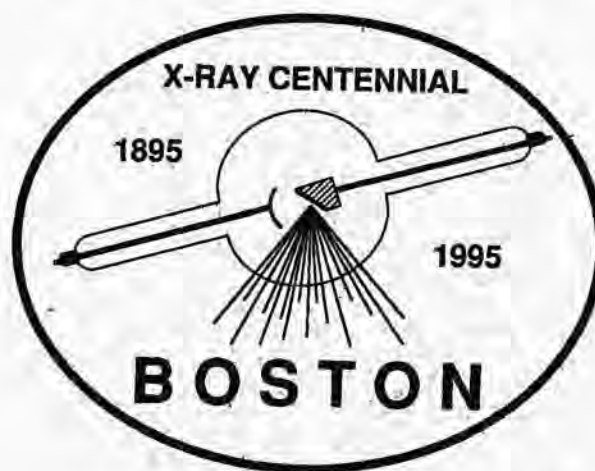


*Joint Annual Meeting of  
The Health Physics Society and  
The American Association of Physicists in Medicine*



**Final Program**

**Health Physics Society**

**40th Annual Meeting**

**July 23-27, 1995**

**Boston, Massachusetts**

**HPS Secretariat**  
1313 Dolley Madison Blvd.  
Suite 402  
McLean, VA 22101  
(703)-790-1745  
FAX: (703)-790-2672  
E-Mail: hpsburkmt@aol.com

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## Registration Hours

Saturday, July 22 .....	3:00 - 6:00 pm
Sunday, July 23 .....	7:30 am - 8:00 pm
Monday, July 24 .....	8:00 am - 6:00 pm
Tuesday, July 25 .....	8:00 am - 5:00 pm
Wednesday, July 26 .....	8:00 am - 3:00 pm
Thursday, July 27 .....	8:00 am - Noon

## Affiliates Program

Monday, July 24 .....	8:30 am-5:30 pm
Tuesday, July 25 .....	9:30 am - 5:30 pm
Wednesday, July 26 .....	9:30 am - 4:00 pm

### **1995 Program Committee**

#### **William J. Fields, Jr., Chair**

A. John Ahlquist  
Janelle S. Braun  
Dennis O. Dumas  
Lynne A. Fairbent  
Kenneth R. Kase  
Phillip D. Kearney  
Karen S. Langley  
Melvin R. Sikov

### **Officers**

MARVIN GOLDMAN, President  
WILLIAM A. MILLS, President-Elect  
KEITH H. DINGER, Treasurer  
RAYMOND H. JOHNSON, JR., Secretary  
RAYMOND H. JOHNSON, JR., Treasurer-Elect  
RAYMOND A. GUILMETTE, Secretary-Elect  
RICHARD J. BURK, JR., Executive Secretary

### **Board of Directors**

#### **Marvin Goldman, Chair**

E. Theodore Agard  
Thomas B. Borak  
Gloria E. Chavez  
Keith H. Dinger  
Brian Dodd  
John R. Frazier  
Raymond A. Guilmette  
Raymond H. Johnson, Jr.  
Kimberlee J. Kearfott  
William A. Mills  
Kenneth L. Mossman  
Charles E. Roessler  
Leon West  
Charles A. Willis

### **Advisory Panel to the Board of Directors**

John P. Corley, Parliamentarian  
Richard J. Burk, Jr., Executive Secretary  
William J. Fields, Program Chair  
David J. Allard, Local Arrangements Co-chair  
Gerald L. Fallon, Local Arrangements Co-chair  
Kenneth L. Miller, Editor-in-Chief of  
*Health Physics*  
Genevieve S. Roessler, Editor of HPS Newsletter  
Robert E. Alexander, Presidents Emeritus Chair

### **Past Presidents**

1955-1956 K. Z. Morgan (*Protempore*)  
1956-1957 K. Z. Morgan  
1957-1958 F. P. Cowan  
1958-1959 L. S. Taylor  
1959-1960 E. E. Anderson  
1960-1961 J. S. Laughlin

1961-1962 W. D. Claus  
1962-1963 C. M. Patterson  
1963-1964 W. T. Harn, Jr.  
1964-1965 H. L. Andrews  
1965-1966 M. Eisenbud  
1966-1967 J. R. Horan  
1967-1968 W. S. Snyder  
1968-1969 W. H. Langham  
1969-1970 J. N. Stannard  
1970-1971 C. C. Palmiter  
1971-1972 D. W. Moeller  
1972-1973 R. D. Evans  
1973-1974 N. Wald  
1974-1975 J. C. Hart  
1975-1976 P. L. Ziemer  
1976-1977 J. C. Villforth  
1977-1978 J. A. Auxier  
1978-1979 C. M. Unruh  
1979-1980 M. W. Carter  
1980-1981 W. C. Reinig  
1981-1982 C. B. Meinhold  
1982-1983 R. J. Cloutier  
1983-1984 B. L. Rich  
1984-1985 W. J. Bair  
1985-1986 J. E. Watson, Jr.  
1986-1987 J. W. Poston  
1987-1988 D. A. Waite  
1988-1989 R. E. Alexander  
1989-1990 R. L. Kathren  
1990-1991 G. S. Roessler  
1991-1992 F. X. Massé  
1992-1993 K. J. Schiager  
1993-1994 K. L. Mossman

### **Local Arrangements Committee**

David J. Allard, Co-chair  
Gerald L. Fallon, Co-chair  
Danielle Bodley - Hospitality  
Susan Burrill - Hospitality  
Vince Chase - Publicity  
Jim Cherniack - A/V and Students  
Warren Church - SK Race  
Ed Cumming - PEP Courses  
Keith Dinger - Summer School  
Christian Doyle - Affiliates Liaison  
Bill Dundulis - Floor Logistics

Mitch Galanek - 5K Race  
 Donald Haes - Golf Tournament  
 Rich Liberace - A/V and Students  
 Rusty Lorenzen - Centennial Night  
 Edward Maher - Centennial Night  
 Constantine Maletskos - Summer School  
 Chris Martel - Golf Tournament  
 Alex Nazarali - Floor Logistics  
 Thomas O'Connell - Hospitality Suite  
 Dennis O'Dowd - Publicity  
 Judi Reilly - Social and Technical Tours  
 Mardi Sawyer - Social Tours  
 Bob Scott - Hotel/Catering

### Registration Fees and Hours

Classification	Pre-Reg.	On-Site
*Member	\$185.00	\$245.00
*Non-Member	\$260.00**	\$320.00**
☞ Student	\$ 40.00	\$ 40.00
☞ Companion	\$ 45.00	\$ 45.00
Exhibits only	\$ 25.00	\$ 25.00
Exhibitor (2/Booth)	No Fee	No Fee
● Member, 1 Day	n/a	\$125.00
● Non-Member, 1 Day	n/a	\$135.00
● Student, 1 Day	n/a	\$ 25.00
Add'l. Awards Luncheon Tickets		\$ 35.00
Add'l Centennial Night Tickets		\$25.00

All registrations except one day include Tuesday Centennial Night

\* Includes Sunday Reception and Thursday Awards Luncheon

☞ Includes Sunday and Student Receptions, Thursday Awards Luncheon

☞ Includes Sunday Reception

● Includes Sessions and Exhibitions ONLY

\*\* \$65 of fee applicable towards NEW HPS Membership if Completed Application is submitted by September 22, 1995

### Registration Hours

Saturday, 22 July	3:00 - 6:00 PM
Sunday, 23 July	7:30 AM - 8:00 PM
Monday, 24 July	8:00 AM - 6:00 PM
Tuesday, 25 July	8:00 AM - 5:00 PM

Wednesday, 26 July 8:00 AM - 3:00 PM  
 Thursday, 27 July 8:00 AM - Noon

### Information

#### Speaker Instructions

You will be allotted a total of 12 minutes unless you have been notified otherwise.

The **Ready Room** (Room 301) will be open Sunday from 1:30 - 3:30 pm, Monday from 8:30 - 11:00 am and 1:00 - 4:00 pm, Tuesday from 8:00 - 10:30 am and 1:00 - 4:00 pm and Wednesday from 8:00 - 10:30 am and 1:00 - 3:30 pm. Slides are to be brought to the designated ready room for loading and previewing at the time indicated below:

Presentation Time	Delivery Deadline
Monday morning	1:30 - 3:30 pm Sunday
Monday afternoon	8:30 - 11:00 am Monday
Tuesday morning	1:00 - 4:00 pm Monday
Tuesday afternoon	8:00 - 10:30 am Tuesday
Wednesday morning	1:00 - 4:00 pm Tuesday
Wednesday afternoon	8:00 - 10:30 am Wed.
Thursday morning	1:00 - 3:30 pm Wed.

Please meet with your session chairs in the meeting room where your paper will be presented 15 minutes before the beginning of the Session.

#### Placement Service

**Placement Service** listings will be posted in the Room 101, with hours from 8:00 am to 5:00 pm, Monday through Wednesday, and 8:00 am - noon on Thursday. Interviews may be conducted in the designated areas of the Placement Center.

#### Business Meeting

The **Annual Business Meeting** will be convened at 5:30 pm on Wednesday, July 26, in Room 309.

#### Awards Luncheon

The **Awards Luncheon** will be held from 12:30 - 2:30 pm on Thursday, July 27, in the Sheraton Hotel Grand Ballroom. The following awards are to be presented:

**Elda E. Anderson Award**

Kathryn A. Higley

**Distinguished Scientific Achievement Award**

Keith F. Eckerman

Robert G. Thomas

#### Distinguished Scientific Achievement Award Memorialization

Ralph Fairchild

#### Fellow Class Awards

Roger C. Brown Joseph C. McDonald

Robert J. Feinberg Eugene L. Saenger

Jack C. Greene Norman R. Sunderland

Gail A. Magenis

#### Student Awards

To Be Announced

The following menu has been selected for the Awards Luncheon:

Appetizer Salad  
 Grilled Chicken and Shrimp With  
 Fusili Pasta, Sundried Tomatoes, Shiitake  
 Mushrooms and a Julienne of Vegetables  
 Served in Saffron Cream and Tomato Basil Sauce  
 Chef's Selection of Seasonal Vegetables  
 Rolls and Butter  
 Boston Creme Pie

If you have any dietary restrictions, please notify the HPS registration desk.

#### Spouse/Companion Hospitality Suite

The Hospitality Suite (The Boylston Street Cafe, Sheraton) will open at Noon-5:00 pm on Sunday, July 23, Monday through Wednesday, July 24-26 from 7:30 am-3:30 pm and Thursday, July 27 from 7:30 am-Noon. Morning and afternoon refreshments will be served on a cash basis. The suite will be a place to mingle, receive and leave messages and gather information on the many attractions to enjoy in Boston and the surrounding area. There will be a complimentary Continental Breakfast Monday morning for all registered Companions, which will feature a safety and orientation to Boston presentation.

### Future HPS Annual Meetings

41st	July 21-25, 1996	Seattle
42nd	June 29-July 3, 1997	San Antonio
43rd	July 12-16, 1998	Minneapolis

### Future HPS Midyear Topical Meetings

29th	January 7-10, 1996
	Scottsdale, Arizona
Topic:	NARM Regulation and Risk Assessment
30th	January 5-8, 1997
	San Jose, California

### Future IRPA Congress

IX	April 14-19, 1996	Vienna
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### NOTES

1. If the presenter is not the first author listed, the name of the presenter is underlined. This is true for poster presentations as well as for slide presentations.
2. Guide to session designations:  
 MAM Sessions Monday Morning  
 MPM Sessions Monday Afternoon  
 TAM Sessions Tuesday Morning  
 TPM Sessions Tuesday Afternoon  
 WAM Sessions Wednesday Morning  
 WPM Sessions Wednesday Afternoon  
 THAM Sessions Thursday Morning
3. Each paper has been given a designation corresponding to the session designation in which it will be presented. Abstracts also have these numbers.
4. Coffee breaks Monday, Tuesday and Wednesday will be in the Exhibit Hall. The breaks on Thursday will be outside the session rooms.
5. There will be **NO SMOKING** in the session rooms.
6. The telephone number for messages at the Boston Sheraton Hotel & Towers is: (617) 236-2000. The Hynes Center number is (617) 954-2700.
7. The HPS Secretariat address and phone numbers are as follows:

1313 Dolley Madison Blvd.  
 Suite 402  
 McLean, VA 22101  
 (703) 790-1745  
 FAX: (703) 790-2672  
 E-Mail: hpsburkmg@aol.com



## G. William Morgan Trust Fund

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

G. William Morgan was a Charter member of the Society and during the Society's early years a very active member. Bill began his health physics career at Oak Ridge National Laboratory as part of the Manhattan Project. He later joined the Atomic Energy Commission and was instrumental in the development of the initial regulations that became part of 10CFR20. He was a great champion of education and helped establish the AEC Health Physics Fellowship Program. Bill later became very successful in the real estate business, but always retained his interest in the health physics profession. The Society's Presidents Emeritus Committee has responsibility for the selection of the international expert who will be supported by the G. William Morgan Trust Fund.

*The Health Physics Society gratefully acknowledges the unsolicited contribution by Canberra in celebration of their 30th Anniversary*

## Activities and Tours

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

### Sunday, July 23

Boston Highlights	1:00-4:30 PM
Opening Reception	6:00-7:30 PM

### Monday, July 24

Hospitality Suite "Mixer"	9:00-10:00 AM
Boston Duck Tour	10:30 AM-12:30 PM
Walking Tour	1:30-4:30 PM

### Tuesday, July 25

5K Run/Walk	6:00-8:30 AM
Lexington & Concord Tour	9:00 AM-12:30 PM
Charles River/Boston Harbor	1:30-4:30 PM
Centennial Night	5:30-11:00 PM

### Wednesday, July 26

Golf Tournament	5:30 AM-3:00 PM
Harvard U/Cambridge Tour	8:30 AM-12:30 PM
Salem & Marblehead Tour	9:00 AM-5:00 PM

### Thursday, July 27

L. L. Bean Tour	9:00 AM-6:00 PM
Awards Luncheon	12:30-2:30 PM

### Friday, July 28

MIT Technical Tour	8:30 AM-5:30 PM
Whale Watch	11:00 AM-6:30 PM

## New This Year

**Sunday, July 23** there will be a joint session from 4:00-5:45 pm featuring three Hartman Orator lectures. The following speakers have been chosen and will make the presentations listed below:

*Introduced by John Laughlin:*

- **Wilhelm Conrad Roentgen.** *Gail D. Adams; University of Oklahoma (retired)*

*Introduced by J. Newell Stannard:*

- **Radioactivity: Conception to Birth.** *Paul W. Frame; Oak Ridge Institute for Science and Education*

*Introduced by Paul L. Ziemer:*

- **Pathway to a Paradigm: The Linear Non-threshold Dose Response Model in Historical Context.** *Ronald L. Kathren; Washington State University*

### Welcome Reception

The HPS Welcome Reception will follow the Hartman Orator lectures in the Sheraton Hotel, Grand Ballroom from 6:00-7:30 pm.

### Professional Enrichment Program

On **Sunday, July 23** there will be a series of thirty courses offered. The courses will be offered in two hour times blocks as noted, 8:00-10:00 am, 10:30 am-12:30 pm and 1:30-3:30 pm. In addition to the Sunday courses there will be six lectures scheduled on **Monday, Tuesday** and **Wednesday** from 12:15-2:15 pm. There

will also be three **Thursday** afternoon courses from 2:30-4:30 pm.

**Monday, July 24** the exhibit hall will open featuring a complimentary continental breakfast for registered attendees. Make plans to stop by the exhibit hall between 8:30-10:00 am on your way to the Plenary Session.

Also featured this year in the exhibit hall will be many historical artifacts from the Oak Ridge Museum. Stop by booths 527-537 and 626-634 for this special exhibit.

### HPS Registration

Your HPS registration fees give you access to either HPS or AAPM sessions and either of the exhibit halls.

In lieu of an Exhibitor's Reception this year, the Exhibit Hall will feature upgraded Coffee Breaks. Stop by the exhibit hall each break and enjoy the extra goodies you will find. Don't forget to thank our exhibitors for their support.

### Centennial Night at the Museum of Science

Plan to attend the **Tuesday, July 25** night at the Museum of Science. This event, included in your registration fee, will be a night to remember. The Museum will be open exclusively for HPS attendees. At the Museum complimentary dessert and coffee will be served. Shuttle busses will provide transportation.

## Plenary Session Schedule - Monday, July 24 - 10:00 am

10:00 am William J. H. Andrewes, *David Wheatland Curator; Harvard University Collection of Historical Scientific Instruments*

10:05 am Opening Remarks by HPS President, Marvin Goldman and AAPM President, Guy Simmons

10:20 am **HPS Morgan Lecturer:** Radiation Protection in Retrospect and in Prospect. *J. Newell Stannard*

10:55 am **AAPM President's Symposium:** The Increasing Importance of the Medical Radiation Physicist in Radiation Oncology. *E. McCullough; Mayo Clinic, Rochester, MN*

11:30 am **AAPM President's Symposium:** The Power of Discovery: The Centennial of Physics in Medicine. *G. Fullerton, University of Texas, San Antonio*

## Health Physics Society Committee Meetings

All Committee Meetings will be held in the Sheraton Hotel unless otherwise noted

*Saturday, July 22, 1995*

### FINANCE COMMITTEE

8:00 am - Noon *Boardroom*

### NRRT

8:30 am - 4:30 pm *Independence East*

### RULES COMMITTEE

9:00 am - 2:00 pm *Exeter B*

### AMERICAN BOARD OF HEALTH PHYSICS

#### - BOARD OF DIRECTORS

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

### CHAMMP USERS GROUP

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

### DOELAP WRITING GROUP

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

### CONTINUING EDUCATION COMMITTEE

12:30 - 6:00 pm *Clarendon A*

### SYMPOSIA COMMITTEE

1:00 - 5:00 pm *Clarendon B*

### HPS BOARD OF DIRECTORS

2:00 - 6:00 pm *Independence Ctr & West*

### HPS EDITORIAL BOARD

3:00 - 6:00 pm *Jefferson*

*Sunday, July 23, 1995*

### VENUES COMMITTEE

8:00 am - 5:00 pm *Exeter A*

### HPSSC WORKING GROUP N13.6

8:00 am - 5:00 pm *Clarendon A*

### HPS BOARD OF DIRECTORS MEETING

8:30 am - 5:00 pm *Independence Ctr & West*

### NRRT

8:30 am - 4:30 pm *Independence East*

### AMERICAN BOARD OF HEALTH PHYSICS

#### - BOARD OF DIRECTORS

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

### STANDARDS COMMITTEE

10:00 am - 4:30 pm *Jefferson*

### HPS - POLICY/CIRMS

1:30 - 4:00 pm *Beacon A*

### STUDENT BRANCH OFFICERS MTG

4:00 - 6:00 pm *Berkeley*

### STRATEGIC PLANNING

4:00 - 6:00 pm *Exeter B*

### ENVIRONMENTAL RADIATION SECTION

#### BOARD MEETING

7:30 - 10:00 pm *Beacon A*

*Monday, July 24, 1995*

### LOW ENERGY BETA RELEASE STD

8:30 am - 4:00 pm *Clarendon A*

### NRRT

8:30 am - 4:30 pm *Fairfax A*

### PUBLICATIONS COMMITTEE

11:00 am - 1:30 pm *Berkeley A*

### SUMMER SCHOOL

11:00 am - 1:30 pm *Hampton A*

### ACADEMIC EDUCATION COMMITTEE

11:15 am - 1:30 pm *Clarendon B*

### N13.33 WORKING GROUP

1:00 - 4:00 pm *Dalton A*

### HPSSC - CONTAMINATION LIMITS

1:00 - 5:00 pm *Exeter A*

### N13.27 WRITING GROUP

1:00 - 5:00 pm *Jefferson*

### N13.34 WORKING GROUP

1:00 - 5:00 pm *Dalton B*

### LABORATORY ACCREDITATION -

#### POLICY

2:30 - 4:00 pm *Boardroom*

### HPS MEDICAL SECTION

3:00 - 5:00 pm *Gardner*

### SCIENTIFIC AND PUBLIC ISSUES COM-

#### MITTEE

3:30 - 4:30 pm *Berkeley A*

### LABORATORY ACCREDITATION -

#### ASSESSMENT

4:30 - 6:00 pm *Boardroom*

*Tuesday, July 25, 1995*

### AMERICAN ACADEMY OF HEALTH PHYSICS - EXECUTIVE COMMITTEE

8:00 am - 5:00 pm *Berkeley*

### HPS N13.44 THYROID PHANTOM

8:30 - 10:30 am *Gardner A*

### NRRT

8:30 am - 4:30 pm *Independence West*

### ANSI 13.36 CORE TRAINING IN RADIATION

8:30 am - 5:00 pm *Exeter A*

### PUBLIC EDUCATION COMMITTEE

11:00 am - 1:30 pm *Clarendon A*

### RESEARCH NEEDS COMMITTEE

11:00 am - 1:30 pm *Clarendon B*

### STUDENT BRANCH COUNCIL

11:15 am - 1:30 pm *Fairfax A*

### NCRP SCIENTIFIC COMMITTEE 46-13

Noon - 1:30 pm *Jefferson*

### STANDARDS WORKING GROUP ON RADON TESTING IN REAL ESTATE TRANSACTIONS

1:00 - 5:00 pm *Boardroom*

### US DOE INTERNAL DOSIMETRY SOFTWARE USERS

4:30 - 6:00 pm *Jefferson*

*Wednesday, July 26, 1995*

### NRRT

8:30 am - 4:30 pm *Independence West*

### ABHP PART 2 PANEL OF EXAMINERS

9:00 - 11:00 am *Jefferson*

### ANSI N13.43

9:00 am - Noon *Exeter B*

### LIAISON COMMITTEE

11:00 am - 1:30 pm *Boardroom*

### HISTORY COMMITTEE

11:00 am - 1:30 pm *Exeter A*

### ALL PROGRAM HP FACULTY MEETING

11:15 am - 1:30 pm *Gardner*

### STATE AND FEDERAL LEGISLATION COMMITTEE

Noon - 2:30 pm *Hampton B*

### NOMINATING COMMITTEE

Noon - 4:00 pm *Kent*

### ASTM E10.04

1:00 - 5:00 pm *Hampton A*

### ANSI 13.31 WORKING GROUP

2:30 - 6:00 pm *Exeter B*

### CONTINUING EDUCATION COMMITTEE

3:00 - 5:00 pm *Jefferson*

*Thursday, July 27, 1995*

### AWARDS COMMITTEE

7:30 - 8:30 am *Gardner A*

### LOCAL ARRANGEMENTS COMMITTEE

7:30 - 9:00 am *Berkeley*

### HPSSC - NORM WORKING GROUP

8:00 am - Noon *Clarendon A*

### HPS BOARD OF DIRECTORS MEETING

8:30 am - Noon; 2:30 pm - ?? *Fairfax*

### AMERICAN ACADEMY OF HEALTH PHYSICS - EXECUTIVE COMMITTEE

2:30 - 5:00 pm *Berkeley*

### PROGRAM COMMITTEE

3:00 - 5:00 pm *Jefferson*

### URANIUM BIOASSAY, ANSI N13.22

3:00 - 6:00 pm *Gardner A*

# Health Physics Society Fortieth Annual Meeting Joint Meeting with The American Association of Physicists in Medicine

Boston Massachusetts - July 23-27, 1995  
Preliminary Scientific Program

If a paper is going to be presented by other than the first author, the presenter's name is underlined.

