Health Physics News

Volume XXXIII Number 8 For Specialists in Radiation Safety August 2005

The Official Newsletter of the Health Physics Society

In This Issue

The Birth of the HPS: A Look Back

A Journal Is Born

Mary Walchuk

May the pages of this journal help us and our associates to understand how much radiation exposure is permissible and guide us in the best means of measuring and controlling it to the greatest good of mankind.

—K.Z. Morgan in the first issue of *Health Physics*, June 1958

Health Physics, the official journal of the Health Physics Society (HPS), was unanimously voted into existence at the June 1957 HPS meeting at the University of Pittsburgh and the first issue was published in June 1958. HPS Past President John Auxier was involved, along with Karl "K.Z." Morgan and Walter Snyder, in the birth of *Health Physics* and was an editor from 1958 to 1977. Auxier shares his memories of that exciting time in the early history of the Society.

John Auxier

Who came up with the idea to start an official journal for the HPS?

Auxier: We will never know who had the earliest idea about the need for a journal for the health physics profession. Elda Anderson was the secretary of the HPS at the time and was the chair of the ORNL [Oak Ridge National Laboratory] Health Physics Division's Publications Committee. She had been troubled by the fact that the papers published in the proceedings of the Health Physics Society's 1956 meeting in Ann Arbor did not carry the mantle of "peer-reviewed." Of course, not all of the papers were of a "peer-review" caliber, but she did hope that the authors would improve with time and experience. Therefore, if one person were to be credited with the original push for an HPS journal, it should be Elda Anderson. She saw the need as early as 1956.

How did you become involved?

Auxier: Elda Anderson was my mentor, and I generally did her bidding. She proposed to the Board of Directors that we needed an official journal and convinced the Board to establish a committee to explore the need. I chaired a small committee which, during the latter part of 1956, contacted a large number of health physicists, chiefly at national laboratories and universities. The applied health physicists

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were only mildly in favor of the idea, but the research staff members around the country (and in Canada) were highly enthusiastic about the prospects of a journal. We recommended that the journal be established, and Elda and Karl got the Board's concurrence to further develop the idea and flesh out the details, including recommendations for an editorial staff.

How were the original three editors chosen?

Auxier: Elda again asked me to do the exploratory work, and I talked to many active authors, including Wright Langham at LASL [Los Alamos Scientific Laboratory]. The general consensus was that, due to the number of publications from ORNL and the desirability of having an adequate support staff available, ORNL should be the initial home for the Journal. Jim Hart, Walter Snyder, and I talked it over and decided that Elda was the ideal person to be the editor. However, with her commitment to teaching and her other duties, she made a counter suggestion. Pointing out that Karl Morgan was far more visible in the profession than she was, a questionable view at the time, and that his prestige would benefit the inception of a new journal, she suggested Karl. She also suggested, very discreetly, that he was spending most of his work time fighting the medical profession about what he called "unnecessary medical exposure"; being the editor might divert some of his energies to the Journal. At this time, Karl was becoming highly visible about the medical profession in general and radiologists in particular. Elda, Jim, Walter, and I approached Karl with the idea of his becoming the editor. He thought that it was a great idea, but he proposed that Walter and I would be editors and could do most of the work, with Karl as the editor-in-chief. Elda took this idea to the Board of Directors and got it approved. She also got everyone's concurrence that her secretary, Natalie Tarr, serve as the secretary to the Journal staff.

Karl Morgan and Walter Snyder

What were the roles of the Journal staff at the beginning?

Auxier: Karl was the editor-in-chief, Walter Snyder and I were the editors, and Natalie Tarr was the secretary. Between us, Walter and I read every manuscript submitted for publication and chose two peers in the subject area to review it for acceptance or rejection. Natalie handled the production of the paperwork and helped ease the pain of rejection for those folks whose manuscripts were not suitable for the Journal.

Were the articles in the first Journal all papers from the annual meeting in Pittsburgh?

Auxier: No. We suggested that presenters of papers at the annual meetings submit their work for review for the Journal, but there was never enough good material from the meetings to serve our needs. Applied health physicists were always reluctant to submit their work because they felt that too much of it was "old hat."

What was the process involved for someone to get an article accepted for the Journal?

Auxier: The initial process has been kept in use from the beginning, though there are more editors involved now than there were initially.

An author sent his/her manuscript to the *Health Physics* Journal office, that is, Natalie's desk. She logged it into the system and forwarded it to either Walter or me. Those papers dealing with "internal dose" or dose standards generally went to Walter and the remainder to me. Sometimes we would both consider a paper when the initial receiver wanted additional input. We each read the papers sent to us and did one of two things. The first thing was to decide if the subject matter was applicable to the field of health physics and sufficiently well written to be understood. If it were applicable to the field and presentable, the second action was to choose at least two respected experts in the subject matter of the paper and then to get their agreement, by telephone, to act as reviewers. The manuscript was then sent to these two reviewers for their review and comment; the form used was similar to that used today, though much simpler.

After the reviewers' comments were received we generally sent the comments and suggestions to the author for any changes that were needed. For papers which the reviewers both felt were without sufficient merit, the polite rejection letter was sent with the returned manuscript. Where the two reviewers had different opinions, Walter and I would either pick a third reviewer or, if the paper was in a field in which we felt confident to act as a reviewer, one of us sometimes served as the third reviewer.

The manuscript was reviewed, changed as necessary, properly formatted, and sent to the publisher.

The papers went through two cycles of proof sheets before final approval to publish was given, generally by Natalie.

Approximately how many articles were submitted for the first several issues, and of those, what percentage was accepted/rejected?

Auxier: Thirteen papers were accepted for the first issue, with a small but unknown number rejected. We were especially concerned about quality and very careful to pick internationally known experts for reviewers. I was an author of one of these papers and it was handled, of course, by Walter. We did agree to make one exception about the author not knowing the reviewer, because I suggested to Walter that we use three reviewers for my paper and that one of them be L.H. Gray. I was honored when Walter told me that Dr. Gray had given the paper very high marks. I think that about 75 percent of the early papers were published, though some took several iterations with the author.

What happened between the time an article was accepted and when it got published?

Auxier: As soon as a paper was accepted and in clean copy it was sent to the publisher. It seemed to take a long time for the galley proof to be returned to us. It sometimes took a couple of months though we kept pushing them. Walter or I would go through the proofs to ascertain that no gross mistakes were made and send it to the author for detailed proofing. When the author returned the manuscript to us, Natalie forwarded it to the publisher again. In general it was only a few weeks before the page proofs came back. If the pages were correct, the publisher was directed to place the manuscript in the next available issue. Meanwhile, the author got the page proofs to make absolutely certain that they were correct. Probably once a year we had to send the publisher a follow-up to correct the page proofs before final printing.

How was the Journal paid for in the beginning?

Auxier: We had a contract with the publisher about costs and income. I believe it was negotiated by Jim Hart and Russ Cowing (first HPS executive secretary). The membership dues were increased to cover part of the costs, advertising was to be a profit, and, I believe, the Society was to cover any shortfalls. We certainly did not make much of a profit from the Journal until the Society hired Dick Burk as our executive secretary. One of Dick's first tasks was to renegotiate our contract with our publisher. We were immediately on the road to greater financial success. The Society's financial return from the Journal was dramatically improved.

Who were the first publisher and printer?

Auxier: Pergamon Press, Inc., handled both. Some of the work was in London, England, later in New York, but the actual printing was done in Northern Ireland.

How many people subscribed to the Journal?

Auxier: As I recall, all members of the Society were automatically subscribers. There was a rather high subscription cost for institutions and nonmembers, with a high percentage of subscribers being health physicists who later became members of IRPA [International Radiation Protection Association]. I believe that the number of Journals printed increased every year up through my service as editor; initially there were about 3,000 copies per issue.

