Annual Report

2020

Year in Review

NCRP

Contents

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.
2. 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.

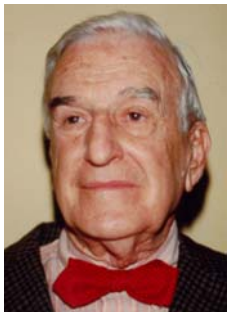
Participants in the Council's work are the Council members and members of scientific, advisory and administrative committees. Council members are selected on the basis of their scientific expertise and serve as individuals, not as representatives of any particular organization. The scientific committees, 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.

NCRP

Mission

To support radiation protection by providing independent scientific analysis, information and recommendations that represent the consensus of leading scientists.

Presidents



Lauriston S. Taylor
1929 – 1977

Warren K. Sinclair
1977 – 1991

Charles B. Meinhold
1991 – 2002

Thomas S. Tenforde
2002 – 2012

John D. Boice, Jr.
2012 –2018

Kathryn D. Held
2019 –

NCRP

President's Message

I think that all readers of this Message will agree that 2020 is a year we will not soon forget. Despite the many challenges we faced, the National Council on Radiation Protection and Measurements (NCRP) weathered 2020 well. Our dedicated, hard-working staff worked mostly from home from late March through the end of the year, we all became fairly adept at doing business by online webinars and phone (Laura and I have each other on speed dial), although some webinar platforms still present challenges for some of us some of the time. Nevertheless, NCRP has had a very productive year, with many exciting new activities, and continues to help meet the needs of the nation in radiation protection.

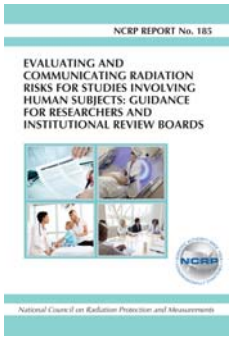
Some events of 2020 that I'd like to highlight include:

- In January, NCRP had the pleasure of participating in the mid-year meeting of the Health Physics Society (HPS) in Bethesda. Donald L. Miller, Chair of Program Area Committee (PAC) 4, gave a plenary lecture for the meeting on "Overview of NCRP Activities (Emphasis on Radiation Protection in Medicine)," and the all-day NCRP-sponsored symposium consisted of two sessions on Radiation Protection in Medicine, including 12 speakers discussing NCRP activities, mostly related to PAC 4 (see list of Presentations, below).
- It was extremely disappointing to cancel our 2020 Annual Meeting only two weeks prior to the scheduled date for the meeting, but the COVID-19 pandemic gave us no choice. The exciting meeting on "Radiation and Flight: A Down-to-Earth Look at Risks" is being carried forward to 2021 (discussed more below). We were glad, however, that we were able to have our Council Business Meeting virtually on March 24, probably one of the first times for many of us to participate in a large (>100 people) virtual meeting. Little did we realize at that time that it would be the first of many such virtual meetings!
- In July NCRP co-sponsored, with the National Cancer Institute (NCI) Radiation Research Program and the National Institute of Allergy and Infectious Diseases (NIAID) Radiation Countermeasures Program, a Virtual Workshop on "Low Dose Radiation Therapy (LDRT) for COVID-19: Benefits or Risk?." This provided a timely opportunity to discuss a controversial therapeutic approach that is being investigated in clinical trials. The thought-provoking discussions were captured in a workshop summary published in a rapid fashion in *Radiation Research* in November 2020.
- A Virtual Symposium was co-organized with Memorial Sloan Kettering Cancer Center and the Greater New York, Baltimore-Washington, and New Jersey Chapters of HPS in November on "Study of One Million Radiation Workers and Veterans." The well-attended symposium addressed stakeholder perspectives on the importance of epidemiology studies of low dose health effects in radiation workers and provided information on the current status of some of the cohorts in the Million Person Study (MPS). A workshop report is being prepared for publication.

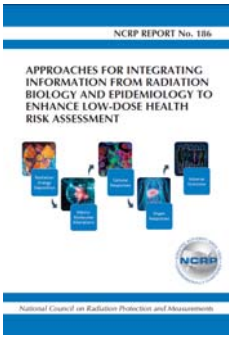
NCRP Publications Completed in 2020

- NCRP Commentary No. 29, *Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced NORM (TENORM) from the Oil and Gas Industry*, prepared by Scientific Committee (SC) 5-2 (Chair: William E. Kennedy, Jr.), was published in April 2020. This Commentary, supported in part by the Centers for Disease Control and Prevention (CDC), reviewed practices associated with contemporary oil and gas exploration and production that have potential radiological concerns; evaluated the historical and current status of regulations pertinent to management of NORM/TENORM in the oil and gas industry; and recommended topics for fuller development in a comprehensive NCRP report.

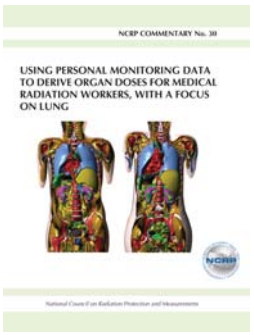
- NCRP Report No. 185, *Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards*, prepared by SC 4-7 (Chair: Julie E.K. Timins), was published in May 2020. This important Report provides guidance to researchers preparing protocols that include ionizing radiation exposure to human subjects and to reviewing bodies, such as Institutional Review Boards, regarding the process of reviewing such protocols. The Report preparation was supported by the American Association of Physicists in Medicine, American Board of Radiology (ABR) Foundation, American College of Radiology, CDC, and Society of Nuclear Medicine and Molecular Imaging.



- NCRP Report No. 186, *Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment*, prepared by SC 1-26 (Chair: R. Julian Preston; Vice Chair: Werner Rühm), was published in July 2020. Extending concepts and approaches discussed in NCRP Report No. 171 and Commentary No. 24, this new CDC-funded Report describes ways to reduce uncertainty in radiation risk assessments at low doses and low dose rates using adverse outcome pathways and key-events approach combined with biologically-based dose response models.



- NCRP Commentary No. 30, *Using Personal Monitoring Data to Derive Organ Doses for Medical Radiation Workers, with a Focus on Lung*, prepared by SC 6-11 (Co-Chairs: Lawrence T. Dauer and R. Craig Yoder), was published in September 2020. Derivation of organ doses for medical radiation workers from monitoring data poses difficult problems. This Commentary, funded by the National Aeronautics and Space Administration (NASA), U.S. Department of Energy (DOE), and CDC, describes an optimum approach for using personal monitoring data to estimate lung and other organ doses.



- Papers from the Taylor, Sinclair and Tenforde Lecturers, as well as a Summary of the 55th Annual Meeting of NCRP, held in April 2019, on "NCRP Meeting the Challenge at 90: Providing Best Answers to Your Most Pressing Questions About Radiation" were published in April 2020 in *Health Physics* [118(4):335–381, 2020].

Committees at Work

- **CC 2, Meeting the Needs of the Nation for Radiation Protection** (Chair: Wayne D. Newhauser; Co-Chair: Jacqueline P. Williams), is expanding on our "Where are the Radiation Professionals (WARP)?" initiative, NCRP Statement No. 12 (2015). Although there have been delays, the Committee writing teams, covering all facets of the radiation sciences, are continuing work to revise the PAC-reviewed draft to address the many thoughtful comments received and produce an updated revision of the draft commentary for Council review.
- **SC 1-27, Evaluation of Sex-Specific Differences in Lung Cancer Radiation Risks and Recommendations for Use in Transfer Models** (Co-Chairs: Michael M. Weil and David J. Pawel), is a NASA-funded initiative of great relevance to astronauts on long-duration missions beyond low-Earth orbit. The commentary will assess sex-specific differences in radiation-induced lung cancer in human populations and animal models and make recommendations for NASA regarding transfer models to be used in predicting radiation risks for astronauts.
- **SC 2-8, Operational Radiation Safety Program** (Chair: Kathryn H. Pryor), is updating NCRP Report No. 127 (1998) providing guidance to individuals with responsibility for establishing and implementing operational radiation safety programs. Following PAC review and revision, a Council review version should be ready for review shortly.
- **SC 3-2, Recommendations for Instrument Response Verification and Calibration for Use in Radiation Emergencies** (Co-Chairs: Leticia S. Pibida and Gladys A. Klemic), is preparing an NCRP statement on recommendations for periodic functionality checks of radiation detection instruments for emergency response in lieu of periodic, and typically cost-prohibitive, manufacturer-recommended recalibrations. This activity is funded by the Conference of Radiation Control Program Directors (CRCPD) and CDC.
- **SC 3-3, Respiratory Protection for Emergency Workers Responding to a Nuclear/Radiological Emergency** (Co-Chairs: Armin Ansari and Adela Salame-Alfie), will prepare an NCRP statement, with funding from CDC, to address respiratory protection for a category of ancillary emergency workers who would be involved in responding to a nuclear or radiological emergency who are neither first responders nor first receivers and are not already part of a respiratory protection program.
- **SC 4-10, Error Prevention in Radiation Therapy** (Co-Chairs: Michael T. Milano and Steven G. Sutlief), is preparing a statement to enumerate the necessary program components for error prevention in radiation therapy and to delineate objective characteristics of a safety-focused radiotherapy department.
- **SC 4-11, prepared NCRP Statement No. 13, *NCRP Recommendations for Ending Routine Gonadal Shielding During Abdominal and Pelvic Radiography*** (Chair: Donald Frush; Co-Chair: Keith J. Strauss), providing succinct recommendations addressing an important issue for radiation protection in medicine. The Statement, along with a companion document, *Implementation Guidance for Ending Routine Gonadal Shielding During Abdominal and Pelvic Radiography*, and a Gonadal Shielding Trifold Flyer, was released on the NCRP website in January 2021. NCRP acknowledges support by the American Association of Physicists in Medicine, ABR, American

College of Radiology, American Society of Radiologic Technologists, Image Gently®, and Society for Pediatric Radiology.

- **SC 4-12, Risk Management Stratification of Equipment and Training for Fluoroscopy** (Chair: Stephen Balter; Vice Chair: Donald L. Miller), is preparing a statement to provide guidance that can be used by facilities to select fluoroscopic equipment that conforms to the appropriate International Electrotechnical Commission (IEC) standard for the facility's intended uses of that particular fluoroscope and to outline a risk-based training program for all individuals privileged to perform or assist with fluoroscopic procedures in a facility. This new activity will be partly funded by the ABR Foundation.
- **SC 6-12**, in a DOE-funded effort, is producing a commentary on **Development of Kinetic and Anatomical Models for Brain Dosimetry for Internally Deposited Radionuclides** (Chair: Richard Leggett; Vice Chair: Sergey Y. Tolmachev) as part of the MPS. This work may also be applicable to concerns of NASA with regards to high linear-energy transfer (LET) radiation effects on the central nervous system. The commentary is currently undergoing Council review.

Publications

Members, particularly chairs, of NCRP SCs are encouraged to publish papers in peer-reviewed journals summarizing the NCRP Reports or Commentaries that they worked on. The four such publications in 2020 are listed here.

- Mettler FA Jr, Mahesh M, Bhargavan-Chatfield M, Chambers CE, Elee JG, Frush DP, Miller DL, Royal HD, Guebert GM, Sherrier RH, Smith JM, Vetter RJ. 2020. Patient exposure from radiologic and nuclear medicine procedures in the United States: procedure volume and effective dose for the period 2006–2016. Radiology. 295(2):418–427.
- Applegate KE, Shore RE, Dauer LT. 2020. Epidemiological support of the linear nonthreshold model in radiological protection: implications of the National Council on Radiation Protection and Measurements Commentary 27 for the radiologist. J Am Coll Radiol. 17(12):1695–1697.
- Milano MT, Mahesh M, Mettler FA, Elee J, Vetter RJ. 2020. Patient radiation exposure: imaging during radiation oncology procedures: executive summary of NCRP Report No. 184. J Am Coll Radiol. 17(9):1176–1182.
- Preston RJ, Rühm W, Azzam EI, Boice JD Jr, Bouffler S, Held KD, Little MP, Shore RE, Shuryak I, Weil MM. 2020. Adverse outcome pathways, key events and radiation risk assessment. Int J Radiat Biol. [Online ahead of print]. PMID: 33211576.

2020 publications involving NCRP work, including some reporting findings from the MPS, are listed here.

- Vetter RJ, Bushberg JT, Mettler FA, Jr. 2020. Summary of NCRP 2019 annual meeting, NCRP meeting the challenge at 90: providing best answers to your most pressing questions about radiation. Health Phys. 118(4):335–348.
- Coleman CN. 2020. Sixteenth annual Warren K Sinclair keynote address: frontiers in medical radiation science. Health Phys. 118(4):349–353.
- Roessler GS, Baes F, Classic K. 2020. The third annual Thomas S. Tenforde topical lecture. HPS ask the experts: the most intriguing questions and answers. Health Phys. 118(4):354–359.

- Bouville, A. 2020. Fallout from nuclear weapons tests: environmental, health, political, and sociological considerations. Health Phys. 118(4):360–381.
- Boice JD Jr, Cohen SS, Mumma MT, Chen H, Golden AP, Beck HL, Till JE. 2020. Mortality among US military participants at eight above-ground nuclear weapons test series. Int J Radiat Biol. 30:1–22. [Online ahead of print] [PMID: 32602389].
- Boice JD Jr. 2020. The likelihood of adverse pregnancy outcomes and genetic disease (transgenerational effects) from exposure to radioactive fallout from the 1945 TRINITY atomic bomb test. Health Phys. 119(4):494–503 [PMID 32881736].
- Boice J Jr, Dauer LT, Kase KR, Mettler FA Jr, Vetter RJ. 2020. Evolution of radiation protection for medical workers. Br J Radiol. 93(1112):20200282 [PMID: 32496817].
- Prasanna PG, Woloschak GE, DiCarlo AL, Buchsbaum JC, Schaue D, Chakravarti A, Cucinotta FA, Formenti SC, Guha C, Hu DJ, Khan MK, Kirsch DG, Krishnan S, Leitner WW, Marples B, McBride W, Mehta MP, Rafii S, Sharon E, Sullivan JM, Weichselbaum RR, Ahmed MM, Vikram B, Coleman CN, Held KD. 2020. Low-dose radiation therapy (LDRT) for COVID-19: benefits or risks? Radiat Res. 194:452–464.
- Yoder RC, Balter S, Boice JD, Grogan H, Mumma M, Rothenberg LN, Passmore C, Vetter RJ, Dauer LT. 2020. Using personal monitoring data to derive organ doses for medical radiation workers in the million person study - considerations regarding NCRP Commentary No. 30. J Radiol Prot. [Online ahead of print]. PMID: 33264760.