## Monday, July 24

### Continuing Education Activities

8:30-9:30 am Room: 304  
CEL-1 Recent Developments in Radiation Litigation; David J. Wiedis, Jose & Wiedis  
8:30-9:30 am Room: 306  
CEL-2 Risk Analysis of Buried Wastes from Electricity Generation; Bernard L. Cohen, University of Pittsburgh

10:00 am- Noon Hallway A, B, C

### MAM-A: Plenary Session Joint with AAPM (Oral Session)

HPS G. William Morgan Lecture and AAPM President's Symposium (see page 7 for list of speakers and schedule)

12:15-2:15 pm

### PROFESSIONAL ENRICHMENT PROGRAM

M-1 Room 100 Introduction to Extremely Low Frequency Electromagnetic Fields (0-3 kHz); J. A. Leonowich; Battelle Pacific Northwest Laboratory  
M-2 Room 102 Extrapolation Chamber Techniques For Measuring Absorbed Dose Rate; M. J. Scannell; Yankee Atomic Electric Company  
M-3 Room 103 Part 20 for Materials Licensees; C. Raddatz; US Nuclear Regulatory Commission  
M-4 Room 309 You CAN Buy Software Quality; R. Oesterling; INEL  
M-5 Room 106 The Selection of Radiation Protection Instruments; K. L. Swinth; Pacific Northwest Laboratory  
M-6 Room 112 Status of NRC's Quality Management Rule; J. E. Glenn; US Nuclear Regulatory Commission

2:30-5:30 pm Room: 306

### MPM-A: Government Section - Implications of Regulating Medical Radiation (Oral Session)

Chair: Frank Congel; US Nuclear Regulatory Commission

2:30 PM Introduction; F. J. Congel  
2:45 PM MPM-A.1  
Physician Perspective. R. F. Carretta; President, American College of Nuclear Physicians  
3:15 PM MPM-A.2  
Regulator Perspective. C. Paperiello; US Nuclear Regulatory Commission  
3:45 PM BREAK  
4:00 PM MPM-A.3  
Hospital Administrator Perspective. J. Gaida; Brigham and Women's Hospital  
4:30 PM MPM-A.4  
State Regulator Perspective. E. D. Bailey; State of California  
5:00 PM MPM-A.5  
Legal Perspective. K. Cyr; US Nuclear Regulatory Commission

2:30-6:00 pm Room: 302

### MPM-B: Operational Health Physics (Oral/Poster Session)

Co-Chairs: John Laferriere; DuPont Merck Pharmaceuticals and Victor Evdokimoff; Boston University Medical Center

#### Oral Presentations

2:30 PM MPM-B.1  
The Ten Principles and Ten Commandments of Radiation Protection. D. J. Strom; Battelle, Pacific Northwest Laboratories  
2:45 PM MPM-B.2  
The International System on Occupational Exposure, ISOE: Status and Results for 1994. E. N. Lazo; OECD

## Monday, July 24

Nuclear Energy Agency, France

3:00 PM MPM-B.3  
ALARA Considerations in Upgrading a Radiation Calibration Facility. R. S. Clement, S. A. Costigan, R. H. Olsner, S. L. Eisele, J. I. Findley, T. W. Houlton, D. J. Aikin and D. T. Seagraves; Los Alamos National Laboratory

3:15 PM MPM-B.4  
Consensus Radiation Protection Practices for Academic Research Institutions. E. A. Christman, K. J. Schiager, M. M. McDougall, E. Parry, J. Ring, D. E. Carlson, C. A. Warfield and W. E. Barkley; Columbia University Health Sciences, University of Utah, University of California-San Diego, Rockefeller University, Harvard University, University of Texas Southwestern Medical Center and Howard Hughes Medical Institute

3:30 PM BREAK

4:00 PM MPM-B.5  
An Analysis of Filter Sizes to Meet the 10CFR20 Effluent Solubility Criterion. T. F. Mengers and L. Cassells; National Institute of Standards and Technology

4:15 PM MPM-B.6  
Recent Health Physics R & D Projects at LLNL. D. E. Hankins; Lawrence Livermore National Laboratory  
4:30 PM MPM-B.7  
Exposure Analysis and Medical Evaluation of a Low Energy X-Ray Diffraction Accident. J. T. Bushberg, G. D. Westcott, V. E. Anderson, D. K. Shelton, T. J. Ferguson and F. A. Mettler; University of California-Davis and University of New Mexico

#### Poster Presentations

AUTHORS PRESENT: 4:45-6:00 PM

MPM-B.9 Moved to WAM-B.16  
MPM-B.10 Alternative Bubbler Technology for HT and HTO Sampling. D. P. Buckbichler, R. L. Flanagan, J. D. Gilbert and J. R. Stencel; Princeton Plasma Physics Laboratory  
MPM-B.11 Tokamak Fusion Test Reactor (TFTR) Activation Measurements Following High Power D-T Operations. J. Gilbert, K. Rule and J. R. Stencel; Princeton Plasma Physics Laboratory  
MPM-B.12 Accounting of Thyroid Dose Due to Iodine-125 From Multiple Acute Intakes Using an Excel® Workbook. G. R. King and G. M. Storchio; Merck Research Laboratories  
MPM-B.13 Philadelphia Radiation Safety Forum. J. C. Kellak, K. N. Lambert and M. Sellson; Thomas Jefferson University, Hahnemann University and University of Pennsylvania  
MPM-B.14 Radiation Dose Levels Generated by

the Interactions of Intense Short Laser Pulses With Substances. M. S. Singh, G. W. Campbell and H. N. Kornblum; Lawrence Livermore National Laboratory

MPM-B.15 Lessons Learned in Installing a Computerized Radiological Protection Information Management System. P. A. Drooff; Pilgrim Nuclear Power Station

MPM-B.16 Evaluation of Factors Involved in Quantifying Radioactive Contamination of Two Wipe Test Materials. M. J. Reynolds, P. J. Meehan and G. M. Storchio; Merck Research Laboratories

MPM-B.17 The Department of Energy's 1993 Radiation Exposure Summary and Revisions to Exposure Reporting Requirements. S. G. Zobel; US Department of Energy

2:30-5:15 pm Room: 304

### MPM-C: RISK (Oral Session)

Co-Chairs: Mary Birch; Duke Power Company and Jim Fairbrent; US Department Of Energy

2:30 PM MPM-C.1  
Healthful Radiation. E. T. Agard; Flower Hospital  
2:45 PM MPM-C.2  
Understanding Public Reception of Scientific Information About the Risks of Nuclear Waste Storage. H. C. Jenkins-Smith, C. L. Silva and L. S. Gomez; University of New Mexico and Sandia National Laboratories

3:00 PM MPM-C.3  
The Health and Environmental Impacts of the Nuclear Fuel Cycle - A French Case Study. M. Dreicer, V. Tort and H. Margerie; CERN, France

3:15 PM MPM-C.4  
Does the Exposure From the Chernobyl Accident Associate With Cancer Deaths in Greece? C. Papastefanou; Aristotle University of Thessaloniki, Greece

3:30 PM MPM-C.5  
Risk Management of the EMF Issue by Municipal Electrical Utilities. M. L. Walsh and S. M. Harvey; EMF-RAD Consulting and Engineering, Canada

3:45 PM BREAK  
4:15 PM MPM-C.6  
Sensitivity Study of Transportation Accident Consequences Within the State of Nevada. S. T. Dondan, F. A. Seiler, R. W. Sobocinski and B. J. Deshler; IT Corporation, New Mexico and Nevada

4:30 PM MPM-C.7  
Radiological Risk Assessment on the Development of Groundwater Wells Located in Areas Potentially Affected by Weapons Testing Activities. S. R. Adams; IT Corporation



## Monday, July 24

**4:45 PM** **MPM-C.8**  
Savannah River Site Consolidated Incineration Facility Health Risk Assessment. *N. E. Hertel, H. M. Coward, T. M. Evans, M. G. Robinson, J. A. Mulholland and D. A. Burge; Georgia Institute of Technology and Westinghouse Savannah River Company*

**5:00 PM** **MPM-C.9**  
Uncertainties in Radiation Risk Analysis at Low Doses. *A. Brodsky; Georgetown University*

**2:30-6:00 pm** **Ballroom C**

### MPM-D: Joint Historical Session with AAPM (Oral Session)

Co-Chairs: Ronald Kathren; Washington State University and Stephen Balter; Philips Medical Systems

**2:30 PM** **MPM-D.1**  
Historical Review: The First Fifty Years of X-Ray Therapy. *C. G. Orton; Harper Hospital and Wayne State University*

**3:00 PM** **MPM-D.2**  
William David Coolidge-Inventor of the Modern X-Ray Tube. *D. J. Allard and M. D. Sawyer; Arthur D. Little, Inc. and Hologic, Inc.*

**3:30 PM** **BREAK**  
**4:00 PM** **MPM-D.3**  
Historical Highlights in Radiation Medical Physics. *L. H. Land; Rush University, Chicago*

**4:30 PM** **MPM-D.4**  
Fifty Years of Human Radiation Experimentation: What Have We Learned? *D. R. Fisher, S. Pillai, E. R. Weiss and W. G. LeFurgy; Pacific Northwest Laboratory and US Department of Energy*

**5:00 PM** **MPM-D.5**  
Insurance of Radiation Risks. *R. G. Gallagher, A. K. Gallagher and J. G. Yusho; Applied Health Physics, Inc., New York Mutual Underwriters and Pennsylvania Department of Environmental Resources*

**5:30 PM** **HPS Morgan Lecturer**  
International Cooperation in Radiation Protection and Safety: Progress in Standard-Setting. *G. H. Coppée; International Labour Office, Switzerland*

**7:00-10:00 pm** **Room: Garden A, Sheraton**

### MPM-E: Aerosol Measurements (Oral Session)

Chair: Morgan Cox; Santa Fe, NM

**MPM-E.1** Use of DAC-hours Can Greatly Overestimate the Intake of Hot PuO<sub>2</sub> Particles During Brief Occupational Exposures. *B. Scott, M. Hoover and G. Newton; Inhalation Toxicology Research Institute*

**MPM-E.2** Effectiveness of Exhaust Register Placement of Continuous Air Monitors in Plutonium Laboratories at Los Alamos National Laboratory. *J. J. Whicker, J. C. Rodgers, C. I. Fairchild, R. C. Lopez and R. C. Scripps; Los Alamos National Laboratory*

**MPM-E.3** New Statistical Approaches to Showing Compliance with DAC-hour Limits. *F. Seiler and J. Alvarez; IT Corporation*

**MPM-E.4** Update on Spread Spectrum Networking of CAM's. *F. Frenquelli; University of Denver*

**MPM-E.5** A Real-Time Stack Radioactivity Monitoring System and Dose Projection Program. *A. Hull, P. Michael and H. Bernstein; Brookhaven National Laboratory and Bernstein & Sons*

**MPM-E.6** Demolition and Removal of Radioactively Contaminated Concrete-Aerosol Measurements. *G. Newton, M. Hoover and A. Grace; Inhalation Toxicology Research Institute*

**MPM-E.7** Overview of the Savannah River High-Volume Alpha Constant Air Monitor. *S. A. Epperson; Westinghouse-Savannah River Company*

**MPM-E.8** A Technical Review of WIPP Alpha-6 CAM Operations. *B. Bartlett and B. Walker; Environmental Evaluation Group*

**MPM-E.9** An Evaluation of the Alpha CAM's at the WIPP vs Current Performance Testing Standards. *M. Cox, S. Clayton and B. Estabrooks; Westinghouse-Waste Isolation Division*

**2:30-5:00 pm** **Room 309**

### MPM-F: Worker Risk Minimization (Oral Session)

Co-Chairs: Carol Hornbrook; EPRI and Ron Cardarelli; Yankee

**2:30 PM** **MPM-F.1**  
Worker Risk Minimization Overview. *M. Williams; Union Electric*

**2:50 PM** **MPM-F.2**  
Physiological Effects of Personal Protective Equipment. *Army/Fire Fighters Research*

**3:10 PM** **MPM-F.3**  
EPRI 1994, 1995, & 1996: Worker Risk Minimization Research. *R. Cardarelli and C. Hornbrook; Yankee and EPRI*

**3:30 PM** **BREAK**  
**4:00 PM** **MPM-F.4**  
Lost Life Expectancy Rate: Risk-Based Dimensionless Quantity for Expressing Measurements of Exposure to Multiple Agents. *D. Stram; Pacific Northwest Laboratory*

**4:20 PM** **Panel Discussion**  
**4:50 PM** **Conclusions**

## Tuesday, July 25

**Continuing Education Lectures**

**7:15-8:15 am** **Room: 304**  
**CEL-3** Revision to 10 CFR Part 20 to Include Radiological Criteria for Decommissioning. *Christine Daily; US Nuclear Regulatory Commission*

**7:15-8:15 am** **Room: 306**  
**CEL-4** Current Issues in Electromagnetic Field Measurements. *John A. Leonowich; Battelle Pacific Northwest Laboratory*

**8:30-11:30 am** **Ballroom C**

### TAM-A: Student I (Poster Session)

Co-Chairs: Scott Murray; General Electric and Kermit Paulson; University of Wisconsin

Note: Each Poster will have a brief introduction by the presenter at the beginning of the session.

**10:00-10:30 AM** **BREAK**

**TAM-A.1** The Health Risk Associated With the Uptake of Radium-226 in Vegetation. *J. W. Collins, L. M. Scott and D. L. Van Gent; Louisiana State University*

**TAM-A.2** Observations of Pressure Differences Across a Slab-on-Grade Residential Structure Utilizing Passive Radon Mitigation. *S. Boddeker and D. E. Hintenlang; University of Florida*

**TAM-A.3** Study of Temporal Variation of Radon Concentration in Public Drinking Water Supplies. *E. L. York; University of North Carolina at Chapel Hill*

**TAM-A.4** Cancelled

**TAM-A.5** Measuring High Concentrations of Radon-222 Using Gamma Spectroscopy. *K. R. Roush, H. B. Spitz, C. W. Becker and L. M. Tomczak; University of Cincinnati and Fernald Environmental Restoration Management Corporation*

**TAM-A.6** Comparison of a <sup>137</sup>Cs-Calibrated NaI(Tl) Portable Gamma Survey Meter and a <sup>226</sup>Ra-Calibrated High Pressure Ion Chamber When Used in a NORM-Contaminated Area. *K. Lovins, H. Spitz, C. Becker, J. Kellar, C. Blasio, J. O'Hare and F. Emerich; University of Cincinnati*

**TAM-A.7** Non-Destructive Assay of Drum Package Radioactive Waste Utilizing Tomographic Gamma Scanning. *K. L. Ausbrooks and L. F. Miller; The University of Tennessee, Knoxville*

**TAM-A.8** Environmental Monitoring for a Radioactive Waste Management Facility: Incinerator Operations. *G. E. Chabot, J. P. Ring and M. A. Tries; University of Massachusetts, Lowell and Harvard University*

**TAM-A.9** Characterization of Hanford HLW Based on Core Sample Analysis. *V. Banjac and A. S. Heger; University of New Mexico*

**TAM-A.10** The Effectiveness of Microwave Digestion in Radiochemical Analysis of Environmental and Biological Samples. *R. Garcia, R. Rasson and B. Kahn; Georgia Institute of Technology*

**TAM-A.11** Sensitivity Analysis of <sup>137</sup>Cs and <sup>233</sup>U Sorption on Basalts and Interbed Materials of the Snake River Plain. *M. D. Blevins, R. A. Fjeld, T. A. DeVol, A. W. Elzerman, S. Ince and M. E. Newman; Clemson University and Applied Geosciences*

**TAM-A.12** Field Survey Correlation and Instrumentation Response for an *In Situ* Soil Measurement Program. *J. A. Myers; University of Michigan*

**TAM-A.13** Evaluation of Post-Disposition Radiological Hazards of Dredged Material From the Columbia River. *D. N. Stewart; Oregon State University*

**TAM-A.14** Radiologically Contaminated Forests: Modeling Approaches and Uncertainty Analysis. *I. Linkov and W. R. Schell; University of Pittsburgh*

**TAM-A.15** Radiological Environmental Monitoring at UNLV. *M. J. Rudin, S. Pensinger and K. J. Shenk; University of Nevada, Las Vegas and Science Applications International Corporation*

**TAM-A.16** Non-Conventional Passive Sensors for Monitoring Tritium on Surfaces. *J. L. Brock, R. B. Gammage, K. E. Meyer and L. F. Miller; University of Tennessee and Oak Ridge National Laboratory*

**TAM-A.17** Determining the Feasibility of Two-Dimensional TLD Arrays for Measuring Residual Surface Contamination on Inaccessible Surfaces. *B. W. Oldfield; Washington State University*

**TAM-A.18** Gamma Efficiency Approximation for Non-Standard Geometries. *L. W. Hatcher and M. J. Rudin; University of Nevada, Las Vegas*

**TAM-A.19** Radiation Monitoring of the Chernobyl Zone. *E. Kerrembaev and K. J. Kearfoot; University of Michigan*

**8:30-11:30 am** **Room: 302**

### TAM-B: External Dosimetry I (Oral/Poster Session)

Co-Chairs: Christopher Soares; NIST and David McFarlane; Texas A&M University

#### Oral Presentations

**8:30 AM** **TAM-B.1**  
Growth of the High Temperature Peak and Its Effect on Dose Measurements in CaF<sub>2</sub>:Mn Thermoluminescence Dosimeters (TLD). *K. Chakrabarti, J. Sharma and V. K. Mathur; Food and Drug Administration and Naval Surface Warfare Center*



## Tuesday, July 25

**8:45 AM TAM-B.2**  
Bubble Detectors-Status After a Decade of R&D. *H. Ing, R. Noulty, J. Jevcak and T. McLean; Bubble Technology Industries, Canada*

**9:00 AM TAM-B.3**  
Electronic Dosimetry-An Opportunity for Improvement. *R. J. Fletcher, T. R. Ohlhaber and T. O. Marshall; Siemens Environmental Systems Ltd., UK; Siemens Dosimetry Service and NRPB, UK*

**9:15 AM TAM-B.4**  
Electronic Dosimeter for Personnel Monitoring-A Supplement or Replacement? *C. F. Wu and T. E. Goff; Waste Isolation Pilot Plant*

**9:30 AM BREAK**

### Poster Presentations

**AUTHORS PRESENT: 10:00-11:30 AM**

**TAM-B.5** Evaluation of Electronic Pocket Dosimeters for Radiological Characteristics. *D. T. Seagraves and R. H. Olsher; Los Alamos National Laboratory*

**TAM-B.6** The Response of an Electronic Neutron Dosimeter in Neutrons Fields With Energies Extending up to 600 MeV. *W. H. Casson, Sr., R. T. Devine, P. A. Staples and L. S. Walker; Los Alamos National Laboratory*

**TAM-B.7** Gamma Ray Dosimeter. *P. Kehrer and D. Nellis; Applied Inventions Corporation and US Nuclear Regulatory Commission*

**TAM-B.8** Combined Passive and Active Radiation Monitoring System. *R. A. Tawil, S. S. Hsu and J. E. Rotunda; Harshaw/Bicron and Dositec, Inc.*

**TAM-B.9** ESR Dosimetry Using Surrogate Biosamples. *C. L. Greenstock and A. Trivedi; AECL Research, Canada*

**TAM-B.10** A New Extremity System and Performance at INEL. *O. R. Perry, R. A. Tawil, K. J. Velbeck and J. E. Rotunda; EG & G Idaho, Inc. and Harshaw/Bicron*

**10:00 am Noon Room: 304**

**TAM-C: Medical Health Physics Section - Joint with AAPM (Oral Session)**

**Co-Chairs:** Jean St. Germain; Sloan Kettering Cancer Center and Michael Stabin; ORISE

**10:00 AM TAM-C.1**  
Current Issues in Radiation Protection. *E. Webster; Massachusetts General Hospital*

**10:30 AM TAM-C.2**  
Patient Skin Dose Reduction in Interventional Neuroradiology Procedures Through Supplemental Beam Filtration and Attention to Technical Factors. *A. M. Norbath, D. D. Busick and M. P. Marks; Stanford University Medical Center*

**10:45 AM TAM-C.3**  
Radiation Injury From Localization X-Rays During Brachytherapy. *B. R. Thomadsen and B. R. Paltwal; University of Wisconsin-Madison*

**11:00 AM TAM-C.4**  
Conversion Factors for Personal Dosimetry of Medical Staff in Interventional Radiology. *C. J. Huyskens and Y. Franken; Eindhoven University of Technology, Netherlands*

**11:15 AM TAM-C.5**  
Radioactivity Content of Sewage and Sludge from Sewage Plants. *D. R. Shearer, P. McCullough and D. North; Rhode Island Hospital*

**11:30 AM TAM-C.6**  
Proposed Regulations for Radioactive Drugs Used in Research. *R. E. Toohey and R. B. Sparks; Radiation Internal Dose Information Center*

**11:45 AM TAM-C.7**  
Is a New Paradigm for Late Radiation Injury on the Horizon. *D. S. Gooden; Saint Francis Hospital*

**8:30-11:00 am Room: 306**

### TAM-D: Radiation Site Surveys I: Instrumentation (Oral Session)

**Co-Chairs:** Carl Gogolak; US Department of Energy, New York and R. L. Watters, Poolesville, MD

**8:30 AM TAM-D.1**  
The Council on Ionizing Radiation Measurements and Standards (CIRMS): A Technology Forum. *K. G. W. Inn and J. M. R. Hutchinson; National Institute of Standards and Technology*

**8:45 AM TAM-D.2**  
CIRMS: Environmental/Public Radiation Protection Issues. *C. V. Gogolak; US Department of Energy, New York*

**9:00 AM TAM-D.3**  
Surveys in Support of Decommissioning: Limitations of Portable Instruments under Current and Proposed Guidelines and Suggestions for Avoiding Common Pitfalls. *J. D. Berger and A. J. Ansari; Auxier and Associates*

**9:15 AM TAM-D.4**  
Design of a Site Characterization Plan for a Nuclear Fuel Fabrication Facility. *G. C. Chapman, J. W. Nagy, R. A. Moore and S. E. Barron; Nuclear Fuel Services, Inc.*

## Tuesday, July 25

**9:30 AM TAM-D.5**  
ASTM Standard for Selection and Use of Release Survey Instruments. *E. Walker; Bechtel Environmental*

**9:45 AM BREAK**

**10:15 AM TAM-D.6**  
Detection Sensitivity of Field Survey Instrumentation. *E. W. Abelquist; Oak Ridge Institute for Science and Education*

**10:30 AM TAM-D.7**  
Field Measurement Methods to Support Cleanup Criteria That Approach Background Radiation Levels. *K. M. Miller; US Department of Energy, New York*

**10:45 AM TAM-D.8**  
A Plea for Environmental Research. *R. L. Watters; Poolesville, MD*

**11:00 am Open Meeting of the CIRMS PERP Subcommittee**

**9:00-10:30 am Room: HPS Exhibit Hall**

### TAM-E: Instrumentation I (Poster Session)

**Co-Chairs:** Thomas M. Gerusky; US Department of Energy and Harold L. Beck; US Department of Energy

**10:30-11:00 AM BREAK**  
**TAM-E.1** Determination of Gross Alpha and Beta Activity in Soil Using Liquid Scintillation Spectroscopy. *S. A. Costigan and G. H. Brooks Jr.; Los Alamos National Laboratory*

**TAM-E.2** Experimental Kits (and a Video) on Ionizing Radiation for Middle and High School Students. *R. E. Apfel and J. D. Martin; Apfel Enterprises, Inc. and Yale University*

**TAM-E.3** Performance Evaluation of a Continuous Air Monitor. *D. F. French, W. L. Bryan and L. F. Miller; The University of Tennessee and Oak Ridge National Laboratory*

**TAM-E.4** Instrument Calibration Issues in DNA (Hybridization) Testing. *H. Schlesinger and J-C Dehmelt; Tektagen, Inc. and S. Cohen & Associates, Inc.*

**TAM-E.5** Monitoring Reactor Containment Atmosphere Particulate Radioactivity to Evaluate RCS Leakage. *D. Smith, G. E. Chabot, C. Nirmala and J. Vanapalli; Consolidated Edison Co. of New York and University of Massachusetts, Lowell*

**TAM-E.6** Design Improvements in an Alpha Scintillation Detector. *E. B. Ripley and L. F. Miller; Oak Ridge Y-12 Plant and The University of Tennessee*

**TAM-E.7** WENDI, A New Generation of Neutron Detector. *A. Beverding, P. Englert, J. Kleck and R. Olsher; San Jose State University, Varian Associates, Inc., and Los Alamos National Laboratory*

**TAM-E.8** Increased Temperature of Detector Improves Efficiency of Radiation Detection and Measurements Using Thermally Stimulated Conductivity in Some Organic Polymers. *A. M. Jabir and N. W. Ramsey; University of Miami School of Medicine and Charing Cross Hospital Medical School, UK*

**TAM-E.9** Evaluation of ANSI N42.17A by Investigating the Effects of Temperature and Humidity on the Response of Radiological Instruments. *R. S. Clement, M. J. Ellenbecker, C. S. French and R. Moure-Eraso; Los Alamos National Laboratory and University of Massachusetts, Lowell*

**TAM-E.10** Characterization of a Gamma-Radiation Well for Calibrating Beta-Gamma Survey Meters. *R. S. Clement, R. H. Olsher, J. I. Findley, R. W. Martin and T. H. Kuckertz; Los Alamos National Laboratory*

**TAM-E.11** Monte Carlo Calculation for Plutonium Fission Track Analysis Using <sup>252</sup>Cf Source. *H. H. Hsu, L. C. Sym and H. L. Pai; Los Alamos National Laboratory, Brookhaven National Laboratory, and R. A. D. Service and Instruments Ltd., Canada*

**TAM-E.12** CdTe and CsI Detectors in Intraoperative Detection. *M. Ricard, R. Regal and H. Simon; Institut Gustave Roussy, C.N.R.S. and EURAD, France*

**8:30-10:45 am Room: 309**

### TAM-F: Cancelled

### TAM-G: Special Session-Science, Risk Assessment and Government (Oral Session)

**Chair:** W. A. Mills; CIRRPC, ORAU

**8:30 AM TAM-G.1**  
Cancer Incidence Among Atomic Bomb Survivors. *E. Ron, D. L. Preston and K. Mabuchi; National Cancer Institute, National Institute of Health and Radiation Effects Research Foundation, Japan*

**9:00 AM TAM-G.2**  
Risk Assessment, It Ain't Science, but What is It? *M. Gough; US Congress, Office of Technology Assessment*

**9:30 AM TAM-G.3**  
After the Dust Settles, Where Now for Human Health Risk Assessment? *R. B. Belzer; Office of Management and Budget*

**10:00 AM Panel/Audience Discussion**

## Tuesday, July 25

10:30 AM **TAM-G.4**  
50 Years Later: Lessons Learned, Paths Forward. *S. K. Galson, U. S. Department of Energy*

12:15-2:15 pm

### PROFESSIONAL ENRICHMENT PROGRAM

- T-1 Room 100** Introduction to Instrumentation to Measure Non-Ionizing Radiation and Fields; *J. A. Leonowich, Battelle Pacific Northwest Laboratory*
- T-2 Room 102** Radiation Protection Program Reviews for 20.1101(c); *W. H. Barley, Washington Public Power Supply System*
- T-3 Room 103** Negotiating the Washington Maze; *J. Billett, HPS Public Affairs Director, Billett & Quinn, Ltd.*
- T-4 Room 309** Lower Limits of Detection; *T. B. Borak, Colorado State University*
- T-5 Room 106** Developing a Quality Manual for a Radiation Calibration Facility; *K. L. Swinth, Pacific Northwest Laboratory and J. Shobe, National Institute for Standards and Technology*
- T-6 Room 112** Global Health Physics Practice and Experience; *T. Lazo, OECD Nuclear Energy Agency*

2:30-5:30 pm

Room C

### TPM-A: Student II

(Poster Session)

Co-Chairs: Wesley Bolch; University of Florida and Steven King; Hershey Medical Center

Note: Each Poster will have a brief introduction by the presenter at the beginning of the session.

