Annual Report

2007

Year in Review



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Charter

The National Council on Radiation Protection and Measurements is a nonprofit corporation chartered by Congress in 1964 to:

- 1. Collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection.
- Provide a means by which organizations concerned with the scientific and related aspects of radiation protection and of radiation quantities, units and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations.
- 3. Develop basic concepts about radiation quantities, units and measurements, about the application of these concepts, and about radiation protection.
- 4. Cooperate with the International Commission on Radiological Protection, the International Commission on Radiation Units and Measurements, and other national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection.

The Council is the successor to the unincorporated association of scientists known as the National Committee on Radiation Protection and Measurements and was formed to carry on the work begun by the Committee in 1929.

Participants in the Council's work are the Council members and members of scientific, advisory and administrative committees. Council members are selected on the basis of their scientific expertise and serve as individuals, not as representatives of any particular organization. The scientific committees, composed of experts having detailed knowledge and competence in the particular area of the committees' interests, draft reports, commentaries and statements. These are then submitted to the full membership of the Council for careful review and approval before being published.

President's Message

Name of the year included the completion of two reports, a commentary, and the proceedings of the 2006 NCRP Annual Meeting. Significant progress was also made toward completion of several other major NCRP reports to be published in the coming year. NCRP publications completed in 2007 included the following.

Report No. 157, Radiation Protection in Educational Institutions, prepared by Scientific Committee 46-17 chaired by Susan M. Langhorst, provides radiation protection guidance for educational institutions that use radioactive materials or radiation-producing equipment for training and research, or for other purposes such as radiation applications in a student health clinic. Guidance is provided both for ionizing radiation and for nonionizing radiation sources such a lasers and microwave-producing equipment.

Report No. 158, *Uncertainties in the Measurement and Dosimetry of External Radiation*, prepared by Scientific Committee 6-1 chaired by Harold L. Beck, describes in depth the uncertainties associated with data obtained from personal dosimeters and area monitors for gamma, beta, neutron, charged-particle, and mixed radiation fields. The report describes concepts and factors that contribute to uncertainty in converting radiation measurements to estimates of organ doses, including statistical methods for combining the uncertainties associated with measurements and models to calculate the total uncertainty in organ dose estimates.

Commentary No. 20, Radiation Protection and Measurement Issues Related to Cargo Scanning with Accelerator-Produced High-Energy X Rays, prepared by Scientific Committee 6-5 chaired by Leslie A. Braby, provides a comprehensive analysis of the health protection issues and radiation measurement technology to be utilized with the Cargo Advanced Automated Radiography System (CAARS). This system is being designed and developed as part of the U.S. Department of Homeland Security's Domestic Nuclear Detection Office program to enhance security surveillance at U.S. border crossings. CAARS facilities will be installed at many land and sea ports-of-entry into the United States for detection in cargo containers of special nuclear materials (SNM) and other high atomic number elements that could be used as shielding for SNM and radioactive materials that might be used in acts of nuclear or radiological terrorism.

Another 2007 publication was the proceedings of the 42nd NCRP Annual Meeting held on April 3 and 4, 2006 on the topic *Chernobyl at Twenty*. The proceedings, along with the 30th Annual Lauriston S. Taylor Lecture by Robert L. Brent on *Fifty Years of Scientific Investigation: The Importance of Scholarship and the Influence of Politics and Controversy*, were published in the November 2007 issue of *Health Physics* (Vol. 93, No. 5). NCRP is appreciative of the efforts of the Program Committee, led by myself with the helpful assistant of the vice chairs Mikhail Balonov, John D. Boice, Jr., and

Elaine Ron, for organizing a timely and well attended meeting on an important topic. The meeting featured a comprehensive epidemiological analysis of health effects among liquidators, cleanup workers, and members of the public exposed to radiation released from the Chernobyl nuclear power reactor accident.

The year 2008 promises to be productive, with several NCRP reports nearing completion. Reports expected to be issued in 2008 are: (1) *Risk to the Thyroid from Ionizing Radiation*, prepared by Scientific Committee 1-8 under the chairmanship of Henry D. Royal; (2) *Management of Persons Contaminated with Radionuclides*, prepared by Scientific Committee 4-1 under the chairmanship of William J. Bair; and (3) *Radiation Exposure of the U.S. Population*, prepared by Scientific Committee 6-2 under the chairmanship of Kenneth R. Kase. Two NCRP President's Reports on *Skin Doses from Dermal Contamination* and *Evaluation of Inhalation Doses in Scenarios Involving Resuspension by Nuclear Detonations at the Nevada Test Site* will be published in 2008.

The proceedings of the 43rd NCRP Annual Meeting held on April 16–17, 2007 on the topic *Advances in Radiation Protection in Medicine* will be published in Health Physics in 2008. In this meeting prominent physicians, medical physicists, and experts in radiation health effects addressed key questions about how to maximize medical benefits in patients while minimizing their risks from exposure to ionizing radiation. Topics discussed at the meeting included patient doses and associated health risks in diagnostic radiology, nuclear medicine, and interventional radiation procedures.

The 2008 NCRP Annual Meeting will be held on April 14–15 on the topic *Low Dose and Low Dose-Rate Radiation Effects and Models* at the North Bethesda Marriott Hotel. The focus of the 2008 meeting, planned by a Program Committee chaired by Antone L. Brooks, will be on the latest scientific findings of low-dose radiation effects on experimental biological systems. Basic biological data, combined with modeling and the results of human epidemiological studies, will be presented, and a discussion will be held of how the results of such studies can be used in establishing future regulatory policies on radiation exposure of workers and the public. A full program summary and information on registration for the meeting can be accessed on the NCRP website at http://NCRPonline.org.

NCRP continued its role during 2007 in providing technical and administrative support to the Veterans' Advisory Board on Dose Reconstruction (VBDR), which was established in 2005 as a requirement of Public Law 108-183 enacted on December 16, 2003. The Board provides oversight of the radiation dose reconstruction and claims adjudication programs for veterans who occupied Hiroshima and Nagasaki, Japan following detonation of atomic bombs in 1945, who were prisoners of war in those locations at the time of the atomic bombs, or who participated in atmospheric nuclear weapons testing in the Pacific and Nevada Test Site until 1962. These veterans are eligible for compensation and medical benefits from the U.S. Department of Veterans Affairs (VA) if they contract diseases that may be associated with radiation exposure. When required, the reconstruction of radiation doses received by the veterans is performed by the Defense Threat Reduction Agency (DTRA) under its Nuclear Test Personnel Review program.

The 17-member VBDR is chaired by Vice Admiral (ret.) James A. Zimble, who served as the 30th Surgeon General of the U.S. Navy. Members of the Board represent a broad range of expertise in areas relevant to the mission of VBDR, and are listed on the VBDR website http://VBDR.org. Since

establishment of VBDR in 2005, NCRP has organized six Board meetings that were open to the public under the Federal Advisory Committee Act. In 2007 meetings of VBDR were held in Las Vegas, Nevada on March 7–8 and in Chicago, Illinois on September 19–20. The work of the Board is primarily centered on the activities of five subcommittees that met several times in 2007. These subcommittees provide in-depth reviews of radiation dose reconstruction procedures used by DTRA and its contractor organizations; the claims adjudication procedures used by VA; quality management and the integration of VA and DTRA activities; communication and outreach efforts involving veterans, DTRA and VA; and alternative methods for expedited dose assessment and claims processing.

During 2007 VBDR continued the development and submission of recommendations to VA and DTRA on potential improvements in the dose reconstruction and claims adjudication procedures. A total of 9 and 10 specific recommendations were made to DTRA and VA, respectively, on topics such as the development of standard operating procedures, quality assurance plans, and decision summary sheets; technical bases and criteria for expedited case processing; methods for handling claims on non-radiogenic diseases; centralizing the review and adjudication of veterans' claims at one regional VA office; and improved communication efforts with veterans. The text of these recommendations, as well as other information on VBDR activities and meetings, can be viewed on the VBDR website.

In addition to direct administrative support of VBDR meetings and related activities, NCRP has continued the development of scientific reports on topics related to uncertainties in external and internal radiation measurements and dosimetry, principles and practices of dose reconstruction, and specific issues related to the evaluation of dermal contamination and inhalation doses. NCRP staff are also providing independent evaluations of the accuracy of dose reconstructions performed by DTRA contractors.

NCRP initiated electronic publishing and launched its publications website, http://NCRPpublications.org, in 2005. The website includes keyword search capability, and a user-friendly shopping cart permits selection of either hardcopy or electronic PDF versions of NCRP publications. The website has been an important communication and distribution tool since its launch, with a total of 219,825 visits and 6.35M "hits" through the end of 2007. A detailed listing of the distribution of NCRP's publications through December 31, 2007 is presented in Appendix 2.

In 2007 NCRP entered into contract agreements with data aggregators and eBook providers as avenues for increasing the awareness and interest worldwide in NCRP publications and their content related to radiation health protection and measurements. On January 10, NCRP announced a partnership with the Knovel Corporation, a New York-based data aggregator that provides powerful methods of finding and applying critical information in many areas of science and engineering. Knovel's analytical tools enable users to perform rapid data extraction, mathematical calculations, tabular data analysis and equation solving, and these capabilities have now been extended to include information contained in NCRP's publications on radiation protection and measurements. On July 10, NCRP announced a contract agreement with NetLibrary, a Dublin, Ohio-based company, to provide worldwide access to NCRP electronic publications. NetLibrary is a leading electronic content provider to the institutional library market, and currently serves users in 15,000 libraries worldwide.

In 2007 the financial position of NCRP remained strong, with renewals of ongoing grants and contracts and additional funding being obtained for the preparation of new scientific reports, for example, on topics related to homeland security and radiation dosimetry. For the fifth consecutive year, NCRP's operating income exceeded its expenses, and the net assets of NCRP increased by \$307,544 in 2007. This brings the increase in assets to \$1.11M since 2002, to a total of \$1.885M, representing a continuing improvement in the financial stability of NCRP. A detailed description of NCRP's finances in 2007 is presented in Appendix 1.

NCRP took the first significant steps in 2007 toward winning long-term contracts from several federal agencies with a strong interest in the guidance provided by NCRP reports related to radiation protection and measurements. Five-year contract proposals have been submitted and NCRP is responding to requests for additional discussion of the content and importance of the proposed new reports. The goal of this strategic initiative is to obtain long-term support for the work of NCRP that will sustain its strong financial position for many years into the future.

As I approach the end of my initial six-year term as President of NCRP, I am pleased by the progress made during this period in promoting the growth and stability of NCRP's finances and operations. I look forward with enthusiasm to continuing to work with members of the Council, NCRP's scientific committees, staff, and collaborators in meeting the challenges that face NCRP in 2008 and beyond.

