



Health Physics News

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"The Future of Nuclear Power Worldwide: Safety, Health and the Environment"

NCRP Forty-Fifth Annual Meeting
2-3 March 2009—Bethesda, Maryland

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Thomas S. Tenforde², and David A. Schauer³*

The role of nuclear power as a major resource in meeting the projected growth of electric power requirements in the United States and worldwide during the 21st century is a subject of great contemporary interest. The goal of the 2009 National Council on Radiation Protection and Measurements (NCRP) Annual Meeting was to provide a forum for an in-depth discussion of issues related to the safety, health, and environmental-protection aspects of new nuclear power reactor systems and related fuel-cycle issues such as fuel production and reprocessing strategies. The meeting was an international conference with participation of about 300 representatives of many nations, scientific organizations, nuclear industries, and governmental agencies engaged in the development and regulatory control of advanced nuclear reactor systems and fuel-cycle operations.

Topics of major interest in the context of the expected expansion in worldwide use of nuclear power that were discussed by participants in the 2009 NCRP Annual Meeting included (1) primary safety, health,

and environmental issues associated with the growth of nuclear power as an energy resource, (2) infrastructure needs for future nuclear power and the associated radiation protection requirements, including nuclear plant operational practices, front-end and back-end fuel-cycle management issues, and fuel nonproliferation safeguards, (3) key challenges to be addressed for nuclear power in the 21st century, including regulatory practices and controls, increasing the number of trained human resources and expanded educational capabilities in nuclear power technology, radiation protection requirements, and effective communication of the risks and benefits of nuclear power resources, and (4) perspectives on how to meet the major challenges in projected growth of nuclear power.

Highlights of the meeting included the following:

- Peter B. Lyons, a Commissioner of the U.S.

Nuclear Regulatory Commission, presented the 6th Annual Warren K. (continued on page 3)



Peter B. Lyons

NCRP Forty-Fifth Annual Meeting

(continued from page 1)

Sinclair Keynote Lecture, “The Role of a Strong Regulator in Safe and Secure Nuclear Energy.” Lyons emphasized to the audience that a strong independent nuclear regulator is necessary for auditable and open licensing actions, for helping to maintain a safety culture in the industry, and for global cooperation in regulation and security. He reviewed the new licensing process under 10 CFR Part 52 that allows for safety reviews of completed nuclear reactor designs for construction and operation, the so-called combined licenses (COL). This approach has led the Commission staff to use a design-center approach for licensing that will enable a better review of the COL and ensure a complete design with high-quality construction. Lyons stated that the Commission faces challenges in the technical review of the Yucca Mountain repository license application as well as the challenge to support human resource needs for the nuclear power infrastructure. Finally, he recommended that NCRP should continue to be an advocate for fundamental scientific investigations on the biological effects of low doses of ionizing radiation.

• John D. Boice, Jr., presented the 33rd Lauriston Taylor Lecture on Radiation Protection and Measurements, “Radiation Epidemiology: The Golden Age and Remaining Challenges.” He was introduced by Robert L. Brent. Dr.



Robert L. Brent

Boice gave an extremely stimulating and wide-ranging discussion of the major epidemiological studies conducted since the 1950s and their importance in quantifying organ-specific radiation risks. He also described the key technical information gained from relatively high-dose



John D. Boice, Jr.

exposures such as those used in a number of radiotherapy procedures, and he discussed several major types of cancer for which data on exposed populations have not demonstrated a clear and convincing association with radiation. Finally, Boice and his family gave an inspirational impromptu concert about radiation epidemiology.

Other sessions of the 2009 NCRP Annual Meeting led to valuable insights on several important aspects of the growing worldwide interest in expanding sources of nuclear power. These sessions included presentations, panel discussions, and significant audience participation on the following subjects.

Implications of Nuclear Power Growth: Sama Bilbao y Leon of the International Atomic Energy Agency (IAEA)



Sama Bilbao y Leon

Winston, chairman of the Conference of Radiation Control Program Directors, discussed the challenges that states face with regard to the need for additional personnel, training capabilities, and infrastructure in order to deal with environmental monitoring and emergency response activities for new nuclear power plants in the United States. Robert M. Bernero, a retired staff member of the U.S. Nuclear Regulatory Commission, reviewed the

was the moderator for this panel discussion and summarized the current state of development and applications of nuclear power worldwide. John P.



