



# Health Physics News

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The Official Newsletter of the Health Physics Society

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## Speaking Up about Radon

Mary Walchuk

I recently took a quick (and completely unscientific) poll of friends and family members with the question, "When you hear the word radon, what is the first thing that pops into your mind?" The responses I received most often were gas, poison, danger, cancer, and basement. I then followed up to see how many of those who answered had tested their homes for radon, what the results were, and if the homes with higher-than-recommended radon levels had been mitigated.

It was interesting to see that only half of the people who knew of the issues surrounding radon had tested their homes and only half of those whose levels were high had mitigated (me included). Many said they knew they should have their homes tested, but hadn't gotten to it yet. Those with high levels who had not mitigated said they thought about it, but weren't sure if the test results were accurate (and wanted to retest), weren't convinced mitigation was really necessary, or weren't sure mitigation would really make a difference.

So why is only part of the message about the issues surrounding radon getting across to the general public? Why is there uncertainty, and what can be done to better inform the public?

The Health Physics Society (HPS) and the World Health Organization (WHO) are among the groups in the

United States raising awareness about radon. HPS members Bill Field and Jan Johnson have played a large role in this effort. Field was instrumental in working on the *WHO Handbook on Indoor Radon: A Public Health Perspective*, which was published in



Graphic adapted from the first-place Colorado radon poster created by Eric Bear, a nine-year-old 4<sup>th</sup> grader from Golden, Colorado.

September 2009. Johnson chaired the ad hoc committee that published the HPS position statement "Update on Perspectives and Recommendations on Indoor Radon" and the companion "Background Information on 'Update on Perspectives and Recommendations on Indoor Radon'" in October 2009. Field and Johnson shared information about the importance of the information provided in the documents.

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## From the President

### Can I get a peek at that one? More on whole-body scanning

Guess what? Whole-body scanning systems are starting to be installed at selected airports around the country. The use of these security screening devices is causing an uproar in many sectors. Privacy issues aside, what about the risk to the public from the radiation dose? Is the risk acceptable?

The term “acceptable risk” describes the likelihood of an event whose probability of occurrence is small, whose consequences are so slight, or whose benefits (perceived or real) are so great, that individuals or groups in society are willing to take or be subjected to the risk that the event might occur. The concept of acceptable risk evolved partly from the realization that absolute safety is generally an unachievable goal and that even very low exposures to certain toxic substances, such as radioactive material, may confer some level of risk. Although conceptually attractive, application of the concept of acceptable risk is fraught with difficulty, ultimately involving consideration of social values. Inequities in the distribution of risks and benefits across society further complicate the determination of an acceptable level of risk.

The Health Physics Society (HPS) believes that public radiation-safety standards should be based on specified values of dose rather than hypothetical estimates of risk. HPS supports the establishment of an acceptable dose of

radiation of 1 mSv  $y^{-1}$  (100 mrem  $y^{-1}$ ) above the annual natural radiation background. Constraints should be applied to each controllable source of public exposure (such as airport security screening) to ensure that the dose limit for an individual from all controllable sources combined will be met. An effective dose of 0.25 mSv (25 mrem) in any year to individual members of the public is a suitable source constraint in most cases.

One definition of acceptable risk: that level of human and/or material injury or loss from an industrial process that is considered to be tolerable by a society or authorities in view of social, political, and economic cost-benefit analysis (BusinessDictionary.com)

HPS believes that intentionally exposing people to low levels of ionizing radiation for security screening is justified if certain criteria are met. The key considerations are the net benefit to society and keeping individual doses as low as reasonably achievable (ALARA) while achieving the desired objective. Appropriate organizations should develop criteria for determining when the social benefits of public screening outweigh the risks associated with ionizing radiation exposure. The criteria should represent the consensus of professional, consumer-advocacy, labor, and business organizations; academic institutions; government agencies; and the general public.

The Society’s principal recommendations about the practice of

security screening individuals by the use of ionizing radiation are:

1. The practice should be limited to those applications that result in an overall net benefit to society.
2. When the practice is used to screen members of the general public, screening systems and their use should conform to the requirements of ANSI/HPS N43.17. This standard limits the reference effective dose delivered to the subject to 0.25  $\mu$ Sv (25  $\mu$ rem) per screening. Additionally, a screening facility should not expose any individual to more than 0.25 mSv (25 millirem) reference effective dose in a year.
3. Subjects should be informed of the radiation exposure.

So how is the collective “we” doing regarding radiation dose from security screening? According to the Interagency Steering Committee on Radiation Standards (ISCORS) Technical Report 2008-1, Guidance for Security Screening of Humans Utilizing Ionizing Radiation (July 2008), the effective dose from backscatter screening systems is typically about 0.05  $\mu$ Sv (5  $\mu$ rem) per scan of the front of the body; scans of the back or sides produce lower effective doses. Several HPS members contributed to both the ANSI standard and the ISCORS report. They have familiarity with available screening systems and are well aware of the quite small radiation doses that occur in practice.

Consequently, we seem to have the technology to keep doses quite low, so low in fact that many passengers will incur much greater cosmic-ray doses from their actual flight than from the security screening.

The other question we must ask is, “Are these systems necessary; can they be justified?” Is there really a net benefit? Considering that we have only the shoe bomber of December 2001 and the underwear

bomber of December 2009 whose actions may have been thwarted by using whole-body screening, I have to wonder whether we need to subject millions of travelers every year to such techniques. It seems to me that we are trying to swat a fly with a sledgehammer.

*Howard W. Dickson*

## Inside the Beltway

*David Connolly  
Washington Representative  
Capitol Associates, Inc.*

One of the true gentlemen I have been privileged to meet and work with over the years in Congress is Representative Vernon Ehlers (R-MI), who happens to be a nuclear physics professor. Unfortunately, Mr. Ehlers has decided to retire from Congress at the end of this year. One of my fondest memories of Mr. Ehlers was a comment he made two years ago to a Bush Administration official about a particular cut in the science budget of the Department of Energy. The Representative said that all the Presidents he has known always give speeches supporting science, but then their budgets come out containing cuts to science programs. Whenever he tried to find out who authorized these cuts in the science budget, he was always told that it was “someone in the basement of OMB” (Office of Management and Budget). Mr. Ehlers responded to this situation, stating what he would do before he left office: “I am going over to the basement of OMB and find out just who this person is who is always cutting science budgets and give him or her a piece of my mind!”

Despite President Barack Obama’s announced support of the nuclear power industry, his budget as submitted by OMB to the Congress did not provide funding (“zeroed out”) for the Nuclear Regulatory Commission’s (NRC) scholarship and fellowship program that provides aid to students of health physics and other nuclear-related disciplines. You may recall that this program was the subject of the December 2009 *Health Physics News* interview with John Gutteridge and has been the centerpiece of the Society’s Washington program for the past 10 years.

Coincident to the revelation that the Obama Administration had decided not to fund the NRC’s scholarship program, Society members and professors Richard Brey and John Poston and I were attending a Research and

Development (R&D) Summit in Washington. Upon hearing about this funding situation, we agreed that it was akin to providing a fully equipped operating room, skilled surgeons, and nursing staff for an operation but neglecting to provide an anesthesiologist to administer the anesthesia to the patient!

In my closing remarks of last month’s article, I exhorted members of the Society to make their voices heard in Congress. This new threat to the education program has made this plea all the more important. During the aforementioned R&D Summit, all of the participants agreed on the importance of communication with members of Congress and their staffs, particularly in their home districts or states.

Since this is an election year, your contact with these congressional people at home reinforces the reality that they are in Congress to serve the needs of their constituents and, in particular, the health physicist who visited them to stress the importance of the education program at the NRC. On a number of occasions during the Clinton and Bush Administrations, OMB had zeroed out the funding for our education programs, but the Congress restored it, in part, through the efforts of the members and leadership of the Society.

Once again, we are all called to make our opinion known to Congress that there can be no nuclear renaissance or greater use of nuclear medicine in this country without an increase in the health physics workforce. You can be part of the process and bring about the restoration of a needed education program for the benefit of the health physics profession, if you just raise your voice!

Hopefully, before his retirement, Congressman Ehlers will find that OMB person in the basement and be able to convince him/her not to cut science programs such as our education program. ☒

(continued from page 1)

### *WHO Handbook on Indoor Radon: A Public Health Perspective*

#### **What is the main purpose of the WHO Handbook?**



**Bill Field**

**Field:** The overall purpose of the WHO Handbook is to provide an overview of radon-related issues including radon health effects, radon measurement techniques, radon mitigation and radon-resistant building construction, cost effectiveness of radon reduction, risk communication, and radon policies and guidelines to help guide the development of countries' national radon programs or to

enhance current radon programs in WHO Member States. The WHO Handbook is also intended to enhance public, political, and economic awareness about the consequences of exposure to radon in residential settings.

#### **For whom is the WHO Handbook intended?**

**Field:** The WHO Handbook is intended for the governmental officials at the national agencies that will develop and oversee or are currently developing or overseeing their countries' national radon programs. In addition, the WHO Handbook also provides information for other stakeholders such as public health agencies, building professionals, measurement laboratories, provincial/state authorities, and others who may be involved with radon programs.

#### **Who helped write the WHO Handbook?**

**Field:** The WHO Handbook was one of the primary products of the International Radon Project (IRP). The IRP was launched in 2005 and included over 100 international governmental officials, radon scientists, epidemiologists, and other radon experts. The primary goal of the project was to reduce the population disease burden due to indoor radon exposure. IRP activities were ably led by Drs. Hajo Zeeb and Ferid Shannoun. The WHO Handbook included six chapters that reflected the work product of the topical working groups within the IRP. A list of working-group chairs is available in the report.

#### **Why did the WHO initiate the IRP in 2005 and not in 1988 when the International Agency for Research on Cancer first classified radon as a human carcinogen?**

**Field:** While there was indirect, but strong, evidence from studies of radon-exposed miners that radon may present a risk in the home, direct evidence regarding the risk posed by residential radon exposure was not available until the late 1990s and early 2000s. As noted on the WHO radon Web site, the findings from case-control studies on lung cancer and residential radon exposure performed in many countries allowed for significant improvement in risk estimates as well as for further evaluation of risk by pooling data from the individual epidemiologic studies. The agreement between findings from the pooled analyses of case-control studies from North America, Europe, and China provided a very strong argument for an international initiative to reduce indoor radon risks.

#### **What was your role in the development of the WHO Handbook?**

**Field:** I chaired the Measurement Working Group, which was the largest working group, and served on three other working groups. I also served on the editorial group that oversaw the production and review process for the WHO Handbook. It was a distinct honor to present the keynote address on behalf of the WHO, which launched the WHO Handbook, at the 2009 International Radon Symposium in St. Louis, Missouri.

#### **All the contributors are prestigious experts, but did anyone provide particular expertise or in some way provide special contributions to the WHO Handbook?**

**Field:** The development of the WHO Handbook was truly a collaborative effort that sought input from every working-group member for the formulation of a global guidance on radon. However, the various working-group chairs, and subchairs, contributed a substantial amount of time towards coordinating meetings and working-group communications, writing, organizing chapter content, and editing the various chapters. In addition, an editorial group of 14 experts, which oversaw the production and review process for the WHO Handbook, devoted significant effort to its completion.

#### **Were there any outstanding challenges in working with such a large panel of international experts?**

**Field:** WHO organized several meetings in Switzerland and Germany to coordinate the working groups' activities. The role of the working-group chairs was to organize, in particular, the writing of the six chapters,

which helped to both reduce possible overlap between the working groups and to improve the efficiency of the overall project. The WHO secretariat reviewed the overall final product and harmonized the chapters regarding the layout and content.

***Did the WHO Handbook include a recommended radon action level similar to the U.S. Environmental Protection Agency's (EPA) radon action level of 150 Bq m<sup>-3</sup>?***

**Field:** The WHO, in consideration of the observed adverse health effects from radon exposure, recommends that a national reference level of 100 Bq m<sup>-3</sup> be set. A reference level does not indicate a rigid boundary between safe and unsafe, but rather defines a level of risk a country considers too high for protracted exposure. However, the WHO takes countries' prevailing conditions into account when implementing the reference levels and accepts a maximum annual mean radon concentration of 300 Bq m<sup>-3</sup>, which is consistent with the International Commission on Radiological Protection (ICRP) radon statement ([http://www.icrp.org/docs/ICRP\\_Statement\\_on\\_Radon%28November\\_2009%29.pdf](http://www.icrp.org/docs/ICRP_Statement_on_Radon%28November_2009%29.pdf)).