Thomas S. Tenforde

Thomas S. Tenforde

President

Membership

There are 100 Council Members serving six-year terms. There are normally 15 to 19 vacancies each year. Election of Council Members is based on nominations made by committee chairmen, current and Distinguished Emeritus Council members, and the Nominating Committee. New members are nominated and elected based primarily on the scientific contributions they have made to the work of the Council and/or recognized interest and scientific or professional competence in some aspect of radiation protection and measurements. In addition, the Board of Directors recommends that candidates with specific areas of expertise be sought based on the needs of the Council. The Council is comprised of specialists in biophysics, dentistry, dosimetry, environmental transport, epidemiology, genetics, health physics, medical physics, molecular and cellular biology, nuclear energy, nuclear medicine, pathology, physics, public health, public policy, radiation measurements, radiation therapy, radiobiology, radiology, risk analysis and communication, statistics, and waste management. In 2007 there were 15 vacancies; eight new members were elected and seven members were re-elected. The eight new members were:

Edward S. Amis, Jr.

Kimberly E. Applegate

Stephen T. Balter

Charles E. Chambers

Ronald E. Goans

Timothy J. Jorgensen

Ruth E. McBurney

Abram Recht

2007 Council Membership

John F. Ahearne	Sigma Xi	2005–2011
Edward S. Amis, Jr.	Montefiore Medical Center	2007–2013
Sally A. Amundson	Columbia University	2005–2011
Kimberly E. Applegate	Indiana University School of Medicine	2007–2013
Benjamin R. Archer	Baylor College of Medicine	2006–2012
Stephen T. Balter	Columbia-Presbyterian Medical Center	2007–2013
Steven M. Becker	University of Alabama at Birmingham	2005–2011
Joel S. Bedford	Colorado State University	2004–2010
Eleanor A. Blakely	Lawrence Berkeley National Laboratory	2006–2012
William F. Blakely	Armed Forces Radiobiology Research Institute	2003-2009
John D. Boice, Jr.	International Epidemiology Institute	2003-2009

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Wesley E. Bolch	University of Florida	2005-2011
Thomas B. Borak	Colorado State University	2007-2013
Andre Bouville	National Cancer Institute	2005-2011
Leslie A. Braby	Texas A&M University	2007-2013
David J. Brenner	Columbia University	2004-2010
James A. Brink	Yale University School of Medicine	2005-2011
Antone L. Brooks	Washington State University, Tricities	2003-2009
Jerrold T. Bushberg	University of California, Davis	2002-2008
John F. Cardella	University of Colorado Health Sciences Center	2002-2008
Stephanie K. Carlson	Mayo Clinic	2003-2009
Charles E. Chambers	Penn State Hershey Medical Center	2007-2013
Polly Y. Chang	SRI International	2005-2011
S.Y. Chen	Argonne National Laboratory	2005-2011
Mary E. Clark	U.S. Environmental Protection Agency	2002-2008
Kelly L. Classic	Mayo Clinic	2003-2009
Michael L. Corradini	University of Wisconsin	2004-2010
Allen G. Croff	Retired	2004-2010
Paul M. DeLuca	University of Wisconsin	2002-2008
David A. Eastmond	University of California, Riverside	2004-2010
Stephen A. Feig	University of California Medical Center, Irvine	2006-2012
John R. Frazier	Independent Consultant	2002-2008
Donald P. Frush	Duke University Medical Center	2004-2010
Thomas F. Gesell	Idaho State University	2002-2008
Ronald E. Goans	MJW Corporation	2007-2013
Robert L. Goldberg	University of California, San Francisco	2006-2012
Raymond A. Guilmette	Los Alamos National Laboratory	2003-2009
Roger W. Harms	Mayo Clinic	2003-2009
Kathryn D. Held	Massachusetts General Hospital	2006-2012
John W. Hirshfeld	University of Pennsylvania School of Medicine	2002-2008
F. Owen Hoffman	SENES Oak Ridge, Inc.	2004-2010
Roger W. Howell	University of Medicine and Dentistry of New Jersey	2003-2009
Timothy J. Jorgensen	Georgetown University Medical Center	2007-2013
Kenneth R. Kase	Lyncean Technologies, Inc.	2005-2011
Ann R. Kennedy	University of Pennsylvania School of Medicine	2007–2013
William E. Kennedy, Jr.	Dade Moeller & Associates	2004-2010
David C. Kocher	SENES Oak Ridge, Inc.	2005-2011
Ritsuko Komaki	MD Anderson Cancer Center	2006–2012
Amy Kronenberg	Lawrence Berkeley National Laboratory	2005–2011
Susan M. Langhorst	Washington University, St. Louis	2005–2011
Edwin M. Leidholdt Jr.	U.S. Department of Veterans Affairs	2006-2012

Howard L. Liber	Colorado State University	2004-2010
James C. Lin	University of Illinois, Chicago	2005-2011
Jill A. Lipoti	New Jersey Department of Environmental Protection	2007-2013
John B. Little	Harvard University School of Public Health	2003-2009
Paul A. Locke	Johns Hopkins University	2004-2010
Jay H. Lubin	National Cancer Institute	2006-2012
C. Douglas Maynard	Wake Forest University School of Medicine	2006–2012
Debra McBaugh	Washington State Department of Health	2006-2012
Ruth E. McBurney	Conference of Radiation Control Program Directors	2007-2013
Cynthia H. McCollough	Mayo Clinic	2003-2009
Barbara J. McNeil	Harvard Medical School	2002-2008
Fred A. Mettler, Jr.	University of New Mexico	2004-2010
Charles W. Miller	Centers for Disease Control and Prevention	2006-2012
Donald L. Miller	National Naval Medical Center	2006-2012
William H. Miller	University of Missouri, Columbia	2005-2011
William F. Morgan	University of Maryland School of Medicine	2002-2008
David S. Myers	Retired	2007-2013
Bruce A. Napier	Pacific Northwest National Laboratory	2002-2008
Gregory A. Nelson	Loma Linda University	2006-2012
Carl J. Paperiello	Independent Consultant	2002-2008
R. Julian Preston	U.S. Environmental Protection Agency	2003-2009
Jerome C. Puskin	U.S. Environmental Protection Agency	2006–2012
Abram Recht	Beth Israel Deaconess Medical Center	2007-2013
Allan C.B. Richardson	Retired	2003-2009
Henry D. Royal	Mallinckrodt Institute of Radiology	2002-2008
Michael T. Ryan	Charleston Southern University	2004–2010
Jonathan M. Samet	Johns Hopkins University	2002-2008
Thomas M. Seed	Radiation Effects Research Foundation	2005-2011
Stephen M. Seltzer	National Institute of Standards and Technology	2004–2010
Roy E. Shore	Radiation Effects Research Foundation	2002-2008
Edward A. Sickles	University of California, San Francisco	2007–2013
Steven L. Simon	National Cancer Institute	2004–2010
Paul Slovic	Decision Research	2005–2011
Christopher G. Soares	National Institute of Standards and Technology	2005–2011
Daniel J. Strom	Pacific Northwest National Laboratory	2002–2008
Thomas S. Tenforde	National Council on Radiation Protection and Measurements	2002–2008
Julie E.K. Timins	Christ Hospital	2004-2010
Richard E. Toohey	Oak Ridge Associated Universities	2006-2012
Lawrence W. Townsend	University of Tennessee, Knoxville	2004-2010

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Fong Y. Tsai	University of California Medical Center, Irvine	2006–2012
Richard J. Vetter	Mayo Clinic	2004-2010
Chris G. Whipple	Environ	2007–2013
Stuart C. White	University of California, Los Angeles	2004-2010
J. Frank Wilson	Medical College of Wisconsin	2003-2009
Susan D. Wiltshire	JK Research Associates, Inc.	2003-2009
Gayle E. Woloschak	Northwestern University	2003-2009
Shiao Y. Woo	MD Anderson Cancer Center	2005-2011
Andrew J. Wyrobek	Lawrence Livermore National Laboratory	2006-2012
Marco A. Zaider	Memorial Sloan-Kettering Cancer Center	2005-2011

Board of Directors

Leslie A. Braby	Thomas F. Gesell	Thomas S. Tenforde
Antone L. Brooks	Kenneth R. Kase	Julie E.K. Timins*
Jerrold T. Bushberg	Amy Kronenberg	Susan D. Wiltshire
S.Y. Chen	Debra McBaugh*	

^{*}Newly elected to the Board of Directors on April 17, 2007

Officers

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

Distinguished Emeritus Members

Warren K. Sinclair, President Emeritus; Charles B. Meinhold, President Emeritus S. James Adelstein, Honorary Vice President W. Roger Ney, Executive Director Emeritus; William M. Beckner, Executive Director Emeritus

Patricia W. Durbin Kenneth L. Miller* Seymour Abrahamson Lynn R. Anspaugh Keith F. Eckerman Dade W. Moeller Thomas S. Ely John A. Auxier A. Alan Moghissi William J. Bair Wesley L. Nyborg Richard F. Foster Harold L. Beck R.J. Michael Fry John W. Poston, Sr. Bruce B. Boecker Ethel S. Gilbert Andrew K. Poznanski Victor P. Bond^{†1/07} Joel E. Gray Genevieve S. Roessler Robert L. Brent Robert O. Gorson Marvin Rosenstein Reynold F. Brown^{†1/07} Arthur W. Guy Lawrence N. Rothenberg Melvin W. Carter^{†8/07} Eric J. Hall Eugene L. Saenger^{†9/07} Randall S. Caswell Naomi H. Harley William J. Schull J. Donald Cossairt* William R. Hendee John E. Till James F. Crow Donald G. Jacobs Robert L. Ullrich Gerald D. Dodd Bernd Kahn Arthur C. Upton Sarah S. Donaldson Charles E. Land F. Ward Whicker William P. Dornsife Marvin C. Ziskin Roger O. McClellan

[†]Deceased during 2007.

^{*}Elected to Distinguished Emeritus Membership April 17, 2007.



Consociate Members

Full members of the Council become Consociate Members at the end of their terms provided they are not re-elected to another term on the Council or are not appointed to Distinguished Emeritus membership.

Peter R. Almond Larry E. Anderson Mary M. Austin-Seymour* Charles M. Barnes John W. Baum Michael A. Bender Merrill A. Bender B. Gordon Blaylock Frederick J. Bonte Harold S. Boyne John W. Brand A. Bertrand Brill Francis R. Bruce Thomas F. Budinger Patricia A. Buffler William W. Burr, Jr. Paul L. Carson Donald K. Chadwick Chung-Kwang Chou Stephen F. Cleary James E. Cleaver Fred T. Cross Francis A. Cucinotta* Stanley B. Curtis Carter Denniston E. Gail de Planque John F. Dicello Richard L. Doan Carl H. Durney

Donald C. Fleckenstein H. Keith Florig Kenneth R. Foster Everett G. Fuller Arthur H. Gladstein Barry B. Goldberg Marvin Goldman Douglas Grahn Andrew J. Grosovsky* Ellis M. Hall Robert J. Hasterlik John M. Heslep David G. Hoel George B. Hutchison Marylou Ingram Seymour Jablon A. Everette James, Jr. John R. Johnson James G. Kereiakes H. William Koch Harold L. Kundel Richard W. Leggett George R. Leopold Thomas A. Lincoln David I. Livermore Ray D. Lloyd Richard A. Luben Arthur C. Lucas Claire M. Mays Harry R. Maxon Mortimer L. Mendelsohn

John E. Moulder Peter C. Nowell Eugene F. Oakberg Gilbert S. Omenn Frank L. Parker Lester J. Peters Ronald C. Petersen William C Reinig **Robert Robbins** Lester Rogers Robert E. Rowland Keith J. Schiager Robert A. Schlenker Raymond Seltser Ferdinand J. Shore Kenneth W. Skrable David H. Sliney Chauncey Starr James H. Sterner Louise C. Strong Herman D. Suit Richard A. Tell Joop W. Thiessen Ralph H. Thomas Lois B. Travis* James E. Turner John C. Villforth Niel Wald

Daniel E. Wartenberg David A. Weber H. Rodney Withers Pat B. Zanzonico*

Marc Edwards

Joe A. Elder

Edward R. Epp

Charles M. Eisenhauer

Jack Miller*

William A. Mills

^{*}Elected to Consociate Membership April 17, 2007.

