP 2H    HPS Laboratory Accreditation Program Assessor Training**

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

The objective of this professional enrichment program topic is to familiarize HPS Laboratory Accreditation Program technical assessors and others with the requirements of the assessment program. The training will describe the program documentation, incorporated elements of ISO/IEC 17025, the accreditation process, and will specifically address technical requirements for instrument calibration and source manufacturing laboratories. The training is required for all members of the HPS Laboratory Accreditation Assessment Committee and is recommended for facilities interested in accreditation. The HPS program is similar to other ISO/IEC 17025 based accreditation programs and the training will be useful for

anyone interested in the accreditation process. The program will also provide an opportunity for the student to practice identification of non-compliant items.

This course provides information to individuals interested in the HPS accreditation program, and is also part 2 of a 2-part course for certifying individuals to audit laboratories for HPS accreditation

**Sunday, 6/25**

**2:00 - 4:00 PM**

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

**Lynn McKay**

**Schmeltzer, Aptaker & Shepard, P.C.**

This course examines the roles that health physicists and radiation protection professionals play in ensuring compliance with laws, regulations and other professional standards that apply to work involving radiation and radioactive materials. Some of these roles include designing and implementing field studies, performing dose or risk assessments, preparing recommendations regarding site use and remediation, analyzing dosimetric data, formulating and implementing sound health physics work practices, designing and implementing personal monitoring procedures, and interpreting the positions of various scientific bodies.

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

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

**Ben Edwards**

**Duke University**

Non-ionizing radiation (NIR) often presents a “final frontier” of the unknown for the practicing health physicist. This paucity of familiarity mirrors the general public’s almost complete lack of understanding of this subject. However, the “fear of the unknown” phenomenon coupled with a plethora of sensationalist misinformation ensures that most practicing health physicists and other safety professionals will eventually confront distressed workers or members of the public in urgent need of credible, factual information on NIR radiation hazards and control measures.

This course provides a fundamental overview of NIR hazards and biological effects. Course attendees will learn the basic terminology and nomenclature, spectral region

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

While some knowledge of optical, radiofrequency, ELF, and static electromagnetic field characteristics may be helpful, both experienced and novice health physicists with NIR safety int

### **PEP 3C Alpha Spec**

**Doug Van Cleef, Dan Upp, and Craig Maddigan**

**ORTEC/Advanced Measurement Technology, Inc**

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

### **PEP 3D Power Lines and Politics**

**Tom Johnson**

**Colorado State University**

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

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

*Dan Strom, Eva Hickey*

*Pacific Northwest National Laboratory*

The May 2003 TOPOFF 2 exercise was held in Seattle. Based on issues raised during that exercise, Pacific Northwest National Laboratory (PNNL) and the King County Wastewater Treatment Division (which treats Seattle's wastewater) performed radiological risk and radiological instrumentation assessments, developed emergency response and recovery plans as well as communication plans for the aftermath of a radiological attack. Large portions of the King County system receive both sanitary sewage and storm water, and one plant treats between 380 and 1,200 million L (100 to 320 Mgal) of wastewater per day, depending on precipitation. We describe the radiological risks anticipated following radiological dispersion events (RDEs) by devices employing explosive and non-explosive means, and dispersals not involving any kind of device. Risks to workers and members of the public are evaluated for direct irradiation, as well as from intakes and intakes of radioactive material. The plant under study produces four significant waste streams: screenings, grit, biosolids, and treated water. Prior arrangements for radioactive waste management are critical for a wastewater treatment plant. Since no bounding assumptions on the physical and chemical form of dispersed radioactive material can be made, a variety of forms were considered. One form, pellets of  $^{60}\text{Co}$ , can result in dangerously high dose rates from the grit waste stream. Using MCNP, PNNL designed and evaluated real-time radiation detectors capable of detecting concentrations of interest and distinguishing medical radionuclides from those likely to be dispersed by an adversary. One rule-of-thumb emerged: 1 MBq/L of dissolved  $^{60}\text{Co}$  produces a dose rate to water (immersion dose) of  $\sim 1$  mSv/h (1 mCi/gal produces  $\sim 1$  rem/h). This kind of bounding calculation permits rapid estimation of dose rates in the plant. We show that instrumentation can have value for both interdiction of attack as well as recovery from attack. We describe the interim emergency response and radiation protection plans. A radiation protection and ALARA program was developed to keep doses to wastewater treatment workers as low as is reasonably achievable and to minimize contamination of the wastewater infrastructure and wastewater treatment facilities. The program includes the special training needs for wastewater workers involved with managing the influent wastewater from a radiological dispersion event. Special concerns are raised because the workers are not trained as radiological workers and have little or no understanding of radiological risks. There remains much work to do. Action levels for decisions to bypass and to resume treatment of radioactively contaminated wastewater need to be developed. The technical basis for such action levels must be documented. A transport and fate model should be developed for water and wastewater treatment facilities. Planning is needed for rapidly determining where contaminated sewage originated, with the goal of limiting further intakes by members of the public and limiting property damage from contamination. Methods for rapid detection