How has the content of the Journal changed over the years?

Auxier: In principal, it has changed little, but shifting emphasis in the field has caused a redirection of the health physicist's activities. This changed emphasis is reflected in the content. In the earlier issues, the emphasis was on radiation detection and measurement, internal emitters and understanding their contribution to dose, radioactive waste disposal, and basic science related to the first three. There was little emphasis on standards and guides because they were not changing rapidly. Today, there is a great emphasis on exceedingly low levels of radionuclides in the environment, statistical methods, detailed regulations, and, one constant, radioactive waste disposal. There is also much discussion of LNT [linear no-threshold], a model chosen in the 1950s to be a convenient basis for standards setting, but which is now a subject of much debate.

What subjects that were covered in the beginning of the Journal are still being discussed in the Journal now?

Auxier: The disposal of radioactive materials and the long-term assumptions about the potential dose to the public represent major areas of present attention. There are still a few articles on basic science related to radiation protection.

In terms of your career, what were the pros and cons of Journal involvement?

Auxier: The major "pro" was that I was exceedingly well read on current activities in the profession.

The major "con" was that my own research went more slowly, though I did much of the Journal work after my family went to bed at night and very early on weekend mornings.

What were the highlights of being a Journal editor?

Auxier: As mentioned above, keeping up with the profession was one, and another was getting to know some of the most distinguished scientists in the world. Some of my favorite people with whom I spoke frequently were "Papa" Sievert, L.H. Gray, Robley (Bob) Evans, Wright Langham, and many others. Being close to and getting inspiration and guidance from Eugene Wigner and Alvin Weinberg were great bonuses.

What were the challenges?

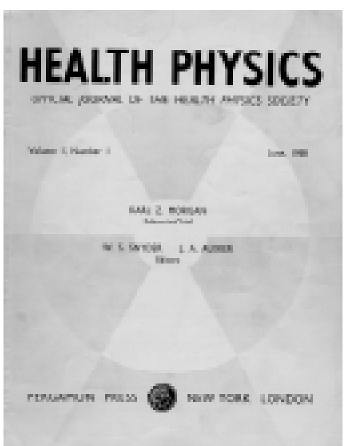
Auxier: The biggest challenge has always been getting really good papers for publication. The second was getting reviewers to review and comment on draft manuscripts within the allotted two weeks. A few great experts routinely took a lot more time and many phone calls. One of my true friends and a great scientist, Niel Wald, was my most interesting challenge, relative to this issue.

Is there anything else you would like to add about the beginnings of the Journal that would be of interest to *Health Physics News* readers?

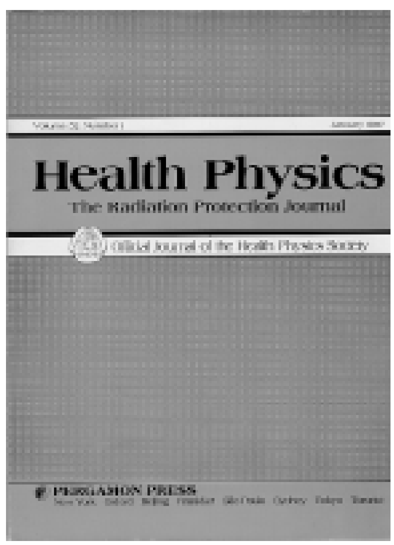
Wright Langham and John Auxier

Auxier: During the first few years we had lots of fun choosing styles, formats, colors, logos, etc. All of these have been changed over the years, but we had lots of control and enjoyed the acts of creativity. Actually, at this age, I still think that editing a major journal was fun, so that tells a lot about the job from my viewpoint. I am pleased with the way the Journal has changed and matured.

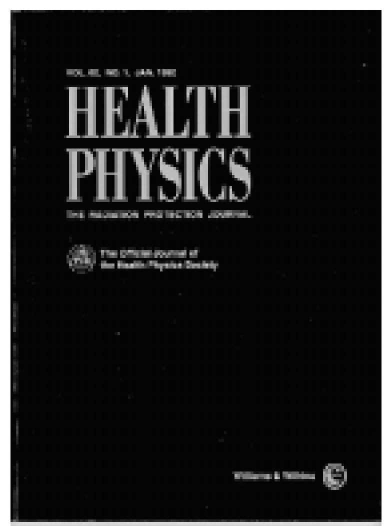
The Maturing Cover of the Journal



June 1958



January 1987



January 1992

In the January 1987 issue of *Health Physics*, Editor-in-Chief Genevieve Roessler explained in her editorial some of the changes made to the appearance of the Journal at that time. The size of the Journal was changed to conform to the standard dimensions of most other scientific journals, making it easier to obtain advertisements, a major source of Journal income. The cover reflected an updated design, taking advantage of modern graphic arts capabilities, and included the explanation for those outside the field that it is "The Radiation Protection Journal."

Editor-in-Chief Richard Vetter introduced more changes to the cover and inside format of *Health Physics* in January 1992. This newest design allows flexibility in printing photographs and figures on the cover to emphasize the inside content. The inside format changes also save space and allow for easier reading.

HEALTH PHYSICS VOL. 1 NO. 1 JUNE 1958
FOREWORD

This, the first issue of *Health Physics*, the journal of the Health Physics Society, marks the formal appearance of the field of Health Physics in the family of scientific disciplines. Like the Health Physics Society, this journal is intended to be international in scope and interest. In this nuclear age, hazards of ionizing radiation are increasing in giant steps, measured in orders of magnitude, and they are basically the same irrespective of the countries in which they occur. The genetic problems associated with occupational exposure to ionizing radiation are of international significance, and the river which flows from one country to the next, picking up radioactive contaminants along its course and discharging them into the area, recognises no national standards of radiation protection. Thus, no single national organization or national journal can truly represent or adequately serve the profession of Health Physics.

Some of the hazards of ionizing radiation were recognized only a few weeks after the discovery of X-rays and though we have been learning more about these hazards ever since, we still have far to go before we have a complete understanding of the mechanisms of radiation damage and of the full implications and consequences of somatic and genetic damage, either directly to man or indirectly through the ecology of his environment.

Radiologists and medical physicists, with the help and guidance of the International Commission on Radiological Protection and of the various national committees, have done a remarkable job of minimizing radiation hazards. With the exception of the unfortunate experience of the radium dial painting industry and of the early quasi-medical use of radium and X-rays, there have been very few cases of serious overexposure.

On December 2, 1942, the first nuclear reactor was operated at the University of Chicago, and at that time it was recognized that behind the concrete shield of a reactor is the equivalent of many thousand times the radiation from all the radium available in all the world. It was then that health physics had its start—at first only six health physicists at the University of Chicago, while today it is estimated there are over 2000 practicing health physicists in all parts of the world.

In June 1955 at the Ohio State University, the health physicists first organized, and in June 1956 at the University of Michigan the constitution and by-laws were adopted and the name “Health Physics Society” was selected. By the time the Society met in June 1957 at the University of Pittsburgh it had grown in membership to about 900, including an encouraging representation from many countries of the world. Those attending this meeting voted unanimously to publish a journal. It was agreed that rather than publish proceedings as was done following the meetings in Ohio and Michigan, a selection of papers from the Pittsburgh meeting would be published in the first few issues of the journal. This has been an invaluable source of material for the launching of the journal.