***Does the WHO guidance regarding radon differ substantially from the U.S. recommendations concerning radon?***

**Field:** The U.S. radon action level of 150 Bq m<sup>-3</sup> is within the suggested range of the WHO guidance.

However, one area that differs from the EPA approach is an increased focus on performing long-term radon testing.

***What have reactions to the WHO Handbook been so far?***

**Field:** Response in the United States from individuals at state and local health departments, nongovernmental health organizations, scientists, and others has been very supportive. The WHO-recommended reference radon level of 100 Bq m<sup>-3</sup> has caused some confusion since it is slightly lower than the EPA's existing radon action level of 150 Bq m<sup>-3</sup>. However, the EPA has recommended for years that owners of homes testing between 150 Bq m<sup>-3</sup> (4 pCi L<sup>-1</sup>) and 74 Bq m<sup>-3</sup> (2 pCi L<sup>-1</sup>) consider mitigating their homes, since there is no "safe" level of radon.

***How is the WHO Handbook being "marketed" to its target audience?***

**Field:** The WHO Handbook is being marketed by the IRP by identifying target audiences for communication strategies aimed at implementing the recommendations of the WHO Handbook and preparing risk-communication materials addressing the different sectors. The WHO Handbook is distributed through WHO Press worldwide. It can be purchased from WHO Press for a nominal fee or downloaded as a pdf file at no cost ([http://whqlibdoc.who.int/publications/2009/9789241547673\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241547673_eng.pdf)).

**“Update on Perspectives and Recommendations on Indoor Radon: Position Statement of the Health Physics Society”**

***The first HPS position statement on radon was adopted in 1990, close to 20 years ago. What prompted the October 2009 update?***



**Jan Johnson**

**Johnson:** The October 2009 update was initiated in late 2007 by Kevin Nelson, the HPS president at the time. A draft update of the position statement developed by the Radon Section in the late 1990s had been submitted to the Scientific and Public Issues Committee (S&PIC) several times, but never really went anywhere, partially because interest in the Radon

Section waned during that period. In 2007, when a revised draft was submitted to the S&PIC, several individuals approached Kevin, concerned that the draft position statement did not take into consideration the

most recent epidemiologic data and the BEIR VI analyses. Kevin proposed an ad hoc committee to take another look at the subject, with me as chair since I had been the most recent president of the Radon Section and had worked on the revised draft position statement. The HPS Board of Directors approved the ad hoc committee at its January 2008 meeting. The ad hoc committee held several telephone conference calls over the next year to develop an updated position statement supported by a background document.

***What are the major changes from the 1990 statement?***

**Johnson:** The October 1990 position statement on “Perspectives and Recommendations on Indoor Radon” did not include a specific recommendation on an action level for the general public, but did suggest that the EPA should concentrate its efforts on homes with “very high radon concentrations (i.e., tens of pCi L<sup>-1</sup> and greater).” The 1990 position statement also included recommendations regarding radon risk communication and discussed

to some degree the effect of smoking on lung-cancer risk from radon. I could not find a background document to support the recommendations in the 1990 position statement, so I don't really know the basis for those recommendations. The primary difference between the old and the updated position statements is the specific recommendation for mitigation at levels exceeding  $4 \text{ pCi L}^{-1}$ , with consideration for mitigation at levels above  $2 \text{ pCi L}^{-1}$ . In addition, the 2009 position statement is accompanied by a background document that clearly provides the justification for the recommendations.

#### ***Who worked on the position statement?***

**Johnson:** The ad hoc committee consisted of 11 members and 3 consultants, including experts in epidemiology, public policy, health physics, and dosimetry as well as radon measurement and remediation.

- Chair: Jan Johnson, Tetra Tech, Inc.
- Jim Burkhardt, University of Colorado
- Bill Field, University of Iowa
- Dan Hill, New Mexico Department of Health
- Tom Kelly, EPA, Director, Indoor Environments Division
- Craig Little, Independent Consultant (Two Lines, Inc.)
- Ed Maher, Dade Moeller and Associates
- Dade Moeller (resigned from the committee due to other commitments)
- Kevin Stewart, American Lung Association
- Dan Strom, Pacific Northwest National Laboratory
- Phil Jenkins, Bowser-Morner
- Dan Steck, St. John's University, Minnesota
- Susan Conrath, EPA

#### ***The HPS position statement recommends an action level that is less than most international levels but in line with WHO recommendations. Was this a topic of discussion among the authors?***

**Johnson:** The HPS position statement action level is consistent with the recommendations of the EPA and the WHO. The epidemiologic data, described in the radon background document, show a statistically significant increased risk of lung cancer at average radon concentrations above  $100 \text{ Bq m}^{-3}$  ( $2.7 \text{ pCi L}^{-1}$ ). The committee members discussed our responsibility, as experts in radiation protection, to recommend action at a level demonstrated to result in an increased risk of lung cancer. We did discuss the various international reference levels, but we were guided by our own determination of a risk-based action level. It should be noted that a month after the HPS position statement was published, the ICRP revised downward its 2007 recommendation

for the upper value for the reference level for radon gas from  $600 \text{ Bq m}^{-3}$  (ICRP Publication No. 103) to  $300 \text{ Bq m}^{-3}$  ( $8 \text{ pCi L}^{-1}$ ) based on an annual dose of  $10 \text{ mSv}$ . The ICRP added a caveat that "national authorities should consider setting lower reference levels according to local circumstances" and that "all reasonable efforts should be made ... to reduce radon exposures to below the national reference level" (ICRP Statement on Radon, November 2009).

#### ***How were HPS members, the media, and the public made aware of the position statement?***

**Johnson:** The position statement was posted on the HPS Web site in October as soon as the Board of Directors approved it (and a few miscellaneous typos were corrected). The background document was posted as well. The HPS issued a press release summarizing the recommendations. I'm not sure where the press release went, but I did not see anything in the newspapers or on TV. There may be such a thing as "radon fatigue" among the public. Also, the HPS is not exactly a "front page, grab the headlines" kind of organization. I expect that what we say doesn't quite make for exciting news and TV sound bites.

#### ***What has been the reaction of HPS members, the media, and the public to the position statement?***

**Johnson:** Much to my surprise, there has been essentially no reaction from anyone. I have not received a single phone call, letter, or email, pro or con, regarding the position statement. I did get one negative comment at the midyear meeting in Albuquerque when I presented a paper describing the process. The epidemiologic data are pretty persuasive, so anyone who took the time to read the background document would have had a difficult time disputing our conclusions on a scientific basis. As a committee, we deliberately decided not to address the issues of other cancer risks such as smoking, obviously the "elephant in the room." I recognize that epidemiology is a science that is often difficult to understand and may even at times appear to be counterintuitive, but we were guided by the expertise of the epidemiologists on the committee.

#### ***Why do members of the public seem so complacent about the risks of radon when they often react very strongly to other radiation risks?***

**Johnson:** Indoor radon is different from the radiation risks that hit the headlines in that no one but Mother Nature is to blame. We can't sue anyone to recover the costs of mitigation. It's pretty much the same as living in Colorado with background levels twice the national average. None of my neighbors gives that much thought,

but just let some uranium mining company come in with the perceived potential to release relatively small levels of radioactive material into the environment, resulting in doses less than 1 percent of the excess Colorado background, and people turn out in droves to protest. I think it's just human nature to ignore the big risks that we ourselves can control (indoor radon, smoking, driving while using a cell phone, etc.) and get excited about even negligible risks that are imposed on us.

***What is the best way to educate the public about a risk like radon?***

**Johnson:** I wish I knew. Even the EPA with all its resources hasn't excited the public about radon. January was Radon Awareness Month, but I didn't hear a single news commentator mention it. I suspect that "word of mouth" with our friends and family is the best way to spread the word. Perhaps even contacting local officials or writing letters to the editor would help, but we tend to get caught up in our own work so

don't take the time to do anything. I had intended to write a formal letter to my town trustees during Radon Awareness Month, but somehow January slipped by and I didn't do it.

***Is there anything else you would like to add about radon and/or the HPS position statement on radon?***

**Johnson:** I approached this task with some apprehension since radon risk has, in the past, been a bit of a "hot button" issue. However, the job was made easy and pleasant by the manner in which the ad hoc committee dealt with the subject. Everyone contributed. When we asked for documentation of the risk, we received it in a concise and understandable format. Committee members meticulously reviewed the drafts and made excellent suggestions for wording changes. The S&PIC was very helpful, and in the end, the Board of Directors approved the position statement. The credit for this goes to the members of the committee who put in a lot of work on this and to our past president, Kevin Nelson, who got the ball rolling (and didn't let it gather any moss).

*Thank you to Linnea Wahl for her contributions in preparing "Speaking Up about Radon."*

**Jan Johnson**

**Jan Johnson** began her 50-year career in health physics at the University of Rochester as an Atomic Energy Commission Fellow. She received her MS in 1959, then took a few years off to marry and have children. Jan worked at Colorado State University (CSU) for 30 years, serving in various positions from research associate to director of environmental health services, receiving her PhD in industrial hygiene from CSU in 1986. She has been a consultant, primarily working with the uranium industry, since 1995 and is currently a senior technical advisor for Tetra Tech. Her greatest achievement is raising three wonderful, productive members of society and being a part of the lives of her four "amazing" grandchildren. She is a lay leader at St. Peter's Episcopal Church and recently joined the 70+ Ski Club.

**Bill Field**

**Bill Field** is a professor at the University of Iowa's College of Public Health. He directs the National Institute for Occupational Safety and Health's funded Occupational Epidemiology Training Program as well as the National Institute of Environmental Health Sciences funded Environmental Lung Disease Research Cluster, located at the University of Iowa. He has been actively involved in radon research for almost 20 years and just recently completed four years assisting WHO in its efforts to produce guidance to reduce the global burden of radon-related lung cancer. He serves on EPA's Radiation Advisory Committee and was recently appointed to the Advisory Board on Radiation and Worker Health, which provides advice regarding activities under the Energy Employees Occupational Illness Compensation Program Act.

**Radon Web Sites**

**WHO Handbook:** [http://whqlibdoc.who.int/publications/2009/9789241547673\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241547673_eng.pdf)

**International Radon Project:** [http://www.who.int/ionizing\\_radiation/env/radon/en/index.html](http://www.who.int/ionizing_radiation/env/radon/en/index.html)

**HPS Position Statements:** <http://hps.org/hpspublications/positionstatements.html>

**ICRP:** [www.ICRP.org](http://www.ICRP.org)

**U.S. EPA:** <http://www.epa.gov/radon/index.html>

**University of Iowa:** <http://www.public-health.uiowa.edu/media/releases/rd.asp?rlsId=675>

**National Radon Posters:** [www.sosradon.org](http://www.sosradon.org) (all the 2010 winning posters and information on contest participation)

## What Did We Learn at the 2010 HPS Midyear Meeting?

Mary Walchuk

We came. We learned. We left.  
Now what?

For those who attended the 2010 Health Physics Society (HPS) Midyear Meeting in Albuquerque this January, a large amount of information was presented on the topic “Radiation Risk Communication to the Public.”

“The meeting was really worthwhile for all,” said HPS Past President Dick Toohey. “I was really impressed by the interactions between the speakers and the attendees, during both the sessions and the breaks.”

For the next several months, we will be presenting (based somewhat on the 27/9/3 template introduced by Vincent Covello) the meeting speakers’ opinions of the most important lessons learned by the meeting attendees.

“Dr. Covello has been to my state several times in the past seven years to provide us with training on risk

communications,” said John Lanza, a public health physician and health department director in Florida.



John Lanza

“Most people are not born as risk communicators so Dr. Covello, with his 27/9/3 philosophy, provides an excellent organizational and memory aid to assist in our presentation of sometimes difficult-to-communicate information. Not everyone can be a communications rock star, but with a little training, most of us can provide valuable information to the public in a simple format during times of maximum stress.”