and localization of unexpected contamination should be developed. Such capabilities could preemptively detect some radiological attacks. Finally, a radiation risk communication program has been developed.

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

### **PEP 3F Characterization of Radioactive Materials for Transportation**

*Sean Austin*

*Radiation Safety Academy*

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

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

*Bob Emery*

*University of Texas*

See overview in PEP 1G

\* Part 3 will focus on "Measuring and Displaying Radiation Protection Program Metrics That Matter (to Management)". Radiation protection programs typically accumulate data and documentation so that regulatory officials can assess compliance with established regulations. The implicit logic with this activity is that compliance equates to an acceptable level of safety. But in this era of constricted resources, mere regulatory compliance is no longer sufficient to justify necessary programmatic resources. Radiation protection programs are now expected to readily demonstrate how they add 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 3H Introduction to Uncertainty Calculation**

*Carl Gogolak, Sam Keith*

*US Department of Homeland Security/Environmental Measurements Laboratory*

An important element in the activities of health physicists who are responsible for the safety of personnel and the general public is the measurement of radiation from various sources, including reactors, radiation-generating machines and radioactive sources used in industry and in the medical diagnosis and treatment of patients. To be meaningful, these measurements must be made using instruments and sources that are not only traceable to a national standards laboratory (e.g., NIST) but also must be performed by competent personnel using appropriate technical standards and procedures designed to ensure the calibration results meet required uncertainty.

The definition of traceability that has achieved global acceptance in the metrology community is contained in the International Vocabulary of Basic and General Terms in Metrology (VIM; 1993):

“...the property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, all having stated uncertainties.”

Because of the importance of uncertainty calculations in Laboratory Accreditation this course will concentrate on the corresponding technical issues involving laboratory quality assurance, the estimation of uncertainty, and limits of detection. Internationally recognized standards from ISO GUM and their NIST counterparts will be explained using examples. Software developed for implementing these standards will be demonstrated.

**Monday, 6/26**

**12:15 - 2:15 PM**

### **PEP M1 Advanced MARSSIM Topics**

*Eric Albequist*

*Oak Ridge Institute for Science and Education*

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

The final status survey design discussion in this course will include examples of how multiple radionuclide contaminants are handled for both building surfaces and land areas. The strategies for designing surveys when multiple radionuclides are present employ the use of surrogate radionuclides, determination of gross activity DCGLs, and application of the unity rule. One of the more challenging aspects of MARSSIM survey design arises when multiple radionuclides are present in Class 1 survey units. In this situation, the MARSSIM user must assess both the

instrument scan MDC and DCGLEMC for the multiple radionuclides present. Final status survey strategies for determining the need for additional soil samples in Class 1 survey units when multiple radionuclides are present will be discussed.