It will be the policy of this journal to accept for publication only those articles which deal with or relate to some aspect of Health Physics, which in turn is defined as a study and practice dealing with any and all factors relating to damage from ionizing radiation and the prevention of such damage. This may mean considerable overlap into the fields of physics, chemistry, biology, medicine, geology, etc., but in every case our objective will be to localize and concentrate in one journal papers relating to radiation protection. These papers will be of four general categories: (1) Research, (2) Engineering, (3) Applied and (4) General. The research papers will include original contributions from both theoretical and experimental research and will relate to such subjects as mechanisms of radiation damage, a determination of the parameters used in the calculation of dose or in the design of a dosimeter, radiobiological studies, ecological effects of radiation, etc. Engineering papers will relate to applied research such as radioactive waste disposal, instrument development, laundry decontamination studies, etc. Applied health physics papers will cover a wide range of interest and experience and will include such subjects as personnel monitoring, area monitoring, use of instruments, urine analysis for radioactive materials, radiation accidents, education and training in health physics, fall-out studies, etc. The “general” category is for a variety of papers on radiation protection; papers that do not fit into the first three classifications. For example, this might include papers on the history and philosophy of the national and international organizations for radiation protection, changes in maximum permissible levels of exposure, liability insurance against radiation hazards, etc. Survey papers which provide timely and authoritative summaries of areas of general interest in any of these categories will be welcomed. In addition to the regular papers, there will be a section of “notes” where short and/or preliminary communications will be published and where brief news items of general interest will appear.

We believe that the nuclear age is here to stay and that its future rests in large measure on the successful control of radiation exposure. *Health Physics* will attempt to uphold the high professional standards of the Health Physics Society and will do its utmost to disseminate knowledge in this field. A successful nuclear industry perhaps entails an increased exposure of mankind to ionizing radiation. We must understand the full and ultimate consequences of this exposure and limit it at a level where we, and those that come after us, can reap the maximum benefits of this new age. May the pages of this journal help us and our associates to understand how much radiation exposure is permissible and guide us in the best means of measuring and controlling it to the greatest good of mankind.

K.Z. Morgan

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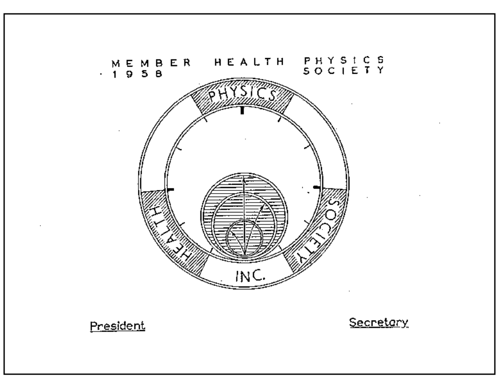
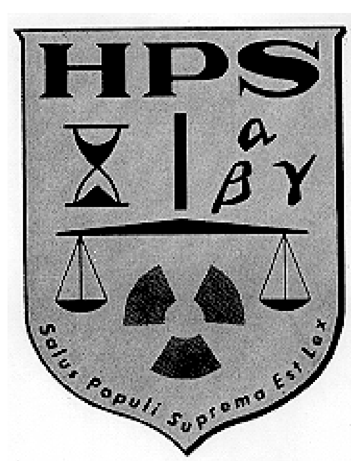
The Landauer company advertised in the first issue of *Health Physics* in June 1958 and has been supporting the Health Physics Society for 50 years. Landauer advertises in *Health Physics* and *Health Physics News*.

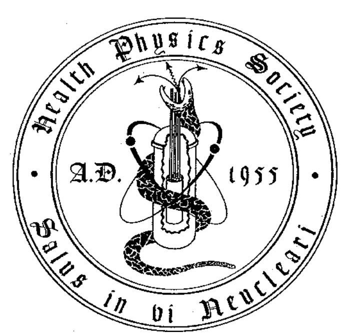
Suggested Insignias for the Health Physics Society

Reproduced from two letters to the editor in the June 1958 Journal



Submitted by Saul J. Harris





Submitted by Al Baietti

From the President

As you read this, my last message to you as president, the annual meeting of the Health Physics Society will be history. All indicators are that the Spokane meeting will be a successful kickoff to our year-long celebration of the 50th anniversary of our society. This is due to the efforts and involvement of many, including the members of the Columbia Chapter; the Secretariat; the Program, Continuing Education, History, Homeland Security, and Local Arrangements Committees; and all the members who attended.

As my year as president winds down, I have thought about where we have come from over the recent years and where we are today as a society. If there is one word to characterize us now, I think it would be . . . engaged. As much as I detest management-speak, this word seems best to describe the state of the Society. Very briefly, we are engaged in fruitful interactions with many federal agencies and members of Congress on issues relating to pending legislation and regulations that affect radiation safety. We are engaged in reviving support for education of new health physicists in the form of fellowships and scholarships and in developing strategies for reestablishing funding for radiation safety-related research. These efforts are aimed at mitigating the consequences of not having enough trained health physicists in the future. We are engaged in obtaining professional recognition of health physics and health physicists in selected states through collaborative efforts with the American Academy of Health Physics, the National Registry of Radiation Protection Technologists, and the American Industrial Hygiene Association. We are engaged at both the national and chapter levels in homeland security issues, which are very complex and involve working with many diverse groups and organizations. We are engaged in careful examination of Society governance, that is, how we are organized and function as a society and whether we are making the best use of our valuable resources. We are engaged increasingly with other societies and organizations, often taking the lead, to synergize our efforts toward common goals. And of course we are engaged in celebrating our 50th anniversary.

To accomplish what we do as a society requires the commitment and effort of many dedicated people. At the risk of forgetting and offending someone (for which I apologize in advance), I would like to acknowledge the contributions of colleagues who were particularly supportive during my term. First, the officers, who comprise the Executive Committee, and the Board of Directors. All have performed admirably in their respective duties and have worked together as a team to move us forward. This was exemplified recently by the Board's dealing with the report from the ad hoc committee on Society restructuring, originally appointed by Ken Kase and effectively chaired by Brian Dodd. The report was discussed in detail and approved at the midyear meeting in February 2005 in New Orleans. This blueprint for managing the Society based on our strategic plan is a logical application of a well-conceived plan. We should expect to see some significant improvements in Society governance once the dust settles.

Much of my personal involvement during the past year has been with federal agencies and staffs of members of Congress. I think we have done well this year, with many legislative and regulatory irons in the fire. The credit for our evolving success and growth must go to the people who have done the heavy work this year, that is, our Congressional and Federal Agency Liaison, Keith Dinger; David Connolly from our governmental relations firm, Capitol Associates; and in particular, Scott Kirk, chair of the Legislation and Regulations Committee and his committee members. Echoing the comments of John Frazier and Ken Kase, Keith's contributions have been invaluable. I can't imagine a better corporate memory on what the Society has done over the years than Keith's. His attention to detail is truly impressive and essential for success in the Washington environment. Plus, his is the face that congressional staff remember, as he is there year after year, and personal relationships are the name of the game on the Hill. Ask David Connolly. David's experience with Congress has also been very important to us in opening new doors, keeping old ones open, and meeting the right people. My particular gratitude goes to Scott and his committee. Over and over, the Society was given opportunities to submit testimony, draft model legislation, contribute to regulation language, and respond to requests from agencies such as the Government Accountability Office. Scott's efforts were not only timely, but the draft materials were always well thought out and written and have been well received. I attribute our recent progress to the team's efforts and wish them continued success. Additionally, Ralph Andersen represented me and the Society on many occasions during the year in important meetings with the Department of Homeland Security and Department of State, as well as other consensus groups. The Society's presence in Washington is enviable, but we have earned it.