Presentations

The work of NCRP, including MPS efforts funded through NCRP, is presented at various venues by NCRP officers, chairs/members of PACs and SCs and others involved in the projects. Presentations in 2020 included:

- John D. Boice, Jr. “Terrestrial Epidemiology Used to Understand Space Radiation Risks - the Million Person Study,” 2020 NASA Human Research Program Investigators’ Workshop; Small Steps Lead to Giant Leaps, Galveston, Texas, January 27–30, 2020.
- Kathryn D. Held, “Radiation Biology for Radiation Protection in Medicine,” Continuing Education Lecture, HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Donald L. Miller, “Overview of NCRP Activities (Emphasis on Radiation Protection in Medicine),” Plenary Lecture, HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Keith J. Strauss, “Gonadal Shielding During Abdominal and Pelvic Radiography (NCRP Scientific Committee 4-11),” HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Stephen Balter, “Patient Radiation Management in Interventional Fluoroscopy,” HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Alan G. Lurie, “Radiation Protection In Dentistry and Oral and Maxillofacial Radiology (NCRP Report No. 177),” HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Steven G. Sutlief, “Program Components for Error Prevention in Radiation Therapy (NCRP Scientific Committee 4-10),” HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Lisa R. Bruedigan, “The Role of the Conference of Radiation Control Program Directors and State Radiation Control Programs in Radiation Protection in Medicine,” HPS Midyear Meeting, Bethesda, Maryland, January 2020.

- Julie K. Timins, "Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards (NCRP Scientific Committee 4-7)," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- David C. Spelic, "Radiological Health at FDA: A Review of Programs and Findings, Past and Present," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Mahadevappa Mahesh, "Medical Radiation Exposure of Patients in the United States (NCRP Report No. 184)," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- R. Craig Yoder, "Estimating Lung Doses to Medical Workers in the Million Person Study (NCRP Scientific Committee 6-11)," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Lawrence T. Dauer, "Evaluation of Sex-Specific Differences in Lung Cancer Radiation Risks and Recommendations for Use in Transfer and Projection Models (NCRP Scientific Committee 1-27)," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Angela Shogren. "Radiation Risk Communication in Medicine (NCRP Program Area Committee 7)," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Kimberly Applegate, "The ICRP and Its Role in Guidance, Communication, and Collaboration," HPS Midyear Meeting, Bethesda, Maryland, January 2020.
- Lawrence T. Dauer, "U.S. Million Person Study: Status and Summary Results to Date," BWCHPS Dinner Meeting, Bethesda, Maryland, January 2020.
- Sergei Y. Tolmachev, Maia Avtandilashvili, Richard W. Leggett, John D. Boice. "Brain Dosimetry for Internally Deposited Radionuclides." EURADOS Annual Meeting 2020, Florence, Italy, January 27–30, 2020.
- Lawrence T. Dauer, "The Chernobyl Accident and Radiation Health Consequences - including presentation of U.S. Million Person Study, Cohorts, Status, and Direction," MSKCC Epidemiology Grand Rounds, February 2020.
- Kathryn D. Held, "Radiation Chemistry; Effects of Radiation on DNA and Chromosomes," invited lecture in Radiation Biology (PMO582). Department of Radiology and Radiological Sciences. Uniformed Services University of the Health Sciences, Bethesda, Maryland, March 12, 2020.
- Kathryn D. Held, "Overview of NCRP Activities with Emphasis on Radiological/Nuclear Terrorism Research and Training," Webinar for RABRAT (Radiobiology Terrorism Research and Training Group), April 13, 2020.
- Kathryn D. Held, "NCRP: What Is It and How Can You Get Involved?" Invited virtual seminar, Armed Forces Radiobiology Research Institute, April 24, 2020.
- John D. Boice, Jr. Radiation carcinogenesis, radiation risks and risk analysis." (virtual presentation) Radiation Biology (PMO582). Department of Radiology and Radiological Sciences. Uniformed Services University of the Health Sciences, Bethesda, Maryland, April 30, 2020.
- Kathryn D. Held, "NCRP: What's in it for RRS Members?" Invited Webinar for Radiation Research Society, May 7, 2020.
- Kathryn D. Held, "Radiation Biology for Radiation Protection in Medicine," Continuing Education/ Health Physics webinar presentation for the U.S. Environmental Protection Agency, June 24, 2020.
- R. Julian Preston, "The NCRP Report on Approaches for Integrating Radiation Biology and Epidemiology for Enhancing Low Dose Risk Assessment," Invited presentation in the National Academies of Sciences, Engineering, and Medicine's First Gilbert W. Beebe Webinar: What's New in Low Dose Radiation, July 22, 2020.
- John D. Boice, Jr. "Radiation epidemiology with a touch of NASA." Savannah River Site. Summer Internship Lecture Series, Aiken, South Carolina (Virtual), August 5, 2020.

- John D. Boice Jr. “Radiation Epidemiology 101." Space Radiation Presentation. NASA Langley Research Center, Hampton, Virginia (Virtual), August 11, 2020.
- John D. Boice Jr. “Radiation Epidemiology and NASA.” Space Radiation Presentation. NASA Langley Research Center, Hampton, Virginia (Virtual), August 18, 2020.
- Lawrence T. Dauer. “U.S. Million Person Study: The Key to Epidemiology is Exceptional Dosimetry.” Space Radiation Presentation. NASA Langley Research Center, Hampton, Virginia (Virtual), August 25, 2020.
- Sergei Y. Tolmachev and Richard W. Leggett. “Brain Dosimetry and High-LET Exposure.” Space Radiation Presentation. NASA Langley Research Center, Hampton, Virginia (Virtual), September 1, 2020.
- CM Milder, BD Ellis, MT Mumma, AP Golder, JD Boice. “Early DOE worker studies: Obtaining vital status, estimating organ doses, and preliminary results.” 2020 HPS Virtual Workshop, September 24, 2020.
- Ashley Golden (presenter), John Boice, Larry Dauer, Sarah Cohen, Mike Mumma, Elizabeth Ellis, “Sex Specific risk from fractionated, low-dose radiation in the Million Person Study Cohorts.” Radiation Research Society Annual Meeting (Virtual), October 18–21, 2020.
- Kathryn D. Held and Gayle E Woloschak, “Report on NCRP-NIH Workshop on Low Dose Radiation Therapy for COVID-19: Benefits or Risks?,” Virtual presentation to SNMMI, October 9, 2020.
- Kathryn D. Held, “Radiation Biology for Radiation Protection in Medicine,” PEP Lecture, HPS Annual Meeting, Bethesda, Maryland, October 14, 2020.
- Kathryn D. Held, “What is NCRP and Why Does it Matter to the EPA?,” Invited talk to U.S. Environmental Protection Agency on October 20, 2020.
- Kathryn D. Held, “Welcome and Introduction,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- John D. Boice, Jr. and Lawrence T. Dauer, “A Million Persons, A Million Dreams - Overview of the MPS,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- R. Craig Yoder, “Dosimetry is Key to Excellent Epidemiology,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Lawrence T. Dauer, “MPS Cohort: Medical Worker Study,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Sarah S. Cohen, “MPS Cohort: Mortality among Workers at the Los Alamos National Laboratory, 1943–1984,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Lawrence T. Dauer, “MPS Cohort: Nuclear Power Plant Workers and Industrial Radiographers,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Emily A. Caffrey and John T. Till, “MPS Cohort: Nuclear Weapons Test Participants,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Ashley P. Golden, “Lung Cancer Risks among Men and Women,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- John D. Boice, Jr. and Michael Mumma, “Cognition and Dementia Following Intakes of Radionuclides,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.
- Caleigh Samuels, “Brain Dose Estimates for Alpha Emitters at MPS Sites,” Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.

- John D. Boice, Jr., Lawrence T. Dauer and Derek W. Jokisch, "A Million More Dreams," Study of One Million Radiation Workers and Veterans, MPS Virtual Symposium, November 6, 2020.

I hope that I have captured all the presentations given on behalf of NCRP. I apologize if I've missed any; please let me know about them. We thank all the individuals who have given of their time and effort to represent NCRP so wonderfully to a variety of stakeholders.

Funding Support

In 2020 NCRP received one new grant, from CRCPD, to support the work of SC 3-2, described above.

In 2020 NCRP work continued with grants and contracts funded by a number of sources including:

- ABR Foundation (SC 4-7 and SC 4-11)
- CDC (SC 1-26, SC 3-2, SC 3-3, SC 5-2, and SC 6-10)
- NASA (SC 1-27, SC 6-11, and MPS)
- DOE (SC 6-12 and MPS)
- U.S. Navy (MPS)

We are most grateful for the significant support from these agencies and organizations and thank them for their continued interest in and funding of NCRP and our programs. This support is vital to our ability to provide the scientific service to the nation that is NCRP's mission.

Annual Meetings

The **56th Annual Meeting of NCRP**, that was to have been held March 23–24, 2020, unfortunately had to be canceled less than two weeks before the scheduled meeting dates due to the COVID-19 pandemic. We were able to hold our vital Business Meeting as a Teams webinar that went smoothly but, obviously, was not the same as an in-person meeting. The decision was made to carry forward the planned Program for the 2020 Annual Meeting on "Radiation and Flight: A Down-to-Earth Look at Risks" to 2021. Most session chairs and speakers indicated their availability for April 19–20, 2021, and Jacky Williams and Cary Zeitlin, Program Co-Chairs, and their Program Committee have done a wonderful job developing an exciting plan for the meeting.

Because the COVID-19 pandemic continues to result in travel restrictions, the **NCRP 57th Annual Meeting** on "**Radiation and Flight: A Down-to-Earth Look at Risks"** will be held virtually on April 19–20, 2021 for the scientific program and our Council Business Meeting will be held virtually on April 21, 2021. The Program will start off with the 17th Warren K. Sinclair Keynote Address by Astronaut Serena M. Auñón-Chancellor, describing "Perception of Radiation Risk from the Astronaut Office." The Annual Meeting will also include the 44th Lauriston S. Taylor Lecture by Robert Ullrich on "Taking Up Space: The Path to Understanding Radiation Risks" and the 4th Thomas S. Tenforde Lecture by Paul Locke entitled "Collision or Cooperation? The Law, Ethics and Science of Personalized Risk Assessments for Space and Air Travel." Although we will once again miss seeing everyone in

person, one advantage we've all noted is that many individuals who would not be able to travel to a meeting in Bethesda will be able to join us virtually, so we look forward to a great attendance at the meeting.

Planning is underway for the **2022 Annual Meeting** of the NCPRP to be held March 28–29, 2022. At this time we are planning for an in-person meeting, maybe with some hybrid components, on the theme of "**NCRP: State of the Science in Radiation Protection,**" with Co-Chairs Jessica Wieder and Lia Laiakis. The Program Committee is planning an innovative, interactive meeting to highlight the work of NCRP and its impact and discuss the future of radiation protection, radiation sciences and NCRP's role in that future.

PAC Work

The Chairs/Co-Chairs of all our PACs have been doing terrific jobs leading their PACs during the past year, despite not being able to meet face-to-face in March 2020. Bruce Napier stepped down as Chair/Scientific Vice President for PAC 5 when he became an Emeritus Member, and Bill Kennedy has ably stepped into those shoes. There are no other changes in PAC leadership to report. The PACs have all met at least once virtually, around the time of the annual meeting, and some PACs have been meeting virtually more frequently to discuss PAC business and have scientific presentations and discussions. Laura, in the NCRP office, has done a super job of facilitating those meetings. I continue to meet every three to four months with the PAC Chairs and find the sessions very helpful as they provide some great ideas for new activities and approaches for NCRP.

Much of the valuable work done by the PACs involves their oversight of and assistance to NCRP SCs, described above. A few other noteworthy contributions from the PACs include:

- PAC 1, and particularly its Chair Gayle Woloschak, was instrumental in suggesting and helping to organize the Virtual Workshop on "Low Dose Radiation Therapy (LDRT) for COVID-19: Benefits or Risk?" that we co-sponsored with the Radiation Research Program of the NCI and the Radiation Countermeasures Program of the NIAID in July 2020. As mentioned above, this timely workshop addressed a topic of great interest. It was a pleasure to work with such a dedicated team — I must especially thank Dr. Pat Prasana from NCI — who put the workshop together in about six weeks and promptly wrote an informative workshop summary published in *Radiation Research* in November 2020 (see the NCRP website for a copy if you're interested).
- PAC 4, under the leadership of Don Miller, was instrumental in organizing the NCRP-sponsored Symposium at the HPS mid-year meeting in January and many PAC 4 members were among the 12 speakers in the Symposium, talking about PAC 4 activities, as described above.
- Working with other PACs, PAC 7 is continuing to work on a revamp of our NCRP website (https://ncrponline.org) to improve its usability and increase our content that could be useful to many stakeholders, including our supporting and collaborating organizations, educators, and the general public. Currently the website includes lots of information on NCRP activities, publications, PACs, SCs and members in the news, so be sure to look at it regularly to keep up-to-date with our activities. We hope to have an updated version of the website soon. Also, please let us know if you have suggestions for additional content.
- An ad hoc committee from PAC 7 has also been assessing ways in which NCRP could more effectively use our publications — reports, commentaries, etc. — to increase visibility of NCRP, better serve our stakeholders, and enhance our income stream from sales of publications, an important source of revenue for us. Some new initiatives are expected to be implemented soon.

Finances

As I reported last year, finances remain one of the biggest challenges for NCRP. 2020 was a highly unusual year from a financial point of view, as well as other points of view! You'll see details in the financial statements later in this Annual Report, but a few remarks are needed here. Our net assets increased somewhat in 2020, although the assets remain below the levels of some years back. Our expenses, but also our income, for 2020 were well below the levels we had projected going into the year. The lack of face-to-face SC meetings, staff and staff consultant travel, and time on meetings in the office, etc. from March through the end of the year due to COVID all impacted those bottom lines negatively. These are all activities that cost money, but also bring in overhead from our grants. We learned how to get work done well by virtual meetings and work from home, but with an impact on finances.

I'm happy to report that our previous back-log of unfunded SCs has largely been eliminated by dedicated efforts of the members involved to get documents finished and published (see report of NCRP publications above). Most of our currently active SCs are now at least partly, if not entirely, supported by grants or contracts.

A very mixed blessing was that without a face-to-face annual meeting, we did not have that large yearly financial drain, which helped the bottom line, but we sorely missed the crucial interactions facilitated by the Annual Meeting. This will also be true for 2021, but we are anticipating an in-person meeting in 2022 and looking for creative ways to help finance it.