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

### **PEP M2 Radiation Detection for Homeland Security, including Detectors and Algorithms and Such**

*James Ely*

*Pacific Northwest National Laboratory*

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

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

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

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

### **PEP M3 Developments in Radiation Litigation**

**Doug Poland**

**LaFollette Godfrey & Kahn**

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

### **PEP M4 Red Bead Experiment**

**Steve Prevette**

**Fluor Hanford Inc.**

The "Red Bead Experiment" was an interactive teaching tool that Dr. Deming made use of in his four-day seminars. In the experiment, a corporation is formed from "willing workers", quality control personnel, a data recorder, and a foreman. The corporation's product is white beads, which are produced by dipping a paddle into a supply of beads. The paddle has 50 holes in it, and each hole will hold one bead. Unfortunately, there are not only white beads in the bead supply, but some defective red beads. The production of the beads is strictly controlled by an approved procedure. Various techniques are used to ensure a quality (no red bead) product. There are quality control inspectors, feedback to the workers, merit pay for superior performance, performance appraisals, procedure compliance, posters and quality programs. The foreman, quality control, and the workers all put forth their best efforts to produce a quality product. The experiment allows the demonstration of the effectiveness (or ineffectiveness) of the various methods. Some humor is also included along the way. Describing the Red Bead Experiment has all the dangers of writing a good movie review. One does not want to give out the complete plot line in the description. Suffice it to say that at the end of the experiment, a Statistical Process Control chart is utilized to examine the results of the experiment. What is discovered is that several of the actions taken (which are commonly seen every day in the workplace) were detrimental to the employees and the workplace, and had no improving effect on the process. The concluding comments point out the hazards of misuse of performance data, and how to properly use performance data in a quality environment in order to achieve continual improvement. At Department of Energy presentations, the Red Bead experience is reviewed in the

context of the Guiding Principles and Core Functions of the Integrated Environment, Safety and Health Management System (ISMS).

### **PEP M5 Skin Dosimetry and Varskin 3**

**James Durham**

**Center for Nuclear Waste Regulatory Analyses,  
Southwest Research Institute**

The skin is the primary target organ during personnel contamination events. In August 2004, an upgraded computer code for modeling the dose to skin from skin contamination was released. Varskin 3 Version 2.2 was written for the US Nuclear Regulatory Commission in FORTRAN and Visual Basic. Several errors were discovered in Version 2.2 that have since been corrected in Version 3.0. The Windows-based code models both infinitely-thin and particulate sources either directly on the skin or on a cover material such as protective clothing. Adding radionuclides to the Varskin 3 library has been greatly simplified, and data entry is accomplished on a single screen. This presentation will discuss the biological effects of radiation on skin at both high and low doses and will provide a demonstration of Varskin 3 with hands-on examples. Attendees will receive an instructional version of Varskin 3 Version 3.0 and electronic copies of the Users Manual and QA documentation.

**Tuesday, 6/27**

**12:15 - 2:15 PM**

### **PEP T1 Public Health Response to a Nuclear/ Radiological Emergency**

**Armin Ansari**

**Centers for Disease Control and Prevention**

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

### **PEP T2 Shielding Design for PET and PET/CT Clinics**

**Robert Metzger**

**Radiation Safety Engineering**

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

In this PEP, the function and typical layouts for PET or

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

### **PEP T3 The Scientific Basis of Dose Reconstruction**

*Dick Toohey*

*Oak Ridge Associated Universities*

This presentation will begin with a 30-minute overview and update of the NIOSH dose reconstruction project for claims under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). The remainder of the presentation will identify the scientific issues involved in dose reconstruction, and how they have been addressed for EEOICPA claims. One hundred and eighty seven issues were identified by a comprehensive review of the literature, other dose reconstruction programs, NIOSH project documents, worker input, internal audits, Advisory Board comments, and findings of the Advisory Board's independent oversight contractor. Issues could be divided into three broad categories: data issues, dosimetry issues, and compensation issues, which account for 12%, 74%, and 14% of the total, respectively. Not surprisingly, half of the dosimetry issues were related to internal dose estimates.

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

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

### **PEP T4 Leading with Leading Indicators**

*Steve Prevette*

*Fluor Hanford Inc.*

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

Leadership, Leading Indicators, statistical methodology, and worker-supervisor teaming are playing a key role in safety and quality at what has been called the world's largest environmental cleanup project. The U.S. Department of Energy's (DOE) Hanford Site played a pivotal role in the nation's defense beginning in the 1940s when it was established as part of the Manhattan Project. After more than 50 years of producing nuclear weapons Hanford, which covers 580 square miles in southeastern Washington state, is now focused on three outcomes:

1. Restoring the Columbia River corridor for multiple uses.

2. Transitioning the central plateau to support long-term waste management.

3. Putting DOE assets to work for the future.

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

### **PEP T5 Uncertainty Assessment in Atmospheric Dispersion Computations**

*Erno Sajo*

*Louisiana State University*

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

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

**J. Stewart Bland**

**Chesapeake Nuclear Services, Inc.**

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

**PEP W2 Detection, Measurement, and Decision**

**Joe Alvarez**

**Auxier & Associates**

Making a decision requires asking a question then collecting enough data to support the decision. Measurement (collecting enough data) is a quantitative process while detection is generally considered qualitative. Clear decisions require quantitative data beyond the region of Type I and Type II errors. While detection may be described as optimizing the region of error, quantitative measurement is data with the smallest amount of error. Decision is not as fundamental as either detection or measurement, but includes value-based weighting of data. Decision, therefore, requires prior investigation of outcomes considering the cost and consequences of wrong decisions. For this reason decision theory incorporates Bayesian probability theory.