3:15-3:45 PM **BREAK**

**TPM-A.1** Patient Shielding Design for Accelerator Based Boron Neutron Capture Therapy. *W. B. Howard and J. C. Yanch, Massachusetts Institute of Technology*

**TPM-A.2** Shielding Design of a Treatment Room for an Accelerator-Based Neutron Source for BNCT. *J. F. Evans and T. E. Blue, Ohio State University*

**TPM-A.3** Radiation Absorbed Dose to the Embryo/Fetus From Nuclear Medicine Procedures. *J. R. Russell, M. G. Stabin, J. B. Stubbs, E. E. Watson and L. F. Miller, University of Tennessee and Oak Ridge Institute for Science and Education*

**TPM-A.4** 3-D In-Phantom Dosimetry System Using Superheated Drop Detectors. *D. M. Jalandani and C. K. Wang, Georgia Institute of Technology*

**TPM-A.5** Determination of Mean Cell Volume-A Key Parameter in BNCT Microdosimetry and Health Physics of High LET Particles. *C. S. Yam, R. G. Zamenhof and G. R. Solares, Massachusetts Institute of Technology, Tufts University School of Medicine and New England Medical Center Hospital*

**TPM-A.6** Performance Evaluation of an Electronic Neutron Dosimeter. *H. W. Harris, W. J. Casson, H. H. Hsu and D. G. Vasilik, University of Michigan and Los Alamos National Laboratory*

**TPM-A.7** Response Comparison of a Single Diode Electronic Dosimeter, a Three Diode Electronic Dosimeter and a Conventional Four Filter TLD Assembly in Several Irradiation Environments. *M. A. Charlton, W. E. Bolch, M. E. McLain and J. W. Poston, Sr., Texas A & M University and University of Florida*

**TPM-A.8** Investigation of a Thermoluminescent Dosimeter Mixture Between LiF:Mg,Ti and Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub> in a Solid Form. *J. P. Walkowicz and J. W. Poston, Sr., Texas A & M University*

**TPM-A.9** A Model for Depth-Dose Distribution in Beta Dosimetry. *T. J. Gillespie, E. Samei, K. J. Kearfott and C-K. C. Wang, Georgia Institute of Technology and University of Michigan*

**TPM-A.10** Estimation of the Beta Particle Attenuation Coefficient Using Monte Carlo Techniques. *W. B. McCarthy and G. Chabot, University of Massachusetts, Lowell*

**TPM-A.11** Cross-Sections of Al, C, Si, SiO<sub>2</sub>, and Mg for 30- to 500-MeV Protons. *K. J. Kim, A. M. Beverding, P. A. J. Englert, C. Gans, J. Sistrone and M. Caffee, San Jose State University, Harvard University and Lawrence Livermore National Laboratory*

**TPM-A.12** Assessment of Quality Factors for Low-Energy Electrons and Photons. *T. Evans and C. K. Wang, Georgia Institute of Technology*

**TPM-A.13** Evaluation of the Energy Distribution of Unknown Photon Radiation Fields by Interpreting the Responses of TLD's and Modification of the Burlin Cavity Theory. *I. S. Abdulhay and G. E. Chabot, University of Massachusetts, Lowell*

**TPM-A.14** An Integrated Indoor Survey Platform. *G. Harder, W. E. Bolch and R. Handy, University of Florida*

**TPM-A.15** Evaluation of the Capabilities of Two Windowless, Multilabel Analysis Codes and Assessment of the Feasibility of Their Incorporation into a University Radiation Safety Program. *J. R. Hoyt, M. E. McLain and J. W. Poston, Sr., Texas A & M University*

**TPM-A.16** First Field Application of Modified Anderson-Braun Neutron REM Counter. *T. DeCastro and V. V. Ngo, Lawrence Berkeley Laboratory and University of California*

## Tuesday, July 25

2:30-5:00 pm

Room 102

### TPM-B: External Dosimetry II

(Oral/Poster Session)

Co-Chairs: Jack Fix; Battelle and William Casson; Los Alamos National Laboratory

#### Oral Presentations

**2:30 PM TPM-B.1**  
A TLD Dose Algorithm Using Artificial Neural Networks. *M. Moscovitch, J. E. Ronunda, R. A. Tawil and B. A. Rathbone, Georgetown University School of Medicine, Harshaw/Bicron and Pacific Northwest Laboratory*

**2:45 PM TPM-B.2**  
A Study of the Effectiveness of Reporting the Dose to the Skin From Small Disk Sources Over an Area of One Square Centimeter at a Depth of 70 Microns in the Skin. *D. L. McFarlane, W. D. Reece and J. W. Poston, Texas A & M University*

**TPM-B.3** See Poster Presentations after TPM-B.10

**3:00 PM TPM-B.4**  
Why Change in the ANSI N13.11 (NVLAP) Conversion Coefficients for Photons, Again? *C. G. Soares and P. R. Martin, National Institute of Standards and Technology*

**3:15 PM BREAK**

#### Poster Presentations

**AUTHORS PRESENT: 3:45-5:00 PM**

**TPM-B.5** Historical Evaluation of Hanford Personnel Neutron Dose. *J. J. Fix, W. V. Baumgartner, L. W. Brackenbush, A. W. Endres and R. H. Wilson, Battelle*

**TPM-B.6** Uncertainties Associated With External Gamma Dose Calculations. *D. E. Bernhardt, Rogers and Associates Engineering Corp.*

**TPM-B.7** The Effective Source-Detector Distance for a <sup>3</sup>He Detector Mounted on a Phantom. *A. J. P. Ghilardi and R. B. Schwartz, Universidade de Sao Paulo, Brasil and National Institute of Standards and Technology*

**TPM-B.8** Experimental Measurements of Radiation Protection Quantities for Beta Radiations and Nearly Monoenergetic Electron Beams Incident at Various Angles. *T. A. da Silva and C. G. Soares, National Institute of Standards and Technology*

**TPM-B.9** Improved Skin Dose Determination Using a Beta Scintillator and Varskin Mod 2. *R. Michel, J. L. Pierce and J. C. McDonald, Pacific Northwest Laboratory*

**TPM-B.10** Radiation Dose Enhancement at Material Interfaces. *H. H. Hsu, D. G. Vasilik and J. Chen, Los Alamos National Laboratory and Institute for Radiation Biology, Germany*

**TPM-B.3** Verifications of Proposed Empirical Functions for Beta Dosimetry by Using Monte Carlo Simulation Methods. *D. C. Lin and G. E. Chabot, Radiation Safety Engineering, Inc. and University of Massachusetts, Lowell*

2:30-5:00 pm

Room 309

### TPM-C: International Contributions to Radiation Protection

An NCRP Sponsored Symposium

(Oral Session)

Chair: Charles B. Meinhold; Brookhaven National Laboratory

**2:30 PM TPM-C.1**  
UNSCEAR 1994, Low Dose Epidemiology. *W. Sinclair, National Council on Radiation Protection and Measurements*

**3:00 PM TPM-C.2**  
UNSCEAR 1994, Adaptive Response. *Burton Bennett, UNSCEAR, Austria*

**3:30 PM BREAK**

**4:00 PM TPM-C.2**  
ICRP/ICRU Report on Dose Quantities for External Radiations. *M. Clark, NCRB, England*

**4:30 PM TPM-C.3**  
IRPA, Information Round Table. *C. Meinhold, C. Huyskens, K. Dufschmid and F. Massé*

2:30-5:30 pm

Room 300

### TPM-D: Radiation Site Surveys II: Implementation and Analysis

(Oral Session)

Co-Chairs: Carl Gogolak; US Department of Energy, New York and Christine Daily; US Nuclear Regulatory Commission

**2:30 PM TPM-D.1**  
Technical Support for EPA's Site Cleanup Rule. *A. B. Wolbarsht, M. Doehmert, H. B. Hull, J. Mauro, R. Anigstein, D. Beres, D. Chen, S. Hay and L. Ralston, US Environmental Protection Agency and S. Cohen and Associates*

**2:45 PM TPM-D.2**  
Development of the EPA Radiation Site Cleanup Regulation. *A. Newman, J. Burnett, L. Johnson and P. L. Tsirigotis, US Environmental Protection Agency*

## Tuesday, July 25

**3:00 PM** **TPM-D.3**  
NRC's Radiological Criteria for Decommissioning. *C. T. Raddatz, US Nuclear Regulatory Commission (presented by C. Daily)*

**3:15 PM** **TPM-D.4**  
Multiagency Radiation Site Investigation Manual. *C. F. Petullo, M. Doehmert, A. M. Huffert, H. Peterson, L. Fragoso, K. Martilla and D. Alberth; US Environmental Protection Agency, Las Vegas and Washington, DC, US Nuclear Regulatory Commission, US Department of Energy, United States Navy, United States Air Force, United States Army*

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

**4:00 PM** **TPM-D.5**  
Data Quality Objectives for Radiation Site Investigations. *M. J. Bertoni; Research Triangle Institute*

**4:15 PM** **TPM-D.6**  
Comparing Statistical Tests for Detecting Soil Contamination Greater Than Background. *R. O. Gilbert, J. W. Hardin and T. LeGore; Battelle, PNL, Stata Corporation and Boell Computer Services*

**4:30 PM** **TPM-D.7**  
Methodology for Determining Whether Residual Radioactivity is Distinguishable from Background. *C. V. Gogolak; US Department of Energy, New York*

**4:45 PM** **TPM-D.8**  
ASTM Standards Development Activities for Risk Assessment. *T. LeGore and F-T. Price; Westinghouse Hanford Co and The Mitre Corporation*

**5:00 PM** **Panel Discussion**

**5:30 PM** **Environmental Radiation Section Business Meeting**

**2:30-3:30 pm** **Room: HPS Exhibit Hall**

### TPM-E Instrumentation II (Poster Session)

Co-Chairs: Thomas M. Gerusky; US Department of Energy and Harold L. Beck; US Department of Energy

See TAM-E for listing of papers

**TPM-F: Cancelled**

## Wednesday, July 26

### Continuing Education Lectures

**7:15-8:15 am** **Room: 309**  
**CEL-5** New Problem Areas in Medical Health Physics; *K. David Steidley, Saint Barnabas Medical Center*

**7:15-8:15 am** **Room: 100**  
**CEL-6** Talking About Risk: Improving Communications Skills; *Joel I. Cohn, Applied Sciences Co.*

**8:30-11:00 am** **Room: 306**

### WAM-A: Environmental I

(Oral Session)

Co-Chairs: Thomas H. Essig; US Nuclear Regulatory Commission and Kathryn Higley; Oregon State University

**8:30 AM** **WAM-A.1**  
Modeling the Resuspension of Radionuclides in Ukrainian Regions Impacted by Chernobyl Fallout. *S. K. Nair, C. W. Miller, K. M. Thiessen and E. K. Garger; SENES Oak Ridge, Inc., Centers for Disease Control and Prevention and Institute of Radioecology, Ukraine*

**8:45 AM** **WAM-A.2**  
Global Positioning System Measurement Inaccuracies. *K. J. Sejkora; Boston Edison Company*

**9:00 AM** **WAM-A.3**  
Data Quality Objectives for Cleanup Operation for Radionuclide in Surface Soil Using in Situ Gamma-Spectrometry for Concentration Measurements. *S. H. Fong and J. L. Alveraz; Georgia Institute of Technology and IT Corporation*

**9:15 AM** **WAM-A.4**  
The Spatial Distribution of Plutonium in Soil Near the Rocky Flats Plant. *S. B. Webb, J. M. Stone, S. A. Ibrahim and F. W. Whicker; Colorado State University*

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

**10:00 AM** **WAM-A.5**  
Monitoring and Reporting Radioactive Airborne Discharges From Hanford Facilities. *L. P. Diediker, K. Rhoads and J. K. Soldat; Westinghouse Hanford Company and Pacific Northwest Laboratories*

**10:15 AM** **WAM-A.6**  
A Comparison of Radiation Doses From Iodine-129: Effluent Based Versus Environmental Concentration Based. *E. J. Antonio, J. K. Soldat and G. W. Patton; Pacific Northwest Laboratory*

**10:30 AM** **WAM-A.7**  
Modeling and Dose Assessment of Four High Explosive Releases of Radioactivity. *K. W. Jacobson, J. E. Bossart, B. C. Lettelier and G. L. Stone; Los Alamos National Laboratory*

**10:45 AM** **WAM-A.8**  
Dose Reconstruction for Experiments Involving <sup>140</sup>La at Los Alamos National Laboratory, 1944-1962. *D. H. Kraig; Los Alamos National Laboratory*

**8:30-11:30 am** **Room: 302**

### WAM-B: Internal Dosimetry/Bioassay

(Oral/Poster Session)

Co-Chairs: Eugene Carbaugh; Pacific Northwest Laboratory and Michael Stabin; Oak Ridge Institute for Science and Education

### Oral Presentations

**8:30 AM** **WAM-B.1**  
"Fuzzy": The Modular Distributed Source Phantom for the Quantitative Assessment of the Regional Gamma Radioactivity of the Human Body. *B. Momcilovic, G. I. Lykken, L. Tao and S. Cassola; USDA, North Dakota and University of North Dakota*

**8:45 AM** **WAM-B.2**  
Shape, Size, and Symmetry-The Art and Science of Human Body Positioning and Self-Absorption Measurement in the Whole Body Counter. *B. Momcilovic, G. I. Lykken, S. Cassola and L. Tao; USDA, North Dakota and University of North Dakota*

**9:00 AM** **WAM-B.3**  
Rapid Analysis for Isotopes of Uranium, Plutonium, and Curium on Breathing Zone Air Samples by Solvent Extraction and PERALS Spectroscopy. *R. L. Metzger, B. H. Jessop and B. L. McDowell; Radiation Safety Engineering, Inc., and Etac, Inc.*

**9:15 AM** **WAM-B.4**  
Long-Term Reevaluations of Internal Dose-A Good Idea? *E. H. Carbaugh; Pacific Northwest Laboratory*

### Poster Presentations

**9:30 AM** Introduction to Posters

**9:45 AM** **BREAK**

**AUTHORS PRESENT: 10:15-11:30 AM**

**WAM-B.5** Uncertainty and Sensitivity Analyses of Particle Deposition in the Respiratory Tract Using the New ICRP Respiratory Tract Model. *T. E. Huston, W. E. Bolch and W. G. Vernetson; University of Florida*

**WAM-B.6** An Improved Method for Evaluating Complex Internal Dosimetry Data. *D. P. Hickman, H. W. Patterson, S. Nguyen, M. Firpo and C. Lagerquist; Lawrence Livermore National Laboratory*

**WAM-B.7** Monte Carlo Calculation of Beta Absorbed Fractions Using a Revised Model of the Gastrointestinal Tract. *J. W. Poston, Jr., K. A. Kodimer, W. E. Bolch and J. W. Poston, Sr.; Argonne National Laboratory, Texas A & M University and University of Florida*



## Wednesday, July 26

**WAM-B.8** Evaluation of Bioassay Needs in a Biomedical Research Institution. *E. Parry; The Rockefeller University*

**WAM-B.9** Prediction of Compton Backgrounds in the Plutonium and Americium Regions of Phoswich Lung Count Spectra. *N. W. Richards, D. J. Downing, J. R. Waits, L. F. Miller, G. R. Rao and G. T. Mei; Oak Ridge National Laboratory and University of Tennessee*

**WAM-B.10** Background Contribution to the Internal Contamination of Thorium. *L. M. Q. C. Juliao, J. L. Lipsztein; Instituto de Radioproteção e Dosimetria, Brasil*

**WAM-B.11** Discrimination Between Occupational and Environmental Sources of Internal Uranium Exposure. *J. A. MacLellan, E. J. Wyse and L. P. Scott; Pacific Northwest Laboratory and Quanterra Environmental Services*

**WAM-B.12** Radiation Dosimetry of Metal Tritides. *Y. S. Cheng, M. B. Snipes, R. F. Kropf and H. N. Jow; Inhalation Toxicology Research Institute and Sandia National Laboratories*

**WAM-B.13** Assessment of Intakes of Radioactive Materials Using 10 CFR Part 61 Data. *P. H. Jones, Jr.; Pilgrim Nuclear Power Station*

**WAM-B.14** Tritium in People Living Near a Heavy Water Reactor Research Facility: Dosimetric Implications. *D. Galeriu, R. J. Cornett, W. J. Workman, A. Trivedi and R. M. Brown; AECL Research, Canada*

**WAM-B.15** Fabrication of a Human Anthropomorphic Calibration Phantom for *In Vivo* Measurement of Eu-152 in the Skull. *J. R. Kellar, H. B. Spitz, M. Soldano, J. W. Nelson and C. W. Becker; University of Cincinnati and Fernald Environmental Restoration Management Co.*

**WAM-B.16** (Formerly MPM-B.9) Derivation and Implementation of an Annual Limit on Intake and a Derived Air Concentration Value for Uranium Mill Tailings. *R. H. Reif and D. W. Andrews; RUST*

8:30-11:45 am Room 304

### WAM-C: Accelerator I (Oral Session)

Co-Chairs: Robert May; CEBAF/SURA and Stephen Musolino; Brookhaven National Laboratory

**8:30 AM WAM-C.1**  
Cancer Treatment Using Protons. *A. R. Smith; Massachusetts General Hospital*

**9:15 AM WAM-C.2**  
Dose Assessment of an Accidental Exposure at the IPNS. *M. M. C. Torres; Argonne National Laboratory*

**9:30 AM WAM-C.3**  
Radiation Safety Aspects of the Next Linear Collider Test Accelerator. *V. Vylet; Stanford Linear Accelerator Center*

**9:45 AM BREAK**  
Co-Chairs: Geoffrey Stapleton; Continuous Electron Beam Accelerator Facility and Vashek Vylet; Stanford Linear Accelerator Center

**10:15 AM WAM-C.4**  
Accelerator-Based UV Light Production for Industrial Processing. *G. R. Neil; Continuous Electron Beam Accelerator Facility*

**10:45 AM WAM-C.5**  
Use of SSRL Beamline 1-5 For Low Energy X-Ray Dosimetry Studies (7-17.5 keV). *N. E. Ipe, H. Bellamy, J. R. Flood, K. R. Kase, K. J. Velbeck and R. Zelac; Stanford Linear Accelerator Center, Harshaw/Bicron and Landauer, Inc.*

**11:00 AM WAM-C.6**  
Soft X-Ray Measurements at a Double Crystal Monochromator Beamline. *M. L. Marceau-Day, P. J. Schilling, E. Tamura, J. D. Scott, D. L. Van Gent and L. M. Scott; Louisiana State University and Laboratorio Nacional de Luz Sincrotron, Brasil*

**11:15 AM WAM-C.7**  
High Energy Neutron Studies at Los Alamos Weapons Neutron Research Facility. *A. J. Miller, L. S. Walker, P. A. Staples, R. L. Mundis, R. T. Devine, W. H. Casson, M. A. Duran, M. S. Gadd and V. R. Harris; Science Applications International Corporation and Los Alamos National Laboratory*

**11:30 AM WAM-C.8**  
Measurement of the Neutron Spectrum for High Energy Neutron Dosimetry Experiments at the LAMPF Weapons Neutron Research Facility White Neutron Source. *P. Staples, J. Koster and J. L. Ullmann; Los Alamos National Laboratory*

8:30-11:30 am Room 309

### WAM-D: AAHP Special Session – Professional Practice of Health Physics (Oral Session)

Chair: W. R. Casey; Brookhaven National Laboratory

**8:30 AM WAM-D.1**  
A Review of Professional Societies Codes and Guidelines. *S. J. Bird; Massachusetts Institute of Technology*

## Wednesday, July 26

**9:00 AM WAM-D.2**  
A Review of the Proposed Code of Ethics for Certified Health Physicists. *J. J. Kelly; Chair, Professional Standards and Ethics Committee*

**9:30 AM WAM-D.3**  
A Review of the Academy's Procedure for Addressing Professional Practice Concerns. *R. Millenberger; Brookhaven National Laboratory*

**9:45 AM BREAK**  
**10:15 AM WAM-D.4**  
Panel Discussion: A Review of Experiences and the Lessons-Learned in Addressing Professional Practice Issues. *Representatives from two Professional Societies; ABIH, L. Gross, Dana Farber Cancer Institute; AAPM, A. Hrejsa, Lutheran General Hospital*

**10:45 AM WAM-D.5**  
Point and Counter-point: Point, O. Raabe; University of California, Davis, Counter-point, TBA

**11:15 AM** Comments and Questions

**11:30 am AAHP Open Meeting**

9:00-10:00 am Room: HPS Exhibit Hall

### WAM-E: Computer Applications I (Poster Session)

Co-Chairs: James H. O'Rear; University of Utah and Olga Fernandez-Flygare; University of California, Los Angeles

**WAM-E.1** The Hotspot Health Physics Codes. *S. G. Homann; Lawrence Livermore National Laboratory*

**WAM-E.2** Project Sapphire Uranium-Beryllium Dose Rate Analysis. *S. N. Cramer, K. D. Lewis and S. D. Moses; Oak Ridge Y-12 Plant*

**WAM-E.3** A General Algorithm for Radioactive Decay With Branching and Loss From a Medium. *D. L. Strenge; Pacific Northwest Laboratory*

**WAM-E.4** A Computer Simulation of the Transport of Radioactive Aerosols in Turbulent Duct Flows. *J. C. Rodgers, Y. Yang and H. Gong; Los Alamos National Laboratory*

**WAM-E.5** RESRAD-RECYCLE: A Computer Code for Dose Assessment From the Recycle and Reuse of Contaminated Material. *B. Nabelssi, C. Yu, E. Dovel, D. LePaire and D. Swider; Argonne National Laboratory*

**WAM-E.6** RESRAD-BASELINE: A Computer Code for Baseline Risk Assessment. *J.-J. Cheng, C. Yu, L. Jones and E. Dovel; Argonne National Laboratory*

**WAM-E.7** The RESRAD Family of Computer

Codes for Risk Assessment. *C. Yu, A. Wallo, III, H. Peterson, Jr. and W. A. Williams; Argonne National Laboratory and US Department of Energy*

**WAM-E.8** The "VET" and the "OE" for your "ISFSL." *J. M. Hylko, M. C. Bradshaw and M. D. Kinney; Roy F. Weston, Inc.*

**WAM-E.9** The Development of a Simple Beta Energy Spectrum Model to Assist in the Selection of an Appropriate Beta Calibration Source for a Gas Proportional Counter. *M. A. Lewandowski; RUST Federal Services, Inc.*

**WAM-E.10** Networked Radiation Protection Data Management System Developed for a Broad-Scope Research Institution and Medical Center. *P. A. Floratos, T. J. Paul, R. C. Crott and J. A. Takahashi; University of California, Los Angeles*

**WAM-E.11** Automating the Paper Chase at the University of Nebraska, Lincoln — One Year Experience with a Commercial Computer-Based Radiation Safety Information System. *L. Grimm; University of Nebraska*

**WAM-E.12** Utilization of a Windows Based Relational Database for Managing a Broad Scope License. *M. Bernstein; Merck Research Laboratories*

**WAM-E.13** Radiological Training for General Laboratory and Biotechnology Personnel. *J. J. Pickering and C. A. Stone; San Jose State University*

### WAM-F: Cancelled

12:15-2:15 pm

### PROFESSIONAL ENRICHMENT PROGRAM

**W-1 Room 100** Health Physics of Cellular Radio; *G. H. Zeman and A. K. Fahy-Elwood; AT&T Bell Laboratories*

**W-2 Room 102** Radiation Doses to the Embryo/Fetus Resulting from Maternal Burdens of Radionuclides; *T. E. Hui and M. R. Sikov; Pacific Northwest Laboratory*

**W-3 Room 103** What Can Go Wrong and How to Prevent It; *B. S. Mallett; US Nuclear Regulatory Commission*

**W-4 Room 309** Mixed Waste Management and Options; *D. Hintenlang; University of Florida*

**W-5 Room 106** Assessment of Facilities for Dosimetry and Calibration Accreditation; *W. H. Casson; Los Alamos National Laboratory and F. M. Cummings; Idaho National Engineering Laboratory*

**W-6 Room 112** Risk and Risk Communication; *C. T. Raddatz; US Nuclear Regulatory Commission*

## Wednesday, July 26

2:30-5:00 pm Room 306

### WPM-A: Environmental II

(Poster Session)

Co-Chairs: Jerome B. Martin; Battelle and Alan J. Solow; Roy F. Weston, Inc.