A new effort, spearheaded by John Lanza, is NCRP offering Continuing Medical Education credits. We have partnered with MECOP, an accrediting organization in Florida, with an initial offering of credits related to fluoroscopic imaging. We need to enhance our advertisement of this product, and, as appropriate, will consider additional material (*e.g.*, NCRP reports) to offer. This could be a unique opportunity for a new funding stream as well as a way to increase the visibility of NCRP.

The ongoing grants from DOE, NASA, CDC, the U.S. Navy, and the ABR are vital to our work and are described above, as well as a new grant from CRCPD. We continue to seek other sources of revenue in this challenging environment, but, at the risk of sounding like a broken record, we need to continue to search for ways to increase funding and secure NCRP's long-term financial position. We thank all the Council members, and others, who have made donations to NCRP directly or took advantage of the AmazonSmile® initiative, and we encourage others of you to remember NCRP with a charitable contribution or as a small percentage beneficiary of an IRA or life insurance policy. Your ideas regarding potential fund-raising opportunities are welcome!

Million Person Study

As you may have noticed from the listings of publications, presentations and funding, the MPS of low-dose health effects remains a major effort for NCRP. This important project is headed by John Boice, NCRP Director of Science, and Larry Dauer is increasingly playing a leadership role. The MPS is designed to study the possible range of health effects from prolonged radiation exposures in healthy American workers and veterans who are more representative of today's population than are the Japanese atomic-bomb survivors, exposed briefly to radiation in 1945, the population typically used as the epidemiological basis for many evaluations of radiation risk. Over the years, the MPS has received critical support (financial and in-kind) from the U.S. Nuclear Regulatory Commission, DOE, NASA, U.S. Department of Defense, NCI, CDC, U.S. Environmental Protection Agency, Landauer, and national laboratories. At this time, funding to NCRP for this work comes from DOE, NASA, and the U.S. Navy.

This important study will provide scientific understanding that can improve guidelines and guidance to protect workers and the public. We look forward to the continuing outstanding productivity of the hard-working MPS team.

Partnerships

In addition to the partnerships with funding agencies described above, NCRP continues numerous active and fruitful partnerships with multiple national and international organizations that are listed on the NCRP website. Additionally, NCRP officers serve on advisory committees and boards and review panels of other groups (*e.g*., Image Gently®, Oak Ridge Associated Universities, Radiation Research Foundation, ABR Test Assembly); NCRP organizes sessions and provides members to serve as speakers and session chairs at meetings of other entities (*e.g*., HPS, Radiation Research Society) (see list of presentations above); and NCRP officers and Board as well as Council and SC members provide NCRP-related educational activities and material for other organizations (*e.g*., CDC, NASA, Vanderbilt, Harvard, University of California Davis, University of Maryland, Armed Forces Radiobiology Research Institute). These activities are critical to NCRP's mission and help "spread the word" about NCRP. Don't hesitate to let us know if you can recommend other opportunities for NCRP partnerships, formal or informal, and we're always available to give presentations to other groups who are interested in NCRP's work.

Some Final Thoughts

NCRP leadership is committed to encouraging more junior professionals in the radiation sciences and more diversity in our SCs, PACs, at our meetings, and as Council members. We strive to add diversity to our ranks by engaging qualified junior investigators, women, and minorities. Please encourage your junior and minority colleagues to become involved with NCRP and let us know of talented individuals that we should include in our activities.

It is with great sadness that I report the passing of three NCRP Emeritus Council Members (John A. Auxier, John B. Little and Michael T. Ryan) and James Cassata, NCRP Executive Director (2012 to 2014) in 2020.

John A. Auxier, October 7, 1925 – August 27, 2020
Dr. Auxier served as an NCRP Council Member from 1976 to 1994. He was a member of the Budget and Finance committee, and served on two SCs which produced NCRP Report No. 56, *Radiation Exposure from Consumer Products and Miscellaneous Sources* (1977) and NCRP Report No. 84, *General Concepts for the Dosimetry of Internally Deposited Radionuclides* (1985).

James R. Cassata, June 2, 1959 – August 22, 2020
Dr. Cassata served as NCRP Executive Director following his retirement from the Navy in 2012 until 2104. In addition, he was a member of the SC that produced NCRP Report No. 166, *Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident*.

John B. Little, October 5, 1929 – May 24, 2020
Dr. Little was first elected to NCRP in 1991 and became a Distinguished Emeritus Member in 2009. During his tenure, he served as a Member of SC 1 and as a Consultant to SC 83. He was also a member of the 1996 Annual Meeting Program Committee. Dr. Little's outstanding contributions to the field of radiation protection were recognized by his selection as the Lauriston S. Taylor Lecturer in 2005. Dr. Little's Taylor Lecture, delivered at the NCRP Annual Meeting, was entitled "Nontargeted Effects of Radiation: Implications for Low Dose Exposures."

Michael T. Ryan, August 21, 1952 – February 22, 2020
Dr. Ryan was first elected to NCRP in 1992 and became a Distinguished Emeritus Member in 2010. During his tenure, he served on NCRP's Board of Directors from 1999 to 2002, the Budget and Finance Committee from 1999 to 2001, was Scientific Vice President for Radioactive and Mixed Waste Management, and a member of SC 64-7. He was also a member of the 2000 and 2005 Annual Meeting Program Committees and a speaker at several other NCRP meetings.

Although 2020 was a unique year, and we've all had to learn new ways to accomplish the NCRP mission and do our jobs, as you can see from the above, 2020 was also a productive year for NCRP. We look forward to another productive year in 2021, although it will continue to be challenging, at least for a while, to be unable to travel to interact in person. Despite challenges, here are many opportunities, and it will be wonderful to continue our interactions with all the many terrific scientific and professional colleagues and partnering organizations who work so hard to support NCRP in our mission to serve our great nation.

Many thanks to the NCRP Staff, Board of Directors, and Council and Distinguished Emeritus Members for assistance in all NCRP work. Special thanks to Laura Atwell, John Boice, Jerry Bushberg, and Larry Dauer for all they have done for NCRP over many productive years and for their dedication and tireless support and sage advice to me throughout the past year.

Kathryn D. Held
President

Membership

There are up to 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 engineering, nuclear medicine, pathology, physics, public health, public policy, radiation measurements, radiation therapy, radiobiology, radiology, risk analysis and communication, statistics, and waste management. In 2020, five new members were elected, and 12 members were re-elected. The five new members were:

Jeri L. Anderson
K. Frieda Fisher-Tyler
Michael T. Milano
Sergei Tolmachev
Lydia B. Zablotska

2020 Council Membership, Affiliation, and Current Term

Sally A. Amundson	Columbia University Medical Center	2016–2022
Jeri L. Anderson	National Institute for Occupational Safety and Health	2020–2026
Armin Ansari	Centers for Disease Control and Prevention	2015–2021
A. Iulian Apostoaei	Oak Ridge Center for Risk Analysis, Inc.	2018–2024
Kimberly E. Applegate	University of Kentucky	2019–2025
Edouard I. Azzam	Rutgers, The State University of New Jersey	2018–2024
Stephen Balter	Columbia-Presbyterian Medical Center	2019–2025
Daniel J. Barnett	Johns Hopkins Bloomberg School of Public Health	2015–2021
Jonine L. Bernstein	Memorial Sloan-Kettering Cancer Center	2018–2024
Luiz Bertelli	Los Alamos National Laboratory	2019–2025
William F. Blakely	Armed Forces Radiobiology Research Institute	2015–2021

Daniel J. Blumenthal	U.S. Department of Energy	2015–2021
John D. Boice, Jr.	National Council on Radiation Protection and Measurements	2018–2024
Wesley E. Bolch	University of Florida	2017–2023
Michael A. Boyd	U.S. Environmental Protection Agency	2020–2026
Richard R. Brey	Idaho State University	2019–2025
Brooke R. Buddemeier	Lawrence Livermore National Laboratory	2015–2021
Jerrold T. Bushberg	University of California, Davis	2020–2026
Polly Y. Chang	SRI International	2017–2023
C. Norman Coleman	National Cancer Institute	2016–2022
Donald A. Cool	Electric Power Research Institute	2019–2025
Michael L. Corradini	University of Wisconsin, Madison	2016–2022
Lawrence T. Dauer	Memorial Sloan-Kettering Cancer Center	2018–2024
Scott Davis	Fred Hutchinson Cancer Research Center	2016–2022
Sara D. DeCair	U.S. Environmental Protection Agency	2017–2023
Christine A. Donahue	CB&I	2015–2021
Joseph R. Dynlacht	Indiana University School of Medicine	2020–2026
Andrew J. Einstein	Columbia University	2019–2025
K. Frieda Fisher-Tyler	State of Delaware	2020–2026
Cynthia Flannery	U.S. Nuclear Regulatory Commission	2017–2023
Patricia A. Fleming	Saint Mary's College, Notre Dame	2015–2021
Donald P. Frush	Stanford University School of Medicine	2016–2022
Eric J. Grant	Radiation Effects Research Foundation	2019–2025
Eric M. Goldin	Retired	2015–2021
Helen A. Grogan	Cascade Scientific, Inc.	2020–2026
Barbara L. Hamrick	University of California, Irvine Health	2019–2025
Willie O. Harris	Exelon Nuclear	2017–2023
Lawrence H. Heilbronn	University of Tennessee	2019–2025
Kathryn D. Held	National Council on Radiation Protection and Measurements & Massachusetts General Hospital	2018–2024
Kathryn A. Higley	Oregon State University	2020–2026
E. Vincent Holahan	U.S. Nuclear Regulatory Commission	2019–2025
Roger W. Howell	Rutgers, The State University of New Jersey	2015–2021
Janice L. Huff	National Aeronautics and Space Administration	2017–2023
Adam R. Hutter	National Urban Security Technology Laboratory	2019–2025
Randall N. Hyer	Center for Risk Communication	2016–2022
William E. Irwin	Vermont Department of Health	2015–2021
Thomas E. Johnson	Colorado State University	2018–2024
Cynthia G. Jones	U.S. Nuclear Regulatory Commission	2017–2023
Ziad N. Kazzi	Emory University	2019–2025

William E. Kennedy, Jr.	WE Kennedy Consulting	2016–2022
Katherine A. Kiel	College of the Holy Cross	2015–2021
Gladys A. Klemic	U.S. Department of Homeland Security	2016–2022
Linda A. Kroger	University of California Davis School of Medicine	2016–2022
Amy Kronenberg	Lawrence Berkeley National Laboratory	2017–2023
Evagelia C. Laiakis	Georgetown University	2019–2025
John J. Lanza	Florida Department of Health	2016–2022
Edwin M. Leidholdt, Jr.	U.S. Department of Veterans Affairs	2018–2024
Mark P. Little	National Cancer Institute	2016–2022
Paul A. Locke	Johns Hopkins University	2016–2022
Alan G. Lurie	University of Connecticut School of Dental Medicine	2016–2022
Mahadevappa Mahesh	Johns Hopkins Hospital	2015–2021
Ruth E. McBurney	Conference of Radiation Control Program Directors, Inc.	2019–2025
Michael T. Milano	University of Rochester Medical Center	2020–2026
Donald L. Miller	Food and Drug Administration	2018–2024
Stephen V. Musolino	Brookhaven National Laboratory	2020–2026
Wayne D. Newhauser	Louisiana State University	2019–2025
Michael A. Noska	U.S. Food and Drug Administration	2017–2023
Harald Paganetti	Massachusetts General Hospital	2018–2024
Christopher N. Passmore	Landauer, Inc.	2017–2023
David J. Pawel	U.S. Environmental Protection Agency	2017–2023
Leticia S. Pibida	National Institute of Standards and Technology	2018–2024
Kathryn H. Pryor	Retired	2016–2022
Mark J. Rivard	Tufts Medical Center	2017–2023
Adela Salame-Alfie	Centers for Disease Control and Prevention	2015–2021
Debra M. Scroggs	Retired	2018–2024
J. Anthony Seibert	University of California Davis Medical Center	2020–2026
Kathleen L. Shingleton	Retired	2017–2023
Angela Shogren	U.S. Environmental Protection Agency	2019–2025
Igor Shuryak	Columbia University Medical Center	2018–2024
Steven L. Simon	National Cancer Institute	2016–2022
David C. Spelic	Center for Devices and Radiological Health, FDA	2016–2022
Michael D. Story	University of Texas, Southwestern Medical Center at Dallas	2020–2026
Glenn M. Sturchio	Mayo Clinic	2016–2022
Julie M. Sullivan	U.S. Food and Drug Administration	2019–2025
Steven G. Sutlief	Landauer Medical Physics	2018–2024
Tammy P. Taylor	Pacific Northwest National Laboratory	2016–2022
Julie K. Timins	New Jersey Commission on Radiation Protection	2016–2022
Sergei Tolmachev	Washington State University	2020–2026

Michael M. Weil	Colorado State University	2017–2023
Jeffrey J. Whicker	Los Alamos National Laboratory	2017–2023
Robert C. Whitcomb, Jr.	Centers for Disease Control and Prevention	2020–2026
Jessica S. Wieder	U.S. Environmental Protection Agency	2017–2023
John P. Winston	Pennsylvania Bureau of Radiation Protection	2018–2024
Jacqueline P. Williams	University of Rochester Medical College	2018–2024
Gayle E. Woloschak	Northwestern University	2015–2021
X. George Xu	Renesselaer Polytechnic Institute	2020–2026
R. Craig Yoder	Retired	2020–2026
Lydia B. Zablotska	University of California, San Francisco	2020–2026
Pat B. Zanzonico	Memorial Sloan-Kettering Cancer Center	2018–2024
Cary J. Zeitlin	Leidos	2020–2026

Board of Directors

Jerrold T. Bushberg, *Chairman*

Armin Ansari	Lawrence T. Dauer	Michael D. Story*
Jonine L. Bernstein	Christine A. Donahue	Jeffrey J. Whicker*
Wesley E. Bolch	John J. Lanza	Jessica S. Wieder
Michael A. Boyd	Donald L. Miller	

*Elected March 24, 2020

Officers

President	Kathryn D. Held
Senior Vice President	Jerrold T. Bushberg
Secretary	Laura J. Atwell
Treasurer	Myrna A. Young

Distinguished Emeritus Members

S. James Adelstein, *Honorary Vice President*
Kenneth R. Kase, *Honorary Vice President*
W. Roger Ney, *Executive Director Emeritus*
David A. Schauer, *Executive Director Emeritus*

Lynn R. Anspaugh
Benjamin R. Archer
John A. Auxier†
Harold L. Beck
Joel S. Bedford
Eleanor A. Blakely
Bruce B. Boecker
Thomas B. Borak
Andre Bouville
Leslie A. Braby
Robert L. Brent
James A. Brink*
Antone L. Brooks
S.Y. Chen
J. Donald Cossairt
Allen G. Croff
Paul M. DeLuca
Sarah S. Donaldson
William P. Dornsife
Keith F. Eckerman
Thomas S. Ely
Stephen A. Feig
John R. Frazier
Thomas F. Gesell
Ethel S. Gilbert
Ronald E. Goans
Joel E. Gray
Raymond A. Guilmette
Eric J. Hall
Naomi H. Harley
William R. Hendee
F. Owen Hoffman
Bernd Kahn
Ann R. Kennedy
David C. Kocher
Ritsuko Komaki
Susan M. Langhorst
Martha S. Linet
Jill A. Lipoti
John B. Little†
Roger O. McClellan
Barbara J. McNeil
Fred A. Mettler, Jr.
Charles W. Miller
Kenneth L. Miller
A. Alan Moghissi
David S. Myers
Bruce A. Napier*
Carl J. Paperiello
John W. Poston, Sr.
Andrew K. Poznanski
R. Julian Preston
Jerome S. Puskin
Genevieve S. Roessler
Marvin Rosenstein
Lawrence N. Rothenberg
Henry D. Royal
Michael T. Ryan†
Stephen M. Seltzer
Roy E. Shore
Paul Slovic
Daniel J. Strom
John E. Till
Richard E. Toohey
Lawrence W. Townsend
Robert L. Ullrich
Richard J. Vetter
F. Ward Whicker
Chris G. Whipple
Susan D. Wiltshire
Marvin C. Ziskin

*Elected to Distinguished Emeritus Membership March 24, 2020.
†Deceased during 2020.