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

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

**PEP W3 Principles of Physical Security for Radioactive Sources**

**John Pelletier**

**NNSA DOE (Sandia)**

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

**PEP W4 RDD/IND Awareness Training for First Responders**

**Ken Groves**

**DOE-National Nuclear Security Administration**

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

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

**PEP W5 New Homeland Security Instrument Performance Standards**

**Michelle Johnson**

**Pacific Northwest National Laboratory**

During this course, participants will become familiar with instrument performance standards recently developed to address performance requirements for instrumentation used by Department of Homeland Security. Two of the four standards recently developed will be discussed: ANSI N42.32, American National Standard Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security and ANSI N42.33, American National Standard for Portable Radiation Detection Instrumentation for Homeland Security. The presenter will spend time discussing test methods used to evaluate an instrument performance against the criteria in the standards. Individuals interested in developing a deeper understanding of the requirements in these standards and in how instruments are evaluated will benefit from attending the course.





## Continuing Education Lectures

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

*Included in Registration Fee*

**Monday** 7:00-8:00 AM

### **CEL1 The High Background Radiation Area in Ramsar Iran**

*Andy Karam*

*Rochester Institute of Technology*

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

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

*Rick Whitman*

*US Customs and Border Protection*

The historical first mission of US Customs Service, from 1789 to 2003, was to protect the interests of the nation by collecting tariffs and duties, protecting trade and health screenings of immigrants. Over time, the mission grew to include the detection of contraband. In March 2003, as part of the creation of the Department of Homeland Security, the US Customs Service was reorganized into US Customs and Border Protection (CBP). The number of employees grew as substantial portions of the Immigration and Naturalization Service and the US Department of Agriculture were merged into the old US Customs Service. Also added, but maintaining its historical uniforms and mission, was the US Border Patrol.

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

**Tuesday** 7:00-8:00 AM

### **CEL3 The Lions, Rhinos and Reactors of South Africa**

*Dave Allard*

*Pennsylvania Dept. of Environmental Protection  
Bureau of Radiation Protection*

This presentation is an overview of a recent trip to South Africa by the author and his wife. The technical portion of the talk will cover an introduction to the past and current nuclear programs in the country, including their con-

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

### **CEL4 Internal Dose Issues in Pregnancy**

*Mike Stabin*

*Vanderbilt University*

The radiosensitivity of the developing embryo and fetus presents unique problems in the protection of pregnant workers and the pregnant medical patient. This CE will review current models and methods for radiation dose calculations to the embryo and fetus from radioactive materials incorporated into the body and give an overview of current practice and knowledge in this area. For workers, a review of international practices on approaches to the protection of pregnant workers and their offspring will be given. For nuclear medicine patients, available dose estimates for a number of important radiopharmaceuticals will be studied, and particular problems related to fetal dosimetry (e.g. fetal thyroid uptake of radioiodines) will also be discussed. A brief overview of current knowledge on radiation effects on the embryo and fetus will also be provided.

**Wednesday** 7:00-8:00 AM

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

*Lanka Venkata*

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

To perform internal dose calculations, the nuclear medicine assumes uniform distribution in an organ, sub-organ or tissue levels. It calculates the mean absorbed dose. The calculations involve energy emitted per radioactive decay, the fraction of the energy absorbed in various tissues/organs and the effective half-life and predicts the biological response. From a review of recent research arti-

cles, it is evident that the administered radiopharmaceuticals are distributed non-uniformly in tissue. Although, it appears that the radiopharmaceuticals uniformly distribute through out the tissue at the macroscopic level, at a closer look at the cellular level (microscopic level) shows that the radiopharmaceuticals distribute non-uniformly. The mean absorbed dose to a tissue element is no more suitable to predict biologic effect due to the non-uniform distribution. Since the average absorbed dose to the kidneys using single-region dosimetric model can misrepresent the dose to local substructures of the kidney, the MIRD committee of the Nuclear Medicine developed a MIRD pamphlet No. 19 entitled "Absorbed Fractions and Radionuclide S values for six Age-Dependent Multiregion Models of the Kidney," to address this issue. In addition, the bystander effects should also be considered to accommodate the non-uniform distribution of radiopharmaceuticals. This presentation will review various aspects of uniform and non-uniform distributions in tissue and overall consideration to look into the basis for radiation therapy and radiation protection.