Covello’s simple format: “When responding to any high-stress or emotionally charged question, be brief and concise in your first response: no more than 27 words, 9 seconds, and 3 messages (bullet points).”

We begin with a dozen speakers, with more to follow in a future issue of *Health Physics News*.



### Barbara Hamrick

- Communication’s a two-way street. You have to listen to be heard.
- Don’t sacrifice clarity for precision; sometimes less is more.
- If you can’t be brief, be good.



### Joel I. Cehn

Communicating with a non-HP audience requires:

- Special skills.
- A different approach than HPs are used to.
- Practice.



### Sam Collins

- There is a communications gap between the beneficial use/potential health effects of radiation and stakeholders’ understanding/acceptance.
- This gap cannot be completely closed by expressing scientific data/information.

- Developing outreach programs with constructive messages and pursuing training in critical conversations is a consideration for HPS to close the communications gap.
- Take responsibility for what’s influencing HPS; get involved in the external processes!



### Patricia Milligan

- Effective risk communication requires thought and preplanning.
- There are many different models for risk communication.
- Communications regarding “radiation” pose special challenges due to fear and

uncertainty surrounding radiation.



**Dan Corti**

- Be brief and concise in your message.
- Target your presentation to the specific audience.
- Avoid being a technical geek (try to anticipate questions and prepare to answer them).



**Gwyneth Cravens**

- Communication with the public about radiation must be improved.
- Avoid jargon. Provide context, perspective.
- Remember: faced with unfamiliar risks, we react the same way the public does.



**Dennis Quinn**

- Be prepared for potential questions—and practice.
- Respond in “sound bites” of 27/9/3.
- Keep your message simple; people in high stress don’t “hear” the message well.



**Gina Dixon**

When communicating risk:

- Be confident, be factual, be compassionate if appropriate, but don’t be apologetic.
- Minimize jargon and unnecessary information.
- Keep it relevant, fresh, and interesting.



**Jan Johnson**

- Communication skills are essential for HPs.
- We can learn to communicate effectively by seeing the world as others see it.
- The HPS ROCKS!



**Darrell Fisher**

- Communicators need to relate to the interests, motives, and knowledge of an audience.
- The teaching tool Nuclear is Hot! for high school students does this without compromising on technical detail and integrity.



**Mark Miller**

- Risk communication is essential in our profession.
- People don’t care what you know until they know that you care!
- Successful risk communication directly enhances successful radiation safety!



**Stuart Walker**

The meeting was valuable for attendees because they learned how in a crisis situation:

- To effectively communicate with the public.
- To build foundation for later.
- To avoid mistakes.

## 77 Questions Commonly Asked by Journalists during an Emergency Crisis

Journalists are likely to ask six questions in a crisis (who, what, where, when, why, how) that relate to three broad topics: (1) what happened, (2) what caused it to happen, (3) what does it mean. Specific questions include:

1. What is your name and title?
2. What are your job responsibilities?
3. What are your qualifications?
4. Can you tell us what happened?
5. When did it happen?
6. Where did it happen?
7. Who was harmed?
8. How many people were harmed, injured, or killed?
9. Are those that were harmed getting help?
10. How are those who were harmed getting help?
11. What can others do to help?
12. Is the situation under control?
13. Is there anything good that you can tell us?
14. Is there any immediate danger?
15. What is being done in response to what happened?
16. Who is in charge?
17. What can we expect next?
18. What are you advising people to do?
19. How long will it be before the situation returns to normal?
20. What help has been requested or offered from others?
21. What responses have you received?
22. Can you be specific about the types of harm that occurred?
23. What are the names of those that were harmed?
24. Can we talk to them?
25. How much damage occurred?
26. What other damage may have occurred?
27. How certain are you about damage?
28. How much damage do you expect?
29. What are you doing now?
30. Who else is involved in the response?
31. Why did this happen?
32. What was the cause?
33. Did you have any forewarning that this might happen?
34. Why wasn't this prevented from happening?
35. What else can go wrong?
36. If you are not sure of the cause, what is your best guess?
37. Who caused this to happen?
38. Who is to blame?
39. Could this have been avoided?
40. Do you think those involved handled the situation well enough?
41. When did your response to this begin?
42. When were you notified that something had happened?
43. Who is conducting the investigation?
44. What are you going to do after the investigation?
45. What have you found out so far?
46. Why was more not done to prevent this from happening?
47. What is your personal opinion?
48. What are you telling your own family?
49. Are all those involved in agreement?
50. Are people over reacting?
51. Which laws are applicable?
52. Has anyone broken the law?
53. What challenges are you facing?
54. Has anyone made mistakes?
55. What mistakes have been made?
56. Have you told us everything you know?
57. What are you not telling us?
58. What effects will this have on the people involved?
59. What precautionary measures were taken?
60. Do you accept responsibility for what happened?
61. Has this ever happened before?
62. Can this happen elsewhere?
63. What is the worst case scenario?
64. What lessons were learned?
65. Were those lessons implemented?
66. What can be done to prevent this from happening again?
67. What would you like to say to those that have been harmed and to their families?
68. Is there any continuing the danger?
69. Are people out of danger? Are people safe?
70. Will there be inconvenience to employees or to the public?
71. How much will all this cost?
72. Are you able and willing to pay the costs?
73. Who else will pay the costs?
74. When will we find out more?
75. What steps need to be taken to avoid a similar event?
76. Have these steps already been taken? If not, why not?
77. What does this all mean? Is there anything else you want to tell us?



Vincent T. Covello

Reprinted from "Risk Communication" by Vincent T. Covello in *Environmental Health: From Global to Local*, edited by Howard Frumkin, New York: Jossey Bass/John Wiley and Sons, Inc. (2005).

## Frank Haughey, PhD, CHP 1930-2007

Kent Lambert, CHP  
with first-person account by Patrick McDermott, CHP

It was recently learned that Francis J. (Frank) Haughey, PhD, CHP, died 6 November 2007. Dr. Haughey was professor emeritus of health physics at Rutgers, The State University of New Jersey's Cook College.



Frank was a charter member and Fellow of the Health Physics Society and a certified health physicist (1962). He served on the American Board of Health Physics (ABHP) Panel of Examiners and two terms on the ABHP Continuing Education Panel. He also served on various advisory committees to the New Jersey Department of Health. Haughey received the Arthur F. Humm, Jr., Memorial Award in 1995 in recognition of his strong support of the National Registry of Radiation Protection Technologists.

After leaving the Air Force in 1955, Frank began his career in health physics, working at Brookhaven National Laboratory, while also attending night school at Hofstra University. Upon earning his bachelor's degree in physics, he went to Rutgers University, receiving his master's degree in 1962 and his PhD in 1966. He joined the radiation sciences faculty in 1966, where he remained until his retirement in 1995. From 1965 to 1975, Rutgers led the nation in students graduating with master's degrees in radiation science (92). Through 1991, there were 181 MS and 26 PhD degrees awarded.

As with all good educators, Frank's legacy is his students, to whom he was extraordinarily dedicated. It is for this attribute that Frank will be most remembered. Frank's devotion to his students included bending (some might say "breaking") the rules to help a student. I met Frank at Rutgers in January of 1992. I was an undergraduate student over a year away from graduation, and

Frank approached me and directed that I take the two-semester "Radiation and Radioactivity" courses. This was the eight-credit foundation on which the Rutgers graduate program was built. (Haughey's disciples will recall that he started every class with an outline, and it always started with "Atomic Structure.") I tried to defer, but Frank insisted if I wanted my master's degree I had to take the classes now because he was going to retire and the HP program would be left to wither. Graduate work was pretty far off in my future. Frank told me: "Don't worry about it. Take the class but don't register for anything; I'll keep your grade in my drawer. After you get into the graduate program, I'll make sure you get the credits." Four years later, Frank was good to his word. This brief story is intended to be illustrating—I suspect most students have a Frank story they can tell, from ordering copies of the *Radiological Health Handbook* or the Chart of the Nuclides to coming in on a Saturday to meet a new student for a tour of the campus to letting a new student without housing "crash" on the floor of his office for a few weeks!

If you were one of Frank's students, you witnessed a professor who truly enjoyed introducing his students to an exciting subject. This is a special quality in a professor; his enthusiasm fueled my curiosity. I was fortunate enough to be a student in the very last class Frank taught and know from many discussions with my predecessors that this enthusiasm was a key to his success and joy for decades.

A few years after Frank retired, his wife of 49 years, Claire, passed away. Frank then retreated into his private life and was generally reclusive to peers and former students. The delay in this remembrance is a result. Frank is survived by his brother, six children, and 14 grandchildren.

The health physics community lost a great teacher, and that is a sad thing. But we still have the education he bestowed upon us and the past and future accomplishments of his students. And that is worth celebrating.

The authors would like to acknowledge Drs. Alan Appleby and Peter Strom for contributing information to make this obituary possible. ☒

The "In Memoriam" Web page (<http://hps.org/aboutthesociety/people/inmemoriam/>) is devoted to the people who have made the Health Physics Society a great organization.

# Committee Activities

## Science Support Committee

*Mike Lewandowski, Chair*

### Bringing HPS to Science Teachers

Over the past few years, the Science Support Committee has experimented with supporting chapters to attend local science teacher meetings to talk to teachers about radiation safety. This experiment has been successful and the committee has formalized the process to fund chapters to interact with local science teachers.

The process is simple. Download the application form at the Science Support Committee page on the Health Physics Society Web site (<https://hps.org/membersonly/committees/sciencesupport/>). Complete the form and return it to the committee chair. Each request is evaluated and resources allocated based on available



North Central Chapter member Kimberly Knight-Wiegert explains resources to a science teacher at the Wisconsin Society of Science Teachers annual meeting.

funding and the priorities listed on the application form.

Chapter members who have attended local science teacher meetings have found this to be a great way to meet and interact with local science teachers. The connections made with teachers have led to further interactions to bring radiation-safety information into the classroom. The committee hopes that the availability of funding and other resources will encourage chapters to meet local science teachers on their own turf and develop lasting collaborations. Check the Science Support Committee Web page for a list of materials and resources available to chapters and individual Society members.

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*Thomas P. Johnston, RRPT*

### Calling All Hands: Get Out and Support Your Local Science Fair!

With great enthusiasm I call upon each and every chapter and Health Physics Society (HPS) member to get out and support your local science fair. Think about this for a moment: what better way to reach future scientists than to be a judge at your local science fair? Judging takes either a half or full day and judges usually get a light breakfast and lunch. There is ample opportunity to support students to maintain their interest in science and provide positive feedback. The rewards are numerous, including self-fulfillment, enrichment, and satisfaction in knowing that you have personally affected the lives and possibly the careers of future scientists.

I would like to share how I got involved with science fairs and how the “bug” bit me. Every year I participate in the local science fair where I live and/or work. As the day draws near for the science fair, my family can tell of the approaching event by the excitement I bring to the dinner table when we discuss upcoming events in our lives. When the fair

finally arrives, by the end of the judging day I get a spring in my step as I start to think about the next year’s science fair.

This all started when I was in grade school. On my walk home from school one day, I happened by the community center and made my first visit to a science fair. I could not wait to get to school the next day and find out about my school’s next science fair. That was years ago and my interest in science fairs remains quite strong. My first involvement in science fairs as a professional was in Palm Beach County, Florida. Then, when I moved to Houston, I immediately got involved (along with the South Texas Chapter) with the Science and Engineering Fair of Houston, Texas. Now that my career has brought me to the DC area, I am involved (with the Baltimore-Washington Chapter) with ScienceMONTGOMERY. I thoroughly enjoy my contribution as a judge each year.