John P. Winston

key regulatory considerations with respect to spent fuel dry-cask storage, centralized fuel storage and disposal, as well as the status of low-level waste compacts. Finally, Stephen LaMontagne of the U.S. Department of Energy’s National Nuclear Security Administration reviewed approaches to implementing nuclear power safeguards.



Stephen LaMontagne



Robert M. Bernero

Trends in Worldwide Use of Nuclear Power: Angelina Howard, vice president of the Nuclear Energy Institute, chaired this session and emphasized the increased levels of interest in and



Urichiro Yoshimura

power power in the United States. Urichiro Yoshimura of the Nuclear Energy Agency provided a comprehensive review of the growth of nuclear power worldwide and the breadth of advanced nuclear power designs that are under construction. Alan Hanson of AREVA discussed advanced light-water reactor (LWR) designs and the AREVA evolutionary power reactor (EPR) specifically. He noted that all advanced LWR designs have focused on improved safety margins as

support for nuclear power in the United States. Urichiro Yoshimura of the Nuclear Energy Agency provided a comprehensive review of the



Angelina Howard



Alan Hanson

well as designs with a lower environmental impact. Finally, Robert N. Hill of Argonne National Laboratory summarized the advanced nuclear reactor designs that surpass

the existing LWRs—the so-called generation IV designs. He discussed a variety of technology options that are available and described how a closed fuel cycle and inherent safety are key features of these advanced reactor designs.

International Perspectives on the Future of Nuclear Power:

An international panel addressed the future of nuclear power. David Bennett of the British Environmental Agency discussed the generic design assessment process that is being followed in Great Britain to assess the advanced LWR designs in preparation for new orders and construction, with a focus on public involvement and consistency of design detail. Alan Hanson of AREVA provided an extensive review of the



Robert N. Hill



Ralph Andersen

focus on applying ALARA principles and reducing radiation areas in operating plants. Sylvan Saint-Pierre of the World Nuclear Association provided a worldwide overview of the front end of the nuclear fuel cycle and emphasized that meeting the challenges in this century must be technology driven. Robert N. Hill of Argonne National Laboratory gave a complementary talk on the technologies associated with the back end of the nuclear fuel cycle and fuel recycle and disposal. He emphasized the need for continued research and development of advanced fuel-recycle technologies.



Sylvan Saint-Pierre

Key Challenges to Be Addressed in the 21st Century and How to Meet These Challenges:

Audeen W. Fentiman of Purdue University moderated a session in which there was an extensive discussion of the key challenges resulting from the expansion of



Audeen W. Fentiman



Carl J. Paperiello

nuclear power and how to meet them. Carl J. Paperiello, a former director of research at the U.S.

Nuclear Regulatory Commission, began the discussion with an overview of the essential infrastructure needed for an effective nuclear regulatory agency and how it must be developed in nations with an emerging nuclear power industry. Elizabeth McAndrew-Benavides of the Nuclear Energy Institute then reviewed the state of the U.S.



Elizabeth McAndrew-Benavides

nuclear industry workforce and the major near-term need to increase the availability of qualified nuclear and power engineers, health physicists, and radiation protection technicians. She discussed the Center for Energy Workforce Development formed in March 2006 and its efforts to increase the size of the nuclear workforce. John F. Ahearne, cochairman of the Department of Energy's Nuclear Energy Advisory Committee, summarized his



John F. Ahearne



Shojiro Matsuura

nuclear fuel cycle with an emphasis on challenges that face the industry for fuel fabrication and recycle. Shojiro Matsuura, president of the Japan Nuclear Safety Research Association, summarized the current radiation protection practices in the Japanese nuclear industry. Alex Marion, vice

president of the Nuclear Energy Institute, gave an extensive review of the current state of nuclear power in the United States and the plans for plant-life extension for the existing 104 nuclear power plants and for construction of advanced LWRs.