3:15-3:45 PM

#### BREAK

**WPM-A.1** Measurement of Iodine-129 in Ambient Air at the Hanford Site, 1984-1992. G. W. Patton and A. T. Cooper; Pacific Northwest Laboratory

**WPM-A.2** Radionuclide Concentrations in Elk Wintering on Los Alamos National Laboratory Lands During 1980 and 1992. P. R. Fresquez, D. R. Armstrong and J. G. Salazar; Los Alamos National Laboratory

**WPM-A.3** Radiological Environmental Monitoring Program for a Magnetic Confinement Fusion Facility. S. Elwood, G. Asclone, J. Gilbert, J. R. Stencel, R. Jurefky and C. Koenig; Princeton University

**WPM-A.4** Assessing Compliance With Residual NORM Standards by Exposure Rate Measurements. H. M. Prichard; Auxier & Associates, Inc.

**WPM-A.5** Assays and Screening of Alpha-Contaminated Soils Using Alpha Spectroscopy of Thick Soil Samples. K. E. Meyer, A. C. Lucas and S. Padavan; Oak Ridge National Laboratory, Oklahoma and Illinois

**WPM-A.6** In-Situ Measurements of Low (<3700Bq/kg) Contamination Levels in Soils Using Passive Alpha Detectors. K. E. Meyer, R. B. Gammage, R. V. Wheeler, M. Salasky and P. Kotrappa; Oak Ridge National Laboratory, Landauer Inc. and Rad Elec Inc.

**WPM-A.7** The Effect of Typical Summertime Ambient Temperatures on Lithium Fluoride Tissue-Equivalent Thermoluminescent Dosimeters (TETLDs). A. K. George and M. E. Kaye; Bechtel National, Inc.

**WPM-A.8** An Environmental TL Dosimeter Using Multi-Element Aluminum Oxide (Al<sub>2</sub>O<sub>3</sub>) Detectors. W. A. Treadaway and R. L. Bates; Los Alamos National Laboratory

**WPM-A.9** An Environmental Dosimetry System Utilizing Hyper-Sensitive Material and Hot Air Heating. R. A. Tawil, K. Velbeck, J. E. Rotunda and M. Moscovitch; Harshaw/Bicron and Georgetown University

**WPM-A.10** Emissions and Dose Estimates From Depleted Uranium Test Containment Facilities at the U. S. Army Combat Systems Test Activity, Aberdeen Proving Ground, Maryland. L. S. Davis, J. C. Beckman and G. Davis; U. S. Army

**WPM-A.11** Health and Environmental Consequences of Depleted Uranium Use in the U. S. Army. T. P. Oxenberg, E. G. Daxon, R. T. Kowalski, D. O.

Lindsey, G. P. O'Brien, J. E. Rael, S. P. Shelton, D. G. Silva, R. A. Smith, L. Strickland, B. M. Thomson and F. T. Tomei; U. S. Army, Armed Forces Radiobiology Research Institute, U. S. Army Picatinny Arsenal, Lamb Associates, Inc., University of New Mexico, U. S. Army Environmental Policy Institute, Georgia Institute of Technology and Life Systems, Inc.

**WPM-A.12** Depleted Uranium Risk Assessment at Jefferson Proving Ground, Indiana. M. H. Ebinger, W. R. Hanson, T. P. Oxenberg and R. E. Herring; Los Alamos National Laboratory, Aberdeen Proving Ground and Jefferson Proving Ground

**WPM-A.13** Conventional Counting at Grid Nodes Compared to High Density Sampling for Radiological Surveys. C. R. Flynn, M. S. Blair and R. R. Highfill; Chemrad Tennessee Corp.

**WPM-A.14** Assessment of Off-Site Radiological Hazards at the Oak Ridge K-25 Site. E. K. Alguifan, E. Balluff and L. E. Miller; Jacobs Engineering Group, Inc., Martin Marietta Energy Systems and The University of Tennessee

**WPM-A.15** Movement of <sup>234</sup>Th-Labeled Soil Particles Through a Homogeneous Soil Medium. K. A. Higley; Oregon State University

**WPM-A.16** External Exposure Model for Various Geometries of Contaminated Soil. S. Kamboj, D. LePoire and C. Yu; Argonne National Laboratory

**WPM-A.17** Radiation Dose Assessment For Plutonium Contamination at Area 13 of the Nevada Test Site Using Nevada Applied Ecology Group Data and the RESRAD Code. T. S. Kroodsmo and L. F. Miller; WCS, Inc. and University of Tennessee

**WPM-A.18** Model-Directed Sampling Program in Chernobyl Forests. W. R. Schell and I. Linkov; University of Pittsburgh

**WPM-A.19** The Use of Chernobyl Data to Test Predictions and Uncertainty Estimates From Exposure Assessment Models. A. I. Apostolov, F. O. Hoffman and K. M. Thiessen; University of Tennessee-Knoxville and SENES Oak Ridge, Inc.

**WPM-A.20** Assessment of Radiological Contamination at Two Former Missile Rocket Launch Sites in the Republic of Belarus. C. J. Clayton, A. E. Hilsmeier and R. M. Moscatto; Aberdeen Proving Ground

**WPM-A.21** Radiological Surveys in Support of Base, Realignment, and Closure Operations at Fort Ord, California. C. J. Clayton and O. E. James; Aberdeen Proving Ground

## Wednesday, July 26

2:30-5:00 pm Room 302

### WPM-B: Biokinetics/Bioeffects

(Oral/Poster Session)

Co-Chairs: Otto G. Raabe; University of California, Davis and Mel Sikov; Pacific Northwest Laboratory

#### Oral Presentations

2:30 PM

**Shazaml-The Inverse Dose-Rate Effect Meets the Effective Threshold.** O. G. Raabe; University of California, Davis

2:45 PM

**Uranium in Drinking Water-A Study of Nephrotoxicity in Humans.** M. Limson Zamora, M. Moss, B. L. Tracy, J. Zielinski and D. P. Meyerhof; Department of Health Canada and Victoria General Hospital, Canada

3:00 PM

**Biokinetics of Radionuclides for Radiation Dosimetry in the Embryo/Fetus.** M. R. Sikov and T. E. Hui; Pacific Northwest Laboratory

3:15 PM

**Re-Evaluation of Fetal Radiation Doses Due to Administrations of Fe-59 to Pregnant Women at Vanderbilt University in the 1940's.** M. G. Stabin, J. B. Stubbs and J. Russell; Oak Ridge Institute for Science and Education and University of Tennessee

3:30 PM

**Individual Monitoring and Dosimetry: The Goiânia Experience.** J. L. Lipsztein, D. R. Melo and C.A.N. Oliveira; Instituto de Radioproteção e Dosimetria, Brasil

3:45 PM

#### BREAK

#### Poster Presentations

**AUTHORS PRESENT: 4:15-5:30 PM**

**WPM-B.6** Parametric Study of Thorium Model. M. C. Lourenco and J. L. Lipsztein; Instituto de Radioproteção e Dosimetria, Brasil

**WPM-B.7** Distribution of Uranium in Two Whole Body Donors. E. T. Marshall, R. E. Toohey, J. D. Cassair and R. L. Kathren; Fermi National Accelerator Laboratory, Oak Ridge Institute for Science and Education and Washington State University

**WPM-B.8** Bayesian Estimation of Biokinetic Parameters for <sup>42</sup>K. S. Xiao and P. G. Groer; University of Tennessee

**WPM-B.9** Interpretation of Tritium Retention and Excretion Data for Dose Calculation. A. Trivedi, D. Galeriu and H. Takeda; AECL Research, Canada and National Institute of Radiological Sciences, Japan

**WPM-B.10** A Dose- and Time-Dependent Model for Radiation-Induced Upper Gastrointestinal Distress. G. H. Anno, G. E. McClellan, M. A. Dore, H. R. Withers and R. W. Young; Pacific-Sierra Research Corporation, Arlington, VA, University of California at Los Angeles and Gaithersburg, MD

**WPM-B.11** Model Calculations of RBE for DNA Double-Strand Breaks by Alpha Particles. J. E. Turner and R. N. Hamm; Oak Ridge National Laboratory

**WPM-B.12** Cell Proliferation Rates in the Lower Respiratory Tract of the Rat Following Radon Exposure. R. A. Gies, E. M. Atencio, A. L. Brooks, C. L. Sanders and F. T. Cross; Battelle, Pacific Northwest Laboratories

**WPM-B.13** Preliminary Evaluation of the Distribution and Biokinetics of <sup>238</sup>PuO<sub>2</sub> in a Whole Body Donor to the USTUR. R. L. Kathren, J. J. Russell and A. C. James; Washington State University

**WPM-B.14** A New Non-Markovian Model to Describe Kinetics of Bone-Seeking Isotopes. R. E. Goans; Oak Ridge Institute for Science and Education and National Institutes of Health

**WPM-B.15** Physical Factors Affecting the Radiation Dose to the Embryo/Fetus From Radionuclides in the Pregnant Woman. T. E. Hui and M. R. Sikov; Pacific Northwest Laboratory

**WPM-B.16** <sup>137</sup>Cs Metabolism in Pregnant Women. D. R. Melo, J. L. Lipsztein, C.A.N. Oliveira and L. Bertelli; Instituto de Radioproteção e Dosimetria, Brasil

**WPM-B.17** Ulcer Induction as a Function of Beta Particle Energy Due to "Hot Particles" on the Skin. D. G. L. Kaurin, J. W. Baum, A. L. Carsten and C. W. Schaefer; Brookhaven National Laboratory

2:30-5:00 pm Room 304

### WPM-C: Accelerator II

(Poster Session)

Co-Chairs: Scott Schwahn; SURF/CEBAF and Lorraine Marceau-Day; Louisiana State University

3:30 PM

#### BREAK

**WPM-C.1** The CEBAF Phased Accelerator Readiness Review-A Model Study. J. R. Boyce, R. May and W. Ortiz; Continuous Electron Beam Accelerator Facility and CEBAF

**WPM-C.2** Electron Accelerator Beam Safety Systems. K. R. Kase and G. B. Stapleton; Stanford Linear Accelerator Center and CEBAF/SURF

**WPM-C.3** Personnel Protection System for an Experiment Area Using a 50 GeV High-Power (300 kW) Electron Beam. X. S. Mao, S. H. Rohri, K. R. Kase, G. Nelson and H. E. Smith; Stanford Linear Accelerator Center

## Wednesday, July 26

**WPM-C.4** Combining Monte Carlo and Finite-Element Calculations to Predict Electron Beam Damage. *P. K. Kloepfel; Continuous Electron Beam Accelerator Facility*

**WPM-C.5** Analysis of Removable Radioactive Material Found on Beamline Components at CEBAF. *S. O. Schwahn and K. B. Welch; Continuous Electron Beam Accelerator Facility*

**WPM-C.6** The Design of Argon Filled Coaxial Beam Loss Ion Chambers at CEBAF. *D. Dotson, L. Kirkland, R. May and G. Stapleton; Continuous Electron Beam Accelerator Facility and Riverside Regional Medical Center*

**WPM-C.7** Hadron Yield From Electron Beam Interactions With Fixed Targets. *P. Degtyarenko, M. Kossov, G. Stapleton and B. Wojtsekhowski; Continuous Electron Beam Accelerator Facility*

**WPM-C.8** Composition of the Radiation Field Around the Neutron Therapy Facility at Fermilab. *K. Vaziri, F. Krueger, T. Kroc and G. Lauten; Fermi National Accelerator Laboratory*

**WPM-C.9** Third Intercomparison of DOE High-Energy Neutron Personnel Dosimeters. *J. C. McDonald, G. Akabani and R. M. Loesch; Pacific Northwest Laboratory and U.S. Department of Energy*

**WPM-C.10** Multisphere Neutron Spectrometry Measurements in a High Energy Neutron Beam. *R. L. Mundis, L. S. Walker, P. A. Staples, A. J. Miller, W. H. Casson, M. A. Duran, M. S. Gadd and V. R. Harris; Science Applications International Corporation and Los Alamos National Laboratory*

**WPM-C.11** Response of the Albatross Neutron Dose Rate Meter to High Energy Neutron Fields and High Photon Dose Rates. *L. S. Walker, J. E. Koster, R. L. Mundis, A. J. Miller, P. A. Staples, W. H. Casson, R. T. Devine, M. A. Duran, M. S. Gadd, V. R. Harris and K. W. Jones; Los Alamos National Laboratory and Science Applications International Corporation*

2:30 - 5:00 pm

Room: 309

### WPM-D: Radon Section Session - Radon Risk Perception in Measurement and Mitigation

(Oral Session)

Co-Chairs: Raymond H. Johnson, Jr.; Communications Sciences Institute and Karen Tuccillo; New Jersey Department of Environmental Protection

**2:30 PM WPM-D.1** Driving Forces for Risk Perception, Communication and Motivation for Indoor Radon Mitigation. *D. E. Hintenlang; University of Florida*

**3:00 PM WPM-D.2** Evaluation and Enforcement of Radon Mitigation System Installations in New Jersey. *K. Tuccillo and F. B. Rauch; New Jersey Department of Environmental Protection*

**3:15 PM WPM-D.3** Radon Risk Perception from a Canadian Perspective. *A. Scott; Arthur Scott and Associates, Canada*

**3:30 PM WPM-D.4** Radon Risk Perception and Public Understanding in PA. *M. Kaufman; PA Department of Environmental Resources*

**3:45 PM BREAK**

**4:00 PM WPM-D.5** Radon Risk, An EPA Perspective. *F. Marciniowski III; US Environmental Protection Agency*

**4:15 PM WPM-D.6** Dealing with Radon Risk Perceptions. *R. Johnson, Jr.; Communications Sciences Institute*

**4:30 PM HPS Radon Section Annual Meeting with EPA Information Exchange**

2:00-5:00 pm Room: HPS Exhibit Hall

### WPM-E: Computer Applications II (Poster Session)

Co-Chairs: James H. O'Rear; University of Utah and Olga Fernandez-Flygare; University of California, Los Angeles

See WAM-E for listing of Papers

### WPM-F: Cancelled

Noon-1:30 PM Room: AAPM Exhibit Hall

### WPM-G: Medical Health Physics Section - Joint with AAPM (Poster Session)

**WPM-G.1** Skin Entrance Exposure with Dose-Area Product Meter. *R. Y. L. Chu; University of Oklahoma and D. V. A. Medical Center*

**WPM-G.2** The Distribution of Stray Radiation Patterns in a Cardiac Catheterization Laboratory. *D. L. Marx and S. Balter; US Army and Philips Medical Systems*

**WPM-G.3** Absorbed Dose Mapping in Self-Shielded Irradiators Using Direct Reading MOSFET Dosimeters. *A. Hartshorn, G. Mackay, M. R. Spender and I. Thomson; Thomson & Nielsen Electronics Limited, Canada*

**WPM-G.4** Ir-192 High Dose Rate Remote Afterloading Dose Calculation Verification. *R. J. Scala; Shadyside Hospital*

**WPM-G.5** Calculation of the Dose to the Ovaries and Uterus for Women Employed in the Radium Watch Dial Industry. *J. C. Roeske and T. G. Stinchcomb; University of Chicago*

**WPM-G.6** In-Situ Radiopharmaceutical Exposures. *C. Tarpley, Jr. and R. D. Ice; West Paces Medical Center and Georgia Institute of Technology*

**WPM-G.7** Optimizing Neutron Fluence, From Low Energy Accelerators, For Treating Brain Tumors with BNCT. *R. Kudchadker, J. F. Kunze and Y-W Lo; University of Missouri-Columbia*

**WPM-G.8** Patterns of Brachytherapy Use at the Memorial Hospital, 1960-1990. *J. St. Germain and J. S. Laughlin; Memorial Sloan-Kettering Cancer Center*

**WPM-G.9** Development and Marketing of a Quality Management Program (QMP). *M. R. Fitzgerald, B. B. Goetz and R. D. Ice; Emory University School of Medicine and Georgia Institute of Technology*

**WPM-G.10** New Jersey's Incorporation of Quality Assurance and Physicists Credentials Into Their X-Ray Equipment Regulations. *M. E. Moore and K. D. Steidley; Cooper Hospital/University Medical Center and St. Barnabas Medical Center*

5:30-6:30 pm

Room: 309

### HPS Annual Business Meeting



## Thursday, July 27

### Continuing Education Activities

**7:15-8:15 am Room: 100**  
**CEL-7** Recent Worldwide Radiation Accidents – Case Histories and Lessons Learned; *James H. Dunlap, Oak Ridge Institute for Science and Education*

**7:15-8:15 am Room: 313**  
**CEL-8** Radioactive Materials in Recycled Metals; *James G. Yusko, Pennsylvania Department of Environmental Resources and Joel Lubenau, US Nuclear Regulatory Commission*

8:30 AM-11:00 AM

Room 309

### THAM-A: Radon

(Oral/Poster Session)

Co-Chairs: Naomi H. Harley, New York University Medical School and Robert Holub, US Bureau of Mines

### Oral Presentations

**8:30 AM THAM-A.1**  
 Performance of Active Soil Depressurization Systems in Large/Commercial Structures. *D. E. Hintenlong and K. K. Al-Ahmady; University of Florida*

**8:45 AM THAM-A.2**  
 The Acute Exposure From Radon-222 and Aerosols in Drinking Water. *G. P. Bernhardt IV and C. T. Hess; University of Maine*

**9:00 AM THAM-A.3**  
 A Pulsed-Relaxator Model for the Behavior of Water Derived Radon-222 and Its Progeny in House Air. *L. E. Haskell and C. T. Hess; University of Maine*

**9:15 AM THAM-A.4**  
 Outdoor Radon and Gamma Ray Background. *N. H. Harley and P. Chittaporn; New York University Medical School*

**9:30 AM THAM-A.5**  
 A Five Year Data Base of Outdoor Radon. *P. Chittaporn and N. H. Harley; New York University Medical School*

**9:45 AM THAM-A.6**  
 Case-Control Study of the Lung Cancer Risk From Radon in Homes. *B. L. Cohen; University of Pittsburgh*

**10:15 AM BREAK**

### Poster Presentations

**AUTHORS PRESENT: 10:45 AM-Noon**

**THAM-A.7** The Effect of Correlated Counts on the Poisson Error Estimate of Radon Measurements Using Scintillation Cells. *P. H. Jenkins and C. J. Kershner; Bowser-Morner, Inc. and Femto-Tech, Inc.*

**THAM-A.8** Measurement of Airborne <sup>218</sup>Po-A Probabilistic Approach. *P. G. Groer and J. Lo; University of Tennessee*

**THAM-A.9** Residential Thoron and Radon Decay Product Sampling in West Chicago, Illinois Residences, Winter 1993-1994. *L. Jensen, R. Frey, D. King, E. Spande, A. Turner and F. Petelka; U. S. Environmental Protection Agency, Illinois and CH2M Hill*

**THAM-A.10** Cancelled

**THAM-A.11** Long Term Stability of Electrets Used in Electret Ion Chambers. *P. Kotrappa and L. R. Steff; Rad Elec Inc.*

**THAM-A.12** Model Development and Computer Simulation for Driving Forces Applied to Indoor Radon Prevention and Mitigation. *K. K. Al-Ahmady and D. E. Hintenlong; University of Florida*

**THAM-A.13** Variations of Radon in Potable Well Water Radon in Virginia. *D. G. Mose and G. W. Mushrush; George Mason University*

**THAM-A.14** Aeroradioactivity as a Community-Level Indicator of Indoor Radon. *D. G. Mose and G. W. Mushrush; George Mason University*

**THAM-A.15** The Florida Radon Literature Data Base. *H. V. Iselin, G. S. Roessler and L. H. Iselin; University of Florida and Professor Emerita of Nuclear Engineering Sciences, Minnesota*

8:30 AM-11:00 AM

Room 105

### THAM-B: Waste Management/

#### Decommissioning

(Oral/Poster Session)

Co-Chairs: James Nicolosi; Scientific Ecology Group, Inc. and Peter Littlefield; Yankee Atomic Electric Co.