Becoming a science fair judge is easy. Once you have decided to be a judge, ask coworkers, col-

leagues, and fellow chapter members to join you. As you discuss the fair with chapter members, ask chapter leadership to sponsor the science fair with a donation and student awards. Awards may consist of an invitation to your next chapter meeting and could include first, second, and third place and honorable mention award certificates, a Chart of the Nuclides, health physics textbooks, cash awards, or U.S. savings bonds. Also, remember that the HPS has the National Student Science Award and the Geoffrey G. Eichholz Outstanding Science Teacher Award. Sponsoring your local science fair may include placement of an advertisement with your chapter logo in the science fair program and/or Web site. On judging day, arrive early to review the judging rules and guidelines (and for the complimentary coffee and pastries!). Select a judging category that relates to your particular field, specialty, or interest. Take time to review the student project

list and exhibit-hall map to plan your judging experience. Next, make initial selections based only on the project's title. Select projects that utilized some form of radiation. Quickly walk through the exhibit hall to look at each project that caught your attention during review of the project list. Take notes on the projects that seem like possible candidates for awards at that time. Start judging from your short list.

At my local science fair, awards are presented by both the science fair and by community organizations. I participate in judging for both groups. I spend the morning judging for the science fair and the afternoon judging for the local chapter of the HPS. Judging at your local science fair is one way to give back to your community, make a no-cost contribution to the lives of future health physicists, and have another opportunity to directly increase awareness of the HPS. No training or experience is necessary. Give of yourself and register to be a science fair judge today! ☒

## Section News

### Accelerator Section

*Linnea Wahl, CHP*

#### Accelerator Section Nominees for 2010 Election

The Accelerator Section Nominations and Elections Committee, headed by Carter Ficklen and Don Cossairt, has announced the section's nominees for the 2010 election of its executive board of directors.

This year, five positions will be filled, including president-elect, treasurer, newsletter editor, and two directors. Section members who have graciously agreed to run for these positions are Rich Brey (Idaho State University) for president-elect, Steve Frey (SLAC, retired) for treasurer, Keith Heinzelman (Lawrence Livermore National Laboratory) for newsletter editor, Lorraine Day (Louisiana State University) for director, and Eric Burgett (Georgia Tech, moving soon to Idaho State University) for director.

The section wishes to thank all of the nominees for agreeing to run and to thank Carter Ficklen and Don Cossairt for their hard work in developing an excellent slate of candidates.

Other Accelerator Section members who are interested in running for these positions are encouraged to contact Carter Ficklen (cficklen@yahoo.com) before 7 May, as ballots must be distributed by 15 May. ☒

## Correspondence

### Articles about Greenhouse Gas Emissions

*Chris Miles, CHP  
Dayton, Ohio*

I was just reading the March 2010 issue of *Health Physics News* and I would like to make a general comment with regard to articles about greenhouse gas emissions. Specifically, I would like to respond to correspondence on this topic by Dan Strom (March *Health Physics News*, p. 10) and Andrew Sowder (January *Health Physics News*, pp. 13-20).

The term "greenhouse gas" implies that the gas is contributing to global warming. These views by Strom and Sowder are presented as if it is an established fact that CO<sub>2</sub> is a greenhouse gas. This theory has certainly not been established as a scientific fact, although it is often presented as such in the media. I have no problem with making a comparison between various energy technologies regarding their respective CO<sub>2</sub> emissions per kW/h of energy produced, but let's not present these comparisons in a manner which suggests that we, as a scientific society, agree that CO<sub>2</sub> is a greenhouse gas that is contributing to global warming. I am certainly not convinced that this is the case and I know there are other scientifically minded Health Physics Society members out there who share my point of view. ☒

## Announcements

### International Conference on Radiation Protection in Medicine—1-3 September 2010

Jenia Vassileva  
Head of Radiation Protection at Medical Exposure Section  
National Center of Radiobiology and Radiation Protection

The International Conference on Radiation Protection in Medicine will be held 1-3 September 2010 at the Riviera Holiday Club, Varna—a famous Black Sea resort in Bulgaria.

The conference is coorganized by the National Centre of Radiobiology and Radiation Protection at the Ministry of Health, Bulgarian Society of Biomedical Physics and Engineering, and Roentgen Foundation. It is supported by the European Commission, International Radiation Protection Association, International Organization for Medical Physics, International Society of Radiographers & Radiological Technologists, European Society for Therapeutic Radiology Oncology, European Federation of Organizations for Medical Physics, and United States organizations the National Council on Radiation Protection & Measurements, the American Association of Physicists in Medicine, and Image Gently.

The Scientific Program Committee is chaired by Dr. Madan Rehani from the International Atomic Energy Agency, and the International Advisory Committee is chaired by Professor Fred Mettler, MD, from the United States.

The motto of the conference is, “Where we are and where we are going in radiation protection in medicine.” The conference will provide a platform for sharing current developments and examine future trends in radiation protection in all applications of radiation in medicine.

The scientific program will include plenary, scientific, and poster sessions, refresher courses, forums/roundtables, and panel discussions. The scope is multidisciplinary, intended for a wide audience of professionals involved in radiation protection, such as medical physicists, imaging and therapy physicians, engineers, radiographers, as well as representatives of authorities, manufacturers, patient organizations, and public-relation and risk-communication specialists.

The official language of the conference is English. Deadline for abstract submission is 30 April 2010. Registration will start from 8 March 2010.

For detailed information, please consult the conference Web site ([www.rpm2010.org](http://www.rpm2010.org)). ☒

### 22<sup>nd</sup> Annual AMUG Meeting

Morgan Cox, CHP

The 22<sup>nd</sup> annual meeting of the Air Monitoring Users Group (AMUG) is scheduled to convene at the Palace Station Hotel in Las Vegas, Nevada, 4-7 May 2010 with standards meetings convening Monday, 3 May. There will be relevant presentations by participants from the U.S. Department of Energy (DOE) laboratories, nuclear utilities, other practitioners in aerosol sampling and monitoring throughout industry, and a host of interested manufacturers and suppliers. We expect visiting experts from Canada and Germany to participate.

The Hoover-Newton award will be presented to a highly deserving member of the AMUG for continued leadership in the field of radioactive aerosol monitoring.

To register at the Palace Station (1-888-319-4661, option 3) simply use the code AMUG to affect the group rates of \$39 plus tax during the week (S-M-T-W-Th) and \$49 for the weekend (F-Sa).

Wednesday, 5 May, will include a day-long tour of the Nevada Test Site. Application forms for this event for U.S. citizens and overseas guests must be completed and submitted to Charlotte Carter of the U.S. DOE-Nevada Operations Office at [carterc@nv.doe.gov](mailto:carterc@nv.doe.gov) as soon as possible.

The registration fee for this meeting is \$90 per person, payable in cash or check from a U.S. bank. Please pay your registration fee to Morgan Cox, 34100 Chagrin Blvd, Suite 1105, Moreland Hills, OH 44022. You may reference AMUG on your check. There will also be on-site registration.

Please contact Morgan Cox (216-464-7716, [morgancx@swcp.com](mailto:morgancx@swcp.com)) or Mark Maiello (845-602-4765, [maiellom@wyeth.com](mailto:maiellom@wyeth.com)) to indicate your interest in participating in this exciting meeting. The program is being assembled in the coming months and will be published in a later edition of *Health Physics News*. ☒

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### 47<sup>th</sup> Annual NCRP 2011 Meeting

The 47<sup>th</sup> Annual National Council on Radiation Protection & Measurements (NCRP) meeting will be held 7-8 March 2011 in Bethesda, Maryland. The topic will be “Scientific and Policy Challenges of Particle Radiations in Medical Therapy and Space Missions.” ☒

## "America's Choir" Welcomes HPS to Salt Lake City

*Karen Langley  
2010 HPS Annual Meeting  
Local Arrangements Cochair*

An invitation has been extended by the Mormon Tabernacle Choir to all Health Physics Society (HPS) members, exhibitors, guests, and family members who will be attending the 55<sup>th</sup> HPS Annual Meeting and 22<sup>nd</sup> Biennial Campus Radiation Safety Officers Meeting in Salt Lake City, Utah, 27 June-1 July 2010, to attend a live TV/radio international broadcast from the LDS Conference Center on Sunday morning, 27 June. There is no charge to attend.

This weekly nondenominational choir and orchestra broadcast from Temple Square is a popular cultural event for visitors and local residents alike.

During summer months, the broadcast takes place at the new LDS Conference Center rather than from the historic pioneer Tabernacle.



About 1,000 seats toward the front of the LDS Conference Center will be reserved for HPS members and guests. The LDS Conference Center, occupying the city block directly north of the Tabernacle on Temple Square, seats about 21,000 and is the largest theater-style auditorium in the world.

Those who would like to attend should assemble at Door 8 of the LDS Conference Center at 8:30

a.m. for seating on Sunday morning, 27 June. A live dress rehearsal runs from 9:00 to 9:30 a.m., and the 30-minute broadcast performance takes place from 9:30 to 10 a.m.

The broadcast performance is restricted to children age eight and older. ☒

### 55<sup>th</sup> Annual Health Physics Society and 22<sup>nd</sup> Biennial Campus Radiation Safety Officers Meeting Salt Palace Convention Center • Salt Lake City, Utah • 27 June-1 July 2010



Wells Fargo Center  
Photo Credit: Jason Mathis



Red Butte Garden  
Photo Credit: Eric Schramm



Salt Palace  
Photo Credit: Steve Greenwood



Salt Lake Temple  
Photo Credit: Eric Schramm

The Health Physics Society  
 2010 Summer Professional Development School • 23-26 June  
 Idaho State University - Pocatello, Idaho

*Rich Brey, CHP*

The Eastern Idaho Chapter of the Health Physics Society (HPS), in collaboration with the Great Salt Lake Chapter of the HPS, proposes to conduct a four-day professional development school (PDS) Wednesday through Saturday, 23-26 June 2010. The PDS will be on internal dosimetry.

Unlike past summer schools in this area of health physics intended for individuals with advanced skills in current techniques, this class is intended to bring the novice internal dosimetrist to a fairly functional level of competence. This course will be heavily structured to enhance the didactic value of materials present.

The instructors in this summer's PDS are all recognized experts in academia and internal dosimetry. Our intention is to begin with a review of past practices in estimation of the intake of radioactive materials and the determination of consequences, which of course are still important to those reviewing records for dose reconstruction (Rich Brey). A detailed consideration of the implications and nuances of bioassay techniques both past and present and their limitations will be provided (Dick Toohey). An introduction to advanced internal dosimetry code IMBA will be provided (Alan Birchall). Consideration of the uncertainty in bioassay input parameters and estimated magnitudes of dose considering state-of-the art approaches will be provided. This portion of the class will present a vision of the future of internal dosimetry and the challenges that are being overcome by those researchers active in this area (Matt Puncher). The art and science that is the interpretation of bioassay results will be discussed (Tony James). A

review of the Medical Internal Radiation Dosimetry (MIRD) system will be provided (Darrell Fisher). This will be followed with detailed instruction and problem solving using current internationally accepted dosimetry models and software, with many examples from operational experiences (Tom LaBone). The class will be completed with a review and comparison of pertinent bioassay regulations and consensus standards prescribing best bioassay practices (Gus Potter). See the tentative schedule below.

The flavor of this PDS will be more academically rigorous than passive, with actual homework assignments being given to participants. These homework questions and their answers will be a part of the written material given to students.

**Location:** The PDS will be held on the campus of Idaho State University (ISU) in Pocatello, Idaho. This is located about two hours and 15 minutes by car north of the Salt Lake City airport. There are several options for traveling to Pocatello. One may fly directly into Pocatello, which is a regional destination for SkyWest Airlines (Delta connection); one may fly into Idaho Falls, which typically has more flight options and is about a 50-mile commute; one may rent a car and drive; or one may take a reliable and inexpensive shuttle (Salt Lake Express, [www.saltlakeexpress.com](http://www.saltlakeexpress.com)) from the Salt Lake City airport to Pocatello (\$36 one-way).