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
E. Stephen Amis, Jr.
Larry E. Anderson
Mary M. Austin-Seymour
Judith L. Bader*
John W. Baum
Steven M. Becker
Merrill A. Bender
Mythreyi Bhargavan-Chatfield
Frederick J. Bonte
Harold S. Boyne
John W. Brand
David J. Brenner
A. Bertrand Brill
Thomas F. Budinger
John F. Cardella
Stephanie K. Carlson
Paul L. Carson
Donald K. Chadwick
Lawrence L. Chi
Chung-Kwang Chou
Kelly L. Classic
Stephen F. Cleary
James E. Cleaver
Fred T. Cross
Francis A. Cucinotta
Stanley B. Curtis
John F. Dicello
Richard L. Doan
Carl H. Durney
David A. Eastmond
Marc Edwards
Charles M. Eisenhauer
Joe A. Elder
Edward R. Epp
Alan J. Fischman
H. Keith Florig
Norman C. Fost
Kenneth R. Foster
Everett G. Fuller
Barry B. Goldberg
Robert L. Goldberg
Marvin Goldman
John D. Graham
Douglas Grahn
Andrew J. Grosovsky
Milton G. Guiberteau
Ellis M. Hall
Roger W. Harms
Robert J. Hasterlik
Martin Hauer-Jensen
John M. Heslep
John W. Hirshfeld, Jr.
David G. Hoel
George B. Hutchison
Hank C. Jenkins-Smith
John R. Johnson
Timothy J. Jorgensen
H. William Koch
Harold L. Kundel
Richard W. Leggett
George R. Leopold
Howard L. Liber
James C. Lin
Thomas A. Lincoln
Jonathan M. Links
David I. Livermore
Richard A. Luben
Jay H. Lubin
Arthur C. Lucas
Harry R. Maxon
Donald M. Mayer*
C. Douglas Maynard
Claire M. Mays
Cynthia H. McCollough
Mortimer L. Mendelsohn†
Jack Miller
William H. Miller
John E. Moulder
Gregory A. Nelson
Andrea K. Ng
Peter C. Nowell
Eugene F. Oakberg
Gilbert S. Omenn
Frank L. Parker
Terry C. Pellmar
Lester J. Peters
Abram Recht
Allan C.B. Richardson
Robert Robbins
Sara Rockwell
Lester Rogers
Robert E. Rowland
Ehsan Samei
Jonathan M. Samet
Keith J. Schiager
Robert A. Schlenker
Beth A. Schueler
Thomas M. Seed
George Sgouros
Ferdinand J. Shore
Edward A. Sickles
Kenneth W. Skrable
David H. Sliney
Christopher G. Soares
Michael G. Stabin
Daniel O. Stram
Louise C. Strong
Herman D. Suit
Richard A. Tell
Joop W. Thiessen
Elizabeth L. Travis
Lois B. Travis
Fong Y. Tsai
Louis K. Wagner
Daniel E. Wartenberg
Stuart C. White
J. Frank Wilson
Shaio Y. Woo
Andrew J. Wyrobek
Marco A. Zaider
Gary H. Zeman

*Consociate Membership effective March 24, 2020.
†Deceased during 2020.

Administrative Committees

Budget & Finance Committee (appointed by the Board of Directors, March 24, 2020)

William E. Kennedy, Jr., *Chair*

Willie O. Harris
John J. Lanza
Kathleen L. Shingleton
R. Craig Yoder

Nominating Committee (appointed by the Board of Directors, March 24, 2020)

Adela Salame-Alfie, *Chair*

Michael Boyd
J. Anthony Seibert
Michael M. Weil
Cary Zeitlin

Program Committee for 2021 Annual Meeting

(appointed by the Board of Directors, March 24, 2020)

Jacqueline P. Williams & Cary J. Zeitlin, *Co-Chairs*

Jeri L. Anderson
Janice L. Huff
Evagelia C. Laiakis
M. Kerry O'Banion
Zarana S. Patel
Mark R. Shavers
Michael D. Story
Michael M. Weil

NCRP

Scientific & Administrative Staff

Laura J. Atwell	Director of Operations
John D. Boice, Jr.	Director of Science
Emily A. Caffrey	Technical Staff Consultant
Sarah S. Cohen	Technical Staff Consultant
Lawrence T. Dauer	Advisor to President
Helen A. Grogan	Technical Staff Consultant
Cindy L. O'Brien	Consultant
Beverly A. Ottman	Receptionist
Marvin Rosenstein	Technical Staff Consultant
Kathleen L. Shingleton	Technical Staff Consultant
Roy E. Shore	Advisor to Director of Science
Linda Walsh	Technical Staff Consultant
Myrna A. Young	Financial Records Manager

Council Committees, Program Area Committees, & Advisory Panel

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 a Council committee, seven program area committees, and an advisory panel. They are:

Council Committee

Meeting the Needs of the Nation for Radiation Protection	Wayne D. Newhauser Jacqueline P. Williams

Program Area Committees and Committee Chairs

Basic Criteria, Epidemiology, Radiobiology, and Risk	Gayle E. Woloschak Jonine L. Bernstein
Operational Radiation Safety	Kathryn H. Pryor
Nuclear and Radiological Security and Safety	Armin Ansari Brooke R. Buddemeier
Radiation Protection in Medicine	Donald L. Miller Lawrence T. Dauer
Environmental Radiation and Radioactive Waste Issues	William E. Kennedy, Jr.
Radiation Measurements and Dosimetry	Steven L. Simon
Radiation Education, Risk Communication, and Outreach	Randall N. Hyer

Advisory Panel

Nonionizing Radiation	Jerrold T. Bushberg

Vice Presidents

Each scientific program area committee is chaired by a Vice President. The Vice Presidents:

- Chair their program area 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 NCRP President and 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

NCRP

Meeting the Needs of the Nation for Radiation Protection

Chair, Wayne D. Newhauser

Goals of Council Committee (CC) 2

- Monitor graduation and employment statistics for radiation professionals, including but not limited to health physicists, radiobiologists, radioecologists, radiologists, radiation oncologists, nuclear medicine physicians, radiochemists, radiation protection engineers, and allied disciplines.
- Continually assess, revise and renew the comprehensive plan initiated with Where Are the Radiation Professionals? (WARP).
- Promote a government led initiative to develop and strengthen human capital in radiation science and radiation protection.

Members of CC 2

Status: Revising after PAC review

Wayne D. Newhauser, *Chair*
Jacqueline P. Williams, *Co-Chair*
Writing Team Leaders:
Edward I. Bluth
Michael A. Noska
Sergei Y. Tolmachev
Lawrence W. Townsend
Lydia B. Zablotska

Basic Criteria, Epidemiology, Radiobiology, & Risk

Vice President, Gayle E.Woloschak

Goals of Program Area Committee (PAC) 1

- Evaluate and approve all 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

Gayle E.Woloschak, *Vice President*
Jonine L. Bernstein, *Vice Chair*
Sally A. Amundson
A. Iulian Apostoaei
Edouard I. Azzam
Joel S. Bedford
Marjan Boerma
John D. Boice, Jr.
Polly Y. Chang
Eric J. Grant
Nobuyuki Hamada
Ann R. Kennedy
Amy Kronenberg
Evagelia C. Laiakis
Mark P. Little
Gregory A. Nelson
Harald Paganetti
David J. Pawel
Dörthe Schaue
George Sgouros
Roy E. Shore
Michael D. Story
Michael M. Weil
Jacqueline P. Williams
Lydia B. Zablotska

Active Scientific Committees Under PAC 1

SC 1-27 Evaluation of Sex-Specific Differences in Lung Cancer Radiation Risks and Recommendations for Use in Transfer and Projection Models

Status: Drafting
Michael M Weil, *Co-Chair*
David J. Pawel, *Co-Chair*
John D. Boice, Jr.
Lawrence T Dauer
Eric J. Grant
David G. Hoel
Janice L. Huff
Dale L. Preston
Mikhail Sokolnikov
Michael D. Story
Richard Wakeford
Linda Walsh
Lydia B. Zablotska
Steve R. Blattnig, *NASA Technical Advisor*
R. Julian Preston, *Advisor*
Werner Rühm, *Advisor*
Marvin Rosenstein, *Technical Staff Consultant*

Completed in 2020

NCRP Report No. 186, Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment, was issued July 3, 2020. The Report was drafted by Scientific Committee 1-26 Chaired by R. Julian Preston and Vice Chair, Werner Rühm. Committee members included Edouard I. Azzam, John D. Boice, Jr., Simon Bouffler, Mark P. Little, Roy E. Shore, Igor Shuryak, and Michael M. Weil; Observer, Armin Ansari; and Marvin Rosenstein, Technical Staff Consultant.

Operational Radiation Safety

Vice President, Kathryn H. Pryor

Goals 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

Kathryn H. Pryor, *Vice President*
Edgar D. Bailey
Christine A. Donahue
Eric M. Goldin
Barbara L. Hamrick
Willie O. Harris
Michael L. Littleton
David S. Myers
John W. Poston, Sr.
Debra M. Scroggs
Kathleen L. Shingleton
Glenn M. Sturchio
Joshua Walkowicz
James S. Willison
James G. Yusko

Active Scientific Committees Under PAC 2

SC 2-8 Operational Radiation Safety Program — Revision to Report No. 127 (1998)
Status: Revising after PAC review
Kathryn H. Pryor, *Chair*
Edgar D. Bailey
Christine A. Donahue
John R. Frazier
Eric M. Goldin
Barbara L. Hamrick
Willie O. Harris
Michael L. Littleton

David S. Myers
John W. Poston, Sr.
Debra M. Scroggs
Kathleen L. Shingleton
Glen M. Sturchio
Joshua Walkowicz
James S. Willison
James G. Yusko
Elizabeth M. Brackett, *Technical Advisor*
Frazier Bronson, *Technical Advisor*
J. Donald Cossairt, *Technical Advisor*

NCRP

Nuclear & Radiological Security & Safety

Vice President, Armin Ansari

Goals 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 late-phase 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 nuclear or radiological explosions or 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.

Members of PAC 3

Armin Ansari, *Vice President*
Brooke R. Buddemeier, *Co-Chair*
Judith L. Bader
Daniel J. Blumenthal
Thomas W. Chenworth
C. Norman Coleman
Sara D. DeCair
John Donnelly (2015 – 2020)
Joseph R. Dynlacht
K. Frieda Fisher-Tyler
Carol J. Iddins
William E. Irwin
Ziad N. Kazzi
Gladys A. Klemic
John J. Lanza
Stephen V. Musolino
Michael A. Noska
Leticia S. Pibida
Adela Salame-Alfie
Julie M. Sullivan

Robert C. Whitcomb, Jr.
Sean M. Crawford, *Consultant*

SC 3-2 Recommendations for Instrument Response Verification and Calibration for Use in Radiation Emergencies

Status: Drafting
Gladys A. Klemic, *Co-Chair*
Leticia S. Pibida, *Co-Chair*
Armin Ansari
Brooke R. Buddemeier
William E. Irwin
Michael Iwatschenko-Borho
P. Andrew Karam
Adela Salame-Alfie
Jeffrey A. Chapman, *Technical Advisor*
Daryl Fahner, *Advisor*
Richard T. Kouzes, *Advisor / PAC 6 Liaison*

SC 3-3 Respiratory Protection for Emergency Workers Responding to a Nuclear/ Radiological Emergency

Status: Drafting
Armin Ansari, Co-Chair
Adela Salame-Alfie, Co-Chair
Jeri L. Anderson
Jeffrey A. Chapman
K. Frieda Fisher-Tyler
Ken Yale
Luis Garcia, *Technical Advisor*
Jeffrey Lodwick, *Technical Advisor*
Ryan A. Schwartz, *Technical Advisor*
Jonathan Szalajda, *Technical Advisor*
Trae Windham, *Techincal Advisor*
Emily A. Caffrey, *Staff Consultant*

NCRP

Radiation Protection in Medicine

Vice President, Donald L. Miller

Goals 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

Donald L. Miller, *Vice President*
Lawrence T. Dauer, *Co-Chair*
Kimberly E. Applegate
Stephen Balter
Edward I. Bluth
Andrew J. Einstein
Donald P. Frush
Joel E. Gray
Linda A. Kroger
Edwin M. Leidholdt, Jr.
Alan G. Lurie
Mahadevappa Mahesh
Fred A. Mettler, Jr.
Michael T. Milano
Wayne D. Newhauser
Madan M. Rehani
Mark J. Rivard
J. Anthony Seibert
David C. Spelic
Steven G. Sutlief
Julie E.K. Timins
John P. Winston
Shiao Y. Woo
Pat B. Zanzonico

Active Scientific Committees Under PAC 4

SC 4-10 Error Prevention in Radiation Therapy
Status: Drafting
Steven G. Sutlief, *Chair*
Edwin M. Leidholdt, Jr.
Lukasz Mazur
Wayne D. Newhauser
Bruce Thomadsen
Shia Y. Woo

SC 4-11 Gonadal Shielding During Abdominal and Pelvic Radiography
Status: Preparing for publication
Donald P. Frush, *Chair*
Keith J. Strauss, *Vice Chair*
Rebecca Milman Marsh
Sarah McKenney
Donald L. Miller
Angela Shogren
Mary Ann Spohrer
Louis K. Wagner
John P. Winston

Completed in 2020

NCRP Report No. 185, *Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards*, was issued May 1, 2020. This Report was drafted by Scientific Committee 4-7 Chaired by Julie E.K. Timins. Committee members included: Jerrold T. Bushberg, Patricia A. Fleming, Linda A. Kroger, Edwin M. Leidholdt, Jr., Donald L. Miller, Robert E. Reiman, J. Anthony Seibert, Steven G. Sutlief, and Michael P. Grissom, *Technical Staff Consultant.*

Environmental Radiation & Radioactive Waste Issues

Vice President, William E. Kennedy, Jr.