Administrative Committees

Budget & Finance Committee (appointed by the Board of Directors, April 18, 2007)

C. Douglas Maynard, Chairman

Mary E. Clark Stephen M. Seltzer Jill A. Lipoti Richard E. Toohey

Nominating Committee (appointed by the Board of Directors, April 18, 2007)

Paul M. DeLuca, Chairman

John F. AhearneDonald P. FrushJerrold T. BushbergSusan M. Langhorst

Program Committee for 2008 Annual Meeting

(appointed by the Board of Directors, September 21, 2006)

Antone L. Brooks, Chairman

Joel S. Bedford Amy Kronenberg
Bruce B. Boecker Charles E. Land
R.J. Michael Fry Roy E. Shore
Dudley T. Goodhead Julie E.K. Timins
Eric J. Hall Susan D. Wiltshire
Kenneth R. Kase Gayle E. Woloschak

Ann R. Kennedy



Scientific and Administrative Staff

David A. Schauer Executive Director

Isaf Al-Nabulsi VBDR Program Administrator

Laura J. Atwell Office Manager,

ICRU Assistant Executive Secretary

Patricia H. Barnhill Text Processor

R. Thomas Bell

James F. Berg

Accounting Consultant

Bruce B. Boecker

Technical Staff Consultant

Technical Staff Consultant

Technical Staff Consultant

Michael P. Grissom

Technical Staff Consultant

Luvenia J. Hawkins Text Processor

ISR Support Staff

Joel O. Lubenau Technical Staff Consultant
Constantine J. Maletskos Technical Staff Consultant
Morton W. Miller Technical Staff Consultant

Cindy L. O'Brien Managing Editor

Beverly A. Ottman Receptionist, Text Processor
Harold T. Peterson Technical Staff Consultant
Marvin Rosenstein Technical Staff Consultant

Carlotta M. Teague Publications Manager, Sales and Marketing
Melanie H. Todd VBDR Senior Administrative Assistant

Bonnie G. Walker Assistant Managing Editor
E. Ivan White Technical Staff Consultant
Jean York Technical Staff Consultant
Myrna A. Young Financial Records Manager

Program Area Committees and Advisory Panels

The program area and advisory committees advise the NCRP President and Board of Directors on issues specific to their expertise. They have responsibility for evaluating the need for new NCRP activities related to the philosophy and the basic principles and requirements in their subject areas.

The work of the Council is supported by six program area and one advisory committees. They are:

Program Area Committees

Basic Criteria, Epidemiology, Radiobiology, and Risk, Antone L. Brooks

Operational Radiation Safety, David S. Myers

Nuclear and Radiological Security and Safety, John W. Poston, Sr.

Radiation Protection in Medicine, Jerrold T. Bushberg

Environmental Radiation and Radioactive Waste Issues, S.Y. Chen

Radiation Measurements and Dosimetry, Thomas F. Gesell

Advisory Panels

Public Policy

Nonionizing Radiation

Vice Presidents

Each scientific program area and advisory committee is chaired by an NCRP Vice President. The Vice Presidents:

- Chair their committee
- Provide recommendations for new work in their area
- Represent NCRP to federal agencies and other potential supporters
- Represent NCRP at scientific meetings
- Advise on membership of their program area committee
- Assist chairmen of new scientific committees with selection of potential committee or advisory members
- Assist in management of scientific committee efforts
- Provide the chairman of the nominating committee with potential candidates for Council membership
- Review all draft publications within their program area committee prior to Council review



Basic Criteria, Epidemiology, Radiobiology, and Risk

Vice President, Antone L. Brooks

Key Functions of Program Area Committee (PAC) 1

- Evaluate and approve all NCRP scientific committee draft recommendations on exposure limits
- Evaluate new epidemiological and radiobiological data and determine their potential effect on human risk coefficients for radiation protection

Members of PAC 1

Antone L. Brooks, Vice President

Joel S. Bedford

Bruce B. Boecker

R.J. Michael Fry

Dudley T. Goodhead

Eric J. Hall

Kenneth R. Kase

Ann R. Kennedy

Amy Kronenberg

Charles E. Land

Roy E. Shore

Julie E.K. Timins

Susan D. Wiltshire

Gayle E. Woloschak

Warren K. Sinclair, Advisor

Thomas S. Tenforde, NCRP Contact

Authorized but Unfunded Activities

Lung cancer risks from inhaled radionuclides

Active Scientific Committees Under PAC 1

SC 1-8 Risk to the Thyroid from Ionizing Radiation

Status: Revising after Council review

Henry D. Royal, Chairman

David V. Becker

A. Bertrand Brill

Roy E. Shore

R. Michael Tuttle

Bruce W. Wachholz

David A. Weber

Pat B. Zanzonico

Elaine Ron, Advisor

Xiaonan Xue, Consultant

Morton W. Miller, Technical Staff Consultant

SC 1-13 Impact of Individual Susceptibility and Previous Radiation Exposure on Radiation Risk for Astronauts

Status: Preparing for Council review

Antone L. Brooks, Chairman

Mary M. Austin-Seymour

Joel S. Bedford

Keith H. Dinger

Roger W. Howell

Ritsuko Komaki

William F. Morgan

Roger P. Shaw

C. Griffin Trotter

Ellen Baker, Consultant

Barbara Hinze, Consultant

Thomas S. Tenforde, Technical Staff Consultant

SC 1-15 Radiation Protection and Science Goals for Short-Term Lunar Missions

Status: Preparing for Council review

Thomas S. Tenforde, Chairman

Jay Apt

Stephen A. Benjamin

Ethel S. Gilbert

Michael J. Golightly

Richard P. Hill

George E. Iliakis

Karen E. Jenni

Stephen W.S. McKeever

John E. Moulder

Peggy L. Olive

C. Griffin Trotter

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Kathryn D. Held, Advisor

Richard A. Mewaldt, Advisor

J. Leslie Redpath, Advisor

R.J. Michael Fry, Consultant

Amy Kronenberg, Consultant

Gregory A. Nelson, Consultant

Kenneth Souza, Consultant

Harold T. Peterson, Jr., Technical Staff Consultant

SC 1-17 Second Cancers and Cardiopulmonary Effects After Radiotherapy

Status: Committee drafting stage

Lois B. Travis, Chairman

John D. Boice, Jr., Vice Chairman

Kimberly E. Applegate

Louis S. Constine

Jean M. Cosset

Ethel S. Gilbert

Ann R. Kennedy

David Malkin

Andrea K.M. Ng

Ching-Hon Pui

James A. Purdy

Xie G. Xu

Joachim Yahalom

James M. Allan, Consultant

Morton W. Miller, Technical Staff Consultant

SC 85 Risk of Lung Cancer from Radon

Status: Preparing for Council review

Naomi H. Harley, Chairman

Douglas B. Chambers

Fred T. Cross

Helen Evans

Aurel Goodwin

Jay H. Lubin

John S. Neuberger

Janet B. Schoenberg

Peter G. Groer, Advisor

Howard L. Kusnetz, Advisor

Edith S. Robbins, Consultant

Editii 5. Robbins, Consumm

David A. Schauer, NCRP Contact

Operational Radiation Safety

Vice President, David S. Myers

Key Functions of Program Area Committee (PAC) 2

- Serve as a national resource for information on operational radiation safety
- Formulate guidance regarding the application of operational radiation safety principles

Members of PAC 2

David S. Myers, Vice President

Edgar D. Bailey

Mary L. Birch

Susan J. Engelhardt

John R. Frazier

Eric M. Goldin

Kathryn A. Higley

Joel O. Lubenau

John W. Luetzelschwab

Kenneth L. Miller

John W. Poston, Sr.

Kathryn H. Pryor

Thomas S. Tenforde, NCRP Contact

Authorized but Unfunded Activities

- Air monitoring
- Design guidelines for nuclear medicine facilities
- Design of facilities and installed equipment for handling unsealed radioactive materials
- Investigation of radiological incidents
- Operational radiation safety in medical fusion imaging procedures
- Radiation protection guidelines for industrial accelerators and irradiators



Active Scientific Committees Under PAC 2

SC 2-2 Key Decision Points and Information Needed by Decision Makers in the Aftermath of a Nuclear or Radiological Terrorism Incident

Status: Committee drafting stage

John W. Poston, Sr., Chairman

Brooke Buddemeier

Abel J. Gonzalez

Robert Ingram

Cynthia G. Jones

Kathleen Kaufman

John Lanza

Edwin M. Leidholdt

Debra McBaugh

Stephen Musolino

Tammy Taylor

Jerrold T. Bushberg, Consultant

Kenneth L. Groves, Technical Staff Consultant

SC 2-3 Radiation Safety Issues for Image-Guided Interventional Medical Procedures

Status: Committee drafting stage

Stephen Balter, Chairman

Beth A. Schueler, Vice Chairman

James A. Brink

Charles E. Chambers

Kenneth F. Layton

M. Victoria Marx

Cynthia H. McCollough

Donald L. Miller

Keith J. Strauss

Louis K. Wagner

Marvin Rosenstein, Technical Staff Consultant

SC 2-4 Self Assessment of Radiation Safety Programs

Status: Committee drafting stage

David S. Myers, Chairman

Edgar D. Bailey

Mary L. Birch

Susan J. Engelhardt

John R. Frazier

Eric M. Goldin

Kathryn A. Higley

Joel O. Lubenau

John W. Luetzelschwab

Kenneth L. Miller John W. Poston, Sr. Kathryn H. Pryor Thomas S. Tenforde, *NCRP Contact*

Published in 2007

Report No. 157, *Radiation Protection in Educational Institutions*, was published in June 2007. The Report was drafted by Scientific Committee 46-17 under the chairmanship of Susan M. Langhorst.



Nuclear and Radiological Security and Safety

Vice President, John W. Poston, Sr.