**Registration:** Registration fees are \$700 for HPS members and \$835 for nonmembers (includes HPS Associate Membership for 2010). As an experiment, the PDS will be available as an encoded streaming video for

*... this class is intended to bring the novice internal dosimetrist to a fairly functional level of competence.*

<b>2010 Summer PDS Schedule</b>		
	<b>Morning 9 a.m. to noon</b>	<b>Afternoon 1 p.m. to 4 p.m.</b>
<b>Wednesday 23 June</b>	<b>Rich Brey</b> —History and Development	<b>Dick Toohey</b> —Bioassay Methods
<b>Thursday 24 June</b>	<b>Alan Birchall</b> —Software/IMBA	<b>Matt Puncher</b> —Uncertainty
<b>Friday 25 June</b>	<b>Tony James</b> —Bioassay Interpretation	<b>Darrell Fisher</b> —MIRD
<b>Saturday 26 June</b>	<b>Tom LaBone</b> —Operational Experiences	<b>Gus Potter</b> —Regulatory Aspects

a finite access period on the ISU server or placed on the HPS server for some predetermined length of time. The video capturing would be conducted by a professional staff available through the university and would be conducted, depending on enrollment, in either an available lecture hall adequate for the numbers of students enrolled or a studio classroom developed for the purpose of video/audio capture. The registration fees will remain the same regardless of on-site or online participation.

**Lodging:** Lodging is available at the Red Lion Hotel Pocatello. Reservations can be made by calling 208-233-2200 or 1-800-RED-LION. Ask for the ISU HPS-PDS rate of \$76.95 per night. Space is limited so please reserve early. The rate is available until 28 May or when the room block sells out, whichever comes first.



For those on a tighter budget, lodging will also be available on campus at ISU. PDS participants have the option of staying at the Rendezvous Center or Dyer Hall. Rendezvous Center rooms are quad-occupancy-style suites. Each room has a private bedroom and a shared living room and bathroom. The cost is \$17 per night plus a one-time \$7 charge for linens. Rooms in Dyer Hall contain two single beds and a shared communal bathroom (on each floor). The cost is \$12 per night plus a one-time \$7 charge for linens. Please contact Bobby Arteaga at 208-282-3699 if you wish to lodge at ISU.

**Meals:** Breakfast, lunch, and snacks on Wednesday, Thursday, Friday, and Saturday are included in the registration fee. Friday's Night-Out dinner is also included. Note: No rebates will be given for missed meals. ☒

## Book Review

*The Health Physics Solutions Manual, 2<sup>nd</sup> Edition*  
*Introduction to Health Physics*  
*Problems Made Easy*

By Herman Cember and Thomas E. Johnson

Timothy A. DeVol, PhD, CHP

The 2<sup>nd</sup> edition of *The Health Physics Solutions Manual: Introduction to Health Physics Problems Made Easy*, by the late Dr. Herman Cember and Dr. Thomas E. Johnson, is an excellent companion text to their 4<sup>th</sup> edition of *Introduction to Health Physics*. The companion set is ideal for a current health physics student or one preparing for the American Board of Health Physics certification exam.

If you are a believer in active learning, that is, learning by solving problems, then *The Health Physics Solutions Manual* is for you! The 518-page solution manual, complete with an index, has meticulously detailed solutions to the 380 problems that appear in the companion text. The solutions contained in the solutions manual are presented in greater detail than the 170+ examples that are worked out in the companion text. The solutions are given step-by-step to include annotation, as necessary, for the reader to understand the logical process that should be followed to arrive at the proper solution. Cross references to equations in the companion text are included, as well as cross references to other needed

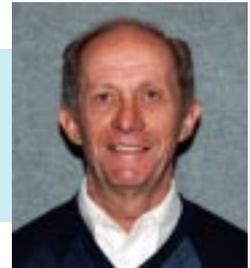
reference materials. These cross references help the student understand how to use these important equations and many of the important reference materials. In some cases, the solutions manual presents two or three solutions to a given problem to illustrate that one can arrive at the “same” correct answer via multiple correct routes. Therefore a given solution may span several pages of the solutions manual. Further, the solutions manual corrects the errors that appear in the answers presented in the back of the companion text. As one might expect when putting together a solutions manual of this magnitude, there are a few errors in the solutions. As a professor of health physics, I will be sure to assign those problems so I can easily determine who is learning the material ...

All in all, the 2<sup>nd</sup> edition of *The Health Physics Solutions Manual* is an excellent resource for all students of health physics and those preparing for certification. The solutions manual serves as an excellent companion text to the authors' 4<sup>th</sup> edition of the *Introduction to Health Physics*. ☒

## NCRP's Latest Report Now Available *Self Assessment of Radiation-Safety Programs*

Mary Walchuk

Health Physics Society member David Myers worked on National Council on Radiation Protection & Measurements (NCRP) Report 162, *Self Assessment of Radiation-Safety Programs*, which was published at the beginning of March. He provided information about the report and its importance to health physicists.



### ***What is the main purpose of Report 162?***

**Myers:** The main purpose of Report 162 is to provide guidance on how to perform self-assessments of radiation-safety programs. Self assessment is the process that an institution uses to critically review its own activities and performance in relation to regulations, standards, internal policy documents, implementing procedures, industry best practices, and goals. The primary objectives of a self-assessment are both to identify deficiencies and to look for ways to improve a radiation-safety program.

### ***Who wrote NCRP Report No. 162?***

**Myers:** Report No.162 was written by Program Area Committee 2 (PAC 2) NCRP. This report was written by the PAC 2 committee itself; however, in some instances, reports on more specialized topics are written under the umbrella of PAC 2 by separate committees composed of specific subject-matter experts. NCRP has published nine reports on operational health physics topics in the last 10 years. The most recent was Report 157, *Radiation Protection in Educational Institutions*, published in 2007.

### ***What is PAC 2?***

**Myers:** PAC 2 is one of six NCRP program area committees and is responsible for writing or overseeing the writing of NCRP reports on operational health physics topics. PAC 2 consists of 11 senior health physicists who have a wide variety of expertise in operational health physics, including national lab, nuclear power, medical, academic, consulting, industrial, and state rad health programs. The current membership of the committee includes two past presidents and the president-elect designate of the Health Physics Society (HPS).

### ***To what type of facilities or operations does Report 162 apply?***

**Myers:** This report applies to the full spectrum of institutions using radioactive material or radiation-generating equipment. Examples of such institutions include a corporation in the private sector, a government research laboratory, a hospital, a nuclear power plant or other nuclear fuel-cycle facility, a university, or a small college. Of course, the complexity of the self-assessment program would scale with the extent and complexity of the radiation-safety program at the institution.

### ***What are some of the important topics covered by the report?***

**Myers:** Report 162 provides guidance on setting up a self-assessment program, the different types of self-assessment (i.e., performance-based, risk-based, and compliance-based), and the qualifications of assessors. It also provides guidance on self-assessment techniques including work observations, interviews, checklists, records review, how to avoid conflicts of interest, and how to document and follow up on self-assessment results.

### ***Why do you think it will be of interest to health physicists?***

**Myers:** Most health physicists have lots of experience in being audited or inspected by regulators, but much less experience in assessing their own radiation safety programs. If an institution doesn't have a self-assessment program, this report would be a good place to start. If an institution does have a self-assessment program, this report would be useful for evaluating the existing program.

***What were the main sources of input for the report?***

**Myers:** The report is mainly the distillation of the collective experience and knowledge of the members of the PAC 2. However, the committee received valuable input from peer reviewers, NCRP collaborating organizations and agencies, and NCRP council members. The report also references documents from regulatory agencies, NCRP reports, and other sources relevant to the self-assessment process.

***How is the report writing funded? Is it different for each report?***

**Myers:** Report 162 was funded by the NCRP with significant support from the HPS. In some cases, funding for reports, often the more specialized topics, is received from a sponsor under a contract arrangement.

***How can Health Physics News readers obtain a copy of the report?***

**Myers:** Report 162 is available for purchase through the

NCRP publications Web site: [www.ncrppublications.org](http://www.ncrppublications.org). HPS members receive a discount on NCRP publications.

***What else is PAC 2 working on?***

**Myers:** PAC 2 itself has begun work on a report on the investigation of radiological incidents. Separate committees under the umbrella of PAC 2 are drafting reports on fluoroscopically guided interventional procedures and key decision points and information needed by decision makers in the aftermath of a nuclear or radiological terrorism incident.

***Is there anything else you would like to add about NCRP Report No. 162 or PAC 2?***

**Myers:** There will be a presentation on Report 162 as part of an NCRP special session at the 2010 HPS Meeting in Salt Lake City. It will be a good opportunity for HPS members to learn about the activities of PAC 2 and the other program area committees. ☒

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## NCRP Releases Report No. 162

### *Self Assessment of Radiation-Safety Programs*

National Council on Radiation Protection & Measurements (NCRP) Report No. 162, *Self Assessment of Radiation-Safety Programs*, provides guidance on establishing a self-assessment program to ensure the timely self-identification and correction of deficiencies in a radiation-safety program and to improve the performance of the program by ensuring that its design and implementation are effective and efficient. The self-assessment process is important for all institutions that use radioactive material or radiation-producing devices. These institutions range from a college using small radioactive sources in the physics department to a large nuclear power plant complex. This report provides information and guidance on the following topics:

- Definition and purposes of self-assessment.
- Types of self-assessment (i.e., performance-based, risk-based, compliance-based, task, process and program level, formal and informal).
- Responsibilities for establishing self-assessment programs including upper management, line management, the radiation-safety committee, radiation-safety program personnel including the radiation-safety program manager or radiation-safety officer, and workers.
- Self-assessment program planning for an institution including determining the purpose and type of self-

assessments, selecting the program elements to be assessed, allocating the necessary resources, and developing a self-assessment program review plan.

- Qualification and selection of individuals performing the self-assessments.
- Self-assessment methods and techniques including evaluation of radiation-safety program survey and monitoring results, workplace observations, interviews, document reviews, checklists, review of metrics, and questionnaires.
- Types of deficiencies that can be identified in the self-assessment process, ranging from the minor ones that are most likely to be found to those that are more serious.
- Identification of noteworthy practices.
- Planning an individual self-assessment, including the program elements to be assessed, the schedule for performing the self-assessment, and the type(s) of self-assessment to be used.
- Conducting the self-assessment, including the entrance meeting, performing the assessment activities, daily team conferences, upper-management briefings, exit meeting, and documentation.
- Documenting the self-assessment, including writing reports, report approval, communicating the results, and legal considerations.

- Developing corrective-action plans including tracking and resolution of corrective actions and reviewing the effectiveness of the corrective-action program.

Self-assessments are a proactive component of an effective radiation-safety program and they should occur at all levels within the institution. Self-assessments can identify and correct deficiencies and can improve the performance of the radiation-safety program. The self-assessment process is designed to find and correct deficiencies before they have a negative impact on safety or the institution's activities. Another benefit of the self-

assessment program is to encourage worker involvement in improving the radiation-safety program. Finally, an effective self-assessment program can demonstrate to regulators that the risk of radiological activities is being adequately managed and that the institution is committed to the safe use of radiation and radioactive material.

The report is available from the NCRP Web site (<http://ncrppublications.org>) in both soft- and hard-copy formats. For additional information, contact David A. Schauer, ScD, CHP, at [schauer@NCRPonline.org](mailto:schauer@NCRPonline.org), 301-657-2652 (x20) or 301-907-8768 (fax). 

### Charles E. Land Gives 34<sup>th</sup> L.S. Taylor Lecture at 2010 NCRP Meeting

The 34<sup>th</sup> L.S. Taylor Lecture, "Radiation Protection and Public Policy in an Uncertain World," was given by Charles E. Land on 8 March 2010 at the 46<sup>th</sup> Annual Meeting of the National Council on Radiation Protection & Measurements (NCRP) in the Crystal Ballroom of the Hyatt Regency Bethesda in Bethesda, Maryland. Dr. Land was introduced by F. Owen Hoffman. This lecture series honors the late Dr. Lauriston S. Taylor, the NCRP founding president.



Photo by John Boice Jr.

Land began his career serving two tours as a research associate statistician with the Atomic Bomb Casualty Commission (ABCC) in Hiroshima. Between ABCC two-year tours, Land taught statistics at Oregon State University. In 1975, he joined the National Institutes of Health (NIH), where he continued to study radiation-related cancer risk as a member of the Radiation Epidemiology Branch of the National Cancer Institute (NCI), Division of Cancer Epidemiology and Genetics until retiring in August 2009.

He received a BA in psychology from the University of Oregon in 1959 and an MA and a PhD in statistics from the University of Chicago in 1964 and 1968, respectively.