I think we all recognize the important contributions the Secretariat makes to the efficient day-to-day management of the activities of the Society. Its presence at all our well-run meetings is obvious, as is its handling of Society correspondence, dues, finances, publications such as the membership handbook, and a host of other behind-the-scenes contributions. It is worth emphasizing that the work of the Secretariat continues to be an important reason why the Society is in sound fiscal shape now. The ability to write contracts that are advantageous to us and helping to develop sound investment strategies are skills that Burk and Associates have long brought to the table. We as a Society benefit greatly. In fact, our ability to consider new programs that cost money is only possible because we are in good fiscal shape. I am personally indebted to our Secretariat Czar, Dick Burk (actually Executive Secretary), for his continuous support during the year. My weekly phone discussions with Dick were essential for moving activities forward and keeping items from falling into cracks. Left to my own, there probably would be cracks filled with forgotten items.

This presidential year has been professionally and personally challenging, invigorating, and satisfying. I am truly indebted to all of our members who have been willing to help when asked, volunteer when not asked, work hard, offer suggestions and criticisms along the way, and gave me a few attaboys too. I hope that you share my view that the Society is moving in a positive direction and will continue to do so.

By now, Ruth McBurney will be your new president. I wish her the best of success in the coming year and offer her my help as she sees fit. Please do the same, and we will continue to have an impact on our profession, our members, and those with whom we interact.

Thank you for allowing me to serve as your president this year.

Raymond A. Guilmette

Correspondence

More Memories of Brucer

Roger Cloutier, CHP
Oak Ridge, Tennessee

Mary Walchuk's cover story in the July *Health Physics News*, "Through the Eyes of J. Newell Stannard," brought back many memories. I would like to expand a little on Newell's comments on Marshall Brucer, who was a medical doctor with an interest in everything.

While in the Air Force during WWII, Brucer volunteered to experience firsthand what happens to individuals when a pressurized airplane suddenly loses pressure. In 1949, he became the first director of the Research Hospital at the Oak Ridge Institute for Nuclear Studies (later renamed Oak Ridge Associated Universities). His staff sought new medical uses for the diagnostic and therapeutic uses of radionuclides. He also helped pioneer several new diagnostic techniques and the development of ^{60}Co teletherapy. Physicians from throughout the world came to the hospital for training in the newly developing field of nuclear medicine.

Brucer helped establish the Society of Nuclear Medicine and was its first president. Because the measurement of radioiodine uptake in thyroids in the 1950s was an unsophisticated technique, Brucer and his staff developed a mock iodine mixture of radionuclides that was placed in half-torso manikins which helped standardize uptake measurements worldwide. Brucer loved to bring order out of disorder. He also possessed a sarcastic wit that he used in the hundreds of Vignettes published by the Mallinckrodt Company. One Vignette title was "The Maximum Ridiculous Dose." Brucer often poked fun at health physics, but in practice he toed the line. Multiple sclerosis forced him to retire from Oak Ridge but not from work. He moved to Arizona and joined the staff of the University Hospital where he continued to provide assistance long after most of us retire.

Editor's Note: We appreciate Roger's additional memories about Dr. Marshall Brucer. Other *Health Physics News* readers may wish to join us in our "Look Back in Time" articles with their memories of the Society, the profession, and/or the people. Send contributions to hpsnews@frontiernet.net.

Source Constraints: Failed Logic

Robert L. Dixon
Winston-Salem, North Carolina

I am pleased that Dr. Osborne has chosen to engage in defending the ICRP (International Commission on Radiological Protection) methodology of source constraints (*Health Physics News*, June 2005, p 12), which can be "boiled down" to two simple rules for the public:

Rule One: Public dose limit = 1 mSv/yr

Rule Two: Now divide Rule One by 3.

The stated rationale for source constraints is that a member of the public might be exposed to several (say three) man-made sources. This seems eminently plausible when stated in such general terms; however, it does not survive closer scrutiny. The "divide by three" logic is as faulty as that in my parody reducing the speed limit by one-half for drivers owning two automobiles.

With two opposing theories, as physicists, we should proceed to experimental verification. Unfortunately, the public dose limit is set down in the ambient background noise. We can, however, adopt the time-honored "Gedanken Experiment" used by Einstein and Bohr.

The following conditions apply and act to naturally constrain the dose: most "man-made" radiation sources (or source groups) under a single control are highly localized in space and time—of limited range and mostly "turned off" (or inaccessible) at night, that is "overlapping." Suppose that all of these sources have been "shielded" to 1 mSv y^{-1} at their closest publicly accessible boundary. If a member of the public devoted his entire lifetime deliberately moving from one of these sources to the next, he would still receive only 1 mSv y^{-1} since he cannot be in two places at once (most people only rarely encounter *any* of these sources).

Only the small subset of the general public who *regularly* occupy areas immediately adjacent to the source-boundary, such as employees of an adjacent facility, have any significant potential for exposure.

Suppose that Jane Doe, a stockbroker, works in an office beside a medical clinic having an x-ray unit (realistically) shielded to 1 mSv y^{-1}. Where can she go after work *on a regular enough basis* to acquire any additional dose which is significant compared to 1 mSv y^{-1}? The probability that her living quarters are beside yet another source is very small, much less a source operated after normal working hours. If she has a second job, it is equally unlikely that it is beside a source which is active after normal hours (she's not a radiation worker). Considering her current 1 mSv y^{-1} exposure, how long will she work in that office, and how long will the x-ray room remain beside it? The median tenure in a job in the United States is 3.7 y, and there is little chance her future employment will place her next to any other sources, hence her average lifetime exposure will be well below 1 mSv y^{-1}.

NCRP #95 ("Exposure of the US Population from Consumer Products and Miscellaneous Sources") does not list any likely sources above 0.07 mSv y^{-1}. The ICRP itself in **ICRP-60** seems to have agreed with me: *"(188) Concerning the possibility of cumulative public exposures from multiple 'other sources': the ICRP 'does not believe that this occurs to a significant extent.'"*

Osborne Responds to Dixon

Richard Osborne
Deep River
Ontario, Canada

A key point is that exposure pathways are not mutually exclusive. Also, occupancy times are taken into account in estimating doses to members of a critical group. The speed-limit analogy is not really appropriate. In principle a person could be a member of the critical group for a facility such as the medical clinic mentioned by Dr. Dixon and could also be fond of fish which happen to be the critical pathway for radionuclides in the effluent from a nearby nuclear facility, and could also live downwind of a radioisotope processing facility for which the critical pathway is gaseous releases to the atmosphere. All these exposures can be contemporaneous. In setting release limits for any given facility the regulator has to judge to what extent adjustment needs to be made for such possible overlapping exposures. In practice, there may not be any appreciable overlap, as I noted in my previous response, and release limits placed on the facility in question could be based on a dose to the critical group that is numerically equal to the individual dose limit. I don't see anything sacrosanct about the "Rule Two" as Dr. Dixon terms the default dose constraint; whatever constraint is applied should be right for the circumstances. In this sense, I think we agree.

What is the Right Model?

Laurence F. Friedman, PhD, CHP
Chicago, Illinois

Richard Osborne must have misunderstood what I meant by the *null hypothesis (Health Physics News*, June 2005, p 12*)*. I was referring to the fact that individuals who suffer radiation exposure who do not die of radiation effects inevitably die of something else. I thought that was clear in my reference to human mortality.

My point is that the question ought not to be whether or not there is an effect. Osborne is correct in saying that we can't know that. The question ought to be whether the effect is large enough to perturb the inevitable outcome, for example, will the exposed person die a lot sooner? It is not worth the kind of money we spend on environmental restoration simply to have the deaths (in the same time frame) attributed to some other cause.

Put another way, our model should not be one of absolute risk from a single insult. Our model should be one of competing causes of death. Based on a competition model all we need to do to achieve "safety" is take our particular insult out of the running. I have sometimes quipped that we can reduce cancer mortality by raising the speed limit, what we might call the Pierre Curie system of cancer prophylaxis.