Goals 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

William E. Kennedy, Jr., *Vice President*
Michael A. Boyd
S.Y. Chen
Allen G. Croff
R. William Field
Patricia A. Fleming
Helen A. Grogan
Kathryn A. Higley
E. Vincent Holahan
Katherine A. Kiel
Jill A. Lipoti
Ruth E. McBurney
Bruce A. Napier
Brian A. Powell
Andrew Wallo, III

Completed in 2020

NCRP Commentary No. 29, *Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced NORM (TENORM) from the Oil and Gas Industry,* was issued April 22, 2020. This Report was drafted by Scientific Committee 5-2 chaired by William E. Kennedy, Jr. Committee mem-

bers included: David J. Allard, Martin D. Barrie, Philip V. Egidi, Gary Forsee, John R. Frazier, Raymond H. Johnson, Andrew J. Lombardo, Ruth E. McBurney, and Kathleen L. Shingleton, *Technical Staff Consultant.*

Radiation Measurements & Dosimetry

Vice President, Steven L. Simon

Goals 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

Steven L. Simon, *Vice President*
Luiz Bertelli
William F. Blakely
Wesley E. Bolch
Leslie A. Braby
Richard R. Brey
Raymond A. Guilmette
Richard T. Kouzes
Jeffrey J. Whicker
R. Craig Yoder
Cary J. Zeitlin
Gary H. Zeman

Active Scientific Committees Under PAC 6

SC 6-12 Development of Models for Brain Dosimetry for Internally Deposited Radionuclides

Status: Revising after PAC review
Richard W. Leggett, *Chair*
Sergei Y. Tolmachev, *Vice Chair*
Maia Avtandilashvili
Keith F. Eckerman
George Sgouros
Gayle E. Woloschak
Helen A. Grogan, *Technical Staff Consultant*

Completed in 2020

NCRP Commentary No. 30, *Using Personal Monitoring Data to Derive Organ Doses for Medical Radiation Workers, with a Focus on Lung*, was issued September 24, 2020. This Commentary was drafted by Scientific Committee 6-11 Co-Chaired by Lawrence T. Dauer and R. Craig Yoder. Committee members included: Stephen Balter, Christopher N. Passmore, Lawrence N. Rothenberg, Richard J. Vetter, and Advisor, Michael Mumma.

NCRP

Radiation Education, Risk Communication, & Outreach

Vice President, Randall N. Hyer

Goals of Program Area Committee (PAC) 7

- Identify the policy implications of NCRP publications, meetings and other events, and seek to communicate those implications in a credible and comprehensible manner to policy makers and the public.
- Suggest members or serve as members of new NCRP scientific committees whose topics relate to education, risk communication, policy, and outreach.
- Provide advice, wording, and strategic outreach options to policy makers and the public for NCRP reports.
- Ensure that NCRP communications and outreach emphasize NCRP's paramount role in providing scientific information and develop communications and outreach strategies so that recommendations are of maximum assistance to policy makers.
- Bolster educational efforts aimed at recruiting, training and retaining radiation health professionals.

Members of PAC 7

Randall N. Hyer, *Vice President*
Steven M. Becker
Manuela Buonanno
Jerrold T. Bushberg
Donald A. Cool
Vince Covello
Ray Johnson*
Thomas E. Johnson
P. Andrew Karam (2017 – 2020)
Paul A. Locke
M. Carol McCurley
Charles W. Miller
Miles O'Brien
Judith F. Rader
Angela Shogren
John E. Till
Jessica S. Wieder
Vivi Siegel, *Consultant*

*Deceased

Nonionizing Radiation

Goals 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, *Chairman*
Chung-Kwang Chou
Joseph A. Elder
Kenneth R. Foster
Michael D. O'Hara
David A. Savitz
Richard A. Tell
Vijayalaxmi Vijayalaxmi
Marvin C. Ziskin

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 documents 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 documents and to identify problems that might result from proposed recommendations. The Collaborating Organizations for the year 2020 are:

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 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

American Institute of Ultrasound in Medicine

American Medical Association

American Nuclear Society

American Pharmacists Association

American Podiatric Medical Association

American Public Health Association
American Radium Society
American Roentgen Ray Society
American Society for Radiation Oncology
American Society of Emergency Radiology
American Society of Health-System Pharmacists
American Society of Nuclear Cardiology
American Society of Radiologic Technologists
American Thyroid Association
Association of Educators in Imaging and Radiological Sciences
Association of University Radiologists
Bioelectromagnetics Society
College of American Pathologists
Conference of Radiation Control Program Directors, Inc.
Council on Radionuclides and Radiopharmaceuticals
Defense Threat Reduction Agency
Electric Power Research Institute
Federal Aviation Administration
Federal Communications Commission
Federal Emergency Management Agency
Genetics Society of America
Health Physics Society
Institute of Electrical and Electronics Engineers, Inc.
Institute of Nuclear Power Operations
International Brotherhood of Electrical Workers
International Society of Exposure Science
National Aeronautics and Space Administration
National Association of Environmental Professionals
National Center for Environmental Health / Agency for Toxic Substances and Disease Registry
National Electrical Manufacturers Association
National Institute for Occupational Safety and Health
National Institute of Standards and Technology
Nuclear Energy Institute

Office of Science and Technology
Product Stewardship Institute
Radiation Research Society
Radiological Society of North America
Society for Cardiovascular Angiography and Interventions
Society for Pediatric Radiology
Society for Risk Analysis
Society of Cardiovascular Computed Tomography
Society of Chairs of Academic Radiology Departments
Society of Interventional Radiology
Society of Nuclear Medicine and Molecular Imaging
Society of Radiologists in Ultrasound
Society of Skeletal Radiology
U.S. Air Force
U.S. Army
U.S. Coast Guard
U.S. Department of Energy
U.S. Department of Homeland Security
U.S. Department of Housing and Urban Development
U.S. Department of Labor
U.S. Department of Transportation
U.S. Environmental Protection Agency
U.S. Navy
U.S. Nuclear Regulatory Commission
U.S. Public Health Service
Utility Workers Union of America

Special Liaison Organizations

Special Liaison relationships are established with various organizations outside of the United 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 publications (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 2020 are:

Australian Radiation Protection and Nuclear Safety Agency

Bundesamt fur Strahlenschutz (Germany)
(Federal Office for Radiation Protection)

Canadian Association of Medical Radiation Technologists

Canadian Nuclear Safety Commission

Central Laboratory for Radiological Protection (Poland)

China Institute for Radiation Protection

Commissariat a l'Energie Atomique (France)

Commonwealth Scientific Instrumentation Research
Organization (Australia)

European Commission

Heads of the European Radiological Protection Competent
Authorities

Health Council of the Netherlands

International Commission on Non-Ionizing Radiation
Protection

International Commission on Radiation Units and
Measurements

International Commission on Radiological Protection

International Radiation Protection Association

Japan Radiation Council

Korea Institute of Nuclear Safety

Nuclear Regulation Authority of Japan

Public Health England

Russian Scientific Commission on Radiation Protection

South African Forum for Radiation Protection

World Association for Nuclear Operators

World Health Organization, Unit of Radiation and Environmental Health

Contracts & Grants

The following entities have provided support for NCRP's work through contracts and grants:

American Board of Radiology Foundation
Centers for Disease Control and Prevention
Conference of Radiation Control Program Directors, Inc.
National Aeronautics and Space Administration
U.S. Department of Energy
U.S. Navy

NCRP

Contributors & Corporate Sponsors

American Association of Physicists in Medicine
American College of Radiology Foundation
American Registry of Radiologic Technologists
American Roentgen Ray Society
American Society of Radiologic Technologists
Council on Radionuclides and Radiopharmaceuticals
Fluke/RaySafe/Landauer
Health Physics Society
Individuals
Institute of Electrical and Electronics Engineers
Nuclear Energy Institute
Radiological Society of North America
Society of Pediatric Radiology

Giving Tuesday Donations

André Bouville
Armin Ansari
Jonine Bernstein
Luiz Bertelli
William Blakely
John D. Boice, Jr.
Michael Boyd
Jerrold T. Bushberg
Shih Yew Chen
Frieda Fisher-Tyler
Kathryn D. Held
Ziad Kazzi
William Kennedy, Jr.
Donald Miller
Chris Passmore
Adela Salame-Alfie
Roy E. Shore
Richard A. Tell
F. Ward Whicker

Review Process

The review process for draft publications is elaborate and comprehensive. It begins with a review by members of the appropriate Program Area Committee and other critical reviewers designated by the Program Area Committee Vice President and the NCRP Secretariat. 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 (71), Collaborating Organizations (77), and Special Liaison Organizations (23). At the time a draft is submitted for Council review it is also placed on NCRP's website for public comment (http://NCRPonline.org). Further modification of draft documents on the basis of the comments received follows, with the goal of reaching a scientific consensus on the material included in the document. 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 commentaries, statements, and presidential 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 as needed. Statements are brief documents 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. 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
2019	Fallout from Nuclear Weapons Tests: Environmental, Health, Political, & Sociological Considerations	André Bouville
2018	Radiation Dosimetry Research for Medicine and Protection: A European Journey	Hans-Georg Menzel
2017	Environmental Radiation and Life: A Broad View	F. Ward Whicker
2016	Radiation Protection and Regulatory Science	John W. Poston, Sr.
2015	Dosimetry of Internal Emitters: Contributions of Radiation Protection Bodies and Radiological Events	Keith F. Eckerman
2014	On the Shoulders of Giants: Radiation Protection Over 50 Years	Fred A. Mettler, Jr.
2013	When Does Risk Assessment Get Fuzzy?	John E. Till
2012	From the Field to the Laboratory and Back: The *What Ifs*, *Wows*, and *Who Cares* of Radiation Biology	Antone L. Brooks
2011	What Makes Particle Radiation so Effective?	Eleanor A. Blakely
2010	Radiation Protection and Public Policy in an Uncertain World	Charles E. Land
2009	Radiation Epidemiology: The Golden Age and Remaining Challenges	John D. Boice, Jr.
2008	Radiation Standards, Dose/Risk Assessments, Public Interactions, and Yucca Mountain: Thinking Outside the Box	Dade W. Moeller
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 of 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

Warren K. Sinclair Keynote Addresses

Year	Title	Lecturer
2019	Frontiers in Medical Radiation Science	C. Norman Coleman
2018	Jus·ti·fied and Com·men·su·rate	Marvin Rosenstein
2017	Aren't We Ready Yet? Closing the Planning, Response and Recovery Gaps for Radiological Terrorism	Jack Herrmann
2016	WARP: Where are the Radiation Professionals?	Richard E. Toohey
2015	Influence of NCRP on Radiation Protection in the United States: Guidance and Regulation	Kenneth R. Kase
2014	Science, Radiation Protection, and the NCRP: Building on the Past, Looking to the Future	Jerrold T. Bushberg
2013	Fukushima Nuclear Power Plant Accident and Comprehensive Health Risk Management	Shunichi Yamashita
2012	Childhood Exposure: An Issue from Computed Tomography Scans to Fukushima	Fred A. Mettler, Jr.
2011	Heavy Ions in Therapy and Space: Benefits and Risks	Marco Durante
2010	Effective Risk Communication Before, During and After a Radiological Emergency: Challenges, Guidelines, Strategies and Tools	Vincent T. Covello
2009	The Role of a Strong Regulator in Safe and Secure Nuclear Energy	Peter B. Lyons
2008	Issues in Quantifying the Effects of Low-Level Radiation	Dudley T. Goodhead
2007	Use and Misuse of Radiation in Medicine	James A. Brink
2006	Retrospective Analysis of Impacts of the Chernobyl Accident	Mikhail Balonov
2005	Contemporary Issues in Risk-Informed Decision Making on Waste Disposition	B. John Garrick
2004	Current Challenges in Countering Radiological Terrorism	John W. Poston, Sr.

NCRP

Thomas S. Tenforde Topical Lectures

Year	Title	Lecturer
2019	HPS Ask the Experts: Our Most Intriguing Questions & Answers	Genevieve S. Roessler
2018	Recent Epidemiologic Studies and the Linear Nonthreshold Model for Radiation Protection – Considerations Regarding NCRP Commentary No. 27	Roy E. Shore
2015	Ethics and Radiation Protection	Jacques Lochard

Annual Meetings

Year	Topic
2019	NCRP Meeting the Challenge at 90: Providing Best Answers to Your Most Pressing Questions About Radiation
2018	Radiation Protection Responsibility in Medicine
2017	Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism
2016	Meeting the Needs of the Nation for Radiation Protection
2015	Changing Regulations and Radiation Guidance: What Does the Future Hold?
2014	NCRP: Achievements of the Past 50 Years and Addressing the Needs of the Future
2013	Radiation Dose and the Impacts on Exposed Populations
2012	Emerging Issues in Radiation Protection in Medicine, Emergency Response, and the Nuclear Fuel Cycle
2011	Scientific and Policy Challenges of Particle Radiations in Medical Therapy and Space Missions
2010	Communication of Radiation Benefits and Risks in Decision Making
2009	Future of Nuclear Power Worldwide: Safety, Health and Environment
2008	Low Dose and Low Dose-Rate Radiation Effects and Models
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

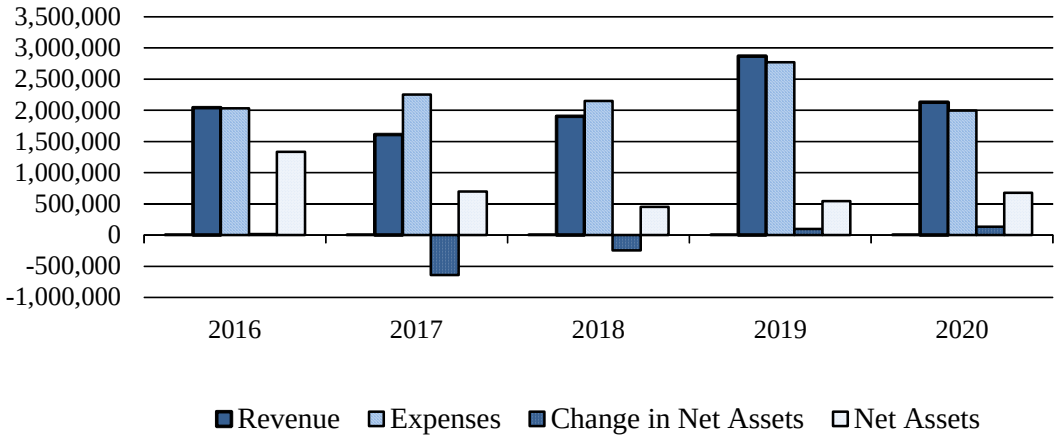
2020 Annual Meeting

The Fifty-Sixth meeting of the NCRP was canceled due to the COVID-19 virus. The business meeting was held *via* webinar on March 24, 2020 to conduct NCRP business.