He was first elected to NCRP in 1981 and became a distinguished emeritus member in 2005. He is a member of Program Area Committee 1 on Basic Criteria, Epidemiology, Radiobiology, and Risk; served as a member of the 1995 and 2008 Annual Meeting

Program Committees; and has been a member or advisor on eight additional scientific committees.

Land is known for his studies of radiation-induced breast cancer among atomic-bomb survivors and the pooled analyses that provided strong evidence for the linearity of the dose response and the increased risk associated with exposures at a young age.

He contributed to the recent publication by the International Commission on Radiological Protection on low-dose extrapolation of risk and was chairman of the National Cancer Institute's

response to the congressional requirement to revise the 1985 report of the NIH ad hoc working group to develop radioepidemiological tables. In addition, he has served on committees for the National Academy of Sciences, the World Health Organization, and the Institute of Medicine.

Among many honors and awards, Land received Public Health Service awards in 1981, 1991, and 1994; the NIH Director's Award in 1986; NIH Individual and Group Merit Awards in 2004; and the Charles Harkin Award for Research in Thyroid Cancer in 2002. He has authored or coauthored more than 180 publications.

The 2010 Annual Meeting of NCRP, held on 8-9 March, had as its theme "Communication of Radiation Benefits and Risks in Decision Making." A summary of meeting highlights will be presented in an upcoming issue of *Health Physics News*.

**From the Case Files of the Radiation Emergency Assistance Center/Training Site (REAC/TS)  
Radiation Accident Registry**

**Medical Management of Criticality Accident Victims: Then and Now  
Part I - Los Alamos, New Mexico, USA 1945 and Tokai-Mura, Japan 1999**

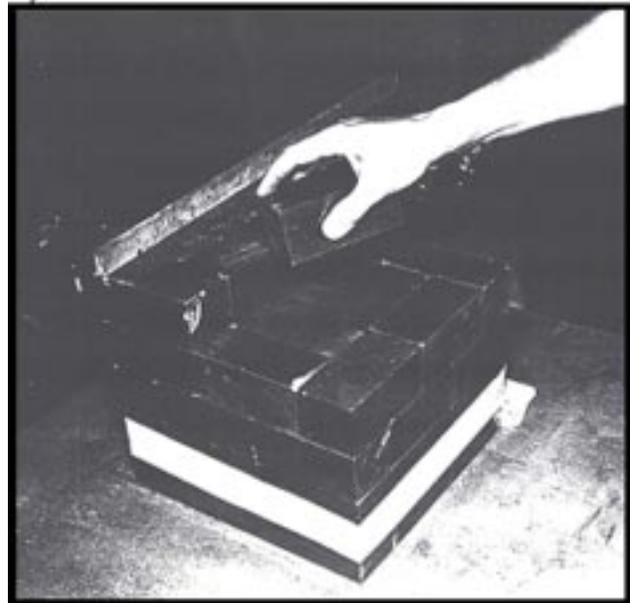
**Introduction.** Historically, criticality accidents resulting in significant injuries to humans number only about 20. Some have had disastrous consequences. Knowledge about the nature of radiation-induced injuries and illnesses has increased since the beginning of the 20<sup>th</sup> century. Advances have been made for treatments of various kinds of injuries, but at about 8-10 Gy acute whole-body exposure, lethality is virtually 100 percent. There is a remarkable difference in the survival of radiation-accident victims between the 1940s and now. Some differences in survival are based on the recent discoveries in medical management of patients with acute whole-body absorbed doses of >8-10 Gy. The contrasts in medical care for criticality-incident victims then and now demonstrate not only how far medicine has come but also how far it has to go.

**Accident “LA1” (Los Alamos first accident).** 21 August 1945—a graduate student from Purdue University was performing criticality research with <sup>239</sup>Pu in Los Alamos, New Mexico. An ongoing set of experiments was being conducted to find out how much reflective material could be placed around a plutonium sphere to cause a criticality. He was configuring the geometry of a reflective tungsten carbide (WC) brick surrounding a sphere of <sup>239</sup>Pu coated with 5 mm of nickel.

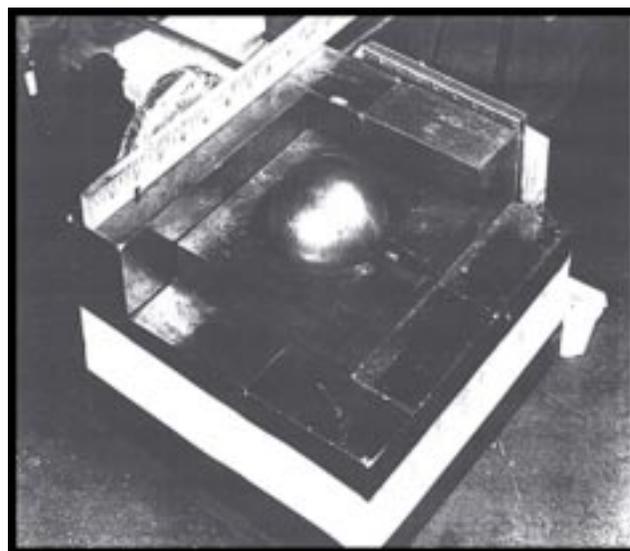
The student added WC bricks to the square structure one at a time, very slowly, while listening to the clicking of a detector. On the first experiment of the day, he constructed a box from WC bricks of 2 1/8" × 2 1/8" × 4 1/4" on a square measuring 14 7/8" per side surrounding the hemisphere.

When a sudden increase in radioactivity indicated that a critical state was imminent, he stopped adding bricks and documented the results. The configuration approached criticality when five layers were complete, including two bricks in the middle of the sixth layer.

That afternoon, he continued and constructed a smaller square of 12 3/4" per side surrounding the hemisphere. Criticality approached with five complete layers.



**Figure 1.** Reflective tungsten carbide (WC) bricks were built in a square to determine the point at which criticality would be reached.



**Figure 2.** The <sup>239</sup>Pu sphere inside a partially completed box.

For some unknown reason and in violation of safety rules, the physicist returned to the lab that evening and constructed a square assembly with a 10 5/8" base. He finished half of the fifth layer and knew criticality was approaching.

At 9:55 p.m., as he attempted to place another brick, it dropped from his left hand into the center of the assembly and a critical excursion occurred. He and a security guard who was sitting about 10-12 feet away experienced a blue glow in the room. The physicist immediately pushed the brick from the assembly with his right hand.

**The Consequences.** The victim had almost immediate numbness and tingling in his right hand. He was admitted to the local hospital within 30 minutes. Severe and unrelenting vomiting began within 90 minutes and ended within 24 hours. He had 24 hours of nausea and hiccoughs with early gastric discomfort and prostration (generalized weakness).

By 24 hours, he was generally improved but had some weakness. By day 10, he had severe abdominal cramping and pain with little relief from narcotics. Diarrhea was almost continuous from days 12 through 26. He died on day 26 in a coma, which was preceded by a period of "irrationality."

**Cutaneous Radiation Syndrome (CRS) and Acute Local Radiation Injury (LRI).** Right after the accident, his right hand gradually became diffusely and tensely swollen, and his left hand was pale, with some swelling of the left index finger and thumb. By 36 hours post event, blistering began on his right hand that gradually progressed to purple discoloration. The physiological expression of injury would later result in gangrene. The wounds were debrided every three to four days. His hands and forearms were even packed



Figure 3. At 3½ days, blisters of the hands were very tense. They ruptured by day five.

in ice. Some of the fingers would eventually become necrotic. Had he survived for a longer period of time, amputations would certainly have been required.

Clinical signs of skin damage at threshold doses for radiation-induced effects are usually delayed by two to three weeks. Approximate threshold doses to skin that cause clinical signs are temporary epilation (loss of hair at ~3 Gy), erythema (redness of the skin at ~6 Gy), dry desquamation (sloughing of the skin at ~10-15 Gy), wet desquamation (sloughing associated with fluid loss at ~20-25 Gy), bullae formation (blister formation at ~30 Gy), and ulceration and finally necrosis (tissue death at >30 Gy). The appearance of large blisters on the hands at 3½ days indicated an absorbed dose to the hands much greater than the threshold dose of ~30 Gy.



Figure 4. Top of the right hand after debridement on day nine. The large amount of edema can be appreciated by the indentation made by the caregiver's thumb, called "pitting" edema.



Figure 5. By day 24, ischemia (decreased blood supply) and necrosis (tissue death) of the fingers is evident.

The loss of intact skin, which acts as a barrier against foreign agents, is the site of entry for infectious agents. These include those viruses, bacteria, and fungi that normally coexist with humans and cause no harm, called “commensal” biological agents. When they cause infection, they are called “opportunistic.”

**Hematopoietic Syndrome.** The clinical signs and symptoms of acute radiation syndrome (ARS) are dependent upon the relative radiosensitivity of various cell types. The most radiosensitive cells in the human body are those of the hematopoietic system (hemato = blood, poiesis = to make) in the bone marrow. Hematopoietic stem cells that will proliferate and differentiate into all of the kinds of mature blood cells are exquisitely sensitive to ionizing radiation.

**Lymphocyte Depletion.** Lymphocytes, a type of white blood cell (WBC), are also exquisitely sensitive to ionizing radiation. Within a day, this patient had a total loss of lymphocytes. The rate at which the absolute lymphocyte count drops and the depth to which it drops are dose-dependent. The rapid total loss of lymphocytes in this case is now known to be the result of a very high absorbed dose. Loss of the other kinds of blood cells will occur later.

Lymphocytes and the other kinds of WBCs are essential to the immunological system. Their loss will allow the development of significant infections of many kinds, including viral, bacterial, fungal, and parasitic.

**Penicillin.** Penicillin (PCN) had only recently been discovered and was the only antibiotic available in the mid-40s. The patient in this case was given frequent injections of the new drug. Unfortunately, PCN is effective against only a few strains of bacteria. The drug has no effect on a large number of bacteria and none at all against viruses, fungi, and parasites.

**Bone Marrow and Stem Cell Transplants.** Bone marrow transplant was not a technique available at the time of this incident. Subsequently, however, bone marrow transplants (BMT) were used to replace radiation-damaged bone marrow and give patients time to reconstitute their own marrow. The results of BMT for accidental radiation illnesses have been mixed. Now, stem-cell transplants are becoming the standard for high-dose cases but are usually reserved for patients who have some chance of survival.

**Gastrointestinal (GI) Syndrome.** The cells that line the small intestine, the intestinal crypt stem cells, are fairly sensitive to ionizing radiation. Starting at about 6 Gy and as the dose increases, progressively more and more of these cells die. This patient developed severe nausea and vomiting, diarrhea, bloody diarrhea, mechanical bowel obstruction, fluid and electrolyte imbalance, hypovolemia (low blood volume), renal (kidney) failure, and cardiovascular collapse leading to his demise at 26 days. In this case, the GI syndrome played a major role in his death.

The intestinal lining, like the skin, is a barrier which prevents many of the intestinal bacteria from spreading to the rest of the body. Many of these are not sensitive to PCN. Once free from the GI tract, they may cause an overwhelming generalized infection or sepsis, which is to be expected in ARS with damage to both the hematopoietic and GI systems.

**The Microvasculature.** Damage to various tissues and organs in high-dose cases may cause multiple organs to fail. The damage may be to the tissue or organ itself, but in many cases may be the result of damage to supporting structures. Of particular concern are the very small blood vessels (arterioles and capillaries) that are less than 100  $\mu\text{m}$  in diameter, collectively called the microvasculature. The radiosensitive cells that line the blood vessels are called endothelial cells. The threshold dose for damage to these cells is  $\sim 6$  Gy. Disruption of blood supply to an organ can cause its failure.

**Conclusion.** Doses to this man’s hands were estimated at 200-400 Gy for the right hand and 50-150 Gy for the left hand. His acute whole-body photon equivalent dose was estimated to be  $>8.4$  Gy. The lethal dose 50/60 ( $LD_{50/60}$ ) for acute whole-body ionizing radiation exposure is on the order of  $\sim 4$  Gy. If this patient had a dose  $>8$  Gy and were treated with today’s medical techniques, he might very well survive longer than 26 days; however, he would likely require amputations for necrotic injuries. Dosimetry in criticality incidents will be the topic of a future article.