Editor's Note: Dr. Osborne touches on the point that Dr. Friedman is making in his Guest Editorial in this newsletter. See page 11.

Inside the Beltway

David Connolly
Washington Representative
Capitol Associates, Inc.

Oftentimes workers in a particular occupation start each working day by performing the same tasks as a necessary part of the job. Whether it is checking the instruments of a machine, checking the arrests made the previous night, or reviewing the activities of the President and Congress, the start of a successful day requires repetition of particular acts. In my house, we call this "doing your due diligence." Increasingly, the performance of due diligence on behalf of the Society reveals that energy policy and nuclear issues are constituting a larger part of the Washington political agenda than has occurred in the past few years. Starting early in the year and continuing throughout, both the Congress and the White House are spending significant periods of time on issues associated with radiation safety. Be it the Energy Policy Act of 2005, homeland security, or medical research, radiation is capturing the attention of the nation's capitol.

In the middle of June, the Senate took up its version of the Energy Bill, which serves as the template for federal energy policy in this country (the House of Representatives had passed its version of the bill in April). As we stated in a previous column, the onset of $2+ per gallon at the gas pump has not only spurred the need for the passage of this particular legislation, but also rekindled the debate as to the type and need of future energy sources for the country, with particular attention to nuclear power. During the third week of June, the President went to a site of a proposed nuclear power plant and not only urged that it be built, but also advocated that others like it would be built throughout the country in the near future.

Interestingly, for the first time in years, environmental interest groups are starting dialogues with parts of the nuclear industry to see if there is common ground that they can both agree upon as to the expansion of nuclear power in this country. Despite the controversy you may have read about in the newspapers surrounding Members of Congress traveling abroad, a congressional delegation recently came back from France deeply impressed with that country's program for recycling spent nuclear fuel rods. An almost unanimous question from this group of legislators was "Why can't we do that in this country?"

Notwithstanding this increased governmental attention, controversies abound on the complex issues dealing with radioactive matter. Many legislators still have deep reservations not only about the future use of nuclear power, but about its present use as well. Other Members question the wisdom of our national policy on the disposal of radioactive waste, particularly Yucca Mountain. Finally, homeland security concerns are shared by Members of both parties. For instance, the question of medical isotope enrichment has become controversial due to the fear that this material might be made available to terrorist organizations.

As the debates on these issues and their ramifications continue and in some cases "heat up," HPS has established its position and continues to be a resource for Congress as a repository of expert scientific knowledge on radiation. Consequently, the Congress is regularly soliciting the Society's views on these issues and will continue to do so in the near future.

Threshold or No Threshold?

Richard V. Osborne

Recent correspondents have discussed what we mean when we say that we believe low doses of radiation are safe. Making decisions like this for our own safety is one thing; making risk-based regulatory decisions is something else.

Given the knowledge that increased frequencies of cancers are observed in exposed populations once individual doses are high enough, somehow, we have to implement controls on practices or in circumstances when radiation exposure of the public is possible. To assess the significance of a radiation dose we need to make some assumption about the relationship between dose and effect on health. The model widely used is the linear no-threshold model (LNT) and this continues to be recommended by the International Commission on Radiological Protection (ICRP). It follows that any given incremental dose can be considered independently of other doses—something that would not be easy with any other model, for example, one with a threshold or with a non-linear response relationship. Indeed, it is a practical model; one where the greater any particular incremental dose, the more attention is paid to it. Our model, though, presents us with hypothetical incremental risk at any incremental dose, however small. If we apply the LNT model logically and consider collective dose as well as individual doses in estimating, for example, the consequences of a release of long-lived radionuclides to the environment, we can end up with an estimated finite number of hypothetical additional cancer deaths, ostensibly predicted by summing millions of tiny individual doses. Authorities, including the ICRP, and many individuals assert that such predictions from the aggregation of small doses are not sensible. The ICRP goes further and recommends that collective dose estimates should be "disaggregated," a given collective dose comprising the higher individual doses being given greater weight in protection decisions than one with the same numerical value but with lower individual doses. Though this may have some appeal, it is without logical foundation if one is adhering to the LNT model.

Although in its recent draft recommendations the ICRP downplays the role of collective dose considerations (protection of individuals has primacy over the utilitarian principle), it is not easy to sweep away the implications of collective dose if one follows the LNT model. However, this agonizing over collective dose is in the context of risk from radiation carcinogenesis. The discussions may be missing a broader context.

We really don't know what might be the actual effects on health of a few micrograys or even a few milligrays of radiation dose added to our normal annual radiation doses. It is a reasonable conclusion that the carcinogenic effects of radiation, observed to increase in likelihood with dose for doses above 50 mGy, do not just drop to zero at all lower doses. In this sense, for radiation protection purposes, LNT is a reasonable model for the detriment to health from radiation-induced cancers. Arguments, on these pages and elsewhere, for a dose threshold (or even a hormetic effect) in radiation carcinogenesis have not been persuasive.

Each radiation event in the body is physically damaging, but the ultimate consequence of any particular initial ionization damage depends on many variables and their interactions. Although one radiation event can leave a residue of genomic damage that is a step along a path to malignancy, there can be stimulatory influences on cells and tissues; an adaptive response, for example. Single radiation events seem sufficient to trigger such multicellular reactions, higher acute doses being no more effective. The influence of these latter effects is already implicitly included in our model of radiation carcinogenesis, based as it is on epidemiological studies, but their other consequences for health are not explicitly or implicitly included in the protection model. There is good reason for this. Although such phenomena are clearly demonstrable experimentally and mechanisms are starting to be understood, the conditions under which they occur, and to what extent, are not well defined. Nevertheless, it is conceivable that there may well be stimulatory, positive effects on health from submilligray doses as well as the negative carcinogenic effects. For small increments in dose above natural background, the net detriment, which is certainly small, may then be zero or even slightly negative (that is, an improvement in overall well-being) if what we call detriment includes all effects on health. Clearly, in this "trans-science" region such views have to be speculative. It follows that, if one were to take as a protection criterion a broad measure of impact on health (such as "years of life lost") reflecting both negative and positive impacts on health, there may be an effective threshold in dose below which the value of the measure is zero or less. Note that, with this model, the incremental cancer risk is not necessarily zero below the threshold—the LNT model can still apply to radiation-induced cancer.

We are left with many questions. Do stimulatory effects on cells from incremental small doses of radiation actually affect the health of exposed individuals? At what dose and dose-rate combination does the risk of radiogenic cancer start to outweigh the contribution of any stimulatory effects to overall health outcome? In other words, what magnitude might an effective threshold for net detrimental effects be—and how does it relate to natural background? What time patterns of radiation events are effective? (Suppose someone's just had a hefty medical diagnostic dose of radiation . . .) We don't have the evidence yet to be able to give answers; we have mainly just descriptions of phenomena. We need quantitative insights applicable to protection—a challenge to experimentalists and epidemiologists. Explorations along these lines, with the applied aim of defining a more general model for protection, may be more productive than those focusing just on radiation carcinogenesis and could lead to a more satisfying (but more complicated) regulatory approach to protecting the public. Not least would possibly be an effective counter to the idea that estimates of impacts on health in large populations from small increments in annual doses are meaningful if based just on the nominal risk coefficient for radiation-induced cancers.

NCRP

NCRP Releases Report No. 149

*A Guide to Mammography and Other Breast Imaging Procedures**

"Mammography, in conjunction with physical examination, is the method of choice for early detection of breast cancer. Other methods should not be substituted for mammography in diagnosis or screening, but may be useful adjuncts in specific diagnostic situations."

That affirmation of more than 40 years of experience with mammography for clinical detection, surveillance, and population screening is the primary conclusion of an intensive review of mammography practice by an expert committee of the National Council on Radiation Protection and Measurements (NCRP) as published in Report No. 149.