Financial Summary

The table and bar graph presented below exhibit NCRP's year-end financial data for 2020 and the four preceding years in the categories: (1) total revenue from grants, contracts, contributions, corporate sponsorships, contributed professional services, 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.

Year	Revenue	Expenses	Change in Net Assets	Net Assets
2016	2,045,362	2,031,142	14,220	1,336,309
2017	1,610,611	2,251,295	(640,684)	695,625
2018	1,905,901	2,152,242	(246,341)	449,284
2019	2,869,835	2,773,607	96,228	545,512
2020	2,124,812	1,997,558	127,254	672,766



Appendix 1. Finances

Exhibit A
Statement of Financial Position
For the year ended December 31, 2020

(unaudited)

Current Assets		
Cash and cash equivalents	$	63,098
Investments [at market]		1,180,615
Accounts receivable:		
Publications		3,711
Grants and contracts		246,117
International Commission on Radiation Units and Measurements		604
Inventory—publications		54,601
Prepaid expenses and other assets		15,469
Total current assets		1,564,215
Property and Equipment [at cost]		
Furniture and equipment		190,147
Less accumulated depreciation		(186,030)
Total property and equipment		4,117
TOTAL ASSETS		1,568,332
Liabilities		
Line of credit		243,916
Accounts payable and accrued expenses		342,962
Deferred revenue		40,000
Total current liabilities		626,878
Other Liabilities		
Deferred rent liability		24,854
Accrued post-retirement benefits		243,834
Total other liabilities		268,688
TOTAL LIABILITIES		895,566
Net Assets		

Without donor restrictions	301,827
With donor restrictions	370,939
TOTAL NET ASSETS	672,766
TOTAL LIABILITIES AND NET ASSETS	$ 1,568,332

Exhibit B
Statement of Activities
For the year ended December 31, 2020
(unaudited)

	Net Assets without Donor Restrictions	Net Assets with Donor Restrictions	Total
Revenue and Other Increases			
Contracts and grants	$ 1,580,155	$ —	$ 1,580,155
Contributions	91,663	—	91,663
Corporate sponsorship	5,000	—	5,000
Contributed professional services	151,075	—	151,075
Sales of publications	177,446	—	177,446
Dividends and interest	20,925	3,810	24,735
Net realized and unrealized gain on investments	77,832	11,299	89,131
Professional and administrative services	5,607	—	5,607
Total revenue and other increases	2,109,703	15,109	2,124,812
Expenses and Other Decreases			
Program costs:			
Contracts and grants	1,018,750	—	1,018,750
Publications	45,190	—	45,190
Contributed professional services	151,075	—	151,075
Total program costs	1,215,015	—	1,215,015
Management and general expenses	741,777	—	741,777
Total expenses	1,956,792	—	1,956,792
Investment fees	10,314	—	10,314
Post-retirement benefit change	30,452	—	30,452
	1,997,558	—	1,997,558
Change in Net Assets	112,145	15,109	127,254
Net Assets at Beginning of Year	189,682	355,830	545,512
Net Assets at End of Year	$ 301,827	$ 370,939	$ 672,766

Exhibit C
Statement of Cash Flow
For the year ended December 31, 2020

(unaudited)

Cash flows from operating activities:	
Change in net assets	$ 127,254
Adjustments to reconcile change in net assets to cash provided by operating activities	
Depreciation	3,251
Net realized and unrealized gain on investments	(89,131)
(Increase) decrease in assets:	
Accounts receivable	79,297
Inventory—publications	(2,790)
Prepaid expenses and other assets	(2,246)
Increase (decrease) in liabilities:	
Accounts payable and accrued expenses	(176,124)
Deferred revenue	40,000
Deferred rent liability	(5,180)
Accrued post-retirement benefits	31,483
Net cash provided by operating activities	5,814
Cash flows from investing activities:	
Purchase of equipment	(803)
Purchase of investments	(501,074)
Sale of investments	515,859
Net cash used by investing activities	13,982
Cash flows from financing activities:	
Net repayments on line of credit	(19,594)
Net increase in cash and cash equivalents	202
Cash and cash equivalents at beginning of year	62,896
Cash and cash equivalents at end of year	$ 63,098

Schedule 1
Schedule of Contracts and Grants Revenue
For the year ended December 31, 2020

(unaudited)

Contracts	
Conference of Radiation Control Program Directors	$ 10,196
U.S. Navy	96,684
Total contracts	**106,880**
Grants	
Centers for Disease Control and Prevention	120,901
National Aeronautics and Space Administration	715,145
U.S. Department of Energy	637,229
Total grants	**1,473,275**
Total contracts and grants revenue	**$ 1,580,155**

Schedule 2
Schedule of Contributions & Corporate Sponsorship Revenue
For the year ended December 31, 2020

(unaudited)

Contributions	
American Association of Physicists in Medicine	$ 5,400
American College of Radiology	10,000
American Registry of Radiologic Technologists	6,000
American Roentgen Ray Society	7,500
American Society of Radiologic Technologists	6,000
Council on Radionuclides and Radiopharmaceuticals	2,000
Fluke/RaySafe/Landauer	3,000
Health Physics Society	12,000
Individuals	9,100
In-kind contributions	2,163
Institute of Electrical and Electronics Engineers	3,000
Radiological Society of North America	25,000
Society of Pediatric Radiology	500
Total contributions	**$ 91,663**
Corporate Sponsors	
Nuclear Energy Institute	$ 5,000
Total Corporate Sponsors	**$ 5,000**

Appendix 2. Publications

Distribution of NCRP Publications

(during the period May 16, 1931 through December 31, 2020)

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b] 2020		Total NCRP Publications[c,j]	All Sources Combined
			Hardcopy	E-Pub[j]		
NCRP Reports						
186	Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment (2020)	__d	64	145	209	209
185	Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards (2020)	__d	63	271	334	334
184	Medical Radiation Exposure of Patients in the United States (2019)	__d	45	293	629	629
183	Radiation Exposure in Space and the Potential for Central Nervous System Effects: Phase II (2019)	__d	47	48	199	199
182	Radiation Safety of Sealed Radioactive Sources (2019)	__d	13	68	413	413
181	Evaluation of the Relative Effectiveness of Low-Energy Photons and Electrons in Inducing Cancer in Humans (2018)	__d	5	41	358	358
180	Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States (2018) (2018)	__d	19	111	576	576
179	Guidance for Emergency Response Dosimetry (2017)	__d	9	31	426	426
178	Deriving Organ Doses and Their Uncertainty for Epidemiologic Studies (with a Focus on the One Million U.S. Workers and Veterans Study of Low-Dose Radiation Health Effects) (2018)	__d	7	35	237	237
177	Radiation Protection in Dentistry and Oral & Maxillofacial Imaging (2019)	__d	102	453	555	555
176	Radiation Safety Aspects of Nanotechnology (2017)	__d	3	19	275	275
175	Decision Making for Late-Phase Recovery from Major Nuclear or Radiological Incidents (2014)	__d	6	15	683	683
174	Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance (2013)	__d	1	119	1,568	1,568
173	Investigation of Radiological Incidents (2012)	__d	5	25	847	847

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
172	Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States (2012)	__d	0	92	1,602	1,602
171	Uncertainties in the Estimation of Radiation Risks and Probability of Disease Causation (2012)	__d	1	44	882	882
170	Second Primary Cancers and Cardiovascular Disease After Radiation Therapy (2011)	__d	1	24	792	792
169	Design of Effective Radiological Effluent Monitoring and Environmental Surveillance Programs (2010)	__d	1	15	467	467
168	Radiation Dose Management for Fluoroscopically-Guided Interventional Medical Procedures (2010)	__d	4	189	1,970	1,970
167	Potential Impact of Genetic Susceptibility and Previous Radiation Exposure on Radiation Risk for Astronauts (2010)	__d	1	8	367	367
166	Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (2010)	__d	4	11	639	639
165	Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers (2010)	__d	5	45	1,408	1,408
164	Uncertainties in Internal Radiation Dosimetry (2009)	__d	0	23	539	539
163	Radiation Dose Reconstruction: Principles and Practices (2009)	__d	5	38	915	915
162	Self Assessment of Radiation-Safety Programs (2009)	__d	2	36	1,068	1,068
161	Management of Persons Contaminated with Radionuclides (2009)	__d	2	69	1,945	1,945
160	Ionizing Radiation Exposure of the Population of the United States (2009)	__d	26	138	3,066	3,066
159	Risk to the Thyroid from Ionizing Radiation (2008)	__d	1	20	646	646
158	Uncertainties in the Measurement and Dosimetry of External Radiation (2007)	__d	1	40	1,401	1,401
157	Radiation Protection in Educational Institutions (2007)	__d	0	19	1,154	1,154
156	Development of a Biokinetic Model for Radionuclide-Contaminated Wounds and Procedures for Their Assessment, Dosimetry and Treatment (2006)	__d	0	12	1,016	1,016
155	Management of Radionuclide Therapy Patients (2006)	__d	1	133	2,167	2,167
154	Cesium-137 in the Environment: Radioecology and Approaches to Assessment and Management (2006)	__d	0	7	778	778
153	Information Needed to Make Radiation Protection Recommendations for Space Missions Beyond Low-Earth Orbit (2006)	__d	1	14	945	945

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
152	Performance Assessment of Near-Surface Facilities for Disposal of Low-Level Radioactive Waste (2005)	__d	0	6	741	741
151	Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (2005)	__d	0	568	6,382	6,382
150	Extrapolation of Radiation-Induced Cancer Risks from Nonhuman Experimental Systems to Humans (2005)	__d	1	7	938	938
149	A Guide to Mammography and Other Breast Imaging Procedures (2004)	__d	0	37	1,689	1,689
148	Radiation Protection in Veterinary Medicine (2004)	__d	1	46	1,631	1,631
147	Structural Shielding Design for Medical X-Ray Imaging Facilities (2004)	__d	31	454	6,955	6,955
	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	1	5	1,271	1,271
145	Radiation Protection in Dentistry (2003)	__d	1	71	3,186	3,186
144	Radiation Protection for Particle Accelerator Facilities (2003)	__d	6	94	2,974	2,974
143	Management Techniques for Laboratories and Other Small Institutional Generators to Minimize Off-Site Disposal of Low-Level Radioactive Waste (2003)	__d	1	10	908	908
142	Operational Radiation Safety Program for Astronauts in Low-Earth Orbit: A Basic Framework (2002)	__d	1	6	1,357	1,357
141	Managing Potentially Radioactive Scrap Metal (2002)	__d	1	10	1,428	1,428
140	Exposure Criteria for Medical Diagnostic Ultrasound: II. Criteria Based on All Known Mechanisms (2002)	__d	0	14	1,118	1,118
139	Risk-Based Classification of Radioactive and Hazardous Chemical Wastes (2002)	__d	0	6	1,155	1,155
138	Management of Terrorist Events Involving Radioactive Material (2001)	__d	3	16	7,895	7,895
137	Fluence-Based and Microdosimetric Event-Based Methods for Radiation Protection in Space (2001)	__d	0	5	967	967
136	Evaluation of the Linear-Nonthreshold Dose-Response Model for Ionizing Radiation (2001)	__d	1	23	1,839	1,839
135	Liver Cancer Risk from Internally-Deposited Radionuclides (2001)	__d	1	5	1,275	1,275
134	Operational Radiation Safety Training (2000)	__d	0	49	1,798	1,798
133	Radiation Protection for Procedures Performed Outside the Radiology Department (2000)	__d	1	46	2,157	2,157

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
132	Radiation Protection Guidance for Activities in Low-Earth Orbit (2000)	__d	2	10	1,249	1,249
131	Scientific Basis for Evaluating the Risks to Populations from Space Applications of Plutonium (2001)	__d	0	5	953	953
130	Biological Effects and Exposure Limits for "Hot Particles" (1999)	__d	4	13	1,357	1,357
129	Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies (1999)	__d	0	7	1,866	1,866
128	Radionuclide Exposure of the Embryo/Fetus (1998)	__d	2	19	1,998	1,998
127	Operational Radiation Safety Program (1998)	__d	2	54	2,960	2,960
126	Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection (1997)	__d	1	9	2,169	2,169
125	Deposition, Retention and Dosimetry of Inhaled Radioactive Substances (1997)	__d	0	6	2,769	2,769
124	Sources and Magnitude of Occupational and Public Exposures from Nuclear Medicine Procedures (1996)	__d	0	32	3,587	3,587
123	Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground (1996)	__d	2	24	3,444	3,444
122	Use of Personal Monitors to Estimate Effective Dose Equivalent and Effective Dose to Workers for External Exposure to Low-LET Radiation (1995)	__d	1	46	3,828	3,828
121	Principles and Application of Collective Dose in Radiation Protection (1995)	__d	1	8	2,676	2,676
120	Dose Control at Nuclear Power Plants (1994)	__d	1	34	3,180	3,180
119	A Practical Guide to the Determination of Human Exposure to Radiofrequency Fields (1993)	__d	4	11	3,759	3,759
118	Radiation Protection in the Mineral Extraction Industry (1993)	__d	1	3	2,796	2,796
117	Research Needs for Radiation Protection (1993)	__d	1	7	2,133	2,133
116	Limitation of Exposure to Ionizing Radiation (1993)	__d	0	200	8,493	8,493
115	Risk Estimates for Radiation Protection (1993)	__d	1	21	3,592	3,592
114	Maintaining Radiation Protection Records (1992)	__d	1	33	2,713	2,713
113	Exposure Criteria for Medical Diagnostic Ultrasound: I. Criteria Based on Thermal Mechanisms (1992)	__d	1	2	3,471	3,471
112	Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination (1991)	__d	2	48	4,262	4,262