**Next month:** Medical management of two fatal cases from the 1999 Tokai-Mura criticality incident.

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## Nominating Committee

*Kathryn H. Pryor, CHP, Chair*

The Nominating Committee is composed of nine plenary members of the Academy whose primary job is to put together a slate of candidates for open positions on the Academy Executive Committee, the American Board of Health Physics (ABHP), and the Academy representation on the American Board of Medical Physics. Nominating Committee members represent a wide variety of geographical areas and disciplines of health physics. It is this diversity on the committee that helps in identifying a larger and more diverse pool of candidates for elective office.

The Nominating Committee contacts potential nominees for

elective office, reviews their eligibility and willingness to serve, ranks the candidates, and forwards the slate of candidates to the Executive Committee. Working closely with the ABHP, the committee also selects and ranks candidates for open positions on the Board. The Nominating Committee identifies candidates for the Academy positions on the American Board of Medical Physics.

Members who are continuing terms or who were reappointed to new terms on the Nominating Committee in 2010 are Morgan Cox, Earl Fordham, John Hageman, Steven King, Kyle Kleinhans, and Glenn Sturchio. New members are Bruce Zibung and Nora Nicholson

(2010 ABHP vice-chair and ex officio member). Kathy Pryor was reappointed to the position of chair of the committee. The Nominating Committee would like to thank those members who concluded their term this past year for their service: outgoing member Keith Anderson and ex officio member Trish Milligan (2009 ABHP vice-chair).

The Nominating Committee strongly encourages Academy members to submit names of potential candidates for elected office or to volunteer to be considered themselves. Past service on the ABHP Examination Panels, Academy standing committees, or the ABHP is helpful but not required.

## Continuing Education Update

*Jim Willison, CHP, Chair*

It seems like I just wrote one of these. First off, let me welcome Cheryl Antonio and Joel Rabovsky to the Continuing Education Committee. Scottie Walker and David Hearnberger completed their terms on the committee as of January. If any of you want to know who is on any of the American Academy of Health Physics (AAHP) Committees, just check out the AAHP Web site ([www.aahp-abhp.org](http://www.aahp-abhp.org)) since the Health Physics Society membership handbook is no longer published.

If any of you are trying to find out which activities have already been approved for continuing education credits, that information is also on the Web site. The course listings have recently been revamped so that all courses approved for a year are now listed under the courses for that year. Previously, you had to dig a little, as courses that were approved for four years were listed in the year they were approved, not in every year they were valid. If this still sounds confusing, just look at the

Web site and it should be pretty easy. I will also remind everyone that browsers have the search function (Ctrl-F) that allows you to find specific text on a page.

As I write this, we currently have two AAHP eight-hour courses lined up for the Salt Lake City meeting. The first is Training Emergency Responders: Materials, Tools, and Methods for Health Physicists. This is a train-the-trainer course related to transportation accidents and also related to homeland security inci-

dents. Our second course is a repeat of the eight-hour HAZWOPER training course offered last year. We are still trying to arrange a third course for the

meeting. Abstracts for the courses are in the meeting preliminary program.

If you have any ideas for topics for the eight-hour AAHP courses

or, even better, if you want to volunteer as an instructor for the Charleston meeting in February 2011, please contact us at [aahpcec@burkinc.com](mailto:aahpcec@burkinc.com).



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The maximum length for each course description is 300 words. Send short course advertisements to:

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Listings that reach the office by the 25<sup>th</sup> of April will appear in the June issue of *Health Physics News*.

*Health Physics News* retains the right to edit short course listings to conform to *Health Physics News* format.

For information about specific short courses, contact the offeror.

**BEVELACQUA RESOURCES**, Attn: Dr. Joseph J. Bevelacqua, PhD, CHP, 343 Adair Drive, Richland, WA 99352; 509-628-2240 or 509-521-8036; email: bevelresou@aol.com; Web site: <http://bevelacquaresources.com>

**TITLE: Certification Review Courses (Part I and Part II); Self-Study Courses (Part I and Part II); Background Materials Review; Part I Question-and-Answer CD and Site License; Part I Additional Question-and-Answer Volume; NRRPT Question-and-Answer CD and Site License.** These courses and materials prepare candidates for the successful completion of the Part I and Part II ABHP Certification Examinations. Historically, our students have achieved passing rates that exceed the average exam passing rates. The Part I Course has been granted 32 CECs (2007-00-001), and the Part II Course has been granted 32 CECs (2007-00-002). The instructor, Dr. Bevelacqua, was an ABHP Part II Panel member, vice-chairman, and chairman. His experience gained in developing the certification examination and knowledge of candidate weaknesses have strengthened the content of these courses and supporting materials. Examination strategies and techniques for successfully passing the examination are emphasized. **Courses:** The Part I and Part II Courses are intense, with lectures followed by problem sessions. A mathematical review is included with each course. About 60 percent of the course for Part II and 30 percent for Part I is devoted to problem solving, with instructor critique and guidance provided to each student. The Part I (II) Course materials include the Part I (II) Self-Study Course materials. Class times are 0815-1700 each day. The Part I Self-Study Course contains 1,600+ problems with solutions, the textbook *Basic Health Physics* (First Edition), detailed course notes, and examination preparation materials. The Part II Self-Study Course includes the textbook *Contemporary Health Physics* (First Edition), 16 Part II examinations with solutions, detailed lecture notes, and examination preparation materials. Both course materials include a summary of recent (1997 to present) NCRP Reports. **Supporting Materials:** In addition to the materials used in the Part I and Part II Courses, supporting materials are available to assist a student's certification preparation: (i) A Background Materials Review (BMR) of basic mathematics, physical science, and operational health physics is available to assist students with weaknesses in these areas. The BMR includes 700 questions and solutions and the textbook *Basic Health Physics*. (ii) The Part I Additional Question-and-Answer Volume contains 440 Part I Questions and Answers, 200 background material questions with solutions, and *Basic Health Physics*. (iii) The Part I CD contains 1,500+ problems with solutions, examination strategy recommendations, and *Basic Health Physics*. (iv) The NRRPT CD contains 1,500+ problems with solutions, examination strategy recommendations, and *Basic Health Physics*.

**EXAM DATE: 28 June 2010**

**FOREIGN STUDENT ADVISORY:** The course language is English. Translation services are not provided.

**DATES: PART I COURSE (19-23 April 2010)**

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**FEE:** \$2,700.00 (Part I Course); \$2,700.00 (Part II Course) \$1,999.00 (each self-study course)—Includes domestic shipping and handling

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**DATES: 12-16 April 2010 (Acton)**

26-30 April 2010 (Las Vegas)

17-21 May 2010 (Gaithersburg)

7-11 June 2010 (Las Vegas)

21-25 June 2010 (Gaithersburg)

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or the NRRPT Certification Exam will benefit from this course. Preparation and study prior to the course is recommended but not required. Tuition assistance is available for students who are not sponsored by their employers. Please contact our course registrar for details.

**DATES:** 24-28 May 2010 (Gaithersburg)

**FEE:** \$1,895.00 (includes all materials, continental breakfast, and lunches)

**PLACE:** Gaithersburg, Maryland

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**FOXFIRE SCIENTIFIC, INC.,** 15201 Mason Drive, Suite 1000, PMB362, Cypress, TX 77433, 877-433-2029; Web site: <http://www.foxfirescientific.com>

**TITLE: Principles of Health Physics: Useful Theory to Practical Application.** Foxfire Scientific, Inc., is offering its annual "Principles of Health Physics: Useful Theory to Practical Application" four-week short course in Houston, Texas. This is the same short course previously offered at Texas A&M University and Baylor College of Medicine by Drs. Ian Hamilton and John Poston. The purpose of this course is to educate and train individuals in a wide range of applied health physics topics, including approximately 50 percent hands-on laboratory exercises. Course faculty and staff work to make the underlying principles of health physics and radiation protection engineering understandable to everyone. In fact, course participants have ranged from a former radiologic technologist, to an individual with a BA in arts and communications, to a PhD in nuclear engineering. All have remarked how surprised and pleased they were that everyone received a wealth of learning and information in the same classroom. "The instructors were learned enough in their profession to explain highly complex subject matter to not so highly-complex-minded individuals [Highest Recommendations]." Registration information along with this year's syllabus, faculty roster, and course agenda may be found at <http://www.foxfirescientific.com/news>.

**DATES:** 7 June-2 July 2010

**FEE:** 1-2 people: \$6,495.00 each

3-9 people: \$5,995.00 each

10+ people: \$5,495.00 each

**PLACE:** Houston, Texas

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**LASER-PROFESSIONALS INC.,** Attn: Yohanna Jones, PO Box 1080, Los Alamos, NM 87544; 888-795-2737 or 505-662-5782, Web site: <http://www.laser-professionals.com>; email: Yohanna@laser-professionals.com.

**TITLE: Laser Safety Officer (three days).** This newly updated course by experienced laser professionals meets the training needs of LSOs in universities and other large research organizations in a three-day course (Tuesday-Wednesday-Thursday). The first two days of this fast-paced, nonmathematical course meet all ANSI and OSHA training requirements for LSOs in most common industrial and research laser situations. Laser hazard analysis using *Easy Haz™ Industrial LSO* software is included. The focus is on making the LSO's job easier. Maximum practicality; *no math*. Some students choose to attend only these two days of basic LSO training. Our most popular option for LSOs at universities and other large research organizations is to add a third day to study more details of the ANSI standard, analysis of laser accidents in research, practical laser safety in research labs, and effective laser safety programs for research. *Easy Haz™ Advanced LSO* laser hazard analysis software is used in class to make hazard analysis easy and to serve as a training tool to aid understanding. All three-day LSO students get practice using it to solve their laser hazard analysis problems and a one-year license to the software. We save the math details until an optional fourth day (Friday) so those who don't want the math don't have to suffer through it. Friday also includes our CLSO practice exam and review for those seeking the CLSO certification. An introductory Basics of Laser Technology course is available preceding the LSO course (on Monday). We also provide on-site courses. Call us if you have questions. We will help you decide which course is best for you, and we'll never try to sell you more

than you need. **CE Points for three-day course:** 3 ABIH CM points, 32 AAHP CECs, 3 BLS CM points. (Dates below are for three-day LSO course.)

**DATES:** 27-29 April 2010 (Washington, DC)

8-10 June 2010 (Las Vegas)

2-6 August 2010 (San Diego)

14-16 September 2010 (Washington, DC)

9-11 November 2010 (Las Vegas)

**FEE:** \$1,250.00 (includes *Easy Haz™ Advanced LSO* software)

See our Web site for other options.

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**RADIATION SAFETY ASSOCIATES, INC.,** Attn: K. Paul Steinmeyer, 19 Pendleton Drive, PO Box 107, Hebron, CT 06248; 860-228-0487; fax: 860-228-4402; Web site: <http://www.radpro.com>; email: [info@radpro.com](mailto:info@radpro.com)

**TITLE: Radiation Safety Officer (five days).** RSA, Inc., recognized by government and industry as a leader in the education and training of radiological health and safety professionals since 1981, features trainers who are radiation protection professionals who serve a diverse clientele and share their experiences with students. Our course emphasizes implementing a safe, compliant licensed program and offers practical suggestions for meaningful radiation protection programs. Hundreds of students have taken this course since we first offered it in 1986. This course prepares you to be an effective RSO regardless of past experience. Class discussions include current U.S. regulatory structure, a review of basic theories/concepts/math, a description of types of radiation and how they interact with matter, personal dosimetry, radiation detection/measurement, exposure/contamination controls, survey requirements/methods, skin-dose calculations, understanding regulations/guidelines, licensing requirements, dealing with regulatory agencies/compliance issues, and emergency planning—ALL aspects of a radiation safety program (see outline posted at <http://www.radpro.com>). This course fully satisfies the 40-hour training requirement of the NRC and Agreement States for most RSOs. Classes are limited to 12 students—maximizing individual attention—at our licensed radiochemical laboratory and instrument calibration facility. Laboratory exercises and demonstrations reinforce technical lectures. No survey simulations here! You measure real radioactive samples and radiation levels in actual radiological areas, using the 50-plus instruments on-site. Training materials (unavailable from other sources) include a two-volume text written especially for this course, a scientific calculator, and a book containing all pertinent federal regulations and numerous Regulatory Guides and will be a practical reference and guidebook for the RSO in years to come. Some prior knowledge of algebra and science is helpful, but someone can complete the course with limited math and science experience. Beverages and lunches of your choice are provided at no extra charge.