The 389-page report provides a guide to currently acceptable practices for conducting and interpreting mammographic studies, technical factors in exposures, equipment recommendations, and a thorough analysis of continuing controversies about benefits and risks from mammography screening programs. The new report supersedes Report No. 85, published in 1986.

Since the publication of the 1986 NCRP report, federal standards for all mammography facilities have been enacted and implemented. The 1992 passage of the Mammography Quality Standards Act made compulsory the voluntary standards developed in 1987 by the American College of Radiology (ACR). A combined certification and accreditation program involves the Center for Devices and Radiological Health of the Food and Drug Administration, inspections for state radiation control programs, and performance reviews by the ACR program.

The NCRP committee reviewed the use of ultrasound, magnetic resonance, thermography, transillumination, computed tomography, and nuclear imaging. It observed that an extensive study of the value of digital mammography was underway by the ACR Imaging Network at the time of publication and that conclusions were not available. However, with many x-ray departments replacing all screen-film procedures with digital imaging and electronic image handling and retrieval, significant changeovers are happening, even without solid data on mammographic values.

"Computed tomography exposes breast tissue to higher levels of ionizing radiation than screen-film or digital mammography, making it unsuitable for annual screening and it does not have the spatial resolution of conventional mammography," the report stated.

The report is available from the NCRP Web site, http://NCRPpublications.org, in both soft- and hard-copy formats. A 20% discount is available to Health Physics Society members for all online purchases by entering the code hps85149 at checkout. For additional information contact David A. Schauer, ScD, CHP, at schauer@NCRPonline.org.

*Preparation of NCRP Report No. 149 was supported by funds from the National Cancer Institute and the American Cancer Society.

Ashok K. Dhar
1947-2005

Roger Moroney, CHP

Ashok Dhar, Senior Director for Regulatory Compliance at CTI Molecular Imaging in Knoxville, Tennessee, passed away on the morning of 12 May following a brief illness. Ashok was very active in the radiopharmaceutical and radiopharmacy health physics community.

Ashok was born in Srinagar, India. He received a BS in metallurgical engineering from Banaras University, Varanasi, India, in 1969, an MS in metallurgical engineering from the University of Washington in 1971, and an MS in radiological sciences/health physics, also from the University of Washington, in 1974.

Ashok began his health physics career at Sargent & Lundy Engineers in Chicago. This work involved various types of radiation protection analyses for design and engineering of commercial boiling water reactor and pressurized water reactor nuclear power plants. While at Sargent & Lundy, he established an in-house TLD-based dosimetry program for personnel radiation monitoring, in-plant nuclear power station radiation surveys, and shielding design verification of operational nuclear power plants.

In 1979, he began work at Abbott Laboratories in Chicago, his first work in the health physics of radiopharmaceutical manufacturing. Under Abbott's broadscope manufacturing and distribution license, Ashok encountered issues covering the spectrum of applied health physics, including development of the initial radiological contingency plan for the facility.

Ashok then moved on to the King Faisal Specialist Hospital and Research Centre (KFSH&RC), Riyadh, Saudi Arabia, in 1982 where he was responsible for the start-up of the health physics program for the cyclotron/radiopharmaceutical operations and research applications. He was promoted to the head of the health physics program there in 1985.

After returning to the United States, Ashok worked briefly for the state of New Mexico at its Carlsbad office overseeing work at the Waste Isolation Pilot Plant. He soon returned to the radiopharmaceutical community upon joining Mallinckrodt Inc.'s Nuclear Medicine Division in May 1988. Ashok began his long stint at Mallinckrodt as the health physics supervisor and RSO for the Maryland Heights, Missouri, radiopharmaceutical manufacturing facility. After several promotions while at the Maryland Heights facility, Ashok became the Manager of Corporate Radiological Affairs for the Mallinckrodt Corporate Regulatory Compliance Department. His responsibilities expanded to encompass the global reach of the Mallinckrodt Medical Radiological Compliance Program, including not only radiopharmaceutical manufacturing, but also radiopharmacies, R&D operations, and legislative affairs. It was in this capacity that he became involved with the Council on Radionuclides and Radiopharmaceuticals, the Council of Radiation Control Program Directors, and various other professional organizations. While in St. Louis, Ashok was very active in the Greater St. Louis Chapter of the Health Physics Society, serving as president from 1993 to 1994.

After nearly 13 years with Mallinckrodt, Ashok moved to Knoxville, Tennessee, where he joined PETNET Pharmaceuticals as its Corporate Radiation Safety Officer. In this position he developed and implemented a comprehensive radiological protection program for its worldwide PET radiopharmacy network. Ashok was transferred to CTI Molecular Imaging, PETNET's parent company, in May 2003 to become its Director of Corporate Compliance and Safety. In this position he was responsible for CTI's Radiological Compliance and Environmental Health and Safety (EH&S) programs worldwide. In January of 2004, he was promoted to senior director for Corporate Regulatory Management. This promotion added CTI/PETNET's Quality and Regulatory Compliance Group to his radiological compliance and EH&S management responsibilities.

Siemens Medical USA acquired CTI in May of 2005, and Ashok was instrumental in the extensive work undertaken before this merger was finalized on 4 May 2005. Early the following morning, Ashok suffered a heart attack and was taken to a local hospital in Knoxville. Unfortunately he was not able to see the fruit of his work on this project before passing away the following Thursday.

He was very active in charitable organizations and was a man of great devotion to his family, friends, and work. His selfless approach will continue to affect people all over the world, and his legacy will live through all those he has touched. He is survived by his parents, wife of 27 years, Kunti, two sons, Suvir and Nikhil, brother Vijay and sister Sarla. We have all been blessed by the impact of his life.

BEIR VII Phase 2 Report Released in June

The BEIR VII Phase 2 report, "Health Risks from Exposure to Low Levels of Ionizing Radiation," released as a prepublication copy on 29 June by the National Academies' National Research Council, concludes that "the current scientific evidence is consistent with the 'linear, no-threshold' risk model." It also presents risk models for exposure to low-level ionizing radiation based on a sex and age distribution similar to that of the entire US population and refers to the risk that an individual would face over his or her life span. The BEIR VII lifetime risk model predicts that approximately one individual in 100 persons would be expected to develop cancer (solid cancer or leukemia) from a dose of 100 mSv while approximately 42 of the 100 individuals would be expected to develop solid cancer or leukemia from other causes. Roughly half of these cancers would result in death.

A press release summarizing the report, the full report, and a report brief are available on the National Academies Web site, http://nationalacademies.org/. The BEIR VII committee was chaired by Richard R. Monson, MD, ScD, School of Public Health, Harvard University. Other committee members are listed in the National Academies' press release.

Chapter News

New England Chapter
Connecticut Chapter

Margaret E. McCarthy
Outgoing Past-President NECHPS and Incoming Secretary CTHPS

As an update reminder to our international membership, the New England Chapter of the Health Physics Society (NECHPS) comprises five of the six New England states: Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island. That southwestern part of the geographical New England, the one that borders New York City, is the separate Connecticut Chapter of the Health Physics Society (CTHPS). The two chapters share a common fall meeting and many members and vendors. The great distances and weather patterns dictate meeting attendance.

Now that the annual meetings have concluded the fiscal year, both chapters are gearing up for the 2006 annual meeting in Providence to celebrate the end of the 50th anniversary celebration of the HPS.