Key Functions of Program Area Committee (PAC) 3

- Identify important steps to be taken in the interdiction of, preparedness for, and effective responses to possible acts of nuclear or radiological terrorism
- Define performance requirements, instrumentation, and testing criteria for security surveillance systems
- Develop operational strategies and optimization procedures for early, intermediate and latephase responses to a nuclear or radiological terrorism incident
- Recommend effective methods for protecting against, mitigating, and treating traumatic injuries and long-term health and psychological effects of radiation exposure and other immediate stress effects such as thermal burns, shock, and contaminated shrapnel wounds resulting from a nuclear or radiological explosions to possible acts of nuclear or radiological terrorism
- Analyze methods for optimizing the cleanup, site restoration, and disposition of contaminated materials resulting from a nuclear or radiological terrorism incident
- Develop operational strategies and optimization procedures for early, intermediate and latephase responses to a nuclear or radiological terrorism incident

Members of PAC 3

John W. Poston, Jr., Vice President
Steven M. Becker
Brooke Buddemeir
Debra McBaugh
Stephen Musolino
Terry C. Pellmar
Tammy P. Taylor
Leslie A. Braby, Liaison
Jerrold T. Bushberg, Liaison
Jill A. Lipoti, Liaison
Julie E.K. Timins, Liaison
Thomas S. Tenforde, NCRP Contact

Radiation Protection in Medicine

Vice President, Jerrold T. Bushberg

Key Functions of Program Area Committee (PAC) 4

- Identify areas with which NCRP should be concerned in radiation protection of patients in medical, dental and chiropractic practice
- Examine and evaluate techniques and procedures to eliminate unnecessary radiation exposure to the patient
- Examine and evaluate training of medical personnel in radiation protection

Members of PAC 4

Jerrold T. Bushberg, Vice President

Edward S. Amis

James A. Brink

John F. Cardella

Cindy C. Cardwell

Kelly L. Classic

Marc Edwards

Donald P. Frush

Ronald E. Goans

Linda A. Kroger

Edwin M. Leidholdt

Fred A. Mettler, Jr.

Theodore L. Phillips

J. Anthony Seibert

Stuart C.White

Shiao Y. Woo

Thomas S. Tenforde, NCRP Contact

Authorized but Unfunded Activities

- Medical evaluation of workers
- Radiological protection standards and ethical issues in studies involving radiation exposure of human research subjects
- Radiation protection guidance for computed tomography



Active Scientific Committees Under PAC 4

SC 4-1 Management of Persons Contaminated with Radionuclides

Status: Preparing for Council review

William J. Bair, Chairman

Wesley E. Bolch

William E. Dickerson

Keith F. Eckerman

Ronald E. Goans

P. Andrew Karam

Richard W. Leggett

Joyce L. Lipzstein

Michael G. Stabin

Albert A. Wiley

Bryce D. Breitenstein, Advisor

Eugene Carbaugh, Consultant

Bruce B. Boecker, Technical Staff Consultant

SC 4-2 Population Monitoring and Decontamination Following a Nuclear/Radiological Incident

Status: Committee drafting stage

Richard J. Vetter, Chairman

Steven M. Becker

Eugene Carbaugh

James R. Cassata

Scott Davis

Fun H. Fong, Jr.

P. Andrew Karam

Steven H. King

Adela Salame-Alfie

Casper Sun

Katherine Uraneck

George J. Vargo

Bruce B. Boecker, Technical Staff Consultant

Environmental Radiation and Radioactive Waste Issues

Vice President, S.Y. Chen

Key Functions of Program Area Committee (PAC) 5

- Serve as a national resource for environmental radiation and radioactive waste information and data
- Prepare scientific reports, commentaries and statements that can be used as fundamental scientific references dealing with radionuclides in the environment
- Help formulate NCRP recommendations on disposal of radioactive and mixed wastes
- Encourage scientific and technical discourse on the disposal of radioactive and mixed wastes including environmental and human risk from disposal
- Encourage scientific and technical discourse on the cost-benefit of activities generating radioactive and mixed wastes

Members of PAC 5

S.Y. Chen, Vice President

Mary E. Clark

Thomas F. Gesell

Martin J. Letourneau

Jill A. Lipoti

Margaret M. MacDonell

Bruce A. Napier

Carl J. Paperiello

Frank L. Parker

Andrew Wallo, III

Chris G. Whipple

Anthony B. Wolbarst

Thomas S. Tenforde, NCRP Contact

Authorized but Unfunded Activities

- Assessment of measurement methodologies for environmental indicators of past releases (joint with PAC 6)
- Case studies and lessons learned from remediation of sites and facilities with radioactive contamination

Annual Report



- Clearance as a radiation protection strategy for radioactive material management
- Development of a risk assessment and risk management parameter handbook
- Development of an NCRP commentary on clearance as a radiation protection strategy for radioactive material management
- Development of an NCRP position on the use of risk management concepts
- Development of an NCRP document on criteria for unrestricted release of slightly radioactive solid materials
- Need for financial support of academic health physics programs
- Radiation protection criteria for plants and animals
- Risk-based corrective actions in remediation of contaminated ecosystems
- Symposium on comparison of methods for estimating and managing radiological and chemical risks
- Usage factors for environmental dose calculations

Active Scientific Committees Under PAC 5

SC 64-22 Design of Effective Effluent and Environmental Monitoring Programs

Status: Preparing for Council review

Bernd Kahn, Chairman

James D. Berger

John Glissmeyer

Carl V. Gogolak

Norbert Golchert

Richard E. Jaquish

Janet A. Johnson

Shyam K. Nair

Bruce A. Napier, Consultant

E. Ivan White, Technical Staff Consultant

Radiation Measurements and Dosimetry

Vice President, Thomas F. Gesell

Key Functions of Program Area Committee (PAC) 6

- Evaluate the field of radiation measurements and dosimetry
- Serve as a source of information to scientific committees preparing reports that include radiation measurements and dosimetry
- Maintain liaison with other organizations and professional societies that have similar interests

Members of PAC 6

Thomas F. Gesell, Vice President

Harold L. Beck

William F. Blakely

Wesley E. Bolch

Leslie A. Braby

Paul M. DeLuca

John F. Dicello

Keith F. Eckerman

Shawna Eisele

Raymond A. Guilmette

Richard T. Kouzes

Margaret McMahn-Norris

David A. Schauer

Steven L. Simon

Christopher G. Soares

David A. Schauer, NCRP Contact

Authorized but Unfunded Activities

- Aerosol measurements
- Assessment of measurement methodologies for environmental indicators of past releases (joint with PAC 5)
- Biological dosimetry
- Evaluation of ultrasensitive measurement techniques
- Guidance on measurements for quality assurance and verification for conformal radiation therapy
- Update of NCRP Report No. 58 "Handbook of Radioactivity Measurements"



Active Scientific Committees Under PAC 6

SC 6-2 Radiation Exposure of the U.S. Population (listed by subcommittee)

<u>Status</u>: Committee drafting stage Kenneth R. Kase, *Chairman* Marvin Rosenstein, *Technical Staff Consultant*

Industrial Exposures

Dennis M. Quinn, *Chairman*Ralph L. Andersen
Regis A. Greenwood
Cynthia G. Jones
E. Scott Medling
Carl J. Paperiello
Linda M. Sewell

Occupational Exposures

Kenneth L. Miller, *Chairman* David J. Allard
Kelly L. Classic
Michael A. Lewandowski
Kathleen L. Shingleton
George J. Vargo

Medical Patient Exposures

Bruce R. Thomadsen, *Chairman* Mythreyi Bhargavan Debbie B. Gilley Joel E. Gray Jill A. Lipoti Mahadevappa Mahesh Fred A. Mettler, Jr. Terry T. Yoshizumi John L. McCrohan, *Consultant*

Background Exposures

Daniel J. Strom, *Chairman*Alan Birchall
Thomas B. Borak
David J. Brenner
Thomas F. Gesell
Paul E. Goldhagen
Keran O'Brien, III
Jerome S. Puskin
Anthony C. James, *Consultant*

Consumer Products and Miscellaneous Source Exposures

Orhan H. Suleiman, *Chairman*Jennifer Goodman
Raymond A. Johnson
Cheryl K. Rogers
Paul W. Frame, *Consultant*Ronald L. Kathren, *Consultant*

SC 6-3 Uncertainties in Internal Radiation Dosimetry

Status: Committee drafting stage Andre Bouville, Chairman A. Julian Apostoaei Wesley E. Bolch Raymond A. Guilmette Anthony C. James Kimberlee J. Kearfott Guthrie Miller David J. Pawell Charles A. Potter George Sgouros Michael G. Stabin Richard E. Toohey Alan Birchell, Consultant Clayton French, Consultant Richard W. Leggett, Advisor R. Thomas Bell, Technical Staff Consultant

SC 6-4 Fundamental Principles of Dose Reconstruction

Status: Committee drafting stage
Bruce A. Napier, Chairman
Lynn R. Anspaugh
Robert D. Daniels
George D. Kerr
David C. Kocher
Kenneth J. Kopecky
James W. Neton
Steven L. Simon
Richard E. Toohey
Paul G. Voilleque
Elena Buglova, Consultant
John E. Till, Advisor
Marvin Rosenstein, Technical Staff Consultant



SC 6-6 Skin Doses from Dermal Contamination

Status: Committee drafting stage
Thomas F. Gesell, *Chairman*Herman Cember
James Durham
John Hopewell
Michael P. Grissom, *Technical Staff Consultant*

SC 6-7 Evaluation of Inhalation Doses in Scenarios Involving Resuspension by Nuclear Detonations at the Nevada Test Site

Status: Committee drafting stage Randall S. Caswell, *Chairman* Thomas Cousins Joseph H. Shinn Mary Ann Parkhurst Otto Raabe Michael P. Grissom, *Technical Staff Consultant*

Published in 2007

Report No. 158, *Uncertainties in the Measurement and Dosimetry of External Radiation*, was published in December 2007. The Report was drafted by Scientific Committee 6-1 under the chairmanship of Harold L. Beck.

Commentary No. 20, Radiation Protection and Measurement Issues Related to Cargo Scanning with Accelerator-Produced High-Energy X Rays, was published in December 2007. The Commentary was drafted by Scientific Committee 6-5 under the chairmanship of Leslie A. Braby.