**DATES:** 7-11 June 2010

**FEE:** \$1,395.00 (Includes all texts, materials, lunches of your choice, and beverages)

**PLACE:** Hebron, Connecticut

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**TITLE: Class 7 (Radioactive) DOT/IATA Training (one day).** RSA, Inc., recognized by government and industry as a leader in the education and training of radiological health and safety professionals since 1981, features trainers who are radiation protection professionals who serve a diverse clientele and share their experiences with students. Here is a **one-day training course** that focuses precisely on shipping the Class 7 Radioactive Materials that most people are interested in. The presentation is limited to Exempt Package Shipments; Excepted Packages Containing Limited Quantities, Instruments, and Articles; and Radioactive White I, Yellow II, and Yellow III shipments in both exclusive use and nonexclusive use vehicles. This is all that most licensees will ever need to ship. Packaging and shipping of SCO, LSA material, and Type B shipments are not covered. Students will participate in packaging and surveying actual radioactive material and will complete

documentation for several types of shipments. Each student receives a 75-page full-color training manual complete with references, pertinent regulations, explanatory text, illustrations, sample forms, and in-class exercises. A written objective exam is administered at the end of the course and a certificate of satisfactory completion is provided. Beverages and lunch of your choice are provided at no extra charge.

**DATES:** 10 May 2010

14 June 2010

**FEE:** \$345.00 (Includes text, materials, lunch of your choice, and beverages)

**PLACE:** Hebron, Connecticut

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**TITLE:** Health Physics Technician Level I, Basic (five days). RSA, Inc., recognized by government and industry as a leader in the education and training of radiological health and safety professionals since 1981, features trainers who are radiation protection professionals who serve a diverse clientele and share their experiences with students. Our course introduces the principles and practice of health physics and radiation protection. Hundreds of students have taken this course since we first offered it. This course is a must for those who have never worked in the nuclear industry or who have experience and now need theory and lab training for advancement, and it will provide you with the tools you need for full qualification as a health physics technician. (See outline posted at <http://www.radpro.com>.) Classes are limited to 12 students—maximizing individual attention—at our licensed radiochemical laboratory and instrument calibration facility. Laboratory exercises and demonstrations reinforce technical lectures. No survey simulations here! You measure real radioactive samples and radiation levels in actual radiological areas, using the 50-plus instruments on-site. Training materials (unavailable from other sources) include a text written especially for this course and a scientific calculator. Some prior knowledge of algebra and science is helpful, but the course can be completed by someone with limited math and science experience. Beverages and lunches are provided at no extra charge.

**DATES:** 3-7 May 2010

**FEE:** \$1,395.00 (Includes all texts, materials, lunches of your choice, and beverages)

**PLACE:** Hebron, Connecticut

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**TITLE:** Respiratory Protection at Nuclear Facilities (three days). First presented in 1983, this course has been completely revised, based on the 1999 changes to Subpart H of 10 CFR 20 and Revision 1 to Regulatory Guide 8.15. This is the only course available taught by the health physicist who assisted with the development of these documents. It includes discussions of both regulatory compliance and strategies for developing and implementing effective programs. Emphasis is given to establishing one respirator program that meets the requirements of both OSHA and NRC. Time is available for solving problems posed by students. (See outline posted at <http://www.radpro.com>.) RSA, Inc., has been recognized by government and industry as a leader in the education and training of radiological health and safety professionals since 1981. Classes are limited to 12 students—maximizing individual attention—at our licensed facility. Copies of all pertinent documents will be supplied to all students. Beverages and lunches are provided at no extra charge.

**DATES:** 17-19 May 2010

4-6 October 2010

**FEE:** \$895.00 (Includes all texts, materials, lunches of your choice, and beverages)

**PLACE:** Hebron, Connecticut

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**REED COLLEGE RESEARCH REACTOR**, Chemistry 102, 3203 Southeast Woodstock Blvd., Portland, OR 97202-8199; 503-777-7222; fax: 503-777-7274; email: [reactor@reed.edu](mailto:reactor@reed.edu); <http://reactor.reed.edu/rso.html>

**TITLE:** Radiation Safety Officer Class (five days). This course is designed to provide RSOs and assistant RSOs with an introduc-

tion to the practice of health physics. While regulation and documentation will be covered, the emphasis will be on the practical skills necessary to perform the duties of RSO. Topics will include radioactivity and decay calculations, radiation and interaction with matter, biological effects; personal dosimetry; instrument selection, use, and calibration; laboratory instrumentation; radioisotope counting and analysis; facility design and use; radioactive waste management; transportation overview; and emergency planning. Scientific calculators will be provided and a math review is included. The Chart of the Nuclides will be provided and used in the class (and the final exam). The facility includes an operating TRIGA® Nuclear Reactor and a licensed instrument calibration facility that will provide the basis for some of the laboratory exercises. The course concludes with a final exam and certificate. Three hours of college credit is available through Concordia University in Portland for an additional \$250.

**DATES:** 15-19 June 2009

**FEE:** \$1,400.00 (includes all course material)

**PLACE:** Portland, Oregon

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**SPACE COAST HEALTH PHYSICS SERVICES, LLC**, PO Box 67, Flagler Beach, FL 32136; 386-283-1906

**TITLE:** Health Physics Concepts. This three-day introductory course is designed for health physicists, Radiation Safety Officers, industrial radiographers, radioactive material licensees, and statutory authority personnel. The course includes the following topics: radiation fundamentals— isotopes, radiation types, half-life, background radiation, absorbed dose and dose equivalent (SI and special units), secular and transient equilibrium; biological effects—stochastic and deterministic effects, acute radiation syndrome, LD 50/60; regulations—occupational dose limits TEDE, TODE, posting requirements; radiation control—ALARA, dose rate factors, inverse square calculations, shielding, contamination control; instrumentation—instrument types including GM, ionization chambers, and scintillation detectors, instrument selection considerations and regulatory requirements; dosimetry—external, internal, ALI, DAC, IRF; applications—license types, isotopic applications in industrial and medicine, industrial radiography, irradiator facilities, reactor types, activation and fission products; emergencies—IAEA emergency category designations, National Source Track System, radiological emergencies.

**DATES:** 6-8 April 2010

6-8 July 2010

**FEE:** \$895.00 (includes course materials and presentation)

**PLACE:** Marriott Residence Inn

1725 Richard Petty Blvd

Daytona Beach, FL 32114

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**TECHNICAL MANAGEMENT SERVICES, INC.**, Attn: Robin Rivard, PO Box 226, New Hartford, CT 06057; 860-738-2440; fax: 860-738-9322; email: [info@tmscourses.com](mailto:info@tmscourses.com). For other course listings please visit our Web site: [www.tmscourses.com](http://www.tmscourses.com).

**TITLE:** Gamma Spectroscopy Applications. This five-day course is designed to remove the “black-box” approach to gamma spectroscopy results (i.e., put the sample on the detector, push the button, read the printed report, accept the results). It will provide a solid basis in the fundamentals of gamma spectroscopy while focusing on the areas that permit the operator to prepare a representative sample, optimize system parameters, and understand the effects of cascade summing, interference peaks, geometry, and libraries parameters. Class exercises guide the student through the interpretation of results with consideration of peak fit, source term, and process knowledge of the sample. Laboratory QA and good practices are also discussed. Time permitting, students will be introduced to the concepts and benefits of modeled geometries and in situ measurements. This course will also provide an overview of the hardware and techniques employed in gamma-ray spectroscopy and provide an understanding of the fundamental physical processes underlying their application. The course will review basic radioactive decay theory and interaction of radiation with matter to explain spectral

features and their interpretation, including peak identification and energy determination, backscatter peaks, single and double escape peaks, and proper use of control charts. This course is designed to provide a practical introduction to gamma spectroscopy for those new to the field of gamma spectroscopy, but also provide practical applications to those who are currently performing gamma spectroscopy. The course is intended for radiochemists, technicians, and others who will be doing routine and specialized gamma spectroscopy, as well as quality-assurance officers and data validators who may have a need to understand gamma spectroscopy measurements.

**DATES: 3-5 May 2010**

**FEE: \$1,395.00**

**PLACE: Baltimore, Maryland**

**TITLE: Neutron Detection and Measurement.** Since neutrons are primarily detected based on photons and charged particles produced by neutron interactions, a neutron detection course should cover the fundamental concepts of neutron interactions as well as those of gammas and charged particles. In addition to interactions, the course will cover all methods of neutron detection, methods for determination of neutron energy, basic concepts of radiation counting statistics, principles and operation of common neutron detectors; specialized neutron detectors, and neutron dosimetry and dosimeters. The course stresses the development of a basic understanding of the principles of operation of neutron detectors and dosimeters and helps develop an ability to intercompare and select instrumentation best suited for different applications. It will provide an opportunity for those new to the field to gain a broad perspective of measurement options, and for practitioners to refresh their knowledge in areas outside their own specialties.

**DATES: 7-11 June 2010**

**FEE: \$1,395.00**

**PLACE: San Francisco, California**

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#### Health Physics News Contributions and Deadline

Almost everything the Managing Editor receives by 20 April will be printed in the June issue.

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Article II, Section I, of the Bylaws of the Health Physics Society declares: "The Society is a professional organization dedicated to the development, dissemination, and application of both the scientific knowledge of, and the practical means for, radiation safety. The objective of the Society is the protection of people and the environment from unnecessary exposure to radiation. The Society is thus concerned with understanding, evaluating, and controlling the risks from radiation exposure relative to the benefits derived." *Health Physics News* is intended as a medium for the exchange of information between members. *Health Physics News* is published monthly and is distributed to the members of the Society as a benefit of membership. Subscriptions for nonmembers are available. Libraries, institutions, commercial firms, government agencies, and any person not eligible for membership may obtain a subscription. A small inventory of recent back issues is maintained by the Society at the Office of the Executive Secretary to supply copies to new members not yet on the mailing list. Inquiries about back copies and about subscriptions should be directed to the HPS Secretariat.

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If you do not use the Internet make your changes through the HPS Secretariat.

Please make any changes or corrections **BESIDE YOUR MAILING LABEL** (on the reverse side of this notice).

If you have any change in your phone number, fax number, or email address, please note it near the label.

## Odds and Ends from the Historical Archives

*Paul Frame*

### "Authentic" Atomic Bomb Test Goggles

**T**hese goggles were sold by the National Museum of Nuclear Science and History (formerly the National Atomic Museum) in Albuquerque, New Mexico. The plaque has a photograph of civilian "VIPs" in beach chairs at the officers' club on Parry Island observing Test Dog, the first of the atomic tests comprising Operation



Greenhouse. It is a neat photo, and that's probably why it was used on the plaque. However, it is unlikely that these goggles can be traced to any specific atomic test.

A strip of cloth tape across the top of the goggles has the name "RAMSAY" on it. As such, it is possible that these goggles were used by Norman F. Ramsey. Ramsey served as a group leader at Los Alamos during WWII and won the Nobel Prize in physics in 1989. 

# Upcoming Events

2010 Summer PDS

"Internal Dosimetry"

<http://hps.org/meetings/meeting29.html>

23-26 June 2010

Idaho State University

Pocatello, Idaho

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55<sup>th</sup> Annual Meeting of the HPS

27 June-1 July 2010

Salt Lake City, Utah

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HPS Midyear Topical Meeting

"Radiation Measurements"

6-9 February 2011

Charleston, South Carolina

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56<sup>th</sup> Annual Meeting of the HPS

12-16 June 2011

Palm Beach, Florida

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NCRP 2011 Annual Meeting

<http://www.ncrponline.org/>

"Scientific and Policy Challenges of  
Particle Radiations in Medical  
Therapy and Space Missions"

7-8 March 2011

Bethesda, Maryland

HPS Web Site: <http://www.hps.org>