New England Chapter Health Physics Society Annual Meeting 7 June 2005, left to right, Margaret McCarthy, Tony Honnellio, Chris Martel, Ron Thurlow, Tara Medich, Victor Evdokimov, Dave Medich, Mike Whalen, John Sumares

Connecticut Chapter Health Physics Society Annual Meeting 13 June 2005, left to right, Peter Mas, June Tampkin-Price, Margaret McCarthy, Mike Bohan

Awards Committee

Kenneth R. Kase
Awards Committee Chairman

Health Physics Society Award Recipients

The following HPS awards were formally presented at the awards reception and dinner at the annual meeting of the Society in Spokane, Washington, on Tuesday, 12 July 2005.

Elda E. Anderson Award

This award is presented to a young member of the Society to recognize excellence in (1) research or development, (2) discovery or invention, (3) devotion to health physics, and/or (4) significant contributions to the profession of health physics. The award consists of a plaque and a $1,500 check. The 2005 recipient is:

Lawrence T. Dauer

Distinguished Scientific Achievement Award

This award acknowledges outstanding contributions to the science and technology of radiation protection. It consists of a plaque and life membership in the Society. The 2005 recipient is:

Eric J. Hall

Robley D. Evans Commemorative Medal

This medal is given in memory of Dr. Robley D. Evans who, over a period of more than 50 years, was exemplary as a physics educator, scientist, author, and humanitarian. His contributions and dedication to radiation safety and to the health physics profession were extraordinary in practice and outstanding in intellectual acumen. The 2005 recipient is:

John W. Poston, Sr.

Founders Award

This award is designed to recognize exceptional service to the Health Physics Society or the health physics profession. It consists of a plaque and life membership in the Society. The 2005 recipient is:

Charles B. Meinhold

Fellow Members

This award honors senior members of the Society who have made significant administrative, educational, and/or scientific contributions to the profession of health physics. The HPS fellow class of 2005 consists of:

Mary L. Birch	***Richard V. Osborne***
Bruce B. Dicey	***Roy A. Parker***
Robert A. Fjeld	***Lawrence M. Rothenberg***
Nolan E. Hertel	***Michael T. Ryan***
David C. Kocher	***Lin-Shin C. Sun***
John A. Leonowich	***Chuan Fu-Wu***

Outstanding Science Teacher Award

This award honors significant teaching contributions made to educating students in topics related to the field of radiation safety. The award consists of a certificate and a citation, a cash award of $500 to the teacher's high school in the teacher's name, an honorary membership in the Society, and travel assistance to attend the awards ceremony. The 2005 recipient is:

Donna Armani

HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

DEPLETED URANIUM

HEALTH PHYSICS SOCIETY FACT SHEET

In recent years, depleted uranium (DU) is frequently noted in the news because of extensive use on the battlefields of Kosovo and Iraq. There is a great deal of concern about the medical effects of DU exposure. In this fact sheet, we will try to explain the significance and validity of these concerns.

What is depleted uranium?

Uranium (U) is a dense, weakly radioactive metallic element that exists naturally in our environment. Uranium is found everywhere in nature and particularly in rocks, soil, water, and air, as well as in all plants, animals, and humans.

- Natural uranium consists of a mixture of three isotopes, which are identified by the mass numbers ^{238}U (99.27% by mass), ^{235}U (0.72%), and ^{234}U (0.0054%).
- Enriched uranium is used as fuel in nuclear power reactors generating electricity. The content of ^{235}U must be enriched (or increased) from 0.72% (as is found in natural uranium) to about 1.5-3%. This material cannot be used to make nuclear explosives. After removal of the enriched fraction, the remaining uranium contains about 99.8% ^{238}U, 0.2% ^{235}U, and 0.001% ^{234}U by mass. This is referred to as depleted uranium or DU.
- Depleted uranium is uranium metal whose isotopic composition has been changed by removal of the ^{235}U and ^{234}U such that the fraction of ^{238}U increases. Depleted uranium is less radioactive than natural uranium.
- Spent uranium fuel from certain nuclear reactors (not commercial reactors) is sometimes reprocessed in plants for uranium enrichment. Some reactor-created radionuclides may consequently contaminate the reprocessing equipment and the resulting DU. Under these conditions another uranium isotope, ^{236}U, may be present in the DU together with trace amounts of other elements.

What is depleted uranium used for?

- Civilian uses – Due to its high density, about 60% more dense than lead, the main civilian uses of DU include counterweights in aircraft and containers for the transport of radioactive materials. Some depleted uranium is used industrially as stabilizers in boats and yacht keels.

- Military uses – DU is used for defensive armor plates on tanks and troop carriers because of its high density. Also, it is used for armor-penetrating bullets and shells because of its high density and its ability to self sharpen as it penetrates its target.

Are there any health effects associated with exposure to DU?

DU behavior in the body is identical to that of natural uranium. Uranium and DU are considered internal hazards. Therefore, inhalation and/or ingestion of these materials should be minimized.

In general, natural U and DU are considered chemical health hazards, rather than radiation hazards. The exception is the case where DU is inhaled in the form of tiny insoluble particles, which lodge in the lungs and remain there for very long times. DU is less of a radiation hazard than natural U because it is less radioactive than natural U. Direct (external) radiation from DU is very low and only of concern to workers who melt and cast U metal.

DU used in commercial civilian applications does not present a significant health hazard because it is usually in solid form and not available for inhalation or ingestion. Military operations with DU, however, may contaminate soil, groundwater, and breathing air. When used as a weapon, small particles of DU may be produced. These particles have high density and most fall to the ground very close to where they are produced.

Studies have been made of workers and other persons who have ingested or inhaled uranium. There is no known association between low-level DU exposure and adverse health effects, including birth defects. In large quantities, DU exposure can cause skin or lung irritation, but only soldiers in the immediate vicinity of an attack that involves DU are potentially exposed to these levels of contamination. People who live or work in areas affected by DU activities may inhale or consume contaminated air, food, or water. Soldiers with wounds containing fragments of DU shrapnel may develop effects at the wound sites. However, the risks to these sites decrease quickly once the DU is removed. Persons exposed to very large inhalation doses of uranium have shown minor, transitory kidney effects, which typically disappear within days to a few weeks after exposure. Persons inhaling insoluble particulates that lodge in the lung may be at elevated risk of developing lung cancer many years later, particularly if they are smokers. But lung cancer has yet to be demonstrated in uranium workers or others exposed acutely or chronically to uranium.

A group of Gulf War veterans who have small DU fragments still in their bodies continue to be followed by government scientists to determine whether there will be long-term health effects. As of early 2005, only subtle but clinically insignificant changes in measures of kidney function have been observed. One common observation is a persistent elevation in the amount of uranium measured in the urine more than 10 years after exposure. This reflects the continued presence of DU in wound sites and its ongoing low-level mobilization and absorption to blood.

In summary, some minor health problems have been observed following exposure to DU, but ONLY with high levels of exposure. Exposures to airborne DU or to contaminated soil following military use are not known to cause any observable health or reproductive effects.

For detailed information on DU, refer to the United Nations Web site: http://www.who.int/ionizing_radiation/env/du/en.

Also refer to WHO Guidance on Exposure to Depleted Uranium (WHO/SDE/OEH/01.12, 2001): http://www.who.int/ionizing_radiation/en/Recommend_Med_Officers_final.pdf

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* The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has grown to approximately 6,000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.

Depleted uranium is currently on the minds of many people due to its use as a weapon, first in the Gulf War and now in Iraq. In response to many questions and concerns from the public, the Health Physics Society (HPS) Public Education Committee (PEC) has issued this new fact sheet on depleted uranium here and on the HPS Web site under Public Outreach (http://hps.org/documents/dufactsheet.pdf). This is the sixth fact sheet prepared by the PEC.