#### **CEL6 Saxton Nuclear Reactor Decommissioning** **Rodger Granlund**

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

**Thursday**

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

#### **CEL7 Medical Triage and Management of Radiation Terrorism Events**

**Ronald E. Goans**  
**MJW Corporation**

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

#### **CEL8 Induction, Repair and Biological Consequences of Clustered DNA Lesions**

**Rob Stewart**  
**Purdue University School of Health Sciences**

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

# Health Physics Society's 51st Annual Meeting June 25-29, 2006 - Providence, Rhode Island

<b>CHP?</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<b>NRRT?</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**HPS Member Number:** hps \_\_\_\_\_

Name for badge: (First) \_\_\_\_\_ (Last) \_\_\_\_\_ (Nickname) \_\_\_\_\_

Affiliation (for badge) (limit to 18 characters and spaces): \_\_\_\_\_

Address (for confirmation): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip/Postal Code: \_\_\_\_\_

Phone: \_\_\_\_\_ FAX: \_\_\_\_\_

Email: \_\_\_\_\_ If Registering - Companion Name: \_\_\_\_\_

**REGISTRATION FEES:** (Mark Appropriate Boxes)

- |   |        |        |
|---|--------|--------|
| <input type="checkbox"/> HPS Member (Sun. Reception, Mon. Lunch, Tues. Awards Dinner)   | \$425  |        |
| <input type="checkbox"/> Non-Member (Sun. Reception, Mon. Lunch, Tues. Awards Dinner)   |        | \$495* |
| <input type="checkbox"/> Student (Sun./Student Receptions, Mon. Lunch, Tues. Awards Dinner)   | \$ 60  |        |
| <input type="checkbox"/> One-Day Registration <input type="checkbox"/> Mon/ <input type="checkbox"/> Tues/ <input type="checkbox"/> Wed/ <input type="checkbox"/> Thurs | \$225  |        |
| <input type="checkbox"/> HPS Emeritus Member (Sun. Reception, Mon. lunch, Tues. Awards Dinner)  | No Fee |        |
| <input type="checkbox"/> HPS PEP Lecturer (Sun. Reception, Mon. lunch, Tues. Awards Dinner)   | No Fee |        |
| <input type="checkbox"/> Companion (Sun. Reception, Mon.-Wed. Continental Breakfast & pm snacks)  | \$ 55  |        |
| <input type="checkbox"/> Exhibition ONLY (Exhibit Hall Badge)   | \$ 25  |        |
| <input type="checkbox"/> Exhibitor (Two Per Booth)  | No Fee |        |
| <input type="checkbox"/> Additional Tues. Awards Dinner Ticket(s) # of Tickets _____  | \$ 60  |        |
| <input type="checkbox"/> AAHP Awards Lunch Ticket(s) (Tues.) '05 NEW CHP Check if attending   | Free   |        |
| <input type="checkbox"/> AAHP Awards Lunch Ticket(s) (Tues.) CHP other than above   | \$ 10  |        |
| <input type="checkbox"/> AAHP Awards Lunch Ticket(s) (Tues.) Guest  | \$ 15  |        |