### Oral Presentations

**8:30 AM THAM-B.1**  
 A Program for Radioactive Waste Management in Saudi Arabia. *W. H. Abulfaraj, S. Abdul-Majid and K. M. Al-Suliman; King Abdulaziz University and King Abdulaziz City for Science and Technology, Saudi Arabia. Presented by A. M. Mamoon.*

**8:45 AM THAM-B.2**  
 Decontamination and Decommissioning of an "Old" Tritium Facility at the Savannah River Site (U). *D. A. Stevenson, W. E. Austin and C. D. Strain; Westinghouse Savannah River Company*

## Thursday, July 27

**9:00 AM THAM-B.3**  
 Experience Performing Decommissioning Surveys for Fixed Tritium Contamination Using a Large-Area Windowless Gas Flow Proportional Detector. *P. R. Steinmeyer; Radiation Safety Associates, Inc.*

**9:15 AM THAM-B.4**  
 Radiological Dose Assessment and Residual Radioactivity Criteria Development for a Nuclear Fuel Fabrication Facility. *J. W. Nagy, G. C. Chapman and R. A. Moore; Nuclear Fuel Services, Inc.*

**9:30 AM BREAK**  
**10:00 AM THAM-B.5**  
 Environmental Dose Rates From Onsite Storage of Reactor Resins. *C. A. Flory; Northeast Utilities Service Company*

**10:15 AM THAM-B.6**  
 Radionuclide Ratios in Waste Streams From the Remediation of a Former Radium Processing Facility. *J. Sykes III, J. H. Henderson, Jr. and M. A. Cafouras; Porter Consultants, Inc., Environmental Technology of North America, Inc. and Hilbert Associates, Inc.*

**10:30 AM THAM-B.7**  
 Potential Industrial Impacts From Recycled Radioactive Scrap Metals. *J.-C. Dehmelt, J. Harrop and J. MacKinney; S. Cohen & Associates, Inc. and U. S. Environmental Protection Agency*

**10:45 AM THAM-B.8**  
 Nondestructive Decontamination of Electronic Equipment by the Entroclean Process. *C. S. Yam, R. Kaiser, O. K. Harling and S. R. Landahl; Massachusetts Institute of Technology, Entropic Systems, Inc., Boston Edison Co., Inc. and Pilgrim Power Station*

### Poster Presentations

**AUTHORS PRESENT: 11 AM-Noon**

**THAM-B.9** Development of a Material Flow Model in Evaluation of Potential Doses From Recycling Slightly Radioactive Scrap Metal. *M. E. Anderson, S. P. Jones, M. A. McKenzie-Carter and G. L. Leatherman; Science Applications International Corporation*

**THAM-B.10** Managing Difficulties Associated With Application of Radiological Release Criteria for C-14 Facilities. *M. A. Vigliani and J. Lischinsky; Applied Consultants, Inc.*

**THAM-B.11** Hazardous Waste Treatment Technologies and Mixed Wastes. *J. Lischinsky and M. A. Vigliani; Applied Consultants, Inc.*

**THAM-B.12** Leaching of Radionuclides From Contaminated Gravel. *W. H. Abulfaraj, A. M. Mamoon and M. A. Sohsah; King Abdulaziz University, Saudi Arabia*

**THAM-B.13** Utilize Storage Photostimulable Phosphor (SPP) Technology in Radioactively Contaminated Site Characterization. *T. Cheng and J. Hwang; Advanced Technologies and Laboratories International, Inc. and Cadmus Group, Inc.*

**THAM-B.14** Evaluation of Acid Digestion and Potassium Fluoride Fusion Procedures for Assaying Uranium in Soil. *D. W. Burkett, L. F. Miller and G. K. Schweitzer; Cleveland Clinic Foundation and The University of Tennessee*

8:30 AM-11:00 AM

Room 105

### THAM-C: Public Information

(Poster Session)

Co-Chairs: Michael Cobian; 3M and Vashek Vylet; Stanford Linear Accelerator Center

**10:00-10:30 AM BREAK**

**THAM-C.1** Recent Upgrades to the U. S. Department of Energy's (DOE) Health Physics Training Programs. *P. V. O'Connell; U. S. Department of Energy*

**THAM-C.2** A New Radiological Health Engineering Program. *K. J. Kearfott; University of Michigan*

**THAM-C.3** International Nuclear Emergency Exercises Sponsored by the OECD Nuclear Energy Agency: INEX 1 and INEX 2. *E. N. Lazo; OECD Nuclear Energy Agency, France*

**THAM-C.4** Cancelled

**THAM-C.5** A Plan for Expanding Citizen Involvement in Radiological Monitoring at the Hanford Site. *R. W. Hanf, R. G. Schreckhise, R. L. Dirkes and G. W. Patton; Pacific Northwest Laboratory*

**THAM-C.6** More Notes From the Attic-A Brief History of the Midwest Chapter of the Health Physics Society: 1970-1979. *J. M. Hylko; Roy F. Weston, Inc.*

**THAM-C.7** Midyear Symposia Contributions to the Profession and the Society. *C. A. Willis; US Nuclear Regulatory Commission*

**THAM-C.8** Openness at the Department of Energy: Getting the Facts Out. *E. Weiss; US Department of Energy – E. Melamed will be the presenter*

**THAM-C.9** Creating a Roadmap to the Story and the Records of Human Radiation Experiments. *W. G. LeFurgy; US Department of Energy*

**THAM-C.10** Radiation – What is Important? A Topical Discussion of Ionizing Radiation. *M. M. Hart; Savannah River Site*

## Thursday, July 27

8:30-10:00 am

Ballroom B

### THAM-D: Regulatory/Legal

(Oral Session)

Co-Chairs: James J. Thompson; University of Utah

8:30 AM

#### THAM-D.1

Commercial Airline Crews-A New Category of Occupational Radiation Workers. *D. J. Allard, E. E. Maher, S. M. Burrill and C. B. Martel; Arthur D. Little, Inc.*

8:45 AM

#### THAM-D.2

Natural Cancer Incidence in the Nuclear Industry Work Force. *L. A. Cross; American Nuclear Insurers - J. L. Forbes will be the presenter*

9:00 AM

#### THAM-D.3

Medical-Legal Issues of Radiation Injury: Two Case Studies. *R. A. Scott; Roger Williams Medical Center*

9:15 AM

#### THAM-D.4

Instruction Concerning Prenatal Radiation Exposure. *S. A. McGuire; U.S. Nuclear Regulatory Commission*

9:30 AM

#### THAM-D.5

A New Concept for Developing Regulations Relating to the Use of Sources of Radiation. *W. H. Briner, G. W. Kerr and R. D. Paris; Duke University Medical Center, Illinois Department of Nuclear Safety and Oregon Department of Human Resources*

9:45 AM

#### THAM-D.6

Radiological Facility Reclassification of the DOE Uranium Mill Tailings Remedial Action (UMTRA) Project. *M. C. Bradshaw, J. M. Hylko and R. E. Cornish; Roy F. Weston, Inc. and US Department of Energy, New Mexico*

10:30 am-Noon

Ballroom B

### THAM-E: Works-in-Progress

(Poster Session)

Co-Chairs: Christopher Martel; Arthur D. Little, Inc. and Stewart Farber; Public Health Sciences

**THAM-E.1** The Lack of Low Level Radiation Health Effects on All Affected Populations: A Compilation of Data and Programs. *J. Muckerheide, Comm of Massachusetts*

**THAM-E.2** Monitor and Reduction of Radiation Exposure to Patient and Staff in a Tertiary Teaching Hospital. *H. M. Kuan; State University of New York*

**THAM-E.3** External Radiation Doses to the Embryo/Fetus. *J. E. Tanner, R. J. Traub and J. A. Leonowich; Pacific Northwest Laboratory*

**THAM-E.4** Assessing Effects of Nasal Radium Irradiation. *S. A. Farber; Public Health Sciences*

**THAM-E.5** Determining A Project Specific Eye Dose Equivalent to Demonstrate Compliance with 10 CFR Part 20. *C. B. Martel; Arthur D. Little, Inc.*

**THAM-E.6** Rocky Flats Neutron Dose Reconstruction Project. *J. M. Aldrich, D. E. Hilmas, R. B. Falk, J. P. Moody, M. E. Anderson and D. L. Hart; EG&G Rocky Flats, Inc.*

**THAM-E.7** Reconstruction of Early Bioassays for Plutonium in Urine: Estimation of Uncertainty in Procedural Recovery. *H. Trindade, R. Morse, L. Ayres and N. Cohen; New York University Medical Center*

**THAM-E.8** Measurement of Radon and Thoron Progeny in Air at the Campus of Fukushima Medical College. *T. Kobayashi and Y. Takaku; Fukushima Medical College, Japan*

**THAM-E.9** Radon Concentrations in Depleted Uranium Storage Facilities. *S. E. Hiney, M. E. McLain, G. A. Schlapper and J. R. Bland; Texas A&M University and Los Alamos National Laboratory*

**THAM-E.10** Rock Wool Insulation as a Source of Radon. *J. C. Elliott and C. I. Elliott; California State University, Fullerton*

**THAM-E.11** Measurement of  $^{131}\text{I}/^{129}\text{I}$  Radioactive Ratio, Released by the Nuclear Reactor at Chernobyl on 26 April 1986. *L. VanMiddlesworth and J. Handl; University of Tennessee and University of Hannover, Germany*

**THAM-E.12** Radioanalytical Applications of ICP/MS Using Enhanced Sensitivity Techniques. *E. J. Wyse, O. T. Farmer, J. P. Bramson, J. A. MacLellan and D. W. Koppelaar; Pacific Northwest Laboratory*

**THAM-E.13 (Formerly MPM-B.5)** A Comparison of Results From PC-Based Radiological Airborne Release Assessment Computer Programs. *X. Rong, K. Kutikkad and S. M. Langhorst; University of Missouri-Columbia*

**THAM-E.14** High-Level Dosimetry for Mixed Gamma and Neutron Fields Using LIF Thermoluminescent Materials. *R. Michel, J. C. McDonald and E. A. Gregg; Pacific Northwest Laboratory*

**THAM-E.15** Fiberoptic-Coupled Thermoluminescence Dosimeter for Remote Sensing of Radiation. *B. L. Justus and A. L. Huston; Naval Research Laboratory*

**THAM-E.16** Pulsed Optically Stimulated Luminescence Dosimetry Using  $\alpha\text{-Al}_2\text{O}_3$ . *C. L. E. Colyott, B. G. Markey, M. S. Akselrod and S. W. S. McKeever; Oklahoma State University and Risoe National Laboratory, Denmark*

## Thursday, July 27

**THAM-E.17** A New Method of Retrospective Biophysical Dosimetry: Optically Stimulated Luminescence and Fluorescence in Dental Enamel. *D. I. Godfrey-Smith, B. Pass and P. Scallion; Dalhousie University, Canada*

**THAM-E.18** Next Generation Thermoluminescent Dosimetry System for Personnel and Environmental Monitoring. *R. A. Tawil, J. Rundo, J. E. Rotunda, J. Fellingner and M. Moscovitch; Harshaw/Bicron Radiation Measurement Products, Bicron Technologies Vertrieb - GmbH, Germany and Georgetown University*

**THAM-E.19** Simultaneous, Multi-Detector Scanning for Rapid Interior Radiological Surveys. *C. R. Flynn, M. S. Blair, R. R. Highfill, P. V. Egid, G. H. Stevens and S. J. Wallace; Chemrad Tennessee Corporation and Oak Ridge National Laboratory, CO*

**THAM-E.20** Portable Radiological Instrumentation Standardization and Qualification Program in the DOE-DP Complex. *G. W. Coutts and D. Hickman; Lawrence Livermore National Laboratory*

**THAM-E.21** Lessons Learned During Response to a Sr-90 Contamination Incident. *C. A. Potter and W. G. Rhodes; Sandia National Laboratories*

**THAM-E.22** Comparison Between the 10 CFR 835 and 10 CFR 20 Implementation Process. *P. B. Chadly and E. M. Atencio; Westinghouse Hanford Company*

**THAM-E.23** A Comparison of NRRPT Knowledge Factors and DOE Core Academic Training Requirements for Radiological Control Technicians. *R. J. Johnston and M. S. Davidson; GTS Duratek*

12:30-2:30 pm

Grand Ballroom  
Sheraton Hotel

### Health Physics Society Annual Awards Luncheon

2:30-4:30 pm

### PROFESSIONAL ENRICHMENT PROGRAM

**TH-1 Room 100** Internal Dosimetry and Part 20; *J. W. Poston, Sr., Texas A&M University*

**TH-2 Room 102** Waste Management at Decommissioning Projects; *W. C. Gaul, RUST Federal Services, Inc.*

**TH-3 Room 103** Negotiating the Washington Maze; *J. Billeit, HPS Public Affairs Director and Billeit & Quinn, Limited*

## PROFESSIONAL ENRICHMENT PROGRAM

Sunday, July 23, 1995 through Thursday, July 27, 1995

The Professional Enrichment Program (PEP) provides a continuing education opportunity for those attending the Health Physics Society Annual Meeting. The topics for the PEP are specifically chosen to cover a broad range of subjects. Some of the sessions are popular repeats from last year and the rest are completely new lectures in response to your suggestions. 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. The class size is limited to allow for interaction between the lecturer and the students.

The speakers, course titles, and the times for each presentation are listed on the following pages. On Sunday, July 23, the day before the Annual Meeting, a series of 30 courses will be offered. These courses are divided into 10 topical areas. The Sunday sessions begin early to allow for 3 sections that day, followed by the Hartman Orator lectures. The program begins at 8:00 am and finishes at 3:30 pm, the Hartman Orator lectures will take place from 4:00-5:30 pm. These lectures will be completed in time for the Welcome Reception which begins at 6:00 pm.

In addition to the above-mentioned sessions for Sunday, six PEP lectures are scheduled on Monday, Tuesday and Wednesday afternoons. Routine PEP attendees should note that the times of the mid-week sessions are 12:15 - 2:15 p.m. again this year, to be consistent with the revised scheduling of the Annual Meeting. There will be three Thursday afternoon PEP sessions from 2:30-4:30 pm.

Registration for each two-hour course is \$30. Attendees may register for courses in one topic area or may attend courses in several topic areas. Registration will be limited to 60 attendees (except as noted) per course 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.

In order to further the Society's commitment to the next generation of Health Physicists, students with a current ID card will be admitted free of charge to any sessions which still have space available after the waiting list has been admitted. Student admission will be on a first-come, first-served basis and will only begin 15 minutes after the start of the ses-

sion to allow for completion of ticket processing.

Continuing Education Credits from the American Academy of Health Physics have been granted for the PEP. The PEP lecture registration fees should be included with registration fees for the Annual Meeting. The PEP registration is included on the Annual Meeting Pre-registration form. **Note that due to space limitations, purchase orders are not accepted for these courses. You are not considered registered for a course unless payment is included with your form.**

### Please Note!!

Please remember to 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 waiting list at that time. Spaces left after the waiting 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. We understand that there are circumstances that will prevent you from being on time, but we do not want to turn people away and have empty seats due to no-shows.

**Note:** Each course is two (2) hours in length and will earn four (4) continuing education credits.

Category A	Communications
Category B	MIRD
Category C	Internal Dosimetry
Category D	IH/Hazmat
Category E	Legal/Regulatory Issues
Category F	Practical Applications
Category G	Fundamentals
Category H	Medical
Category I	Dosimetry
Category J	Rad Waste/Decommissioning

Sunday, July 23, 8:00-10:00 am

### 1-A (Communications)

**Teaching Radiation Protection Using Non-traditional Methods and Information Mapping - J. Ellsworth Weaver III, Pacific Gas & Electric's Diablo Canyon Power Plant.**

**Class size is limited to 40 students.**

Radiation protection information is often contained within difficult to read procedures, regulations, regulatory guides, and papers. Although the information may be difficult to read and understand, it remains vitally important to master. The traditional approach to instruction on this information is the "stand and deliver" lecture. Lectures bore students because they must remain a passive audience. Bored students make for uninformed students. Games and other non-traditional approaches provide a means for helping people learn by getting them involved. Rote memory, scorned by some trainers, can provide a foundation for acquiring higher knowledge and skills. Factual recall can also serve as a source of credibility for subject matter experts. This class explores methods to break through the stifling boredom and to enjoy oneself while learning. This is not a lecture.

Students will use copies of a complex regulation to compete for mastery of the subject. The regulation will be Info-Mapped for ease of information transfer. Info-Mapping is being used at Diablo Canyon and Palo Verde Power Plants. Other training documents using Info-Mapping will be available for your perusal and discussion.

### 1-B (MIRD)

**Internal Dosimetry by MIRD and MIRDose: Theory And Dose Calculations - Wesley E. Bolch, University of Florida**

The safety assessment of potential new imaging agents requires the determination of their biokinetics and resulting absorbed dose distributions. The MIRD methodology has been used for a number of years to compute internal dose from radiopharmaceuticals. The software package MIRDose provides a routine to utilize biokinetic data in the computation of average absorbed doses to organs of interest. While this methodology was intended for use in nuclear medicine, it has been widely used in radiation protection. This course will review the MIRD methodology and will provide instruction on the use of MIRDose which is written for IBM-compatible PCs. Approximately one-half of the course will be devoted to formal instruction in the use of MIRD methodology and one-half devoted to applications in nuclear medicine and

radiation protection. Each student will receive information on obtaining a free copy of the program. MIRDose Version 3 will be featured. This version includes the standard Cristy & Eckerman family of pediatric phantoms as well as three new phantoms describing pregnant women at various stages of gestation.

### 1-C and TH-1 (Internal Dosimetry)

**Internal Dosimetry and Part 20 - John W. Poston, Sr., Texas A&M University**

The "new" standards for protection against radiation (10CFR20) were implemented effective January 1, 1994 by all NRC and agreement state licensees. These regulations require the addition of external and internal radiation exposure and the controlling of the total effective dose equivalent within a single dose equivalent limit. In addition, the approaches to internal dose assessment, using the ICRP Publication 30 techniques, have changed. For these reasons, internal dose assessment has taken on a new importance. This presentation will address the NRC recommended approaches to internal dose assessment and the documents and other guidance available for use in such assessments. Included in the discussion will be a series of problems to illustrate the use of these important documents.

### 1-D (IH/Hazmat)

**Industrial Hygiene - Peter Collopy, Carnegie Mellon University**

Industrial Hygiene is the practice of anticipation, recognition, evaluation and control of hazardous agents in the work place. This course builds upon basic introductory industrial hygiene courses and training by introducing more specific methods for the evaluation and control of non-radiological hazardous agents in the work place. Students taking this course should have a fundamental understanding of OSHA regulations and basic industrial hygiene principles such as application of PELs and TLVs. A brief review of new standards and regulations will be presented in this course. Evaluation of hazardous agents through modeling and measurement techniques will be introduced with specific work place examples. Control methods for various exposure scenarios will also be discussed. This course is intended for personnel currently performing some non-radiological industrial hygiene activities.

### 1-E (Legal/Regulatory Issues)

**Current Issues in Radiation Litigation - David J. Wiedis, Jose & Wiedis**

This lecture will begin with a discussion of basic legal concepts which are fundamental to understanding



radiation litigation. Among the topics covered will be how lawyers investigate and defend a radiation case, how the case proceeds from the incident through the discovery process, preparation for trial and trial. Practical examples from cases will include strategy developed for depositions and trial. We will also examine issues currently being litigated in this field. Those issues include: the role of the federal dose standard, the role of ALARA, expert testimony and "junk science," what constitutes a compensable injury, and what is adequate proof of causation. Finally, emphasis will be placed on how to avoid litigation, the role of good recordkeeping, and what to do in the event you are sued.

#### 1-F & 2-F (Practical Applications)

**Bioassay Data Evaluation Workshop for the Estimation of Intakes, Exposures, and Doses from Internal Radiation Sources** - Clayton French and Kenneth Skrable, University of Massachusetts Lowell and Thomas LaBone, Westinghouse Savannah River Company

This special 4 hour Professional Enrichment Program (PEP) is devoted to the evaluation of in vivo and in vitro bioassay data. Following a concise summary of the biokinetic models and methods used for evaluation of bioassay data, actual data submitted in advance by participants of this PEP are evaluated in terms of estimated intakes, exposures, and internal radiation doses. Submission of data does not guarantee a seat in this PEP; the standard policy for registration and acceptance of participants in PEP sessions will be followed. Participants submitting data should include:

1. A concise summary and description of the data itself (e.g. spot urine samples in units of Bq/L, 24 hour incremental urine samples in units of Bq, the dates and times of bioassay samples, etc.) and
2. Descriptions of the type(s) of exposure(s) (e.g. chronic, acute, or mixture of both), the dates and times of exposures, the intake mode(s) (e.g., inhalation, ingestion, absorption through the skin, wound, or mixed modes), radionuclides, chemical compound forms, and particle size, and any other information useful in the evaluation of the bioassay data such as air sampling data taken at the time of the exposure of workers.

Data will not be identified by either the name of the facility or by the names of exposed persons unless a specific request is made and specific permission is granted by the person submitting the data. Confidentiality of all other submitted data will be maintained.

**NOTE: This is a two part course; you must register for both parts to participate.**

#### 1-G (Fundamentals)

**Health Effects - C. L. Greenstock, AECL Research, Canada**

Exposure to ionizing radiation can result in a variety of biological effects including cancer and cell death. These effects are dependent upon the nature of the radiation and the overall biological response, particularly DNA repair and the antioxidant defence processes. The results of acute versus chronic exposure, and the effects of dose, dose-rate and radiation type, will be described. Data from such experiments provide the foundation for new regulations and dose limits including ICRP 60.

The lecture will give an historical perspective, and will provide the audience with basic principles and concepts. The talk will discuss the interaction of radiation with biological targets, mechanistic insight into the radiation damage, and details of those factors that influence the biological consequences. These include the radiobiological oxygen effect, DNA damage repair, the oxidative stress response including signaling processes and the immune system, adaptation and cross-resistance, gene induction and the role of antioxidant defense enzymes.

Finally, in bio-monitoring it is important to be able to distinguish between radiation dose and biological risk. The importance of biological response modifiers and other environmental and genetic determinants of individual radiosensitivity in the fields of radiation protection, regulatory limits and epidemiological risk estimation, will be discussed.

#### 1-H (Medical)

**Introduction to the Physics of Mammographic Imaging - Charles C. Chamberlain, S.U.N.Y. Health Science Center**

At the present time, x-ray mammography is the only means available for the earliest detection of breast cancer. The production of a high quality diagnostic mammogram is arguably the most challenging task in radiologic imaging, involving a high degree of expertise on the part of the radiologist who reads the films, the x-ray technologist who positions the patient and makes the exposure and the medical physicist or medical health physicist who may evaluate the proper functioning of the imaging system. It is important the physicist have an understanding of the basic physical principles which dictate the required photon energies, x-ray generator construction, imaging systems and patient dosimetry. The course will include discussion of photon interactions with tissue, radiologic and image contrast, production and effects of scatter and related topics. State-of-the-art mammographic im-

aging systems will also be covered. Discussion will include implications of the federal Mammography Quality Standards Act of 1992, as time permits.

#### 1-I (Dosimetry)

**Introduction to Microdosimetry - James E. Turner, Oak Ridge National Laboratory**

Microdosimetry is the study of radiation transport and energy deposition on a distance scale of micrometers and smaller. Investigations seek to understand the different chemical and biological effects of radiation in terms of the track structures of different kinds of radiation. The course deals with radiation transport and its simulation by Monte Carlo procedures, track structure and radical production in liquid water, and modeling of the chemical and biological effects of ionizing radiation. The microdosimetric concepts and quantities defined by the International Commission on Radiation Units and Measurements and in common use are covered.

#### 1-J (Rad Waste/Decommissioning)

**On-Site Storage of Low-Level Radioactive Waste - Steven R. Adams, IT Las Vegas Regional Office**

Management of On-Site Storage of Low-Level Radioactive Waste (LLRW) is described that emphasizes radiation safety, cost containment and minimization of the impact of the Low-Level Radioactive Waste Policy Act. Effective means of managing LLRW volumes are discussed. Methods for limiting the production of LLRW at the source are described. Decay in storage, incineration, special packaging techniques, and suggestions for training and awareness of LLRW generators are reported that have been shown to be effective in waste minimization. Selection of waste-reduction techniques are described including recycling or reclaiming, source reduction or substitution, procedure modification, compaction, effective decontamination, and concentration of LLRW through ion exchange, charcoal absorption, and evaporation. Mixed waste handling techniques and screening methods to identify radioactive medical waste is discussed. Data and database requirements are described for implementing decay in storage including software, bar-codes, surveys, radionuclide identification, and release criteria. Operational experience is related that will assist in waste minimization including experimental designs for research facilities, work segregation, and procedure/training reviews. Packaging methodologies are depicted for LLRW to ensure proper handling for decay storage or incineration. Storage options are described including methods for optimization of cost benefit for storage module designs, weather protection, risk analysis, and environmental monitoring requirements.