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
111	Developing Radiation Emergency Plans for Academic, Medical and Industrial Facilities (1991)	__d	0	7	4,306	4,306
110	Some Aspects of Strontium Radiobiology (1991)	__d	0	2	2,727	2,727
109	Effects of Ionizing Radiation on Aquatic Organisms (1991)	__d	0	2	2,385	2,385
108	Conceptual Basis for Calculations of Absorbed-Dose Distributions (1991)	__d	0	16	3,429	3,429
107	Implementation of the Principle of As Low As Reasonably Achievable (ALARA) for Medical and Dental Personnel (1990)	__d	0	17	3,701	3,701
106	Limit for Exposure to “Hot Particles” on the Skin (1990)	__d	0	32	3,070	3,070
105	Radiation Protection for Medical and Allied Health Personnel (1989)	__d	1	19	7,186	7,186
104	The Relative Biological Effectiveness of Radiations of Different Quality (1990)	__d	1	15	2,720	2,720
103	Control of Radon in Houses (1989)	__d	1	12	3,973	3,973
102	Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies up to 50 MeV (Equipment Design, Performance and Use) (1989)	__d	0	47	8,343	8,343
101	Exposure of the U.S. Population from Occupational Radiation (1989)	__d	1	10	4,369	4,369
100	Exposure of the U.S. Population from Diagnostic Medical Radiation (1989)	__d	1	7	5,189	5,189
99	Quality Assurance for Diagnostic Imaging (1988)	__d	0	55	5,532	5,532
98	Guidance on Radiation Received in Space Activities (1989)	__d	0	9	3,589	3,589
97	Measurement of Radon and Radon Daughters in Air (1988)	__d	1	8	4,438	4,438
96	Comparative Carcinogenicity of Ionizing Radiation and Chemicals (1989)	__d	0	5	4,265	4,265
95	Radiation Exposure of the U.S. Population from Consumer Products and Miscellaneous Sources (1987)	__d	0	15	4,473	4,473
94	Exposure of the Population in the United States and Canada from Natural Background Radiation (1987)	__d	3	11	4,646	4,646
93	Ionizing Radiation Exposure of the Population of the United States (1987)	__d	1	13	7,628	7,628
92	Public Radiation Exposure from Nuclear Power Generation in the United States (1987)	__d	1	7	3,831	3,831
91	Recommendations on Limits for Exposure to Ionizing Radiation (1987)	__d	0	0	8,486	8,486
90	Neptunium: Radiation Protection Guidelines (1988)	__d	0	3	3,033	3,033

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
89	Genetic Effects from Internally Deposited Radionuclides (1987)	__d	0	3	4,113	4,113
88	Radiation Alarms and Access Control Systems (1986)	__d	1	8	4,989	4,989
87	Use of Bioassay Procedures for Assessment of Internal Radionuclide Deposition (1987)	__d	0	5	4,430	4,430
86	Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields (1986)	__d	1	14	5,548	5,548
85	Mammography—A User's Guide (1986)	__d	0	0	32,655	32,655
84	General Concepts for the Dosimetry of Internally Deposited Radionuclides (1985)	__d	0	6	4,446	4,446
83	The Experimental Basis for Absorbed-Dose Calculations in Medical Uses of Radionuclides (1985)	__d	0	6	3,754	3,754
82	SI Units in Radiation Protection and Measurements (1985)	__d	1	14	4,902	4,902
81	Carbon-14 in the Environment (1985)	__d	0	2	4,145	4,145
80	Induction of Thyroid Cancer by Ionizing Radiation (1985)	__d	0	4	4,428	4,428
79	Neutron Contamination from Medical Electron Accelerators (1984)	__d	0	53	5,448	5,448
78	Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States (1984)	__d	0	5	6,631	6,631
77	Exposures from the Uranium Series with Emphasis on Radon and Its Daughters (1984)	__d	0	5	6,794	6,794
76	Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment (1984)	__d	0	3	6,832	6,832
75	Iodine-129: Evaluation of Release from Nuclear Power Generation (1983)	__d	0	5	6,075	6,075
74	Biological Effects of Ultrasound: Mechanisms and Clinical Implications (1983)	__d	0	5	11,430	11,430
73	Protection in Nuclear Medicine and Ultrasound Diagnostic Procedures in Children (1983)	__d	13	6	5,679	5,679
72	Radiation Protection and Measurement for Low-Voltage Neutron Generators (1983)	__d	0	5	4,614	4,614
71	Operational Radiation Safety—Training (1983)	__d	0	0	5,075	5,075
70	Nuclear Medicine—Factors Influencing the Choice and Use of Radionuclides in Diagnosis and Therapy (1982)	__d	0	10	5,611	5,611
69	Dosimetry of X-Ray and Gamma-Ray Beams for Radiation Therapy in the Energy Range 10 keV to 50 MeV (1981)	__d	0	19	5,360	5,360
68	Radiation Protection in Pediatric Radiology (1981)	__d	0	12	4,743	4,743

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
67	Radiofrequency Electromagnetic Fields—Properties, Quantities and Units, Biophysical Interaction and Measurements (1981)	__d	0	11	5,657	5657
66	Mammography (1980)	__d	0	0	4,598	4,598
65	Management of Persons Accidentally Contaminated with Radionuclides (1980)	__d	0	10	18,666	18,666
64	Influence of Dose and Its Distribution in Time on Dose-Response Relationships for Low-LET Radiations (1980)	__d	0	4	5,431	5,431
63	Tritium and Other Radionuclide Labeled Organic Compounds Incorporated in Genetic Material (1979)	__d	0	5	4,458	4,458
62	Tritium in the Environment (1979)	__d	0	4	4,114	4,114
61	Radiation Safety Training Criteria for Industrial Radiography (1978)	__d	0	3	6,319	6,319
60	Physical, Chemical and Biological Properties of Radiocerium Relevant to Radiation Protection Guidelines (1979)	__d	0	3	4,171	4,171
59	Operational Radiation Safety Program (1979)	__d	0	0	8,046	8,046
58	A Handbook of Radioactivity Measurements Procedures (1978)	__d	0	30	13,985	13,985
57	Instrumentation and Monitoring Methods for Radiation Protection (1978)	__d	1	18	11,270	11,270
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	5	7,014	7,014
54	Medical Radiation Exposure of Pregnant and Potentially Pregnant Women (1977)	__d	0	34	11,072	11,072
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	5	4,860	4,860
51	Radiation Protection Design Guidelines for 0.1-100 MeV Particle Accelerator Facilities (1977)	__d	0	0	8,514	8,514
50	Environmental Radiation Measurements (1976)	__d	1	6	8,106	8,106
49	Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies up to 10 MeV (1976)	__d	0	151	18,801	18,801
	Adjunct to NCRP Report 49 (1976)	__d	0	0	2,797	2,797

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
48	Radiation Protection for Medical and Allied Health Personnel (1976)	__d	__e	0	14,359	14,359
47	Tritium Measurement Techniques (1976)	__d	0	6	6,537	6,537
46	Alpha-Emitting Particles in Lungs (1975)	__d	0	4	6,238	6,238
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	3	6,703	6,703
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	6	47,410	47,410
41	Specification of Gamma-Ray Brachytherapy Sources (1974)	__d	0	14	5,724	5,724
40	Protection Against Radiation from Brachytherapy Sources (1972)	__d	0	45	10,226	10,226
39	Basic Radiation Protection Criteria (1971)	__d	__e	0	40,393	40,393
38	Protection Against Neutron Radiation (1971)	__d	3	14	9,292	9,292
37	Precautions in the Management of Patients who have Received Therapeutic Amounts of Radionuclides (1970)	__d	0	0	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	17,662	17,662
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	0	0	22,363	22,363
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	0	9,953	34,403
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	0	3,836	7,980
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	4,083	14,873

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
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	3,073	14,922
22	Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure (1959)	52,526	0	0	7,450	59,976
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	0	0	7,659	58,159
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

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
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	554	5,604	1,005,337	1,964,785
Lauriston S. Taylor Lectures						
43	Fallout from Nuclear Weapons Tests: Environmental, Health, Political and Sociological Considerations, by André Bouville (2019)	__i	__i	__i		__i
42	Radiation Dosimetry Research for Medicine and Protection: A European Journey, by Hans-Georg Menzel (2018), Health Phys. 116(2):222–234 (2019)	__i	__i	__i		__i
41	Environmental Radiation and Life—A Broad View, by F. Ward Whicker (2017), Health Phys. 114(2):192–203 (2018)	__i	__i	__i		__i
40	Radiation Protection and Regulatory Science, John W. Poston, Sr. (2016), Health Phys. 112(2):193–198 (2017)	__i	__i	__i		__i
39	Dosimetry of Internal Emitters: Contributions of Radiation Protection Bodies and Radiological Events, Keith F. Eckerman (2015), Health Phys. 110(2):192–200 (2016)	__i	__i	__i		__i
38	On the Shoulders of Giants: Radiation Protection Over 50 Years, Fred A. Mettler, Jr. (2014), Health Phys. 108(2):102–110 (2015)	__i	__i	__i		__i
37	When Does Risk Assessment Get Fuzzy?, John E. Till (2013), Health Phys. 106(2):148–161 (2014)	__i	__i	__i		__i
36	From the Field to the Laboratory and Back: The *What Ifs*, *Wows*, and *Who Cares* of Radiation Biology, Antone L. Brooks (2012), Health Phys. 105(5):407–421 (2013)	__i	__i	__i		__i
35	What Makes Particle Radiation So Effective?, Eleanor A. Blakely (2011), Health Phys. 103(5):508–528 (2012)	__i	__i	__i		__i
34	Radiation Protection and Public Policy in an Uncertain World, Charles E. Land (2010), Health Phys. 101(5):499–508 (2011)	__i	__i	__i		__i
33	Radiation Epidemiology: The Golden Age and Remaining Challenges, John D. Boice, Jr. (2009), Health Phys. 100(1):59-76 (2011)	__i	__i	__i		__i
32	Radiation Standards, Dose/Risk Assessments, Public Interactions, and Yucca Mountain: Thinking Outside the Box, Dade W. Moeller (2008) Health Phys. 97:376–391 (2009)	__i	__i	__i		__i
31	The Quest for Therapeutic Actinide Chelators, Patricia W. Durbin (2007), Health Phys. 95:465–492 (2008)	__i	__i	__i		__i

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
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 (2007)	__i	__i	__i		__i
29	Nontargeted Effects of Radiation: Implications for Low-Dose Exposures, John B. Little (2005), Health Phys. 91:416–426 (2006)	__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 (2005)	__i	__i	__i		__i
27	The Evolution of Radiation Protection–From Erythema to Genetic Risks to Risks of Cancer to ?, Charles B. Meinhold (2003), Health Phys. 87:240–248 (2004)	__i	__i	__i		__i
26	Developing Mechanistic Data for Incorporation into Cancer and Genetic Risk Assessments: Old Problems and New Approaches, R. Julian Preston (2002), Health Phys. 85:4–12 (2003)	__i	__i	__i		__i
25	Assuring the Safety of Medical Diagnostic Ultrasound, Wesley L. Nyborg (2001), Health Phys. 82:578–587 (2002)	__i	__i	__i		__i
24	Administered Radioactivity: *Unde Venimus Quoque Imus*, S. James Adelstein (2000), Health Phys. 80:317–324 (2001)	__i	__i	__i		__i
23	Back to Background: Natural Radiation and Radioactivity Exposed, Naomi H. Harley (1999), Health Phys. 79:121–128 (2000)	__i	__i	__i		__i
22	From Chimney Sweeps to Astronauts: Cancer Risks in the Work Place, Eric J. Hall (1998), Health Phys. 75:357–366 (1999)	__i	__i	__i		__i
21	Radionuclides in the Body: Meeting the Challenge, William J. Bair (1997), Health Phys. 73:423–432 (1998)	__i	__i	__i		__i
20	70 Years of Radiation Genetics: Fruit Flies, Mice and Humans, Seymour Abrahamson (1996), Health Phys. 71:624–633 (1997)	__i	__i	__i		__i
19	Certainty and Uncertainty in Radiation Research, Albrecht M. Kellerer (1995), Health Phys. 69:446–453 (1996)	__i	__i	__i		__i
18	Mice, Myths and Men, R.J. Michael Fry (1994)	__d	0	__ k	512	512
17	Science, Radiation Protection and the NCRP, Warren K. Sinclair (1993)	__d	0	__ k	544	544
16	Dose and Risk in Diagnostic Radiology: How Big? How Little?, Edward W. Webster (1992)	__d	0	0	1,434	1,434
15	When is a Dose Not a Dose?, Victor P. Bond (1991)	__d	0	0	752	752
14	Radiation Protection and the Internal Emitter Saga, J. Newell Stannard (1990)	__d	0	0	354	354

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
13	Radiobiology and Radiation Protection: The Past Century and Prospects for the Future, Arthur C. Upton (1989)	__d	0	0	580	580
12	How Safe is Safe Enough?, Bo Lindell (1988)	__d	0	0	1,010	1,010
11	How to Be Quantitative about Radiation Risk Estimates, Seymour Jablon (1987)	__d	0	0	1,023	1,023
10	Biological Effects of Non-Ionizing Radiations: Cellular Properties and Interactions, Herman P. Schwan (1986)	__d	0	0	1,692	1,692
9	Truth (and Beauty) in Radiation Measurement, John H. Harley (1985)	__d	0	0	765	765
8	Limitation and Assessment in Radiation Protection, Harald H. Rossi (1984)	__d	0	0	1,530	1,530
7	The Human Environment—Past, Present and Future, Merril Eisenbud (1983)	__d	0	0	1,034	1,034
6	Ethics, Trade-Offs and Medical Radiation, Eugene L. Saenger (1982)	__d	0	0	1,251	1,251
5	How Well Can We Assess Genetic Risk? Not Very, James F. Crow (1981)	__d	0	0	1,404	1,404
4	From "Quantity of Radiation" and "Dose" to "Exposure" and "Absorbed Dose"—An Historical Review, Harold O. Wyckoff (1980)	__d	0	0	1,852	1,852
3	Radiation Protection—Concepts and Trade Offs, Hymer L. Friedell (1979)	__d	0	0	2,085	2,085
2	Why be Quantitative about Radiation Risk Estimates? Sir Edward E. Pochin (1978)	__d	0	__ k	2,338	2,338
1	The Squares of the Natural Numbers in Radiation Protection, Herbert M. Parker (1977)	__d	0	__ k	1,513	1,513
	Total Lectures Distributed	0	0	0	21,673	21,673
NCRP Annual Meeting Proceedings						
40	Radiation Protection Responsibility in Medicine, Proceedings of the Fifty-Fourth Annual Meeting held March 5–6, 2018, Health Phys. 116(2):111–294 (2019)	__i	__i	__i		__i
39	Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism Is There a Need for Realignment to Close Remaining Gaps?, Proceedings of the Fifty-Third Annual Meeting held March 6–7, 2017, Health Phys. 114(2):109–260 (2018)	__i	__i	__i		__i
38	Meeting the Needs of the Nation for Radiation Protection: How Did We Get Here?, Proceedings of the Fifty-Second Annual Meeting held April 11–12, 2016. Health Phys. 112(2):111–234 (2017)	__i	__i	__i		__i