Public Policy

Key Functions of Public Policy Panel

- Evaluate the use of scientific knowledge about radiation in the development of policy
- Evaluate the effectiveness of communication among scientists, policy makers, and the public on issues involving radiation
- Serve as a resource to any scientific committees preparing documents that may be used as the basis for public policy, decision making, and public communication
- Develop and implement activities that encourage the interest and involvement of a broad spectrum of individuals and groups who can contribute to or benefit from NCRP studies and documents
- Identify policy implications of topics NCRP is investigating and of methods for effectively communicating results to policy makers

Members of Advisory Panel

John F. Ahearne
Steven M. Becker
Mary E. Clark
David C. Kocher
Jill A. Lipoti
Paul A. Locke
Charles W. Miller
Paul Slovic
Chris G. Whipple
Susan D. Wiltshire
Thomas S. Tenforde, NCRP Contact



Nonionizing Radiation

Key Functions of Nonionizing Radiation Panel

- Analyze mechanisms of interaction of nonionizing radiation with biological systems, including humans
- Identify biological responses and potential human health effects
- Evaluate theoretical and applied aspects of dosimetry and exposure assessment of humans to nonionizing radiation
- Provide recommendations on acceptable exposure levels for nonionizing radiation in occupational, medical and public environments
- Analyze procedures for mitigating exposure in public and occupational settings

Members of Advisory Panel

Jerrold T. Bushberg

James E. Cleaver

Arthur W. Guy

David G. Hoel

James C. Lin

David H. Sliney

Jan A.J. Stolwijk

Richard A. Tell

Marvin C. Ziskin

Thomas S. Tenforde, NCRP Contact

Collaborating Organizations

Organizations or groups of organizations that are national in interest and are concerned with scientific problems involving radiation quantities, units, measurements and effects, or radiation protection may be granted collaborating status by NCRP. Collaborating Organizations provide a means by which NCRP can gain input into its activities from a wider segment of society. At the same time, the relationships with the Collaborating Organizations facilitate wider dissemination of information about the Council's activities, interests and concerns. Collaborating Organizations have the opportunity to comment on draft reports at the time that drafts are submitted to the members of the Council. This is intended to capitalize on the fact that Collaborating Organizations are in an excellent position to both contribute to the identification of what needs to be treated in NCRP reports and to identify problems that might result from proposed recommendations. The Collaborating Organizations for the year 2007 are:

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American Academy for Dermatology

American Academy of Environmental Engineers

American Academy of Health Physics

American Academy of Orthopaedic Surgeons American Association of Physicists in Medicine

American Brachytherapy Society

American College of Cardiology

American College of Medical Physics American College of Nuclear Physicians

American College of Occupational and Environmental

Medicine

American College of Radiology

American Conference of Governmental Industrial

Hygienists

American Dental Association

American Industrial Hygiene Association

Contact Person

Robert Bolan,

Robert O. Gorson

William C. Anderson Howard W. Dickson

Howard W. Dickson

Karen L. Hackett Lynne Fairobent,

Angela R. Keyser

- . . . - . . .

Rick Guggolz, Mark J. Rivard

James Dove

Carrie Kovar

Cullic Roval

Lawrence N. Rothenberg

Bennett Greenspan,

Virginia Pappas

Joel R. Bender,

Thomas S. Ely

Harvey L. Neiman

James Price

James B. Bramson

O. Gordon Banks,

Irene Patrek

Annual Report

American Medical Association

American Public Health Association

American Roentgen Ray Society

American Radium Society

NCRP

American Institute of Ultrasound in Medicine Carmine M. Valente,

Marvin C. Ziskin Barry Dickinson, James Lyznicki

American Nuclear Society Bernard L. Cohen,

Shawn Coyne-Naubett, Patricia Schroeder

American Pharmaceutical Association Anne Burns

American Podiatric Medical Association Pamela J. Coleman,

Glenn B. Gastwirth Georges C. Benjamin Jackie Weinstein James A. Brink

Laura Thevenot

American Society for Therapeutic Radiology and

Oncology

American Society of Emergency Radiology

American Society of Health-System Pharmacists

American Society of Nuclear Cardiology

Steven Carter

Steven Carter

American Society of Radiologic Technologists

F. Lynn May,

Greg Morrison

Association of Educators in Imaging and Radiological Valerie Christensen

Sciences

Association of University Radiologists

Josette Szalko
Bioelectromagnetics Society

Stefan Engstrom,

Gloria Parsley
Ninni Jacob

Ruth McBurney

Campus Radiation Safety Officers

College of American Pathologists

Myron Pollycove,
Lee Van Breman

Conference of Radiation Control Program Directors, Inc. David Allard,

Council on Radionuclides and Radiopharmaceuticals

Henry Kramer,
Leonard R. Smith
Defense Threat Reduction Agency

Paul K. Blake

Electric Power Research Institute

Federal Communications Commission

Paul K. Blake

Kurt E. Yeager

Robert F. Cleveland, Jr.

Federal Emergency Management Agency Vanessa Quinn

Genetics Society of America Seymour Abrahamson

Health Physics Society

Brian Dodd,
Richard Burk

Institute of Electrical and Electronics Engineers, Inc. Ronald C. Petersen,

Mary Ward-Callan

Institute of Nuclear Power Operations Jeff Place

International Brotherhood of Electrical Workers William F. Paul National Aeronautics and Space Administration NASA Administrator National Association of Environmental Professionals Clay E. Easterly National Center for Environmental Health / Agency for Robert L. Spengler Toxic Substances and Disease Registry Stephen Vastagh, National Electrical Manufacturers Association Andrew Whitman William G. Lotz National Institute for Occupational Safety and Health National Institute of Standards and Technology David Gilliam, James Turner Nuclear Energy Institute Ralph Andersen Office of Science and Technology John Marburger Paper, Allied-Industrial, Chemical and Energy Workers Mark Griffon, International Union Herman Potter Product Stewardship Institute Scott Cassel Radiation Research Society Martin Brown Radiological Society of North America Dave Fellers Society for Cardiovascular Angiography and Charles Chambers, Interventions Wayne Powell, Bonnie H. Weiner Society for Pediatric Radiology Marilyn J. Goske Society for Risk Analysis Robin Cantor Society of Chairmen of Academic Radiology Lise Swanson Departments Society of Interventional Radiology Stephen Balter, Debbie Katsarelis Society of Nuclear Medicine Virginia Pappas, Henry D. Royal Susan Roberts Society of Radiologists in Ultrasound Society of Skeletal Radiology David Rubin U.S. Air Force Ramachandra K. Bhat Surgeon General U.S. Army, U.S. Army Robert Eng U.S. Coast Guard Michael Adess U.S. Department of Energy Secretary of Energy U.S. Department of Housing and Urban Development Richard H. Broun, Joel Segal U.S. Department of Labor Chia Ting Chen

U.S. Department of Transportation

U.S. Navy

U.S. Environmental Protection Agency

Richard W. Boyle

EPA Administrator, Elizabeth Cotsworth

Safety Committee

Chairman, Navy Radiation

NCRP

U.S. Nuclear Regulatory Commission

U.S. Public Health Service Utility Workers Union of America NRC Chairman, E. Vincent Holahan Petro Shandruk John M. Walsh, Jr.

Special Liaison Organizations

States that have an interest in radiation protection and measurements. This relationship provides: (1) an opportunity for participating organizations to designate an individual to provide liaison between the organization and NCRP; (2) that the individual designated will receive copies of draft NCRP reports (at the time that these are submitted to the members of the Council) with an invitation to comment but not vote; and (3) that new NCRP efforts might be discussed with liaison individuals as appropriate, so that they might have an opportunity to make suggestions on new studies and related matters. The Special Liaison Organizations for 2007 are:

Organization	Contact Person
Australian Radiation Laboratory	Keith H. Lokan
Bundesamt fur Strahlenschutz (Germany) (Federal Office for Radiation Protection)	Wolfram Konig
Canadian Nuclear Safety Commission	J.K. Pereira
Central Laboratory for Radiological Protection (Poland)	Slawomir Sterlinski
China Institute for Radiation Protection	Huating Yang
Commissariat a l'Energie Atomique (France)	Annie Sugier
Commonwealth Scientific Instrumentation Research Organization (Australia)	Stan Barnett
European Commission	Hans Forsstrom
Health Council of the Netherlands	A. Wijbenga
Health Protection Agency	Roger Cox
International Commission on Non-Ionizing Radiation Protection	Paolo Vecchia
International Commission on Radiation Units and Measurements	Paul M. DeLuca
Japanese Nuclear Safety Commission	Atsuyki Suzuki
Japan Radiation Council	Yasuhito Sasaki
Korea Institute of Nuclear Safety	Kwang Sik Choi
Russian Scientific Commission on Radiation Protection	Anatoly F. Tsyb
South African Forum for Radiation Protection	D. van As
World Association for Nuclear Operators	Edgar Hux
World Health Organization, Unit of Radiation and Environmental Health	Zhanat Carr



Corporate Sponsors

The Corporate Sponsor's Program facilitates the interchange of information and ideas, and corporate sponsors provide valuable fiscal support for the NCRP program. The Corporate Sponsors for 2007 are:

Organization	Contact Person
3M	Frederick B. Entwistle
Duke Energy Corporation	Larry Haynes
GE Healthcare	Mark Doruff
Global Dosimetry Solutions	Sander Perle
Landauer, Inc.	R. Craig Yoder
Nuclear Energy Institute	Ralph L. Andersen

Review Process

The review process for draft publications is elaborate and comprehensive. It begins with a review by a group of critical reviewers designated by the appropriate PAC Vice President. Second, following modification of the draft on the basis of the comments of the critical reviewers, the publication is submitted for review to the full Council membership (100), Distinguished Emeritus members (48), Collaborating organizations (73), and Special Liaison organizations (18). At the time a draft is submitted for Council review it is also placed on the NCRP's website for public comment (http://NCRPonline.org). Further modification of draft reports on the basis of the comments received follows, with the goal of reaching a scientific consensus on the material included in the report. An NCRP report can be released for publication by the President only if there are no more than two remaining disapprovals by members of the Council after resolution of review comments.

In addition to full reports, NCRP also produces statements, commentaries, and presidential reports. Statements are brief documents (four or fewer pages) that succinctly address topics of contemporary interest and importance for radiation protection. The review and approval process for statements is the same as for reports. NCRP commentaries are documents that provide preliminary evaluations, critiques, reviews and results of exploratory studies, or extensions of previously published NCRP reports on an accelerated schedule when time for the normal review process is not available. Approval is by the Board of Directors with involvement by other Council members to an extent dependent on the time available. Presidential reports are documents on specific issues in radiation health protection that are developed by a scientific committee, reviewed by members of Council and other subject-area experts as needed, and approved for publication by the Board of Directors and the President.



Lauriston S. Taylor Lectures

Year	Title	Lecturer
2007	The Quest for Therapeutic Actinide Chelators	Patricia W. Durbin
2006	Fifty Years of Scientific Investigation: The Importance of Scholarship and the Influence of Politics and Controversy	Robert L. Brent
2005	Nontargeted Effects of Radiation: Implications for Low- Dose Exposures	John B. Little
2004	Radiation Protection in the Aftermath of a Terrorist Attack Involving Exposure to Ionizing Radiation	Abel J. Gonzalez
2003	The Evolution of Radiation Protection: From Erythema to Genetic Risks to Risks of Cancer to ?	Charles B. Meinhold
2002	Developing Mechanistic Data for Incorporation into Cancer Risk Assessment: Old Problems and New Approaches	R. Julian Preston
2001	Assuring the Safety of Medical Diagnostic Ultrasound	Wesley L. Nyborg
2000	Administered Radioactivity: Unde Venimus Quoque Imus	S. James Adelstein
1999	Back to Background	Naomi H. Harley
1998	From Chimney Sweeps to Astronauts: Cancer Risks in the Work Place	Eric J. Hall
1997	Radionuclides in the Body: Meeting the Challenge	William J. Bair
1996	70 Years of Radiation Genetics: Fruit Flies, Mice and Humans	Seymour Abrahamson
1995	Certainty and Uncertainty in Radiation Research	Albrecht M. Kellerer
1994	Mice, Myths, and Men	R.J. Michael Fry
1993	Science, Radiation Protection and the NCRP	Warren K. Sinclair
1992	Dose and Risk in Diagnostic Radiology: How Big? How Little?	Edward W. Webster
1991	When is a Dose Not a Dose?	Victor P. Bond
1990	Radiation Protection and the Internal Emitter Saga	J. Newell Stannard

1989	Radiobiology and Radiation Protection: The Past Century and Prospects for the Future	Arthur C. Upton
1988	How Safe is Safe Enough?	Bo Lindell
1987	How to be Quantitative about Radiation Risk Estimates	Seymour Jablon
1986	Biological Effects on Non-Ionizing Radiations: Cellular Properties and Interactions	Herman P. Schwan
1985	Truth (and Beauty) in Radiation Measurements	John H. Harley
1984	Limitation and Assessment in Radiation Protection	Harald H. Rossi
1983	The Human Environment—Past, Present and Future	Merril Eisenbud
1982	Ethics, Trade-Offs and Medical Radiation	Eugene L. Saenger
1981	How Well Can We Assess Genetic Risk? Not Very	James F. Crow
1980	From "Quantity of Radiation" and "Dose" to "Exposure" and "Absorbed Dose"—An Historical Review	Harold O. Wyckoff
1979	Radiation Protection—Concepts and Trade Offs	Hymer L. Friedell
1978	Why be Quantitative About Radiation Risk Estimates?	Sir Edward Pochin
1977	The Squares of the Natural Numbers in Radiation Protection	Herbert M. Parker

2007 Lauriston S. Taylor Lecture

The Thirty-First Lauriston S. Taylor Lecture presented by Patricia W. Durbin, *The Quest for Therapeutic Actinide Chelators*, will be published in *Health Physics*.