The PEC is responsible for gathering, organizing, and presenting information within the Society's objectives. The PEC facilitates dissemination of accurate, unbiased information on ionizing radiation by preparing educational materials as suggested and/or approved by the Scientific and Public Issues Committee. Current PEC members Marcia Hartman, Dan McGrane, Ralph Ochoa, Ali Simpkins, Mark Somerville, Vince Williams, Rob Woodard, and Board Liaison Andrew Karem developed this latest fact sheet. Other individuals involved in preparation of the Depleted Uranium Fact Sheet include Ron Kathren, CHP, an expert in the field.

HUMAN CAPITAL CRISIS IN RADIATION SAFETY

POSITION STATEMENT OF THE HEALTH PHYSICS SOCIETY*

Adopted: August 2001
Revised: June 2005

Contact: Richard J. Burk, Jr.
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Radiation is used for many beneficial purposes to support this country's energy, medical, and security needs. Radiation protection (health physics) is one of the science and engineering disciplines in which a shortfall in sufficiently trained and educated individuals is projected in this country over the next 5 to 10 years. In 2002 the Health Physics Society (HPS) established a task force to review the current and future needs for radiation protection professionals working in the energy, health, and security sectors. Results of the Task Force Report are available on the HPS Web site (HPS 2004), have been published in the HPS newsletter *Health Physics News* (Nelson 2004), and have been used to develop this Position Statement.

The Health Physics Society recommends that significant financial commitment by the Congress and federal agencies be made to support education of scientists and engineers, science teachers, educators in math and science, research associated with these programs (including health physics), equipment and supplies for science teaching in secondary schools, and scholarships and financial support to colleges and universities in science and technology. This is necessary to ensure an adequate supply of qualified scientists and engineers, including radiation safety professionals.

The National Science Foundation (NSF 2001) indicated that the number of US citizens enrolling in science and technology graduate degree programs declined more than 15% from 1993 through 1999, with the greatest declines seen in mathematics (25%), engineering (23%), and the physical sciences (15%). In health physics the number of students graduating with either a bachelor's, master's, or PhD degree declined 55% from 270 students in 1995 to 122 in 2002. In addition, the number of health physics programs graduating at least 5 students annually decreased from 20 programs in 1995 to 7 programs in 2002. Zumeta and Raveling (Zumeta and Raveling 2003) identified "very modest compensation for graduate students and postdoctoral appointees" as one reason that science and technology careers are considered less attractive. Support for research and teaching has historically come from the federal government, but recently this support has dwindled. Federal support is needed because scientific and engineering education is in the national interest and promotes the common good and national security.

The human capital crisis continues to deepen; while needed enrollments and focused academic and training programs shrink, the need for well-educated and trained graduates is intensifying. In the federal government alone human capital issues were felt in all agencies according to a recent Government Accountability Office report (Walker 2001). It was anticipated that 35% of the fiscal year 1998 federal workforce will be eligible for regular retirement by 2006. Well-educated people in science and technology are needed to meet growing needs in industry, government (NRC, EPA, DOE, etc.), medicine, and homeland defense and in order for the United States to continue to be a world leader in science and technology.

Strong, healthy academic programs are needed to continue to provide a meaningful succession of scientists and engineers and this includes radiation protection professionals working in the energy, regulatory/security, and health sectors of our nation. A report published by the Nuclear Engineering Department Heads Organization (NEDHO 2000) stated that enrollment in nuclear engineering programs has been declining since 1992. Recently, demand for nuclear scientists has outstripped supply.

Furthermore, with expanding uses of radiation in diagnostic and therapeutic medical applications and the potential expansion of nuclear technology to meet the nation's future energy needs, it is clear to the radiation safety community that the current imbalance between supply and demand will significantly worsen in the near term, after which it will soon become untenable. The shortage of qualified radiation safety professionals will compromise the rigorous oversight necessary for the continued safe use of radiation for the benefit of the citizens of the United States.

A conservative total of approximately 6,700 radiation protection professionals from all employment sectors combined has been identified in the Task Force Report. This value does not include, for example, part-time or consulting radiation protection professionals. Strong, healthy academic programs are necessary to ensure a continuing supply of radiation protection professionals working in these critical employment sectors.

Although the remaining health physics academic programs have the potential to expand and meet the current demand for graduates in health physics, this potential cannot be realized without rapid and substantial investment. The HPS has, for many years, provided support to students in health physics and encouraged standardization and accreditation in health physics education and training. Many members of the Society donate time and effort to health physics academic programs, in addition to their substantial effort in providing radiation fundamentals training to science teachers. The HPS has also explored private sources of funding for health physics academic programs and actively encourages students to become interested in health physics programs. However, the critical human capital shortage in radiation safety is overwhelming the Society's efforts to help respond to this crisis.

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*The Health Physics Society is a nonprofit scientific professional organization whose mission is to promote the practice of radiation safety. Since its formation in 1956, the Society has grown to approximately 6,000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.

CHP Corner

American Academy of Health Physics
American Board of Health Physics
Web site: http://www.aahp-abhp.org

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CHP Seal Soon Available as Stamp

The popular personalized CHP seal which became available three years ago as an embosser can soon also be obtained as a stamp for printing the seal. Several Academy members had noted that, with the current widespread use of document scanners, fax machines, photocopiers, and other electronic media, many times the embossed seal is not eligibly displayed on reproduced documents. Using the stamp to print the seal will provide a visible image that reproduces well electronically.

Active and emeritus CHPs will be able to order the new CHP stamp for approximately the same cost as the embosser (now $34.95) at the American Academy of Health Physics Web site (http://www.hps1.org/aahp/) (members only section) or by contacting Nancy Johnson at the Secretariat (703-790-1745 extension 25). The stamp is expected to be available on the Web site later this summer.

AAHP Committees

A brief summary of American Academy of Health Physics (AAHP) Committee duties and the requirements of the committee members can be found on the AAHP Web site (http://www.hps1.org/aahp/committee_duty_overview.htm).

The Display Ads, Short Course listings, and Placement Center are available in the hard-copy version of *Health Physics News*.

Health Physics News Contributions and Deadline
Almost everything the Managing Editor receives by 20 August will be printed in the October issue.

HPS Reference Library: http://www.min.uc.edu/nuclear/hpspep/peplib.html

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Article II, Section 1, 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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Odds and Ends from the Historical Archives

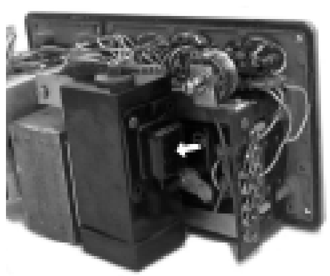
Paul Frame

RADIAC Survey Meter with Organic Scintillator (early 1950s)

This is an IM-75/PDR-18A survey meter produced for the military by Tracerlab Inc.

The AN/PDR-18, which I believe first came out in 1949, is an absolutely fantastic instrument. It is one of the very earliest, if not the earliest, gamma scintillation survey instruments to go into production. The scintillating crystal is approximately 1" x 3/4" x 1/2" in size. It is not hygroscopic, so it's not NaI, and because it is crystalline, it can't be plastic. It seems to be some type of organic crystal. In 1950, Tracerlab focused on producing two types of scintillators: plastic and stilbene. For this reason, I am guessing that the scintillator is stilbene.

The photo on the right shows the inside of the front end of the instrument. The small black rectangular crystal housing (indicated by the white arrow) is mounted on the front side of the housing for the "side-on" photomultiplier tube (an RCA 931A).



Upcoming Events

39th Health Physics Society Midyear Topical Meeting
22-25 January 2006
Scottsdale, Arizona

51st Annual Meeting of the Health Physics Society
http://hps.org/newsandevents/meetings/meeting5.html
25-29 June 2006
Westin Convention Center
Providence, Rhode Island

NCRP 2006 Annual Meeting
"Chernobyl at Twenty"
3-4 April 2006
Crystal City Forum
Arlington, Virginia

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