\*Includes Associate Membership for year 2006 - *FIRST TIME MEMBERS ONLY*

**Would you like your name included on the Attendee List?**  Yes  No

**SOCIAL PROGRAM:**

	Preregistration Fees	On-Site Fees	Total
<input type="checkbox"/> Foxwoods Casino <b>CANCELLED</b>			
<input type="checkbox"/> Historic Providence (Sunday, 6/25)	# of Tickets _____ X \$34	# of Tickets _____ X \$39	
<input type="checkbox"/> Mohegan Sun Casino <b>CANCELLED</b>			
<input type="checkbox"/> Historic Providence (Monday, 6/26)	# of Tickets _____ X \$34	# of Tickets _____ X \$39	
<input type="checkbox"/> Sakonnet Vineyards (Monday, 6/26)	# of Tickets _____ X \$58	# of Tickets _____ X \$63	
<input type="checkbox"/> Mystic, Connecticut (Monday, 6/26)	# of Tickets _____ X \$30	# of Tickets _____ X \$35	
<input type="checkbox"/> Annual HPS 5K Run/Walk (Tues, 6/27) Shirt Size: S <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/> XL	# of Tickets _____ X \$25	# of Tickets _____ X \$30	
<input type="checkbox"/> Coastal Rhode Island's Lighthouses (Tuesday, 6/27)	# of Tickets _____ X \$60	# of Tickets _____ X \$65	
<input type="checkbox"/> Newport, America's First Resort (Wednesday, 6/28)	# of Tickets _____ X \$68	# of Tickets _____ X \$73	
<input type="checkbox"/> Night Out Ballgame (Wednesday, 6/28)	# of Tickets _____ X \$35	# of Tickets _____ X \$40	
<input type="checkbox"/> Night Out Dinner Cruise (Wednesday, 6/28)	# of Tickets _____ X \$45	# of Tickets _____ X \$50	
<input type="checkbox"/> Downcity Alive (Thursday, 6/29)	# of Tickets _____ X \$29	# of Tickets _____ X \$34	

**TECHNICAL TOURS:**

<input type="checkbox"/> Rhode Island Hospital Gamma Knife (Monday, 6/26)	# of Tickets _____ X \$10	# of Tickets _____ X \$15	
<input type="checkbox"/> Juliett 484 Russian Submarine Tour (Tuesday, 6/27) - Adult	# of Tickets _____ X \$12	# of Tickets _____ X \$17	
<input type="checkbox"/> Juliett 484 Russian Submarine Tour (Tuesday, 6/27) - Child 6-17	# of Tickets _____ X \$9	# of Tickets _____ X \$14	
<input type="checkbox"/> Brown Univ "Magic and Mystery of Physics" (Tuesday, 6/27)	# of Tickets _____ X \$15	# of Tickets _____ X \$20	
<input type="checkbox"/> MIT Reactor, Magnet Lab, Plasma Sci Fusion Ctr (Wed, 6/28)	# of Tickets _____ X \$27	# of Tickets _____ X \$32	
<input type="checkbox"/> Woods Hole Oceanographic Institute (Thursday, 6/29)	# of Tickets _____ X \$32	# of Tickets _____ X \$37	

**PAYMENT INFORMATION - Government Requisitions are accepted for registration, however Purchase Orders are NOT accepted for PEP, AAHP, Social/Technical Tour Registration. HPS TAX ID # 04-6050367**

**Check Payment:** Health Physics Society, 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101

VISA  MasterCard  American Express  Discover

Card Number: \_\_\_\_\_ Exp. Date: \_\_\_\_\_

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**Please see AAHP/PEP Registration form and Disabilities information on following page**

<b>Registration Section Total</b>	\$ _____
<b>Social Program/Technical Tours Total</b>	\$ _____
<b>AAHP/PEP Total (From Back of Form)</b>	\$ _____
<b>TOTAL FEES ENCLOSED</b>	\$ _____

Your Housing while in Providence: \_\_\_\_\_ Name: \_\_\_\_\_

**DISABILITIES:** The Annual Meeting is accessible to persons with disabilities. Please specify assistance required and a HPS representative will contact you. \_\_\_\_\_

**AAHP COURSES: Saturday, 6/24 - 8:00 AM - 5:00 PM**

- Course 1 - Introduction to Practical Monte Carlo Simulation for Health Physicists. *A. Hodgdon, J. Yanch* \$175.00
- Course 2 - Security Enhancement for Radiological Facilities and... *J.P. Grimm, G. Tittermore, M.S. Soo Hoo* \$175.00
- Course 3 - HPS Lab Accreditation Program and Technical Auditing. *K. Swinth, S. Keith, C. Gogolak, T. Slowey* \$175.00