Sunday, July 23, 10:30 am-12:30 pm

#### 2-A (Communications)

**Public Relations - How to Effectively Influence Opinion - John Billeit, HPS Public Affairs Director, Billeit & Quinn, Limited**

The course will provide a basic introduction to public relations. It is designed to address the interests of both the novice and the experienced practitioner.

Whether for an individual, small organization or complex entity, the material presented will furnish attendees with the basic concepts and methodologies of public relations. Among the subjects to be discussed are establishing your goals, identifying your publics, crafting your message, choosing your communication vehicles and evaluating your results.

The session will be conducted in an interactive seminar format.

#### 2-B (MIRD)

**Acquisition and Analysis of Quantitative Radiopharmaceutical Data in Humans - Jeffrey A. Siegel, Cooper Hospital**

An accurate determination of the time dependent amount of activity in situ is required to accurately estimate absorbed dose for source and target organs of the body according to the Medical Internal Radiation Dose (MIRD) schema. This session describes what data needs to be collected and how this data is analyzed and processed to estimate absorbed radiation dose. It involves:

1. Data collection: identification of the various source regions, determination of adequate temporal sampling, and collection of counting data,
2. Data analysis: determination of activity in source regions as a function of time and,
3. Curve processing: integration of the time-activity curves to obtain the total number of disintegrations, cumulated activity, or residence time in each source.

#### 2-C (Internal Dosimetry)

**Practical Applications of Internal Dosimetry Calculations - Eugene H. Carbaugh, Pacific Northwest Laboratory**

Assessment of intakes and internal doses often require the health physicist to exercise a substantial amount of professional judgment, as well as knowledgeable use of computer codes or hand calculations. While it would be nice to say that internal dosimetry is a precise science, the reality is that many assumptions tied to an assessment are taken for granted. At one extreme is the complete use of default assumptions; at the other is the attempt to specifically tailor a

detailed assessment to a unique individual. This course, presented with humor in a down-to-earth style, will discuss nine types of calculational adjustments and provide practical insights into dealing with some real-world bioassay and internal dose puzzles.

#### 2-D (IH/Hazmat)

##### **Ventilation Design and Measurement - Lou Diberardinis, Massachusetts Institute of Technology**

This course will address the basic principles of airflow and airflow measurement techniques involved in the design and measurement of ventilation systems used for toxic contaminant control in the work place. Design techniques will be discussed. Participants will learn how to troubleshoot existing ventilation systems and how to determine if they are designed properly. Participants are encouraged to bring existing problems to the course for discussion.

#### 2-E (Legal/Regulatory Issues)

##### **Radiation Worker Epidemiology and Risk - Ethel Gilbert, Battelle Pacific Northwest Laboratories**

Several epidemiologic studies of workers who have been exposed occupationally to low levels of radiation have been conducted in the United States, Great Britain, and Canada. These studies provide a direct assessment of risk based on data on person exposed at actual levels of interest, and thus serve as a check on the validity of risk estimates obtained through extrapolation from studies of persons exposed at high doses, such as the Japanese atomic bomb survivors. This course will review results of the worker studies with particular attention to national and international efforts to reduce uncertainties by combining data from several studies. Approaches for analyzing data from worker studies will be described, and special problems, such as bias resulting from unidentified confounding factors and from uncertainties in dose estimates, will be discussed. Current risk estimates will also be briefly reviewed.

#### 1-F & 2-F (Practical Applications)

##### **Bioassay Data Evaluation Workshop for the Estimation of Intakes, Exposures, and Doses from Internal Radiation Sources - Clayton French and Kenneth Skrabble, University of Massachusetts Lowell and Thomas LaBone, Westinghouse Savannah River Company**

See PEP 1F for description.

Continuation of a 2 part course

#### 2-G (Fundamentals)

##### **Radiochemistry in Radiation Protection and Site Characterization - Ahmed E. Nevissi, University of Washington**

Radiation protection and environmental remediations and cleanups need knowledge about the kinds and quantities of radionuclides present at a site. Site characterization and cleanup will require that large numbers of samples be collected and analyzed using specific, agency approved, analytical protocols. The type of analysis might be organic, inorganic, or radionuclide, or a mixture of all three. Analytical or radioanalytical analyses of radioactive material are processes which typically consist of several discrete operations such as separation, quantification, data management, and quality control/assurance. In addition, once the analytical results are generated, a significant amount of effort is required to reduce and interpret them. The radionuclide segment of these processes is typically carried out by radiochemists and the operations are conducted in radiochemistry laboratories.

Radiochemical measurements for radiation protection and site characterization cover a wide variety of analysis of samples with activities that may span over several orders of magnitude. Different aspects of more conventional measurements in radiochemistry laboratories will be reviewed, some of the common problems encountered in radiochemical measurements will be explained, and the future trends in radiochemistry will be discussed.

#### 2-H (Medical)

##### **Radiation Safety During Fluoroscopic and Interventional Procedures - Ted Villafana, The Medical College of Pennsylvania**

The diversity of modern fluoroscopic instrumentation coupled with the increasing complexity and duration of fluoroscopically guided procedures results in increasing possibilities of greater radiation dose to both patients and personnel.

This PEP course will introduce the Health Physicist to basic instrumentation for the various fluoroscopic configurations including stationery and mobile units, conventional GI, digital acquisitions, cardiac cath and electrophysiology cine and high output mode procedures. Doses to patient and personnel will be presented as well as the factors affecting them. Also covered will be personnel monitoring approaches as well as personnel orientation and credentialing of fluoroscopic operators. Various radiation protection devices and operational radiation safety strategies will be presented.

#### 2-I (Dosimetry)

##### **Microdosimetric Measurements and Applications in Radiation Protection - Joseph C. McDonald, Battelle Pacific Northwest Laboratories**

The term microdosimetry has been applied to a field of research that is devoted to the study of the microscopic distribution of energy depositions in irradiated matter. This presentation deals with the practical matters of measuring distributions of energy deposition events, determining microdosimetric quantities and calculating other derived parameters that are useful for radiation protection purposes. The focus of the presentation is on the experimental techniques that have been used to measure the distribution of absorbed dose in lineal energy. Experimental measurements will be compared to theoretical calculations, and examples of radiation protection applications will be provided. The presentation describes experimental techniques and details that are useful for the operation of gas-filled proportional counters. Course attendees are encouraged to attend the companion course presented at this meeting, entitled: "An Introduction to Microdosimetry."

#### 2-J and TH-2 (Rad Waste/Decommissioning)

##### **Waste Management at Decommissioning Projects - Wayne C. Gaul, RUST Federal Services, Inc.**

Wastes generated during a decontamination and decommissioning (D&D) project may require treatment to meet the disposal requirements mandated by Federal and State regulations, disposal site specific requirements, and cost constraints. Selection of an appropriate treatment methodology is critical to the successful completion of the D&D project. If the wrong treatment method is employed, treatment and disposal costs may be unnecessarily high and the waste may not be acceptable for disposal. Proper selection requires knowledge of the available treatment processes, their costs, and the requirements for disposal of the wastes. Examples of decontamination techniques and their applicability will be given. Since treatment costs are so highly dependent on site and waste characteristics, the costs will be discussed on a general basis.

Because the treatment and disposal of mixed waste presents a number of unique problems compared to low-level waste, each will be discussed separately. A discussion will be given on different treatment options for mixed waste.

Soil presents a tremendous challenge for waste management and is very site specific due to the large diversity of soil types. Soil washing will be discussed

in relation to the separation of the contaminated fraction for volume reduction.

Sunday, July 23, 1:30-3:30 pm

#### 3-A (Communications)

##### **A Workshop on the Do's and Don'ts of Risk Communication for the Technically Inclined - David A. Waite, CH2M Hill**

This course will be conducted in the format of a facilitated participation workshop. The objectives of the course are (1) to examine our personal and professional goals for risk communication, (2) compare our goals with others to whom we try to communicate risk information, and (3) to understand the most effective risk communication techniques, considering the differences. These differences are examined in terms of motivation, based on generally observed characteristics and behaviors, often derived from backgrounds and training. Salient points of the discussion of these characteristics will be documented through the use of recent case studies. Recognizing that accommodating the differences among key groups involved in risk communication will require some time and a process, the course will be concluded with a consideration of a strategy for helping us personally transition from the present state of risk communication disarray to a status more attractive to us technically inclined.

#### 3-B (MIRD)

##### **Internal Dosimetry by MIRD and MIRDose: Biokinetic Modeling - Michael G. Stabin, Radiation Internal Dose Information Center**

Often the most difficult parameter to obtain for solution of the MIRD internal radiation dose equation is the residence time (or cumulated activity), which is the area under the time-activity curve for an organ, tissue, the whole body, etc. In an internal dosimetry problem, the kinetics of all source regions must be characterized in order to calculate all contributions to the radiation dose in various target regions. After the kinetics are well characterized, the areas under the time-activity curves for the source regions must be estimated. This program will demonstrate through description and example several approaches to the characterization of source region kinetics and integration of the time-activity curves. The use of direct integration, least squares analysis, and compartmental modeling techniques will be discussed, and results using the different methods will be compared. Theoretical aspects of the different approaches will be described as time permits. Inclusion of the results of biokinetic modeling into the MIRD (and other)



calculational systems will be explained and demonstrated. This session is a companion to the sessions on the calculational techniques of internal dosimetry by MIRD and MIRDOSE and on the gathering of kinetic data by scintigraphic methods.

### 3-C (Internal Dosimetry)

#### Medical Management of Radiation Accidents - *Jerrold T. Bushberg, University of California, Davis*

While radiation accidents are rare, there are a variety of accident situations that can result in inadvertent radiation exposure and contamination in combination with physical injury. Common accident scenes include transportation of radioactive material, medical and research laboratory accidents, industrial accidents involving commercial nuclear power, and high level sealed sources used for industrial radiography. The response to these types of accidents is relatively independent of its initiating event. Thus, for the purposes of discussion this presentation will use an accident at a commercial nuclear power plant to serve as a model for radiation accident response and management. It is important to realize that most medical centers are not prepared to deal with radiation accidents. This is, however, typically a function of inadequate training and experience rather than a lack of special material requirement. Those medical centers that have a plan are preparing to deal with a relatively small scale accident involving one to two people that have been both injured and either exposed to radiation or internally and/or externally contaminated. These plans and procedures are not, however, designed to deal with large scale accidents involving hundreds of injured and contamination individuals.

Medical response and management of radiological accidents begins with education of medical and ancillary health care personnel in the fundamentals of radiation exposure and its biological effects. Additional training and hands on experience in radiation protection principles is necessary to minimize patient and personnel radiation exposure and contamination. This course will present the essential elements necessary to train medical personnel regarding priorities for medical management of these patients and how to recognize and evaluate different types of radiation injuries. Information is also presented to help educate ancillary health care workers on how to set up and use radiation monitoring and decontamination equipment and facilities. This course provides an overview of acute radiation injury and the principles which are essential to the appropriate medical management of radiation accident victims.

### 3-D (IH/Hazmat)

#### The 3 H's - Preparation Provides Relief - *Peter Collopy, Applied Health Physics*

This course will provide an overview of the regulations of DOT, EPA and OSHA in regard to hazard communication. The key elements for OSHA's Hazard Communication and Chemical Hygiene Standards (HAZ Comm), DOT's Hazardous Materials Transportation Act (HMTA) and OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) will be identified. Problems and solutions for implementing these regulations at various facilities and industries will be discussed. Examples of written plans and training programs will be used to illustrate best available practices.

### 3-E (Legal/Regulatory Issues)

#### Calculating, Recording and Reporting Occupational Radiation Exposures - *Mary Thomas, U.S. Nuclear Regulatory Commission*

This course will discuss the use of Regulatory Guides 8-7, Rev. 1 and 8.9, Rev. 1 as well as the REMIT software package. There will be lots of time for questions and answers on Forms 4 and 5, PSE, acceptable dose history records, and the REIRS database. Attendees are asked to review Reg Guide 8.7 and Part 20 prior to the course and bring questions for this interactive workshop.

### 3-F (Practical Applications)

#### Health Physics Resources on the Internet - *Hector Mandel, University of Illinois at Urbana-Champaign*

This lecture will provide health physicists with the basic information they need in order to understand and effectively use the vast resources now available on the internet. Topics will range from basic concepts like communications software, network connections, email and newsgroups to the newest developments. Specific examples of how gopher, WAIS and the World Wide Web can be used to access valuable health physics related information resources will be included.

### 3-G (Fundamentals)

#### Fundamentals of Non-Ionizing Radiation Protection - *John A. Leonowich, Battelle Pacific Northwest Laboratory*

No prior knowledge of the field is required. It is clear that the use of non-ionizing radiation (NIR) continues to cause concern to both workers and the general public. Many misconceptions have clouded the appreciation of the actual hazards associated with this type of radiation. This course will review the fundamentals of NIR protection and will provide the basis

for the health physicist to pursue further study in this area. Included among the topics to be covered are: radiofrequency and microwave radiation (3 kHz 300 GHz), lasers, optical and ultraviolet sources, and extremely low frequency (ELF) electromagnetic fields (0-3 kHz). 1992 marked the release of extensive revisions to both the ANSI/IEEE Radiofrequency/Microwave Standard and the ANSI Z136.1 Laser Standard. Both these revisions will be reviewed, as well as the ACGIH recommendations for magnetic fields and non-coherent optical radiation. Detailed outlines of each area discussed will be provided to each participant.

### 3-H and M-6 (Medical)

#### Status of NRC's Quality Management Rule - *John E. Glenn, U.S. Nuclear Regulatory Commission*

On January 27, 1992, a new NRC rule became effective requiring licensees to establish and maintain Quality Management Programs. The rule also changed the definitions of misadministration and introduced definitions for "written directives" and "recordable events" among other changes. The rule has, we believe, improved the likelihood of misadministrations being detected and reported. To this time, there is very little data about misadministrations that have been avoided or prevented as a result of the rule. A brief description of misadministrations reported, the results of an NRC contracted review of the 1700 programs and lessons learned since the rule became effective will be presented. Current NRC plans and initiatives, particularly regarding high-dose-rate after loading brachytherapy, will be discussed.

### 3-I (Dosimetry)

#### External Dosimetry - *Michael W. Lantz, Arizona Public Service Company*

This class will present particular external dosimetry issues related to nuclear power stations. Discussions will include such topics as TLD quality assurance processes, neutron dosimetry, electronic dosimetry, the dosimetry of large noble gas submersions, and dealing with medical uptakes of radioactive material.

### 3-J (Rad Waste/Decommissioning)

#### Soil and Ground Water Exploration for Site Characterization - *Dr. Frank Bellini, Yankee Atomic Electric Company*

Site characterization includes site sampling, monitoring and analysis activities to determine the nature and extent of contamination. This presentation addresses the details of work done for subsurface investigations.

Preliminary steps involve establishment of site survey control, a compilation of pertinent site history and the location of underground utilities and components. These data guide initial layout of sampling locations. Surface soil sampling uses low-tech methods, but maintaining certain protocols is essential. Subsurface sampling requires a drilling contractor and experienced personnel to plan, supervise and interpret results of that operation. Because subsurface sampling is done remotely, only proper technique yields quality samples. Prevention of sample cross-contamination requires scrupulous care. Detailed description of soil samples and the composition and geometry of soil units must also be determined. Standard, functional soil description procedures will be presented.

Sampling and monitoring of ground water is also necessary for such sites. Location and construction of observation wells are critical to obtaining useable results. Well installation techniques and numerous related pitfalls will be described. Ground water sampling techniques to assure representative samples will be detailed.

Analyzed and reduced field data serve as input for dose modeling. The DOE computer code, RESRAD, a site screening model recognized by the NRC, offers an example for model development.

Monday, July 24, 12:15-2:15 pm

### M-1

#### Introduction to Extremely Low Frequency Electromagnetic Fields (0-3 kHz) - *John A. Leonowich, Battelle Pacific Northwest Laboratory*

This course will introduce the controversial topic of extremely low frequency electromagnetic fields (ELF-EMF's). These fields have been linked to a number of health effects, including cancer. The course will provide a non-technical review of the basic physics of ELF electric and magnetic fields, as well as to explore the potential health effects of these EMF's. In particular, the established biological effects of magnetophosphene induction, reproductive effects, and melatonin suppression will be reviewed. Additionally, cancer epidemiological research will be discussed, with the aim of pointing out some of the strengths and weaknesses of current studies. Both public and occupational exposure studies will be explored. Current exposure criteria recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), as well as the International Commission for Non-ionizing Radiation Protection (ICNIRP) will be reviewed. The course will also familiarize the student with some of the instrumenta-



tion currently used to perform hazard assessments of ELF-EMF's. At the end of the course, the student should be able to understand the risks associated with these fields, as well as to be able to intelligently explain these risks to the concerned layman. The course has no prerequisite, though attendance at the PEP course Introduction to Non-ionizing Radiation is recommended.

#### M-2

**Extrapolation Chamber Techniques For Measuring Absorbed Dose Rate - Matthew J. Scannell, Yankee Atomic Electric Company**

The attendees are introduced to the fundamental techniques of extrapolation chamber measurements. This includes an introduction to the theory of operation that make these chambers 'primary instruments' for measuring absorbed dose rate. A history of extrapolation chambers and the different designs is summarized. A review is given of the environmental correction factors required for field measurements and for precise measurements in accordance with national laboratory standards. The Yankee Atomic extrapolation chamber will be demonstrated as an example of how the measurement process can be automated. The current use of extrapolation chambers for calibrating nuclear power plant fields, beta emitting sources and medical ophthalmic applicators are discussed. Also discussed are the recent research applications including characterizing electronic equilibrium conditions in photon fields and evaluating doses from localized activity sources like 'hot particles.' This lecture should give attendees a thorough understanding of how these versatile instruments can and are being applied to meet current challenges in the field of radiation dosimetry.

#### M-3

**Part 20 for Materials Licensees - Charleen Raddatz, U.S. Nuclear Regulatory Commission**

This course will discuss some of the special problems facing materials licensees with the implementation of the revised Part 20 (May 1991). We will discuss radiation protection programs, ALARA, Dose records, Surveys and many other general topics. Attendees are asked to read the rule prior to the course and bring any questions about its implementation. This will be a highly interactive discussion rather than a lecture format.

#### M-4

**You CAN Buy Software Quality - Richard Oesterling, INEL**

Bugs! They are everywhere. Some are helpful, others are costly. Among the most costly, individu-

ally, are defects in computer software. "Caveat Emptor" never applied to any item of trade more than to software. Due to the special nature of software as a "publication," not a product, the buyer has little recourse unless specific contractual obligations are imposed upon the vendor.

This course is not intended to make software engineers of the participants. Rather, it will focus on the steps a person can take to maximize the potential of obtaining the desired software. This will be done by introducing the two principal elements that need to be present for the software to attempt to attain high reliability and defect-free operation.

The first element is the definition, by the customer, of "quality" in terms of adequate requirements and validation criteria. This will be presented in the context of the standards that are available both for guidance during development and for inclusion in contractual stipulations.

The second element is the set of characteristics possessed by a software vendor who is likely to produce software of high quality. These characteristics are promulgated in the Capability Maturity Matrix of the Carnegie-Mellon Software Engineering Institute that will be abstracted for the closing segment of this presentation.

#### M-5

**The Selection of Radiation Protection Instruments - Kenneth L. Swinb, Pacific Northwest Laboratory**

Appropriate radiation protection instruments are essential to a radiation protection program. Instruments must meet requirements for radiation type, function (e.g., dose rate, contamination control, emergency response), and environmental conditions expected during their use. Information will be presented on the selection of instruments from the large variety of instruments available. Published standards are available that define the expected performance of instruments; the performance of typical instruments against criteria in these standards will be described. Methods of using available information to assist in the selection of appropriate instruments will be described. The instrument should be considered as part of a system. In addition to technical performance requirements, the user must consider the development of procedures, the calibration of the instrument, training, function and performance test requirements and maintenance requirements. All of these factors affect the cost and performance of the instrument.

Electronic personnel dosimeters, EPDs, share many of the features of instruments. Selection of an EPD will be compared to selection of an instrument.

#### 3-H and M-6

**Status of NRC's Quality Management Rule - John E. Glenn, U.S. Nuclear Regulatory Commission**  
See PEP 3-H for description.

*Tuesday, July 25, 12:15-2:15 pm*

#### T-1

**Introduction to Instrumentation to Measure Non-Ionizing Radiation and Fields - John A. Leonowich, Battelle Pacific Northwest Laboratory**

It is often necessary to make measurements of non-ionizing radiation and fields in order to ensure compliance with applicable standards. This class will review the types of instrumentation available to the health physicist/industrial hygienist for making compliance measurements, and discuss the unique problems the surveyor faces in making accurate assessments due to the limitations of currently available instrumentation. The following types of instruments will be discussed: low frequency (0 - 3 kHz) electric and magnetic field sensors, radiofrequency/microwave narrow- and broad-band instruments (3kHz - 300 GHz), ultraviolet meters (100 - 400 nm), and instruments used to quantify coherent (i.e. laser), radiation (100 nm - 1mm). Representative types of instruments will be available for demonstration and inspection by class participants. It is recommended that the PEP course Introduction to Non-Ionizing Radiation be attended as a prerequisite to this class.

#### T-2

**Radiation Protection Program Reviews for 20.1101(c) - William H. Barley, Washington Public Power Supply System**

Section 20.1101(C) of 10CFR require periodic (at least annual) reviews of radiation protection program content and implementation. This course is designed to assist both broad based licensees and smaller radioactive material licensees to develop a review process tailored to each licensee's specific program content. Included will be recommended documentation methods. Various types of radioactive material licenses will be cited as examples during the course and recommended review processes structured for each cited example to assist students with application of techniques presented to their own specific license conditions.

#### T-3 and TH-3

**Negotiating the Washington Maze - John Billett, HPS Public Affairs Director, Billett & Quinn, Limited**

During the course, attendees will walk through the federal legislative and regulatory process. We will also review the current legislative and regulatory climate, pending actions and anticipated outcomes rela-

tive to the interests of the members of the Health Physics Society.

The session will be conducted in an interactive seminar fashion. It is designed to provide a two-way communication bridge for the exchange of information between Health Physics Society Members and the Society's Public Affairs Director.

#### T-4

**Lower Limits of Detection - Thomas B. Borak, Colorado State University**

Judgments on whether or not a sample contains radioactivity must often be based on the stochastic nature of radioactive decay and sample processing. In many instances, formulas can be applied to assess the "lower limit of detection" or "minimum detectable activity" of a certain methodology. This lecture will review the underlying assumptions involved in the derivation of several popular formulas. Information will be presented to indicate how the results are affected when the assumptions in the derivation are not satisfied. Examples of alternative computational methods will be presented and applied to real data. The discussions will focus on the following two questions:

- \* At what level can you conclude that there is radioactivity in a given sample?
- \* How much radioactivity is required in order to routinely identify its presence in samples?

#### T-5

**Developing a Quality Manual For a Radiation Calibration Facility - Kenneth L. Swinb, Pacific Northwest Laboratory and J. Shobe, National Institute for Standards and Technology**

One of the key efforts in preparing a calibration facility for accreditation under either the Health Physics Society program or the NVLAP program for secondary calibration laboratories for ionizing radiation is the development of the quality manual. The manual states the laboratory's policies and operational procedures established in order to meet the requirements of the accreditation program. Specific elements and procedures that must be included in the quality manual are outlined in the specific program requirements or criteria. Manuals that are incomplete or inaccurate will delay the accreditation process. The requirements for the quality manual will be described and areas that prove troublesome will be discussed. Examples of manual elements will be presented. The quality manual is similar to a technical basis manual and the similarities will be discussed.

**T-6**  
**Global Health Physics Practice and Experience -**  
**Ted Lazo, OECD Nuclear Energy Agency**

Since the beginning of the commercial nuclear-power industry in the 1960's, the number of reactors in the world has grown continuously. In parallel with this growth has come growth in experience with nuclear reactors, and the specific area of radiation protection is no exception to this rule. However, many different countries participate in the nuclear world, and the experiences and practices in radiation protection in each country have been driven by different cultural and regulatory pressures, and have evolved along different paths. In spite of these differences, one of the common goals of radiation protection around the world is, and has always been, to assure that worker occupational exposures are kept As Low As Reasonably Achievable (ALARA), social and economic factors being taken into account. The different approaches taken to achieve this goal can vary significantly, and the examination of these different approaches can be of value to all those involved in nuclear-power generation.