Annual Meetings

Year	Торіс
2007	Advances in Radiation Protection in Medicine
2006	Chernobyl at Twenty
2005	Managing the Disposition of Low-Activity Radioactive Materials
2004	Advances in Consequence Management for Radiological Terrorism Events
2003	Radiation Protection at the Beginning of the 21st Century—A Look Forward
2002	Where the New Biology Meets Epidemiology: Impact on Radiation Risk Estimates
2001	Fallout from Atmospheric Nuclear Tests—Impact on Science and Society
2000	Ionizing Radiation Science and Protection in the 21st Century
1999	Radiation Protection in Medicine: Contemporary Issues
1998	Cosmic Radiation Exposure of Airline Crews, Passengers and Astronauts
1997	The Effects of Pre- and Postconception Exposure to Radiation
1996	Implications of New Data on Radiation Cancer Risk
1995	Environmental Dose Reconstruction and Risk Implications
1994	Extremely-Low-Frequency Electromagnetic Fields: Issues in Biological Effects and Public Health
1993	Radiation Science and Societal Decision Making
1992	Radiation Protection in Medicine
1991	Genes, Cancer and Radiation Protection
1990	Health and Ecological Implications of Radioactively Contaminated Environments
1989	Radiation Protection Today—The NCRP at Sixty Years
1988	Radon
1987	New Dosimetry at Hiroshima and Nagasaki and Its Implications for Risk Estimates
1986	Nonionizing Electromagnetic Radiations and Ultrasound
1985	Radioactive Waste
1984	Some Issues Important in Developing Basic Radiation Protection Recommendations
1983	Environmental Radioactivity
1982	Radiation Protection and New Medical Diagnostic Approaches

1981	Critical Issues in Setting Radiation Dose Limits
1980	Quantitative Risk in Standards Setting
1979	Perceptions of Risk

2007 Annual Meeting

The Forty-Third Annual Meeting of the NCRP was held April 16–17, 2007 in Arlington, Virginia. The topic of the meeting was *Advances in Radiation Protection in Medicine*. The sessions and presentations were as follows:

Fourth Annual Warren K. Sinclair Keynote Address

Use and Misuse of Radiation in Medicine, James A. Brink

Diagnostic Radiology I

Magnitude of Radiation Uses and Doses in the United States: NCRP Scientific Committee 6-2 Analysis of Medical Exposures, Fred A. Mettler, Jr.

Dose in Computed Tomography: How to Quantitate, How to Reduce, Cynthia H. McCollough Pediatric Dose Reduction in Computed Tomography, Donald P. Frush

Diagnostic Reference Levels for Medical Imaging with Ionizing Radiation: ICRP Guidance, Marvin Rosenstein

Capturing Patient Doses from Fluoroscopically-Based Diagnostic and Interventional Systems, Stephen Balter

Interdisciplinary Issues

Update on Linear Nonthreshold Dose-Response Model and Implications for Diagnostic Radiology Procedures, R. Julian Preston

Research Involving Human Subjects, Richard L. Morin

Radiation and Pregnancy, Claire Cousins

Nuclear Medicine

Operational Radiation Safety for PET, PET/CT, and Cyclotron Facilities, Pat B. Zanzonico Combined Imaging Modalities: PET/CT and SPECT/CT, Alan H. Maurer

Diagnostic Radiology II

Exposure Reduction Through Quality Assurance for Diagnostic X-Ray Procedures, Jill A. Lipoti State of Art: Computed Radiography and Digital Radiography, J. Anthony Seibert Developments in Mammography, Martin J. Yaffe
Trends in Utilization and Collective Doses from Medical Procedures, Mythreyi Bhargavan Cone-Beam Imaging in Dentistry, Stuart C. White



Interventional Procedures

Overview of Contemporary Interventional Procedures, Donald L. Miller Patient and Personnel Safety in Interventional Fluoroscopy Procedures, Louis K. Wagner Technical Advances of Interventional Fluoroscopy and Flat-Panel Image Receptor, Pei-Jan P. Lin

Radiation Oncology

New Technologies in Radiation Therapy: Ensuring Patient Safety, Radiation Safety, and Regulatory Issues in Radiation Oncology, Howard L. Amols

Dose to Normal Tissues Outside the Radiation Therapy Patient's Treated Volume: A Review of Different Radiation Therapy Techniques, James A. Purdy

Patient Susceptibility to Radiation-Induced Cancer and Second Cancers Following Radiotherapy Procedures, James M. Allan

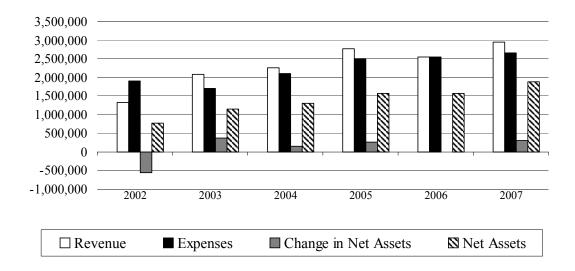
Serving on the Program Committee for the 2007 Annual Meeting were: Jerrold T. Bushberg, Chairman; Stephen Balter, James A. Brink, Cynthia C. Cardwell, Charles E. Chambers, Donald P. Frush, Linda A. Kroger, Edwin M. Leidholdt, Jr., Fred A. Mettler, Jr., Thomas Olhaber, Theodore L. Phillips, James E. Rodgers, J. Anthony Seibert, and Thomas B. Shope, Jr. The proceedings of the 2007 Annual Meeting will be published in *Health Physics*.

APPENDICES

Financial Summary

The table and bar graph presented below exhibit the year-end financial data for 2007 and the five preceding years in the following categories: (1) total revenue from grants, contracts, contributions, corporate sponsorships, administrative services, sales of publications, and investments; (2) total operating and investment expenses; (3) change in net assets of the corporation; and (4) net assets. For the fifth year in a row revenue exceeded expenses and NCRP's net assets grew.

Year	Revenue	Expenses	Change in Net Assets	Net Assets
2002	1,333,185	1,898,246	(565,061)	774,876
2003	2,078,744	1,695,867	382,877	1,157,753
2004	2,249,303	2,093,973	155,330	1,313,083
2005	2,765,706	2,507,843	257,863	1,570,946
2006	2,548,731	2,542,101	6,630	1,577,576
2007	2,955,060	2,647,516	307,544	1,885,120





Appendix 1: Finances

Exhibit A Statement of Financial Position December 31, 2007

(unaudited)

Current Assets	
Cash and cash equivalents	574,246
Investments [at market]	1,434,467
Accounts receivable:	
Publications [net of allowance of 2,863]	40,049
Grants and contracts	186,410
International Commission on Radiation Units and Measurements	1,054
International Society of Radiology	329
Other	8
Accrued interest receivable	3,517
Inventory—publications	330,003
Prepaid expenses and other assets	28,818
Total current assets	2,598,901
Property and Equipment [at cost]	
Furniture and equipment	323,320
Leasehold improvements	8,510
	331,830
Less accumulated depreciation and amortization	300,759
Total property and equipment	31,071
TOTAL ASSETS	2,629,972
Liabilities	
Accounts payable and accrued expenses	258,797
Total current liabilities	258,797

TOTAL LIABILITIES AND NET ASSETS

NCRP

2,629,972

Other		

Deferred rent liability	14,171
Accrued post retirement benefits	471,884
Total other liabilities	486,055
TOTAL LIABILITIES	744,852
Net Assets	
Unrestricted:	
Undesignated	385,744
Board designated	1,316,457
Temporarily restricted	182,919
TOTAL NET ASSETS	1,885,120



Exhibit B
Statement of Activities
For the year ended December 31, 2007
(unaudited)

	Unrestricted	Temporarily Restricted	Total
Revenue and Other Increases			
Contracts and grants	2,344,208		2,344,208
Contributions	136,649		136,649
Corporate sponsorship	45,000		45,000
Sales of publications	285,975		285,975
Dividends and interest	51,414	4,510	55,924
Professional and administrative services	39,364		39,364
Net realized and unrealized gains (loss) on investments	76,082	(28,142)	47,940
Total revenue and other increases	2,978,692	(23,632)	2,955,060
Expenses			
Program costs:			
Contracts and grants	1,344,653		1,344,653
Publications	175,884		175,884
Lecture	0	2,000	2,000
Investment fees	18,343	2,949	21,292
	1,538,880	4,949	1,543,829
Management and general expenses	1,103,687	0	1,103,687
Total expenses	2,642,567	4,949	2,647,516
Change in Net Assets	336,125	(28,581)	307,544
Net Assets at Beginning of Year	1,366,076	211,500	1,577,576
Net Assets at End of Year	1,702,201	182,919	1,885,120

Exhibit C Statement of Cash Flow For the year ended December 31, 2007

(unaudited)

Cash flows from operating activities:	
Change in net assets	307,544
Adjustments to reconcile change in net assets to cash provided by operating activities	
Depreciation and amortization	8,023
Net realized and unrealized gain on investments	(47,940)
(Increase) decrease in assets:	
Accounts receivable	(50,946)
Inventory—publications	(17,125)
Prepaids and other assets	2,609
Increase (decrease) in liabilities:	
Accounts payable and accrued expenses	75,027
Deferred rent liability	(3,364)
Accrued post retirement benefits	(16,627)
Net cash provided by operating activities	257,201
Cash flows from investing activities:	
Purchase of furniture, equipment and leasehold improvements	(9,287)
Purchase of investments	(894,053)
Sale of investments	885,180
Net cash used by investing activities	(18,160)
Net increase in cash and cash equivalents	239,041
Cash and cash equivalents at beginning of year	335,205
Cash and cash equivalents at end of year	574,246