David Bennett



Alex Marion

Infrastructure Needs for Nuclear Power: Ralph Andersen of the Nuclear Energy Institute gave a comprehensive review of radiation protection practices in the United States and the importance of dose as a key metric for radiation protection improvement—over a six-fold decrease of exposures in the industry has been achieved during the past 25 years. He also emphasized the importance of not becoming complacent and continuing to

committee's report on the need for advanced nuclear research and development facilities. Edward Lazo of the Nuclear Energy Agency then provided an international perspective on the challenges that are faced in the development of evolving radiation protection guidelines and regulations.



Edward Lazo



Ann S. Bisconti

He emphasized the need to continue a focus on reducing the dose to nuclear power workers. Ann S. Bisconti reviewed the public perception of nuclear power and radiation and the need to communicate more effectively on the benefits and risks associated with radiation.

discussed the current status of low-level waste disposal alternatives. He emphasized the need to work within the current regulations and use risk-informed guidance in waste management. A report prepared by Thomas Isaacs of Stanford University and



Michael T. Ryan



Michael L. Corradini

presented by Michael L. Corradini focused on the need to provide secure sources of nuclear fuels to countries that are developing new nuclear capabilities. He recommended that assistance should also be provided to those nations on options for safe methods of handling the disposition of spent fuel and associated nuclear waste materials.

Meeting the Challenges in Expansion of Nuclear Power:

Mary E. Clark of the Environmental Protection Agency



Mary E. Clark

was the moderator of a panel discussion on this topic. Paul W. Lisowski, deputy assistant secretary of nuclear energy at the Department of Energy, emphasized the need to address



Paul W. Lisowski

the complete fuel cycle and consider the long-term goals for spent fuel recycling to provide resources and meet waste disposal needs.



Wayne L. Johnson considered to allow for nuclear power growth, including the need for national leadership in controlling the economic risks faced by utilities when undertaking the construction and operation of new nuclear facilities. Mark T.



Michael J. Lawrence

Michael J. Lawrence and Wayne L. Johnson of the Pacific Northwest National Laboratory reviewed key actions that need to be



Mark T. Peters

Peters, deputy associate director of the Argonne National Laboratory, provided a broad overview of the research and development initiatives that must be undertaken to meet many of the technological challenges in expanding the availability and use of nuclear power. Michael T. Ryan, editor in chief of *Health Physics*,

Other Scientific Highlights of the Meeting:

- Following the morning scientific session on Tuesday, 3 March, Thomas Tenforde and Kenneth Kase, the scientific vice president of NCRP, announced the availability of prepublication copies of Report No. 160, "Tonizing Radiation Exposure of the Population of the United States." This report provides a comprehensive update of all sources of exposure of workers and members of the general public, which were last summarized in NCRP Report No. 93 published in 1987. The most important finding based on an exposure database current through 2006 is the fact that the collective effective dose received by members of the U.S. population has nearly doubled since the 1980s. This large change is primarily the result of an increase by a factor of more than seven in the collective effective dose resulting from a rapid growth over the past two decades in the use of diagnostic medical imaging techniques such as computed tomography and nuclear medicine procedures. In distinct contrast to the information summarized in Report No. 93, which showed that medical doses in the early 1980s were only about 15 percent of the total dose, Report No. 160 indicates that medical radiation exposure of the U.S. population is now comparable in magnitude to the exposure from ubiquitous background radiation and represents about one-half the total dose.
- Another highlight of the meeting was a presentation by Kase, the newly elected president of the International Radiation Protection Association (IRPA), on the interna-



Ken Kase

tional role played by IRPA in promoting radiation protection policies and practices worldwide. He summarized the primary goals of IRPA, which include providing assistance with establishing radiation protection guidance in many member nations, increasing the development of essential education and training programs related to health protection, and promoting the improvement of radiation protection culture and professional standards for radiation protection experts in member nations. IRPA holds an international congress every four years, and member nations host regional congresses during the intervening years. The last international congress was

Dr. Tenforde reported on the progress of scientific committees and noted the significant contributions of the following individuals:

- **Henry Royal**, chairman of SC 1-8, for the publication of NCRP Report No. 159, "Risk to the Thyroid from Ionizing Radiation"
- **William J. Bair**, chairman of SC 4-1, for the publication of NCRP Report No. 161, "Management of Persons Contaminated with Radionuclides"
- **Thomas F. Gesell**, chairman of SC 6-6, for completion of a review of "Skin Doses from Dermal Contamination"
- **Randall S. Caswell**, chairman of SC 6-7, for completion of a review of "Evaluation of Inhalation Doses in Scenarios Involving Resuspension by Nuclear Detonations at Nevada Test Site"
- **Jerrold T. Bushberg**, chairman of the 2007 Annual Meeting Program Committee, for publication of the Proceedings, "Advances in Radiation Protection in Medicine," in *Health Physics* 95(5):461-657 (2008)
- **Patricia W. Durbin**, 31st Lauriston S. Taylor Lecturer, for publication of "The Quest for Therapeutic Actinide Chelators" in *Health Physics* 95(5):465-492 (2008)

held in Buenos Aires, Argentina, in October 2008.

Overall, the 2009 NCRP Annual Meeting provided an up-to-date view on the growth of nuclear power sources in nations throughout the world. Important issues were discussed on the challenges faced in designing advanced and inherently safe reactors, applying appropriate procedures for handling the production and disposition of nuclear fuels, minimizing the potential health and environmental effects of expanded use of nuclear power worldwide, and introducing nonproliferation safeguards to avert

potential threats to national security from the misuse of nuclear materials.

Presentations and Proceedings

Presentations from the 2009 NCRP Annual Meeting can be purchased online at <http://NCRPpublications.org>, and the proceedings will be published by NCRP.

Forty-Fifth Annual Business Meeting

The NCRP Annual Business Meeting held on 3 March 2009 included election of Council and Distinguished Emeritus Members, Officers, and the Board of Directors.

Newly elected Council Members are:

- Mythreyi Bhargavan
- Brooke R. Buddemeier
- Christine A. Donahue
- Alan J. Fischman
- Patricia A. Fleming
- Andrea K. Ng
- Adela Salame-Alfie
- Beth A. Schueler
- Elizabeth L. Travis

Newly elected Distinguished Emeritus Members are:

- John D. Boice, Jr.
- Antone L. Brooks
- John B. Little
- Susan D. Wiltshire

Officers elected are:

- President Thomas S. Tenforde
- Senior Vice President Kenneth R. Kase
- Secretary and Treasurer David A. Schauer

Council Members elected to the Board of Directors are:

- | | |
|------------------------|---------------------|
| • Leslie A. Braby | • Paul A. Locke |
| • Jerrold T. Bushberg | • Debra McBaugh |
| • S.Y. Chen | • William F. Morgan |
| • Paul M. DeLuca | • David S. Myers |
| • Raymond A. Guilmette | • Julie E.K. Timins |
| • Kathryn D. Held | |

It was noted that the president and senior vice president are automatically directors.

Schauer summarized NCRP's financial performance in 2008. Revenue was approximately \$2.9 million and expenses were \$3.1 million, 14 percent of which was from net realized and unrealized losses on investments. The loss in assets in 2008 was approximately \$262 thousand. This amount subtracted from the net assets as of 1 January 2008 yielded total net assets of approximately \$1.6 million at the end of 2008.

The Business Session was adjourned following Tenforde's expression of appreciation to the Council and

Scientific Committee members, dedicated staff, and all of their predecessors who have contributed to NCRP's rich history for the past 80 years.

Authors

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Tenforde also made a special presentation of an engraved glass plaque to Laura Atwell, recognizing her 25 years of outstanding and dedicated service to NCRP. The presentation included a letter from NCRP President Emeritus Dr. Warren K. Sinclair in which he stated: "To many of us you are not only the voice and authority for NCRP, but its memory, its heart, and its personification. The No. 1 NCRP lady!"



John D. Boice, Jr., his wife Jennifer, and his son Jack perform "Epidemiology" after John's Taylor Lecture at the 2009 NCRP Forty-Fifth Annual Meeting on 2 March. For more information see www.ncrponline.org.

2010 NCRP Annual Meeting—8-9 March 2010

"Communication of Radiation Benefits and Risks in Decision Making"

Hyatt Regency Bethesda, One Bethesda Metro Center

6400 Wisconsin Avenue, Bethesda, Maryland