The objective of this PEP class is, then, to discuss some of the different radiation-protection experiences and practices of various countries around the world, and to show that the sharing and exchange of these ideas, in spite of cultural and regulatory differences, can help to reduce occupational exposures. To better understand the context of radiation protection around the world, the radiological status of the world's nuclear-power plants will be discussed, and the organizations and documents which provide the philosophy of and guidance for radiation protection will be presented. This will lead into a discussion of current "good practice," drawing from the experience of various countries, and finally some conclusions and observations regarding the future of radiation protection will be given.

Wednesday, July 26, 12:15-2:05 pm

**W-1**  
**Health Physics of Cellular Radio - Gary H. Zeman**  
**and Alice K. Fahy-Elwood, AT&T Bell Laboratories**

Health Physicists are occasionally called upon to answer questions about health and safety issues associated with cellular radio installations. This course will provide Health Physicists with the framework within which these questions can be addressed. The course will include: the history of cellular radio, basic principles of cellular radio systems, operating pa-

rameters of typical cell sites, applicable national and international health and safety standards for radiofrequency (RF) energy, and occupational and general public exposure to RF energy associated with operating cell sites. The course will also review current directions in RF bioeffects research, in RF safety standards bodies, and in the regulation of RF safety by government agencies.

**W-2**  
**Radiation Doses to the Embryo/Fetus Resulting from Maternal Burdens of Radionuclides - T. E. Hui and M. R. Sikov, Pacific Northwest Laboratory**

Radiation dose limits to the embryo/fetus are specified in 10 CFR Part 20. Increasingly sophisticated approaches are being developed to address the dosimetry of the embryo/fetus for maternal intakes or burdens of radionuclides. This course is designed to provide an overview of dosimetry issues that need to be considered and appropriate methodologies for representative exposure scenarios. Continuing growth and changes in the morphology and physiology of the embryo/fetus and the woman throughout gestation affect the metabolic patterns that give rise to different activity concentrations as well as the physical relationships and dosimetric considerations. Several approaches for biokinetic modeling, based on both animal and human data, will be presented. Computer-aided dynamic modeling of deposition, clearance, and retention using commercially available software will be demonstrated and results will be illustrated through the models for representative radionuclides. The course will discuss the physical aspects of the dosimetry that need to be considered. These include the fact that the embryo/fetus receives gestational-stage-dependent differences in the dose contributions from itself and from the maternal body and these are influenced by the deposition pattern, growth of the embryo/fetus, and differences among modes of intake (inhalation versus ingestion, acute versus chronic exposures). Finally, surrogate approaches for radiation protection practice, such as the use of radiation dose to the uterus or limiting the intake to a fraction of ALI, will be discussed.

**W-3**  
**What Can Go Wrong and How To Prevent It - John Potter, U.S. Nuclear Regulatory Commission**

Each year, the Nuclear Regulatory Commission (NRC) receives information concerning events covering a wide range of health physics problems. Each of these events pose unique health physics challenges to evaluate the information and determine the appro-

priate response. All health physicists will encounter events such as these and the lessons learned are an important addition to a health physicist's practical experience. This session will acquaint the participant with issues that should be considered when making response decisions and explore how these issues relate to some events to which the NRC has responded over the last few years. Case studies of events will include overexposures of individuals using radiography sources, spread of contamination into unrestricted areas accessible to large numbers of the public, spread of contamination from radioactive sources inadvertently cut open, chemical reactions at fuel facilities, loss of sources, medical radioactive waste sent to landfills and problems with source retrieval in brachytherapy.

**W-4**  
**Mixed Waste Management and Options - David Hintenlang, University of Florida**

The combination of hazardous and radioactive waste materials has created a major waste disposal dilemma for a wide variety of organizations and institutions. This course will examine issues and management options to reduce the difficulties created by these mixed wastes. The regulatory framework governing mixed wastes will be assessed through a review of relevant portions of the Resource Conservation Recovery Act (RCRA) and the Atomic Energy Act. The commonly found forms and matrices of mixed waste will be discussed to help participants identify mixed waste and the processes that generate it. Options for the storage, treatment and disposal of mixed waste will be examined. These will include on-site options for waste stream identification and minimization, forms amenable to on-site treatment and RCRA requirements for treatment procedures. The capabilities and limitations for commercial off-site treatment and disposal will also be surveyed and the session will conclude with a review of the status of proposed treatment technologies that are under development to mitigate the mixed-waste dilemma.

**W-5**  
**Assessment of Facilities for Dosimetry and Calibration Accreditation - W. H. Casson, Los Alamos National Laboratory and F. M. Cummings, Idaho National Engineering Laboratory**

The process of accrediting a laboratory to provide a dosimetry or calibration service involves a comprehensive assessment of its capabilities. This includes a review of the quality manual, a performance test and an on-site review of operations. During the assessment process the reviewers or assessors are con-

firmed that the candidate laboratory can meet requirements in the established standards or criteria. Compliance is required for certain criteria; other criteria constitute recommendations. In addition, during the on-site assessment the technical experts will often make suggestions to improve the performance of the laboratory. Ensuring that the laboratory meets minimum requirements and clearly differentiating their performance from suggested improvements are key roles of the assessor and his supervision. The roles of the assessor, typical on-site activities, common observations, and proper preparation for the on-site assessment will be discussed.

**W-6**  
**Risk and Risk Communication - Charleen Raddatz, U.S. Nuclear Regulatory Commission**

This course will discuss some risk perception facts and figures not necessarily related to radioactive material as demonstration of the problem of risk perception. Then we will discuss strategies for dealing with public outrage not supported by actual risk levels.

Thursday, July 27, 2:30-4:30 pm

**1-C and TH-1**  
**Internal Dosimetry and Part 20 - John W. Poston, Jr., Texas A&M University**  
See PEP 1C for description.

**2-J and TH-2**  
**Waste Management at Decommissioning Projects - Wayne C. Gaul, RUST Federal Services, Inc.**  
See PEP 2-J for description.

**T-3 and TH-3**  
**Negotiating the Washington Maze - John Billett, HPS Public Affairs Director, Billett & Quinn, Limited**  
See PEP T-3 for description.

## Health Physics Society 1995 Exhibitors

### 3M/OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY DIVISION *Booth 616*

Manufacturers and markets maintenance-free and reusable respirators, supplied and powered air respiratory systems, personal monitoring systems, and hearing protection products.

### AAHP/ABHP *Booth 620*

ADCO SERVICES, INC. *Booth 405*  
Radioactive waste broker.

### ALOKA CO., LTD. *Booth 409*

ALPHA SPECTRA, INC. *Booth 504*  
Alpha Spectra manufactures scintillation detectors for health physics, academic, industrial, medical and exploration applications. Materials used include most of the scintillation phosphors e.g. NaI(Tl), BGO, plastics, etc.

### AMERICAN NUCLEAR SYSTEMS, INC. *Booth 727*

Instrumentation for NaI spectroscopy featuring the revolutionary Quadratic Compression Converter™. WTC2000 Wipe Test System with fully quantitative spectroscopic analysis. Quantum™ 2000 Windows based system. Detectors, sources and accessories.

AMERSHAM CORPORATION *Booths 334, 336*  
Radiation sources for instrument calibration, gauging, radiography and medicine.

### ANALYTICAL TECHNOLOGIES, INC. *Booth 234*

As a full-service environmental testing laboratory, Analytical Technologies, Inc. is dedicated to the analysis of radioactive, hazardous and mixed waste. The primary emphasis of ATI's service is quality data and timely response.

ANALYTICS, INC. *Booths 318, 320*  
Analytics, Inc. provides radioactivity calibration standards and performance evaluation samples for radioactivity measurement systems. Analytics now represents CEA/LMRI (France) in North America.

APPEL ENTERPRISES INC. *Booth 602*  
Superheated drop (bubble) detectors and dosimeters for neutrons. Educational kits on ionizing

radiation. Introducing REMbrandt™ at HPS meeting.

APTEC NUCLEAR INC. *Booths 406, 408*  
Broad range of PC Based Hand and Foot, and Whole Body Surface Contamination Monitors for Alpha and Beta contamination monitoring will be on display. Nucleonics and Multichannel Analyzers for laboratory and in-field applications will also be featured.

ARTHUR D. LITTLE, INC. *Booth 427*  
Arthur D. Little's Radiation Technology and Policy Unit provides a full range of Radiation Protection Services for government and commercial organizations. Our services include: HP Support, Program Audits, D&D Planning, Training, Special Studies, etc.

ATLANTIC NUCLEAR *Booth 324*  
Large selection of Instruments, Shielding and Accessories for Health and Medical Physics. Also special products per customer specifications.

### BALCAN ENGINEERING LIMITED *Booth 404*

New hopper loaded machines to cleanly split and empty plastic vials and bottles. Also Balcan's traditional crushers for emptying glass vials and bottles. Machines are manually or pneumatically operated to overcome problems associated with hazardous liquids and electrically powered equipment.

BATTELLE PNL *Booth 216*  
Battelle's Health Protection Department offers services in all aspects of health protection. These include: Instrument Testing, Dosimeter Irradiations, HP Program Assistance, Emergency Preparedness, Exposure Assessment, Dosimetry Services, Industrial Hygiene, and Rad Engineering.

BECTON DICKINSON *Booth 413*  
DIAGNOSTIC INSTRUMENT SYSTEMS  
Featured will be the solid state tritium and beta gas monitors, along with programs to upgrade current units in the field. Training and warranty programs are also available.

BICRON\*NE *Booths 229, 231, 233*  
Both Bicron and NE Technology, Inc. are recognized as being in the forefront of radiation detection and measurement technology. The uniting of these two companies will enhance the development of systems and instruments for health physics applications.

BIONOMICS, INC. *Booth 316*  
Waste disposal, Brokerage and Consulting. Radioactive, mixed and hazardous waste, PU/BE source shipments.

BUBBLE TECHNOLOGY INDUSTRIES *Booth 307*  
MICROSPEC-2TM Spectroscopic Survey System - Dose and Radionuclide ID in a Truly Portable Package. Neutron Bubble Detectors for Personal Neutron Dosimetry

### CANBERRA INDUSTRIES *Booths 101, 103, 105, 107, 200, 202, 204, 206*

Canberra introduces its Proline Family of integrated spectroscopy instruments. Proline instruments are designed specifically to meet your counting application requirements and are furnished fully integrated - ready to use. Two new products are being introduced under the Proline banner. The Gamma Analyst is a fully integrated automatic gamma spectrometer, based on a unique, small footprint sample changer design that allows the user to mix and match samples of various geometries in a single load. The Alpha Analyst is an integrated, 100% computer controlled alpha spectroscopy instrument that provides modular expandability, rigorous quality assurance and the best analysis algorithms in the industry.

Canberra will also show its In-Situ system for soil counting which is furnished ready to count for 32 in-situ geometries. Calibrations furnished are detector specific for a wide energy range, so the user can avoid the intrinsic inaccuracies associated with other approaches using modelled or estimated calibrations.

A new version of the Fastscan screening whole body counter will be on display which will allow subjects to count themselves without the need to have an operator present, thus saving time and money.

CHEMCHEK INSTRUMENTS, INC. *Booth 421*  
Kinetic phosphorescence analyzer for high speed ultra low level uranium analysis.

CHEMRAD *Booth 203*  
USRADS system for radiological, geophysical, heavy metal and soil gas site characterization surveys.

### COMMONWEALTH CLINICAL SYSTEMS, INC. *Booth 432*

ALARA - A service to ensure compliance with 10 CFR 20 and state exposure tracking requirements. We work with your air monitor and dosimeter data to generate Federal, State, management and individual reports.

CONSULTEC SCIENTIFIC, INC. *Booth 636*  
Health physics training; SimRad Surveyor Software.

CoPHYSICS CORPORATION *Booth 513*  
SitePad - Data collection and mapping system for site and room surveys.

D A SERVICES *Booth 106*  
D A Services will display protective clothing and contamination control equipment designed to be compatible with standard volume reduction systems.

DOSIMETER CORPORATION *Booth 430*  
Pocket Dosimeters, both Quartz Fiber and electronic, Area Monitors, Radiation survey instruments and probes.

DOSITEC INC. *Booths 227*  
Electronic Dosimetry System, Underwater Radiation Monitoring, Telemetry System.

### EBERLINE INSTRUMENTS *Booths 308, 310*

A range of health physics instruments, including contamination monitors, environmental monitors, and portable survey instruments.

### EG&G NUCLEAR INSTRUMENTS *Booths 416, 418, 420, 422*

ELECTRON TUBES INC. *Booth 729*  
Photomultiplier and related accessories, high voltage power supplies, and silicon detectors.

EUCLID GARMENT MANUFACTURING CO. *Booths 400, 402*



**F & J SPECIALTY PRODUCTS, INC.** *Booth 433*

Radiological and Non Radiological Air Monitoring Systems, Air Flow Calibrators, Filter Holders, Filter Paper, Radioiodine Collection Cartridges and Radon Detection Devices.

**FEMTO-TECH INC.** *Booth 739*

Beta scintillation detector and controller, tritium area and process monitors, portable tritium monitors, continuous radon monitors.

**GAMMA PRODUCTS** *Booth 419*

Gamma Products, Inc. manufactures automated gamma counting systems for Marinelli beakers and other samples, and manual and automated alpha/beta counting systems. Also specializes in low level shielding.

**GENITRON INSTRUMENTS** *Booth 526*

Probes for environmental monitoring; radon monitor.

**GE REUTER-STOKES INC.** *Booth 312*

Environmental Gamma Monitoring Systems utilizing a HPIC (High Pressure Ion Chamber) and digital control unit. Portable and fixed-placement models available with: solar power and RF or hard-wire telecommunications integrated with our Real-Time Data Acquisition/Control software.

**GTS DURATEK** *Booth 613*

Health Physics training, professional staff augmentation, 10 CFR 20 and DOE Rad Con Manual compliance, assessments, temporary health physics technical support, radioactive waste treatment technologies.

**HALLIBURTON NUS** *Booth 425*

Radiological Data Management System software used to document facility radiological program implementation and produce required reports. Also, provide Health Physics consulting services to Government and Industry.

**HEALTH PHYSICS INSTRUMENTS** *Booth 403*

Manufactures portable and fixed radiation measuring instruments including gamma, alpha and beta survey instruments, area monitors, personnel dosimeters and neutron REM meters.

**HELGESON SCIENTIFIC SERVICES** *Booth 534*

HSS provides a complete range of state-of-the-art personnel and waste monitoring equipment and complementary health physics services, including mobile whole body counting units and surface survey instruments.

**HISTORICAL EXHIBIT** *Booths 527-535 and 626-634*

**HI-Q ENVIRONMENTAL PRODUCTS CO.** *Booth 213*

Air sampling and radiation monitoring equipment. Isokinetic and fixed stack sampling for particulates, iodine, tritium and other radionuclides.

**HOLADAY INDUSTRIES, INC.** *Booth 505*

Non-ionizing radiation detection and measurement instrumentation. RF induced current instrumentation.

**HPS PUBLICATIONS** *Booth 611*

**ICN DOSIMETRY SERVICE** *Booth 723*

**INFINITY ANALYTICAL SERVICE** *Booth 330*

Analytical testing laboratory; radio-chemistry-inorganic chemistry; organic chemistry-materials.

**INFORMATION MAPPING, INC.** *Booth 218*

Information Mapping is a communication training and consulting company. We help organizations to document important compliance procedures and to build and manage online and paper-based systems to ensure compliance with procedural and regulatory compliance.

**IRPA** *Booth 232*

**ISOTOPE PRODUCTS LABORATORIES** *Booths 516, 518, 520, 522*

As a NIST traceable laboratory, IPL manufactures radioactive standards, sources and nuclides. They also distribute a complete line of scintillation crystals including NaI, CsI and BGO crystals.

**MAG. B. KALLINGER** *Booth 109*

**K & S ASSOCIATES, INC** *Booth 537*

Accredited instrument calibration laboratory, accredited dosimetry calibration laboratory, kVp meter calibrations, instrument repair service, custom cable service.

**LANCS INDUSTRIES INC.** *Booth 113*

Health Physics/Radiological Control Items: Air Fed Hoods, Clothing, Tents, Containments, Lead Wool Blankets/Shielding Items, Accessories, Signs, Bags/Tubing, Specialty manufacturing of standard and custom items.

**LANDAUER, INC.** *Booths 506, 508*

World leader in personnel radiation monitoring services. Accredited by both NVLAP and AECB.

**LND INC.** *Booth 313*

Nuclear Radiation Detectors - GM Tubes, BF<sub>3</sub>HE<sup>3</sup>, Proportional Counters Ionization Chambers, Gas Sampling and Flow Fission Chambers, LND will modify, design and manufacture to your specifications.

**LOCKHEED - MARTIN** *Booth 407*

**LU DLUM MEASUREMENTS, INC.** *Booths 326, 328*

Ludlum Measurements, Inc. manufactures instrumentation used to detect and measure nuclear radiation.

**MGP INSTRUMENTS, INC.** *Booth 530*

Radiation detection equipment and systems; ranging from portable Health Physics instruments, personnel dosimetry, and fixed channel monitoring.

**M. J. W. CORPORATION, INC.** *Booth 210*

MJW Corporation provides radiological consulting services and multimedia computer software. Titles on display include the Graphical Electronic Dosimetry Display System, Visual Survey Data System, Video Tour System and Health Physics Fundamental Training Program.

**MSA** *Booths 217, 219*

MSA will display a full line of personal protective equipment including products for respiratory protection and environmental monitoring.

**NASCO** *Booth 617*

Whirl-Pak sterile plastic bags for holding a dosimeter and also for transporting a sample to a laboratory for testing or analysis. Liquid sample collectors for use in tanks, streams, sewers, etc.

**NATIONAL NUCLEAR CORPORATION** *Booth 311*

NNC will offer contamination monitors, scrap monitors wastemonitors and their sister companies, Reactor Experiments offers radiation shielding materials, and high purity metal foils, while XETEX will offer dosimeters, ratemeters and their Telescan as well as the Abacus Alpha/Beta Sample Counter.

**THE NDL ORGANIZATION, INC.** *Booth 528*

Radiological service company: Radioactive waste disposal and processing scintillation media disposal; radiation lab analysis, decommissioning, radioactive and hazardous transportation; Health Physics consulting, computer program.

**NES INC.** *Booth 417*

An engineering consulting firm providing radiological and environmental regulatory compliance, site characterizations/assessments, health and ecological risk characterizations, probabilistic and sensitivity analysis, program reviews and audits, and decontamination and decommissioning services.

**NE TECHNOLOGY, INC.**

See BICRON•NE

**NFS RADIATION PROTECTION SYSTEMS** *Booths 301, 303*

Radiological Control Software and Hardware for the Nuclear Industry.

**NORTH AMERICAN SCIENTIFIC, INC.** *Booth 305*

Radiation standards and sources, NIST traceable, for insuring quality data by HP's in industry, reactors, medical facilities, universities and research institutions.

**NORVELL PROTECTIVE CLOTHING MANUFACTURERS** *Booth 209*

Recognized as the innovator of many of the nuclear industry's standard protective garments. Norvell is a certified woman owned business with a 25 year history of reliable service and quality garment manufacture. If you can think of it, we can manufacture it.

**NRPT** *Booth 104*

**NUCLEAR MEASUREMENTS CORPORATION** Booth 431

NMC will exhibit the latest proportional counters and gamma/neutron monitors. Information will be available on stack monitoring with isokinetic sampling, containment monitors, liquid, tritium and continuous air monitors plus a unique criticality monitor.

**NUCLEAR NEWS** Booth 411

Nuclear News is the monthly news magazine of the nuclear industry, published by the American Nuclear Society. Also published by ANS is Radwaste Magazine, a bimonthly covering radwaste management at utilities, US Department of Energy sites, etc.

**NUCLEAR RESEARCH CORPORATION** Booths 719, 721

Nuclear Research Corporation Manufactures a complete line of Radiation Monitoring systems, Health Physics instrumentation, Environmental Monitors and GM tubes.

**OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION** Booth 436

Photographic display and catalogs of the training activities in the health physics training classes offered.

**OHM REMEDIATION CORP.** Booth 502

Radioactive and mixed waste remediation services focusing on site characterization, remediation, decontamination and decommissioning, health physics, radiological engineering and innovative treatment technologies.

**ORDELA, INC.** Booth 511

Ordela, Inc. offers rapid alpha assay instrumentation for air filter, water, soil, swipe, and smear samples.

**OVERHOFF TECHNOLOGY CORPORATION** Booths 323

Tritium monitors and other Health Physics Instrumentation.

**OXFORD INSTRUMENTS, INC.** Booths 300, 302

Oxford Instruments, Inc., Nuclear Measurements Group is a manufacturer of nuclear counting systems. Product lines include gamma and alpha spectroscopy systems, low level alpha and beta counting systems, NIM, and educational counters.

**PACKARD INSTRUMENT COMPANY** Booth 208

**PANASONIC INDUSTRIAL COMPANY** Booth 525

TLD Readers and pocket dosimeters.

**PP&L RESOURCES INC.** Booth 532

Personnel and environmental dosimetry; low level environmental radioactivity measurements.

**PRINCETON GAMMA-TECH, INC.** Booths 521, 523

PGT intrinsic germanium detection, in vivo lung monitors and the PGT lab cooler.

**PROTEAN INSTRUMENT CORPORATION** Booth 322

Automatic Ultra Low-Background Alpha/Beta Counting Instrument; Automatic Alpha/Beta Air Filter Counting System with Air Pumps; Manual Windowless Alpha/Beta Counter.

**PRO-TEM, INC.** Booth 331

Cost effective, client-server information solutions for the Energy Industry. Health Physics products include modular systems from the ARACS access control system to PRORAD for complete health physics information management. Hands-on demonstrations.

**QUANTRAD SENSOR, INC.** Booth 612

Instruments and detectors for detection and analysis of alpha, beta, x-ray and gamma radiation. New portable system, the Scout, for in situ identification of radio nuclides.

**RADCAL CORPORATION** Booth 324

Radcal manufactures a wide variety of ionization chamber based radiation monitors for HP and Medical Physics applications. Please stop by our booth at the AAPM hall and enter in the drawing for free 'calculator' size kVp meters. Our agent, Atlantic Nuclear is exhibiting at booth 324.

**RAD ELEC, INC.** Booth 519

Rad Elec offers the E-PERM System for radiation monitoring.

**RADIATION DETECTION COMPANY** Booth 332

TLD and film dosimetry service.

**RADIATION SAFETY ASSOCIATES** Booth 507

Radiation surveys and assessments, plans, decontamination - decommissioning, radiochemical analysis and publications/software for Health Physicists.

**RADOS TECHNOLOGY INC.** Booth 412

Personnel Dosimetry systems and contamination monitoring systems.

**RIS CORP** Booth 211

Ruggedized environmental monitoring systems with emphasis on radiation detection. Real time alpha monitors for liquid effluents and petroleum. Offers a wide range of sensor and electronic development capabilities.

**RSO, INC.** Booth 410

RSO, Inc. is a full service company located in Laurel, MD. The company has provided sales and services to users of radioactive materials for over 20 years. Ask about the new decay in storage program.

**SAFE TRAINING SYSTEMS LTD.** Booth 536

STS designs and manufactures simulators for radiation monitoring training: 800 series for surface contamination; 900 series for radiation field measurements including dosimeters; plumes system for airborne fallout training.

**SAIC/RADeCO** Booths 510, 512

SAIC RADeCO provides a complete line of quality products and services including: RADeCO air samplers, air flow calibrators, portable alpha analyzers, calibration services, alarming dosimeters, personnel contamination monitors, radioiodine sampling cartridges, radiation monitoring systems, training and consulting services.

**SCIENTIFIC ECOLOGY GROUP, INC.** Booth 321

SEG volume reduction services, super compaction, incineration vitrification, metal smelting, steam reforming, and quantum CEP.

**SCINTREX, LTD.** Booth 201

Fixed and portable tritium monitors, portable radiation survey and contamination monitors and control room instrumentation.