**PROFESSIONAL ENRICHMENT PROGRAM:**

**Sunday, 6/25 8:00 - 10:00 AM**

- 1A Internal Dosimetry - Harmony in Concepts and Units. *M. Stabin*
- 1B The Health Physicist as an Expert Witness: The Daubert Procedure. *R. Johnson*
- 1C Calculating and Reporting Fetal Radiation Exposure. *A. Karam*
- 1D Radiation Detection Instrumentation: A View Of The Past, Present And Future. *M. Cox*
- 1E Brain-Based Learning – Part A, New Approaches for Effective Radiation Safety.... *R. Johnson*
- 1F Critical Decision and Tools for First-Time and Experienced Managers...*J. Hylko*
- 1G EH&S “Boot Camp” for University and Hospital Radiation Safety Prof... *B. Emery*
- 1H Technical Auditing for Health Physicists. *S. Keith, S. Schwahn, K. Swinth*

**Sunday, 8:00-10:00 AM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

**Sunday, 6/25 10:30 AM - 12:30 PM**

- 2A Fundamentals of Neutron Detection and Detection Systems. *J. Chapman*
- 2B Changes in Natural Background Radiation Levels over the History of Life. *A. Karam*
- 2C Gamma Spec. *D. Van Cleef, D. Upp, C. Maddigan*
- 2D Radiation Detection Instrumentation 2: A Review of Current Relevant Standards. *M. Cox*
- 2E Brain-Based Learning – Part B, New Approaches for Effective... *R. Johnson*
- 2F Particle Size and Pulmonary Hazard. *H. Cember*
- 2G EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals. *B. Emery*
- 2H HPS Laboratory Accreditation Program Assessor Training. *K. Swinth*

**Sunday, 10:30 AM-12:30 PM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

**Sunday, 6/25 2:00 - 4:00 PM**

- 3A The Role of Health Physicists in Various Types of Radiation Litigation. *L. McKay*
- 3B Non-ionizing Radiation: An Overview of Biological Effects and Exposure Limits. *B. Edwards*
- 3C Alpha Spec. *D. Van Cleef, D. Upp, C. Maddigan*
- 3D Power Lines and Politics. *T. Johnson*
- 3E Infrastructure Issues for Planning Response and Recovery from... *D. Strom, E. Hickey*
- 3F Characterization of Radioactive Materials for Transportation. *S. Austin*
- 3G EH&S “Boot Camp” for University and Hospital Radiation Safety Professionals. *B. Emery*
- 3H Introduction to Uncertainty Calculation. *C. Gogolak, S. Keith*

**Sunday, 2:00-4:00 PM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

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

- M1 Advanced MARSSIM Topics. *E. Albequist*
- M2 Radiation Detection for Homeland Security, including Detectors and Algorithms.... *J. Ely*
- M3 Developments in Radiation Litigation. *D. Poland*
- M4 Red Bead Experiment. *S. Prevette*
- M5 Skin Dosimetry and Varskin 3. *J. Durham*

**Monday, 12:15-2:15 PM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

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

- T1 Public Health Response to a Nuclear/Radiological Emergency. *A. Ansari*
- T2 Shielding Design for PET and PET/CT Clinics. *R. Metzger*
- T3 The Scientific Basis of Dose Reconstruction. *D. Toohey*
- T4 Leading with Leading Indicators. *S. Prevette*
- T5 Uncertainty Assessment in Atmospheric Dispersion Computations. *E. Sajo*

**Tuesday, 12:15-2:15 PM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

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

- W1 ALARA for Radioactive Effluents: Regulatory History and Application...*J.S. Bland*
- W2 Detection, Measurement, and Decision. *J. Alvarez*
- W3 Principles of Physical Security for Radioactive Sources. *J. Pelletier*
- W4 RDD/IND Awareness Training for First Responders. *K. Groves*
- W5 New Homeland Security Instrument Performance Standards. *M. Johnson*

**Wednesday, 12:15-2:15 PM**  
 \_\_\_/\_\_\_/\_\_\_ = \$60.00  
 1st 2nd 3rd  
 Yes, stand by list

Are you interested in being a Mentor at the meeting?  Yes  No  
 Are you interested in working with a Mentor at the meeting?  Yes  No

AAHP Total \$ \_\_\_\_\_

PEP Total \$ \_\_\_\_\_

**AAHP/PEP Total \$ \_\_\_\_\_**

**(Transfer this total to previous page)**

If FAXing registration form, (703) 790-2672  
 please do not mail the original.