Schedule 1 Schedule of Contracts and Grants Revenue For the year ended December 31, 2007

(unaudited)

\sim					
Co	n	tı	ra	C	tc

Centers for Disease Control and Prevention	155,513
Defense Threat Reduction Agency and Veterans Administration	1,244,522
Department of Homeland Security, Domestic Nuclear Detection Office	314,196
U.S. Navy	49,044
Total contracts	1,763,275
Grants	
Department of Energy	37,581
National Cancer Institute	393,352
Nuclear Regulatory Commission	150,000
Total grants	580,933
Total contracts and grants revenue	2,344,208



Schedule 2 Schedule of Contributions & Corporate Sponsorship Revenue For the year ended December 31, 2007

(unaudited)

American Academy of Oral and Maxillofacial Radiology American Association of Physicists in Medicine 15,	,000 500 ,000 500 ,000 ,000
American Association of Physicists in Medicine	500
, Jan Jan	500
American Callege of Medical Physics	,000
American Conege of Medical Physics	_
American College of Radiology Foundation 35,	,000
American Industrial Hygiene Association 1,	
American Nuclear Society 3,	,000
American Osteopathic College of Radiology	275
American Roentgen Ray Society 7,	,500
American Society for Therapeutic Radiology and Oncology 3,	,000
American Society of Radiologic Technologists 6,	,000
Council on Radionuclides and Radiopharmaceuticals 2,	,500
Health Physics Society 20,	,000
Individuals 3,	,374
Landauer, Inc.	,000
Lillian and Robert Brent Fund 2,	,000
Radiological Society of North America 20,	,000
Society of Nuclear Medicine 2,	,500
Society for Pediatric Radiology	500
Xoran Technologies 10,	,000
Total contributions	,649
Corporate Sponsors	
3M 5,	,000
Duke Energy Corporation 5,	,000
GE Healthcare	,000
Global Dosimetry Solutions 5,	,000
Landauer, Inc.	,000
Nuclear Energy Institute 10,	,000
Total Corporate Sponsors 45,	,000



Appendix 2: Publications

Distribution of NCRP Publications

(during the period May 16, 1931 through December 31, 2007)

		Number of Copies Distributed					
	Title and Year of Publication	Government Printing Office ^a	NCRP Publications ^b 2007			All Sources Combined	
No.					Total NCRP Publications		
			Hardcopy	E-Pub	_		
NCRI	Reports						
158	Uncertainties in the Measurement and Dosimetry of External Radiation (2007)	d					
157	Radiation Protection in Educational Institutions (2007)	d					
156	Development of a Biokinetic Model for Radionuclide- Contaminated Wounds and Procedures for their Assessment, Dosimetry and Treatment (2006)	d	371	46	417	417	
155	Management of Radionuclide Therapy Patients (2006)	d	450	189	639	639	
154	Cesium-137 in the Environment: Radioecology and Approaches to Assessment and Management (2006)	d	350	82	432	432	
153	Information Needed to Make Radiation Protection Recommendations for Space Missions Beyond Low-Earth Orbit (2006)	d	448	75	527	527	
152	Performance Assessment of Near-Surface Facilities for Disposal of Low-Level Radioactive Waste (2005)	d	31	35	481	481	
151	Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (2005)	d	641	303	2,388	2,388	
150	Extrapolation of Radiation-Induced Cancer Risks from Nonhuman Experimental Systems to Humans (2005)	d	19	41	620	620	
149	A Guide to Mammography and Other Breast Imaging Procedures (2004)	d	26	46	993	993	
148	Radiation Protection in Veterinary Medicine (2004)	d	15	39	979	979	
147	Structural Shielding Design for Medical X-Ray Imaging Facilities (2004)	d	666	211	3,314	3,314	
	Compact disk version of Report No. 147	d	0	0	143	143	
146	Approaches to Risk Management in Remediation of Radioactively Contaminated Sites (2004)	d	13	13	1,015	1,015	



			Number	of Copies Di	stributed	
			NCRP Pub	olications ^b		
No.	Title and Year of Publication	Government Printing Office ^a	200)7	Total NCRP Publications	All Sources Combined
			Hardcopy	E-Pub	_	
145	Radiation Protection in Dentistry (2003)	d	23	138	1,718	1,718
144	Radiation Protection for Particle Accelerator Facilities (2003)	d	28	80	1,720	1,720
143	Management Techniques for Laboratories and Other Small Institutional Generators to Minimize Off-Site Disposal of Low-Level Radioactive Waste (2003)	d	3	5	687	687
142	Operational Radiation Safety Program for Astronauts in Low-Earth Orbit: A Basic Framework (2002)	d	22	5	1,098	1,098
141	Managing Potentially Radioactive Scrap Metal (2002)	d	14	5	1,164	1,164
140	Exposure Criteria for Medical Diagnostic Ultrasound: II. Criteria Based on All Known Mechanisms (2002)	d	6	14	746	746
139	Risk-Based Classification of Radioactive and Hazardous Chemical Wastes (2002)	d	10	6	926	926
138	Management of Terrorist Events Involving Radioactive Material (2001)	d	141	76	7,323	7,323
137	Fluence-Based and Microdosimetric Event-Based Methods for Radiation Protection in Space (2001)	d	2	5	738	738
136	Evaluation of the Linear-Nonthreshold Dose-Response Model for Ionizing Radiation (2001)	d	5	23	1,255	1,255
135	Liver Cancer Risk from Internally-Deposited Radionuclides (2001)	d	3	1	1,089	1,089
134	Operational Radiation Safety Training (2000)	d	11	17	1,207	1,207
133	Radiation Protection for Procedures Performed Outside the Radiology Department (2000)	d	19	25	1,517	1,517
132	Radiation Protection Guidance for Activities in Low-Earth Orbit (2000)	d	27	8	966	966
131	Scientific Basis for Evaluating the Risks to Populations from Space Applications of Plutonium (2001)	d	3	2	780	780
130	Biological Effects and Exposure Limits for "Hot Particles" (1999)	d	1	13	1,062	1,062
129	Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies (1999)	d	2	6	1,600	1,600
128	Radionuclide Exposure of the Embryo/Fetus (1998)	d	8	18	1,480	1480
127	Operational Radiation Safety Program (1998)	d	26	39	2,033	2,033
126	Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection (1997)	d	2	16	1,818	1,818

	Title and Year of Publication	Number of Copies Distributed						
		Government Printing Office ^a	NCRP Pub	olicationsb				
No.			2007		Total NCRP Publications	All Sources Combined		
			Hardcopy	E-Pub	_			
125	Deposition, Retention and Dosimetry of Inhaled Radioactive Substances (1997)	d	1	4	2,484	2,484		
124	Sources and Magnitude of Occupational and Public Exposures from Nuclear Medicine Procedures (1996)	d	9	19	3,017	3,017		
123	Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground (1996)	d	6	12	3,022	3,022		
122	Use of Personal Monitors to Estimate Effective Dose Equivalent and Effective Dose to Workers for External Exposure to Low-LET Radiation (1995)	d	6	12	3,110	3,110		
121	Principles and Application of Collective Dose in Radiation Protection (1995)	d	3	9	2,392	2,392		
120	Dose Control at Nuclear Power Plants (1994)	d	0	5	2,964	2,964		
119	A Practical Guide to the Determination of Human Exposure to Radiofrequency Fields (1993)	d	2	32	3,376	3,376		
118	Radiation Protection in the Mineral Extraction Industry (1993)	d	2	1	2,596	2,596		
117	Research Needs for Radiation Protection (1993)	d	1	4	1,915	1,915		
116	Limitation of Exposure to Ionizing Radiation (1993)	d	48	73	6,835	6,835		
115	Risk Estimates for Radiation Protection (1993)	d	43	20	3,071	3,071		
114	Maintaining Radiation Protection Records (1992)	d	5	8	2,402	2,402		
113	Exposure Criteria for Medical Diagnostic Ultrasound: I. Criteria Based on Thermal Mechanisms (1992)	d	0	5	3,246	3,246		
112	Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination (1991)	d	6	15	3,671	3,671		
111	Developing Radiation Emergency Plans for Academic, Medical and Industrial Facilities (1991)	d	4	5	4,019	4,019		
110	Some Aspects of Strontium Radiobiology (1991)	d	1	4	2,543	2,543		
109	Effects of Ionizing Radiation on Aquatic Organisms (1991)	d	1	4	2,162	2,162		
08	Conceptual Basis for Calculations of Absorbed-Dose Distributions (1991)	d	1	6	3,096	3,096		
07	Implementation of the Principle of As Low As Reasonably Achievable (ALARA) for Medical and Dental Personnel (1990)	d	9	13	3,287	3,287		
106	Limit for Exposure to "Hot Particles" on the Skin (1990)	 d	0	3	2,853	2,853		
105	Radiation Protection for Medical and Allied Health Personnel (1989)	d	54	21	6,638	6,638		



			Number	of Copies Di	stributed	
			NCRP Pub	licationsb		
No.	Title and Year of Publication	Government Printing Office ^a	2007		Total NCRP Publications	All Sources Combined
	H	Hardcopy	E-Pub	_		
104	The Relative Biological Effectiveness of Radiations of Different Quality (1990)	d	2	9	2,369	2,369
103	Control of Radon in Houses (1989)	d	0	4	3,733	3,733
102	Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies up to 50 MeV (Equipment Design, Performance and Use) (1989)	d	57	58	7,533	7,533
101	Exposure of the U.S. Population from Occupational Radiation (1989)	d	0	8	4,135	4,135
100	Exposure of the U.S. Population from Diagnostic Medical Radiation (1989)	d	14	15	4,942	4,942
99	Quality Assurance for Diagnostic Imaging (1988)	d	23	25	7,409	7,409
98	Guidance on Radiation Received in Space Activities (1989)	d	22	1	3,380	3,380
97	Measurement of Radon and Radon Daughters in Air (1988)	d	1	11	4,172	4,172
96	Comparative Carcinogenicity of Ionizing Radiation and Chemicals (1989)	d	1	5	4,076	4,076
95	Radiation Exposure of the U.S. Population from Consumer Products and Miscellaneous Sources (1987)	d	1	15	4,215	4,215
94	Exposure of the Population in the United States and Canada from Natural Background Radiation (1987)	d	0	26	4,359	4,359
93	Ionizing Radiation Exposure of the Population of the United States (1987)	d	0	20	7,329	7,329
92	Public Radiation Exposure from Nuclear Power Generation in the United States (1987)	d	0	5	3,666	3,666
91	Recommendations on Limits for Exposure to Ionizing Radiation (1987)	d	0	0	8,483	8,483
90	Neptunium: Radiation Protection Guidelines (1988)	d	0	0	2,895	2,895
89	Genetic Effects from Internally Deposited Radionuclides (1987)	d	245	1	3,947	3,947
88	Radiation Alarms and Access Control Systems (1986)	d	6	9	4,751	4,751
87	Use of Bioassay Procedures for Assessment of Internal Radionuclide Deposition (1987)	d	1	8	4,186	4,186
86	Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields (1986)	d	1	8	5,230	5,230
85	Mammography—A User's Guide (1986)	d	0	0	32,654	32,654
84	General Concepts for the Dosimetry of Internally Deposited Radionuclides (1985)	d	1	2	4,217	4,217