**SCOTTSDALE 1996 MIDYEAR MEETING** Booth 230

**SEATTLE -1996 ANNUAL MEETING** Booth 434

**S. E. INTERNATIONAL, INC.** Booth 524

**J. L. SHEPHERD & ASSOCIATES** Booth 237

**SIEMENS DOSIMETRY SERVICE** Booth 503

Siemens Dosimetry Service exhibits a complete line of film badges, TLD badges, track etch dosimeters, electronic alarming dosimeters and fast neutron bubble detectors.

**SIEMENS plc** Booth 333

EPD - Electronic Personal Dosimeter

**SPECTRUM SCIENCES, INC.** Booth 212

Very low background alpha/beta counting systems; ultra low background gross alpha counting system; solid state nuclear particle detectors.

**STAN A. HUBER CONSULTANTS, INC.** Booth 509

Nuclear Consulting and training services; radioactive site characterization and decontamination; radioactive source leak testing and sample analysis; instrument calibrations; nuclear gauges installed and removed; rad-waste management services.

**TECHNICAL ASSOCIATES** Booth 335

Recent editions to T/A: Health physics instrument line including more sensitive and more rugged. Tritium surface monitors and large area, GM and scintillation detectors.

**TECHNICAL MANAGEMENT SERVICES, INC.** Booth 437

Nationwide training and consulting company specializing in quality short courses for the nuclear industry.

**TELEDYNE BROWN ENGINEERING-ENVIRONMENTAL SERVICES** Booth 517

TLD Systems, TLD Badge Service, NaI Scintillation Detectors, Radiological Services.

**TGM DETECTORS INC.** Booth 435

TGM is a manufacturer of Gas-Filled radiation detectors, used in original equipment and for replacements with health physics instruments.

**THE SOURCE, INC.** Booth 337  
NIST traceable calibration standard for nuclear measurements equipment.

**TMA/EBERLINE** Booth 309

**US DEPARTMENT OF ENERGY PROGRAM/ENVIRONMENTAL MANAGEMENT PROGRAM** Booths 604, 606

The Department's EM exhibit highlights some of the technologies being used to address environmental contaminants. This Program manages the treatment, storage, and/or disposal of waste resulting from nuclear weapons production.

**US ECOLOGY** Booth 111  
Radioactive waste collection, transportation, volume reduction, and disposal. The first and finest.

**U.S. NUCLEAR REGULATORY COMMISSION** Booth 235  
Federal government agency recruiting for Health Physicists and Physical Scientists.

**VICTOREEN/NUCLEAR ASSOCIATES** Booths 317, 319

Victoreen manufactures & services nuclear radiation detectors instrument and systems. Products include micro processor-based survey meters of the GM ion chamber and scintillation types, reactor & lab monitoring systems, TLD Dosimeter and readers, chips and quartz fibre dosimeters and medical beam analyzers.

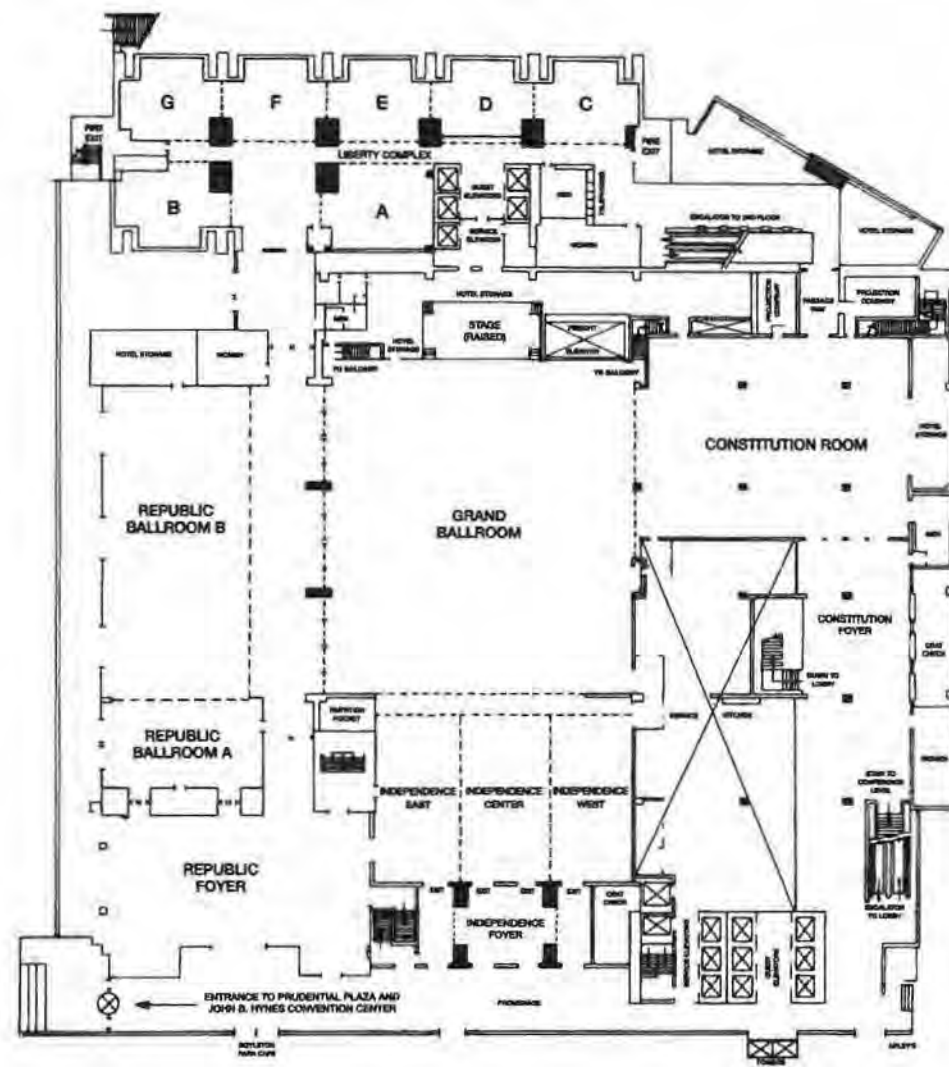
**WALLAC INC.** Booth 423  
1415 Ultra Low Level, alpha/beta separation liquid scintillation counting system with digital spectrum analysis.

**WM. B. JOHNSON & ASSOCIATES, INC.** Booth 429  
Portable instrumentation to measure nuclear radiation dose and contamination personal dosimeters.

**WILLIAMS & WILKINS** Booth 610  
Williams & Wilkins publishes medical books, journals and electronic media products, including the journal *Health Physics*.

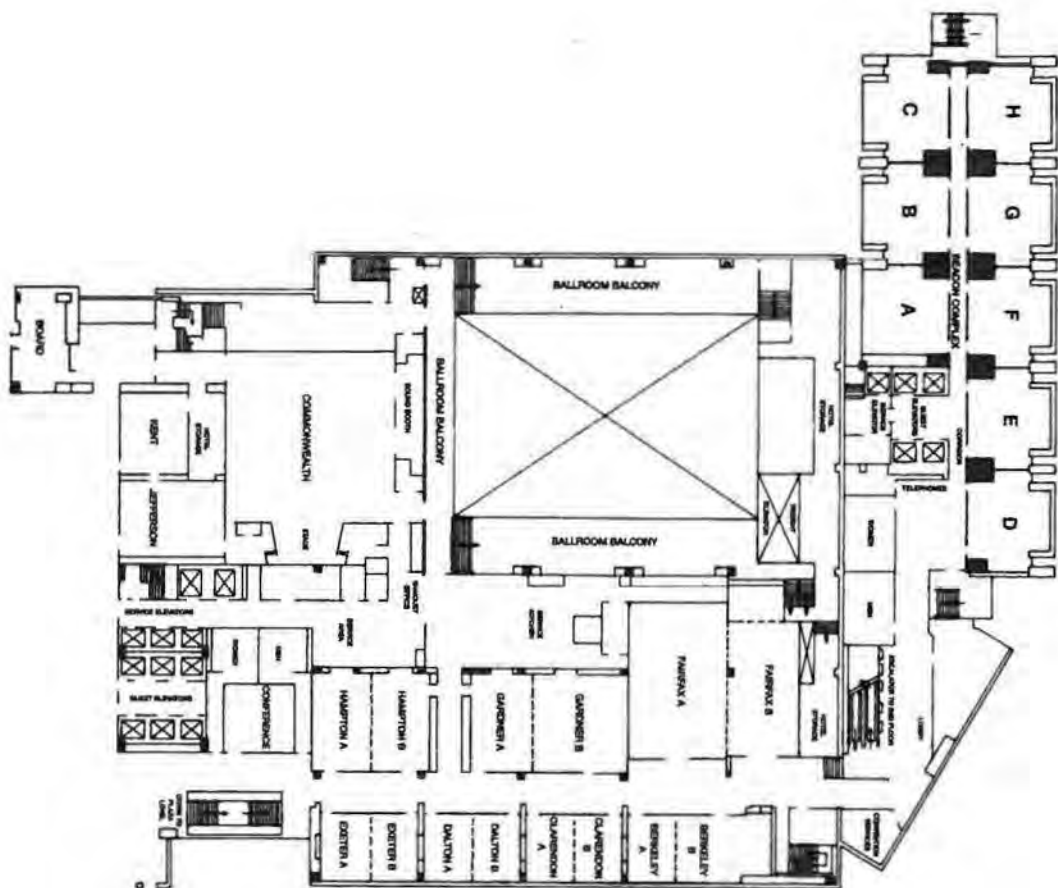
**YANKEE ATOMIC ELECTRIC COMPANY** Booth 731  
Engineering services brochures, collimated gamma ray spectrometer, table, display board.

**Sheraton Boston Hotel and Towers**  
**Plaza Level, 2nd Floor**



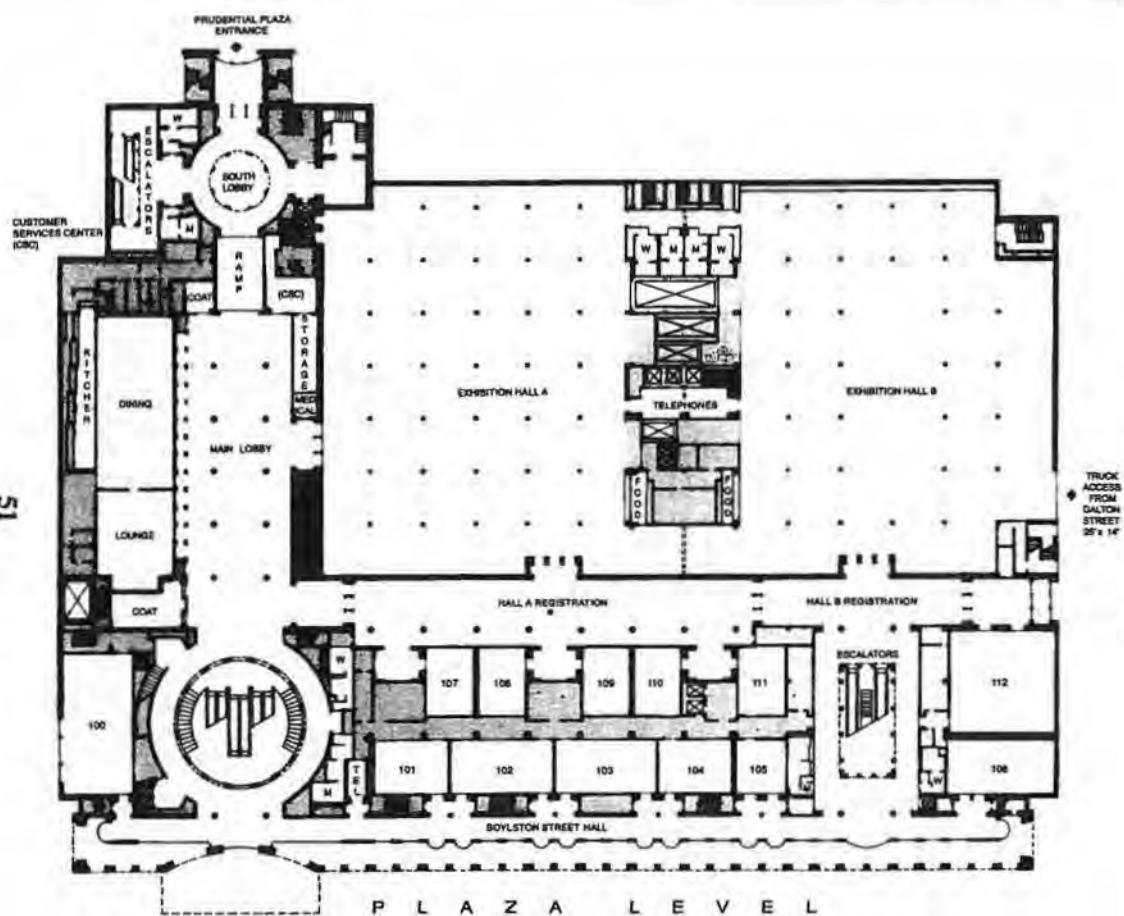


*Sheraton Boston Hotel and Towers  
Conference Level, 3rd Floor*



50

*Hynes Convention Center  
Plaza Level, 1st Floor*



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P L A Z A   L E V E L



3M/Occupational Health and Environmental Safety Division Booth 616

AAHP/ABHP Booth 620

ADCO Services, Inc. Booth 405

ALOKA Co., Ltd. Booth 409

Alpha Spectra, Inc. Booth 504

American Nuclear Systems, Inc. Booth 727

Amersham Corporation Booths 334, 336

Analytical Technologies, Inc. Booth 234

Analytics, Inc. Booths 318, 320

Apfel Enterprises Inc. Booth 602

Aptec Nuclear Inc. Booths 406, 408

Arthur D. Little, Inc. Booth 427

Atlantic Nuclear Booth 324

Balcan Engineering Limited Booth 404

Battelle PNL Booth 216

Becton Dickinson Diagnostic Instrument Systems Booth 413

BICRON+NE Booths 229, 231, 233

Bionomics, Inc. Booth 316

Bubble Technology Industries Booth 307

Canberra Industries Booths 101, 103, 105, 107, 200, 202, 204, 206

Chemchek Instruments, Inc. Booth 421

Chemrad Booth 203

Commonwealth Clinical Systems, Inc. Booth 432

Consultec Scientific, Inc. Booth 636

CoPhysics Corporation Booth 513

D A Services Booth 106

Dosimeter Corporation Booth 430

Dositec Inc. Booth 227

Eberline Instruments Booths 308, 310

EG&G Nuclear Instruments Booths 416, 418, 420, 422

Electron Tubes Inc. Booth 729

Euclid Garment Manufacturing Co. Booths 400, 402

F & J Specialty Products, Inc. Booth 433

FEMTO-Tech Inc. Booth 739

Gamma Products Booth 419

Genitron Instruments Booth 526

GE Reuter-Stokes Inc. Booth 312

GTS Duratek Booth 613

Halliburton NUS Booth 425

Health Physics Instruments Booth 403

Helgeson Scientific Services Booth 534

Historical Exhibit Booths 527-535 and 626-634

HI-Q Environmental Products Co. Booth 213

Holiday Industries, Inc. Booth 505

HPS Publications Booth 611

ICN Dosimetry Service Booth 723

Infinity Analytical Service Booth 330

Information Mapping, Inc. Booth 218

IRPA Booth 232

Isotope Products Labs. Booths 516, 518, 520, 522

MAG. B. Kallinger Booth 109

K & S Associates, Inc. Booth 537

Lancs Industries Inc. Booth 113

Landauer, Inc. Booths 506, 508

LND Inc. Booth 313

Lockheed - Martin Booth 407

Ludlum Measurements, Inc. Booths 326, 328

MGP Instruments, Inc. Booth 530

M.J.W. Corporation Booth 210

MSA Booths 217, 219

NASCO Booth 617

National Nuclear Corporation Booth 311

The NDL Organization, Inc. Booth 528

NES Inc. Booth 417

NE Technology, Inc. See BICRON+NE

NFS Radiation Protection Sys. Booths 301, 303

North American Scientific, Inc. Booth 305

Norvell Protective Clothing Manuf. Booth 209

NRRPT Booth 104

Nuclear Measurements Corporation Booth 431

Nuclear News Booth 411

Nuclear Research Corporation Booths 719, 721

Oak Ridge Institute for Science and Education Booth 436

OHM Remediation Corp. Booth 502

Ordela, Inc. Booth 511

Overhoff Technology Corporation Booth 323

Oxford Instruments, Inc. Booths 300, 302

Packard Instrument Co. Booth 208

Panasonic Industrial Company Booth 525

PP&L Resources Inc. Booth 532

Princeton Gamma-Tech, Inc. Booths 521, 523

Protean Instrument Corporation Booth 322

Pro-Tem, Inc. Booth 331

Quantrad Sensor, Inc. Booth 612

Radical Corporation Booth 324

Rad Elec, Inc. Booth 519

Radiation Detection Company Booth 332

Radiation Safety Associates Booth 507

Rados Technology Inc. Booth 412

RIS Corp. Booth 211

RSO, Inc. Booth 410

Safe Training Systems Ltd. Booth 536

SAIC/RADECO Booths 510, 512

Scientific Ecology Group, Inc. Booth 321

Scintrex, Ltd. Booth 201

Scottsdale 1996 Midyear Meeting Booth 230

Seattle - 1996 Annual Meeting Booth 434

S. E. International, Inc. Booth 524

J. L. Shepherd & Associates Booth 237

Siemens Dosimetry Service Booth 503

Siemens plc Booth 333

Spectrum Sciences, Inc. Booth 212

Stan A. Huber Consultants, Inc. Booth 509

Technical Associates Booth 335

Technical Management Services, Inc. Booth 437

Teledyne Brown Engineering-Environmental Services Booth 517

TGM Detectors Inc. Booth 435

The Source, Inc. Booth 337

TMA/Ebeline Booth 309

US Department Of Energy Booths 604, 606

Program/Environmental Management Program

U.S. Nuclear Regulatory Commission Booth 235

US Ecology Booth 111

Victoreen/Nuclear Associates Booths 317, 319

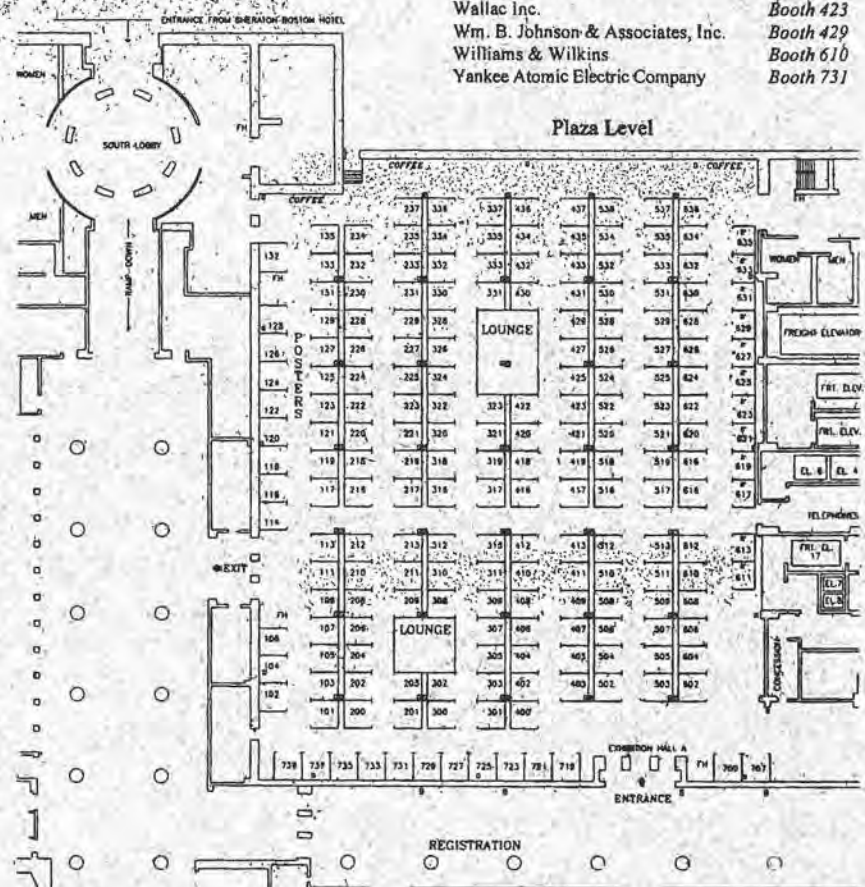
Wallac Inc. Booth 423

Wm. B. Johnson & Associates, Inc. Booth 429

Williams & Wilkins Booth 610

Yankee Atomic Electric Company Booth 731

### HPS Exhibit Hall Floor Plan





Wednesday, July 26	Thursday, July 27	Registration Hours
<b>Continuing Education Lectures</b> <b>CEL-5</b> New Problem Areas in Medical Health Physics 7:15 - 8:15 am Room 309 <b>CEL-6</b> Talking About Risk: Improving Communications Skills 7:15 - 8:15 am Room 100 <b>WAM-A</b> Environmental I 8:30-11:00 am Room 306 <b>WAM-B</b> Internal Dosimetry/Bioassay 8:30-11:30 am Room 302 <b>WAM-C</b> Accelerator I 8:30-11:45 am Room 304 <b>WAM-D</b> AAHP - Professional Practice of Health Physics 8:30-11:30 am Room 309 <b>AAHP Open Meeting</b> 11:30 am Room 309 <b>WAM-E</b> Computer Applications I 9:00-10:00 am HPS Exhibit Hall <b>WAM-F</b> Cancelled	<b>Continuing Education Lectures</b> <b>CEL-7</b> Recent Worldwide Radiation Accidents - Case Histories and Lessons Learned 7:15 - 8:15 am Room 100 <b>CEL-8</b> Radioactive Materials in Recycled Metals 7:15 - 8:15 am Room 313 <b>THAM-A</b> Radon 8:30 am-Noon Room 309 <b>THAM-B</b> Waste Management/Decon. 8:30 am-Noon Room 313 <b>THAM-C</b> Public Information 8:30-11:00 am Ballroom A <b>THAM-D</b> Regulatory/Legal 8:30-10:00 am Ballroom B <b>THAM-E</b> Works-in-Progress 10:30 am-Noon Ballroom B <b>Awards Luncheon</b> 12:30-2:30 pm Grand Ballroom Sheraton <b>Professional Enrichment Program</b> 2:30 - 4:30 pm <b>TH-1</b> Internal Dosimetry and Part 20 Room 100 <b>TH-2</b> Waste Management at Decommissioning Projects Room 102 <b>TH-3</b> Negotiating the Washington Maze Room 103	Saturday 3:00-6:00 pm Sunday 7:30 am-8:00 pm Monday 8:00 am-6:00 pm Tuesday 8:00 am-5:00 pm Wednesday 8:00 am-3:00 pm Thursday 8:00 am-Noon
<b>Professional Enrichment Program</b> 12:15 - 2:15 pm <b>W-1</b> Health Physics of Cellular Radio Room 100 <b>W-2</b> Radiation Doses to the Embryo/Fetus Resulting from Maternal Burdens of Radionuclides Room 102 <b>W-3</b> What Can Go Wrong and How to Prevent It Room 103 <b>W-4</b> Mixed Waste Management and Options Room 309 <b>W-5</b> Assessment of Facilities for Dosimetry and Calibration Accreditation Room 106 <b>W-6</b> Risk and Risk Communication Room 112 <b>WPM-A</b> Environmental II 2:30-5:00 pm Room 306 <b>WPM-B</b> Biokinetics/Bioeffects 2:30 - 5:30 pm Room 302 <b>WPM-C</b> Accelerator II 2:30-5:00 pm Room 304 <b>WPM-D</b> Radon Section Session 2:30 - 5:00 pm Room 309 <b>WPM-E</b> Computer Applications II 2:00-3:30 pm HPS Exhibit Hall <b>WPM-F</b> Cancelled <b>WPM-G</b> Medical Health Physics Section - Joint with AAPM Noon-1:30 pm AAPM Exhibit Hall <b>Annual Business Meeting</b> 5:30-6:30 pm Room 309 <b>Calibration Workshop</b> 6:30 - 9:30 pm Commonwealth Sheraton		<b>Exhibit Hall Hours</b> Monday 8:30 am-5:30 pm Tuesday 9:30 am-5:30 pm Wednesday 9:30 am-4:00 pm