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
37	Changing Regulations and Radiation Guidance: What Does the Future Hold?, Proceedings of the Fifty-First Annual Meeting held March 16–17, 2015. Health Phys. 110(2):97–237 (2016)	__i	__i	__i		__i
36	NCRP: Achievements of the Past 50 Years and Addressing the Needs of the Future, Proceedings of the Fiftieth Annual Meeting held March 10–11, 2014. Health Phys. 108(2):97–241 (2015)	__i	__i	__i		__i
35	Radiation Dose and the Impacts on Exposed Populations, Proceedings of the Forty-Ninth Annual Meeting held March 11–12, 2013. Health Phys. 106(2):145–329 (2014)	__i	__i	__i		__i
34	Emerging Issues in Radiation Protection in Medicine, Emergency Response, and the Nuclear Fuel Cycle, Proceedings of the Forty-Eighth Annual Meeting held March 12–13, 2012. Health Phys. 105(5):401–468 (2013)	__i	__i	__i		__i
33	Scientific and Policy Challenges of Particle Radiations in Medical Therapy and Space Missions, Proceedings of the Forty-Seventh Annual Meeting held March 7–8, 2011. Health Phys. 103(5):529–684 (2012)	__i	__i	__i		__i
32	Communication of Radiation Benefits and Risks in Decision Making, Proceedings of the Forty-Sixth Annual Meeting held March 8–9, 2010. Health Phys. 101(5):497–629 (2011)	__i	__i	__i		__i
31	Future of Nuclear Power Worldwide: Safety, Health and Environment, Proceedings of the Forty-Fifth Annual Meeting held March 2–3, 2009. Health Phys. 100(1):2–112 (2011)	__i	__i	__i		__i
30	Low Dose and Low Dose-Rate Radiation Effects and Models, Proceedings of the Forty-Fourth Annual Meeting held April 14–15, 2008. Health Phys. 97(5):373–541 (2009)	__i	__i	__i		__i
29	Advances in Radiation Protection in Medicine, Proceedings of the Forty-Third Annual Meeting held April 16–17, 2007. Health Phys. 95(5):461–686 (2008)	__i	__i	__i		__i
28	Chernobyl at Twenty, Proceedings of the Forty-Second Annual Meeting held April 3–4, 2006. Health Phys. 93(5):345–595 (2007)	__i	__i	__i		__i
27	Managing the Disposition of Low-Activity Radioactive Materials, Proceedings of the Forty-First Annual Meeting held March 30–31, 2005. Health Phys. 91(5):413–536 (2006)	__i	__i	__i	3	3
26	Advances in Consequence Management for Radiological Terrorism Events, Proceedings of the Fortieth Annual Meeting held April 14–15, 2004. Health Phys. 89(5):415–588 (2005)	__i	__i	__i	1	1
	Compact disk version of Proceedings No. 26	__i	0	0	102	102

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b] 2020		Total NCRP Publications[c,j]	All Sources Combined
			Hardcopy	E-Pub[j]		
25	Radiation Protection at the Beginning of the 21st Century—A Look Forward, Proceedings of the Thirty-Ninth Annual Meeting held April 9–10, 2003. Health Phys. 87(3):249–318 (2004)	__i	__i	__i		__i
24	Where the New Biology Meets Epidemiology: Impact on Radiation Risk Estimates, Proceedings of the Thirty-eighth Annual Meeting held April 10–11, 2002. Health Phys. 85(1):1–108 (2003)	__i	__i	__i		__i
23	Fallout from Atmospheric Nuclear Tests—Impact on Science and Society, Proceedings of the Thirty-seventh Annual Meeting held April 4–5, 2001. Health Phys. 82(5):573–748 (2002)	__i	__i	__i		__i
22	Ionizing Radiation Science and Protection in the 21st Century, Proceedings of the Thirty-sixth Annual Meeting held April 5–6, 2000. Health Phys. 80(4):317-402 (2001)	__i	__i	__i		__i
21	Radiation Protection in Medicine: Contemporary Issues, Proceedings of the Thirty-fifth Annual Meeting held April 7–8, 1999 (1999)	__d	0	0	205	205
	Compact disk version of Proceedings No. 21	__d	0	0	82	82
20	Cosmic Radiation Exposure of Airline Crews, Passengers and Astronauts, Proceedings of the Thirty-fourth Annual Meeting held on April 1–2, 1998, Health Phys. **79**(5):466–613 (2000)	__i	__i	__i	0	__i
19	The Effects of Pre- and Postconception Exposure to Radiation, Proceedings of the Thirty-third Annual Meeting held on April 2–3, 1997, Teratology **59**(4):181–317 (1999)	__i	__i	__i	0	__i
18	Implications of New Data on Radiation Cancer Risk, Proceedings of the Thirty-second Annual Meeting held April 3–4, 1996 (1997)	__d	0	__ k	384	384
17	Environmental Dose Reconstruction and Risk Implications, Proceedings of the Thirty-first Annual Meeting held April 12–13, 1995 (1996)	__d	0	__ k	428	428
16	Extremely-Low-Frequency Electromagnetic Fields: Issues in Biological Effects and Public Health, Proceedings of the Thirtieth Annual Meeting held on April 6–7, 1994 [not published]	__d	0	__ k	0	0
15	Radiation Science and Societal Decision Making, Proceedings of the Twenty-Ninth Annual Meeting held April 7–8, 1993 (1994)	__d	0	__ k	565	565
14	Radiation Protection in Medicine, Proceedings of the Twenty-Eighth Annual Meeting held April 1–2, 1992 (1993)	__d	0	__ k	847	847

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
13	Genes, Cancer and Radiation Protection, Proceedings of the Twenty-Seventh Annual Meeting held April 3–4, 1991 (1992)	__d	0	__ k	690	690
12	Health and Ecological Implications of Radioactively Contaminated Environments, Proceedings of the Twenty-Sixth Annual Meeting held April 4–5, 1990 (1991)	__d	0	__ k	917	917
11	Radiation Protection Today—The NCRP at Sixty Years, Proceedings of the Twenty-Fifth Annual Meeting held April 4–5, 1989 (1990)	__d	0	0	661	661
10	Radon, Proceedings of the Twenty-Fourth Annual Meeting held March 30–31, 1988 (1989)	__d	0	__ k	1,454	1,454
9	New Dosimetry at Hiroshima and Nagasaki and Its Implications for Risk Estimates, Proceedings of the Twenty-Third Annual Meeting held April 8–9, 1987 (1989)	__d	0	__ k	748	748
8	Nonionizing Electromagnetic Radiations and Ultrasound, Proceedings of the Twenty-Second Annual Meeting held April 2–3, 1986 (1988)	__d	0	__ k	1,025	1,025
7	Radioactive Waste, Proceedings of the Twenty-First Annual Meeting held April 3–4, 1985 (1986)	__d	0	__ k	1,421	1,421
6	Some Issues Important in Developing Basic Radiation Protection Recommendations, Proceedings of the Twentieth Annual Meeting held April 4–5, 1984 (1985)	__d	0	__ k	1,537	1,537
5	Environmental Radioactivity, Proceedings of the Nineteenth Annual Meeting held April 6–7, 1983 (1984)	__d	0	__ k	3,976	3,976
4	Radiation Protection and New Medical Diagnostic Approaches, Proceedings of the Eighteenth Annual Meeting held April 6–7, 1982 (1983)	__d	0	__ k	1,210	1,210
3	Critical Issues in Setting Radiation Dose Limits, Proceedings of the Seventeenth Annual Meeting held April 8–9, 1981 (1982)	__d	0	__ k	1,667	1,667
2	Quantitative Risk in Standards Setting, Proceedings of the Sixteenth Annual Meeting held April 2–3, 1980 (1981)	__d	__e	__ k	2,158	2,158
1	Perceptions of Risk, Proceedings of the Fifteenth Annual Meeting held March 14–15, 1979 (1980)	__d	0	__ k	1,944	1,944
	Total Proceedings Distributed	0	0	0	22,025	22,025
NCRP Commentaries						
30	Using Personal Monitoring Data to Derive Organ Doses for Medical Radiation Workers, with a Focus on Lung (2020)	__d	20	90	110	110
29	Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced NORM (TENORM) from the Oil and Gas Industry (2020)	__d	20	123	143	143

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
28	Implementation Guidance for Emergency Response Dosimetry	__d	2	41	817	817
27	Implications of Recent Epidemiologic Studies for the Linear-Nonthreshold Model and Radiation Protection (2018)	__d	3	73	706	706
26	Guidance on Radiation Dose Limits for the Lens of the Eye (2016)	__d	2	67	616	616
25	Potential for Central Nervous System Effects from Radiation Exposure During Space Activities Phase I: Overview (2016)	__d	0	14	194	194
24	Health Effects of Low Doses of Radiation: Perspectives on Integrating Radiation Biology and Epidemiology (2015)	__d	1	45	643	643
23	Radiation Protection for Space Activities: Supplement to Previous Recommendations (2014)	__d	0	14	314	314
22	Radiological Health Protection Issues Associated With Use of Active Detection Technology Systems for Detection of Radioactive Threat Materials (2011)	__d	0	9	239	239
21	Radiation Protection in the Application of Active Detection Technologies (2011)	__d	0	8	290	290
20	Radiation Protection and Measurement Issues Related to Cargo Scanning With Accelerator-Produced High-Energy X Rays (2007)	__d	0	11	546	546
19	Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism (2005)	__d	0	18	1,618	1,618
18	Biological Effects of Modulated Radiofrequency Fields (2003)	__d	0	11	707	707
17	Pulsed Fast Neutron Analysis System Used in Security Surveillance (2003)	__d	0	5	633	633
16	Screening of Humans for Security Purposes Using Ionizing Radiation Scanning Systems (2003)	__d	0	14	896	896
15	Evaluating the Reliability of Biokinetic and Dosimetric Models and Parameters Used to Assess Individual Doses for Risk Assessment Purposes (1998)	__d	0	9	835	835
14	A Guide for Uncertainty Analysis in Dose and Risk Assessments Related to Environmental Contamination (1996)	__d	0	7	1,812	1,812
13	An Introduction to Efficacy in Diagnostic Radiology and Nuclear Medicine (Justification of Medical Radiation Exposure) (1995)	__d	0	10	1,621	1,621
12	Radiation Exposure and High-Altitude Flight (1995)	__d	0	10	857	857
11	Dose Limits for Individuals Who Receive Exposure from Radionuclide Therapy Patients (1995)	__d	0	22	1,682	1,682

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office[a]	By NCRP Secretariat[b]		Total NCRP Publications[c,j]	All Sources Combined
			2020			
			Hardcopy	E-Pub[j]		
10	Advising the Public about Radiation Emergencies: A Document for Public Comment (1994)	__d	0	8	1,362	1,362
9	Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus or Nursing Child (1994)	__d	1	9	1,678	1,678
8	Uncertainty in NCRP Screening Models Relating to Atmospheric Transport, Deposition and Uptake by Humans (1993)	__d	0	6	1,054	1,054
7	Misadministration of Radioactive Material in Medicine—Scientific Background (1991)	__d	0	8	1,293	1,293
6	Radon Exposure of the U.S. Population—Status of the Problem (1991)	__d	0	8	1,300	1,300
5	Review of the Publication, "Living Without Landfills" (1989)	__d	0	4	3,237	3,237
4	Guidelines for the Release of Waste Water from Nuclear Facilities with Special Reference to the Public Health Significance of the Proposed Release of Treated Waste Waters at Three Mile Island (1987)	__d	0	5	1,003	1,003
3	Screening Techniques for Determining Compliance with Environmental Standards—Releases of Radionuclides to the Atmosphere (1986)	__d	0	0	3,603	3,603
2	Preliminary Evaluation of Criteria for the Disposal of Transuranic Contaminated Waste (1982)	__d	0	0	292	292
1	Krypton-85 in the Atmosphere—with Specific Reference to the Public Health Significance of the Proposed Controlled Release at Three Mile Island (1980)	__d	0	0	697	697
	Total Commentaries Distributed	0	49	649	30,798	30,798
NCRP Symposia Proceedings						
3	Acceptability of Risk from Radiation—Application to Human Space Flight, Proceedings of a Symposium held May 29, 1996 (1997)	__d	0	0	655	655
2	Radioactive and Mixed Waste—Risk as a Basis for Waste Classification, Proceedings of a Symposium held November 9, 1994 (1995)	__d	0	0	463	463
1	The Control of Exposure of the Public to Ionizing Radiation in the Event of Accident or Attack, Proceedings of a Symposium held April 27-28, 1981 (1982)	__d	0	0	1,849	1,849
	Total Symposia Proceedings Distributed	0	0	0	2,967	2,967
	Total NCRP Publications Distributed	959,448	603	6,253	1,082,800	2,042,248

[a]The U.S. Government Printing Office distributed NCRP reports during the period May 16, 1931 through December 31, 1975.
[b]Includes distribution of complimentary copies.
[c]Since the initiation of the NCRP Publication Program in July 1966 and includes distribution through the American Association of Physicists in Medicine and the Health Physics Society.
[d]Document distributed only by NCRP Publications (hardcopy and electronic download).
[e]Out of print before December 31, 2019.
[f]This report was not distributed by the U.S. Government Printing Office. The report was originally published by the Section of Nuclear Medicine, Department of Pharmacology, The University of Chicago, Chicago, Illinois and the distribution given here was by that office.
[g]No record of distribution is available.
[h]Out of print prior to initiation of Publication Program in July 1966.
[i]Published and distributed by source indicated.
[j]Data incomplete because sales information from the Health Physics Society for 2020 had not been provided at the time this Annual Report went to publication.
[k]Not available in softcopy (i.e., PDF, E-Pubs).