	Title and Year of Publication	Number of Copies Distributed						
		Government Printing Office ^a	NCRP Pub	olications ^b				
No.			2007		Total NCRP Publications	All Sources Combined		
			Hardcopy	E-Pub	_			
83	The Experimental Basis for Absorbed-Dose Calculations in Medical Uses of Radionuclides (1985)	d	0	1	3,527	3,527		
82	SI Units in Radiation Protection and Measurements (1985)	d	2	6	4,536	4,536		
81	Carbon-14 in the Environment (1985)	d	0	1	3,953	3,953		
80	Induction of Thyroid Cancer by Ionizing Radiation (1985)	d	0	0	4,260	4,260		
79	Neutron Contamination from Medical Electron Accelerators (1984)	d	3	18	4,705	4,705		
78	Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States (1984)	d	0	0	6,451	6,451		
77	Exposures from the Uranium Series with Emphasis on Radon and Its Daughters (1984)	d	0	0	6,633	6,633		
76	Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment (1984)	d	0	3	6,654	6,654		
75	Iodine-129: Evaluation of Release from Nuclear Power Generation (1983)	d	0	0	5,928	5,928		
74	Biological Effects of Ultrasound: Mechanisms and Clinical Implications (1983)	d	1	7	11,199	11,199		
73	Protection in Nuclear Medicine and Ultrasound Diagnostic Procedures in Children (1983)	d	0	3	5,480	5,480		
72	Radiation Protection and Measurement for Low-Voltage Neutron Generators (1983)	d	0	7	4,399	4,399		
71	Operational Radiation Safety—Training (1983)	d	0	0	5,067	5,067		
70	Nuclear Medicine—Factors Influencing the Choice and Use of Radionuclides in Diagnosis and Therapy (1982)	d	0	8	5,395	5,395		
69	Dosimetry of X-Ray and Gamma-Ray Beams for Radiation Therapy in the Energy Range 10 keV to 50 MeV (1981)	d	1	3	4,981	4,981		
68	Radiation Protection in Pediatric Radiology (1981)	d	3	7	4,459	4,459		
67	Radiofrequency Electromagnetic Fields—Properties, Quantities and Units, Biophysical Interaction and	د	٥	6	5 424	5 424		
66	Measurements (1981)	d	0	6	5,424	5,424		
66		d	e	Ü	4,598	4,598		
65	Management of Persons Accidentally Contaminated with Radionuclides (1980)	d	20	50	18,324	18,324		
64	Influence of Dose and Its Distribution in Time on Dose- Response Relationships for Low-LET Radiations (1980)	d	1	1	5,231	5,231		

			Number	of Copies Di	stributed	
			NCRP Pub	licationsb		
No.	Title and Year of Publication	Government Printing Office ^a	200)7	Total NCRP Publications	All Sources Combined
			Hardcopy	E-Pub	_	
63	Tritium and Other Radionuclide Labeled Organic Compounds Incorporated in Genetic Material (1979)	d	1	1	4,316	4,316
62	Tritium in the Environment (1979)	d	41	2	3,924	3,924
61	Radiation Safety Training Criteria for Industrial Radiography (1978)	d	0	1	6,145	6,145
60	Physical, Chemical and Biological Properties of Radiocerium Relevant to Radiation Protection Guidelines (1979)	d	0	0	4,025	4.025
59	Operational Radiation Safety Program (1979)	d d	0	0	8,046	8,046
	A Handbook of Radioactivity Measurements Procedures (1978)	d d	18	6	13,557	13,557
57	Instrumentation and Monitoring Methods for Radiation Protection (1978)	d	4	6	10,910	10,910
56	Radiation Exposure from Consumer Products and Miscellaneous Sources (1977)	d	e	0	5,905	5,905
55	Protection of the Thyroid Gland in the Event of Releases of Radioiodine (1977)	d	0	0	6,827	6,827
54	Medical Radiation Exposure of Pregnant and Potentially Pregnant Women (1977)	d	5	20	10,460	10,460
53	Review of NCRP Radiation Dose Limit for Embryo and Fetus in Occupationally Exposed Women (1977)	d	e	0	9,289	9,289
52	Cesium-137 from the Environment to Man: Metabolism and Dose (1977) $$	d	0	1	4,685	4,685
51	Radiation Protection Design Guidelines for 0.1-100 MeV Particle Accelerator Facilities (1977)	d	0	0	8,511	8,511
50	Environmental Radiation Measurements (1976)	d	0	2	7,888	7,888
49	Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies up to 10 MeV (1976)	d	2	40	17,311	17,311
	Adjunct to NCRP Report 49 (1976)	d	0	0	2,796	2,796
48	Radiation Protection for Medical and Allied Health Personnel (1976)	 d	e	0	14,359	14,359
47	Tritium Measurement Techniques (1976)	d	0	3	6,354	6,354
46	Alpha-Emitting Particles in Lungs (1975)	d	0	0	6,066	6,066
45	Natural Background Radiation in the United States (1975)	d	e	0	7,296	7,296
44	Krypton-85 in the Atmosphere—Accumulation, Biological Significance, and Control Technology (1975)	d	0	2	6,336	6,336

		Number of Copies Distributed						
	Title and Year of Publication		NCRP Pub	licationsb				
No.		Government Printing Office ^a	2007		Total NCRP Publications	All Sources Combined		
			Hardcopy	E-Pub	_			
43	Review of the Current State of Radiation Protection Philosophy (1975)	d	e	0	9,722	9,722		
42	Radiological Factors Affecting Decision-Making in a Nuclear Attack (1974)	d	0	5	47,206	47,206		
41	Specification of Gamma-Ray Brachytherapy Sources (1974)	d	0	4	5,454	5,454		
40	Protection Against Radiation from Brachytherapy Sources (1972)	d	1	6	9,749	9,749		
39	Basic Radiation Protection Criteria (1971)	d	e	0	40,393	40,393		
38	Protection Against Neutron Radiation (1971)	d	0	5	8,857	8,857		
37	Precautions in the Management of Patients who have Received Therapeutic Amounts of Radionuclides (1970)	d	3	4	17,402	17,402		
36	Radiation Protection in Veterinary Medicine (1970)	d	0	0	7,620	7,620		
35	Dental X-Ray Protection (1970)	d	0	0	28,559	28,559		
34	Medical X-Ray and Gamma-Ray Protection for Energies up to 10 MeV—Structural Shielding Design and Evaluation (1970)	d	e	0	17,622	17,622		
33	Medical X-Ray and Gamma-Ray Protection for Energies up to 10 MeV—Equipment Design and Use (1968)	d	e	0	98,134	98,134		
32	Radiation Protection in Educational Institutions (1966)	d	1	2	22,356	22,356		
31	Shielding for High Energy Electron Accelerator Installations (1964)	3,700	e	0	2,697	6,397		
30	Safe Handling of Radioactive Materials (1964)	24,450	0	3	9,919	34,369		
29	Exposure to Radiation in an Emergency	55,705	e	0	3,678	59,383		
28	A Manual of Radioactivity Procedures (1961)	22,892	e	0	3,665	26,557		
27	Stopping Powers for Use with Cavity Chambers (1961)	4,144	0	1	3,823	7,937		
26	Medical X-Ray Protection up to Three Million Volts (1961)	75,894	e	0	27,154	103,048		
25	Measurement of Absorbed Dose of Neutrons and Mixtures of Neutrons and Gamma Rays (1961)	10,790	0	0	4,082	14,872		
24	Protection Against Radiations from Sealed Gamma Sources (1960)	35,710	e	0	953	36,663		
23	Measurement of Neutron Flux and Spectra for Physical and Biological Applications (1960)	11,849	0	0	3,072	14,921		
22	Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure (1959)	52,526	0	0	7,434	59,960		



		-	NCRP Pub	olicationsb		
No.	Title and Year of Publication	Government Printing Office ^a	2007		Total NCRP Publications	All Sources Combined
			Hardcopy	E-Pub	_	
21	Safe Handling of Bodies Containing Radioactive Isotopes (1958)	29,304	e	0	2,352	31,656
20	Protection Against Neutron Radiation up to 30 Million Electron Volts (1957)	16,989	e	0	353	17,342
19	Regulation of Radiation Exposure by Legislative Means (1955)	15,140	e	0	0	15,140
18	X-Ray Protection (1955)	98,713	e	0	0	98,713
17	Permissible Dose from External Sources of Ionizing Radiation (1954)	60,530	e	0	2,038	62,568
16	Radioactive Waste Disposal in the Ocean (1954)	16,203	e	0	2,664	18,867
15	Safe Handling of Cadavers Containing Radioactive Isotopes (1953)	14,486	e	0	0	14,486
14	Protection Against Betatron-Synchrotron Radiations up to 100 Million Electron Volts (1954)	27,190	e	0	1,710	28,900
13	Protection Against Radiation from Radium, Cobalt-60 and Cesium-137 (1954)	22,785	e	0	0	22,785
12	Recommendations for the Disposal of Carbon-14 Wastes (1953)	23,506	e	0	2,571	26,077
11	Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water (1953)	32,494	e	0	0	32,494
10	Radiological Monitoring Methods and Instruments (1952)	59,651	e	0	3,894	63,545
9	Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users (1951)	28,810	e	0	5,682	34,492
8	Control and Removal of Radioactive Contamination in Laboratories (1951)	50,500	34	1	7,633	58,133
7	Safe Handling of Radioactive Isotopes (1949)	60,867	e	0	0	60,867
6	Medical X-Ray Protection up to Two Million Volts (1949)	70,261	e	0	0	70,261
5	Safe Handling of Radioactive Luminous Compounds (1941)	6,187	e	0	0	6,187
4	Radium Protection (1938)	10,086	e	0	0	10,086
3	X-Ray Protection (1936)	16,490	e	0	0	16,490
2	Radium Protection (1934)	g	e	0	0	0
1	X-Ray Protection (1931)	1,596	e	0	0	1,596
	Total NCRP Reports Distributed	959,448	4,104	2,323	933,913	1,893,361

	Title and Year of Publication	Number of Copies Distributed						
No.		Government Printing Office ^a	NCRP Publications ^b					
			2007		Total NCRP Publications	All Sources Combined		
			Hardcopy	E-Pub	_			
Lauri	ston S. Taylor Lectures							
30	Fifty Years of Scientific Investigation: The Importance of Scholarship and the Influence of Politics and Controversy, Robert L. Brent (2006) Health Phys. 93, 348–379	_i	_i	_i		_i		
29	Nontargeted Effects of Radiation: Implications for Low- Dose Exposures, John B. Little (2005) Health Phys. 91 , 416–426	_i	_i	_i		_i		
28	Radiation Protection in the Aftermath of a Terrorist Attack Involving Exposure to Ionizing Radiation, Abel J. Gonzalez (2004), Health Phys. 89 , 418–446	_i	_i	_i		_i		
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