

2023

Year in Review



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Charter

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

1. Collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection.
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.

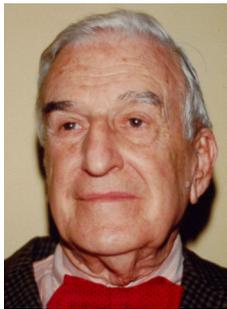
The Council is the successor to the unincorporated association of scientists known as the National Committee on Radiation Protection and Measurements and was formed to carry on the work begun by the Committee in 1929.

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.

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 –

President's Message



NCRP is a wonderful organization, and all who are affiliated with it should be proud of the work done for our great nation. As I near the end of my five-plus years as President, I want to thank all the members of Council, our Board of Directors, program area committees (PACs), scientific committees (SCs), and administrative committees, as well as all our many partners — federal agencies and other organizations — for the privilege of working with you. As I say every year, NCRP has faced and will continue to face challenges, but the progress and accomplishments achieved together have been substantial. COVID changed some of our ways of operating, and for some things we'll never go back to the old ways.

This means we miss seeing our colleagues as regularly in face-to-face committee meetings, but NCRP can operate, often as effectively and efficiently, by virtual meetings, resulting in not-insignificant cost savings, particularly for our administrative efforts that don't have direct funding. Thank you all for making the work of NCRP happen so well.

It was particularly nice this year to have our Annual Meeting in person in March, after not being able to meet face-to-face since 2019. The very successful 59th annual meeting on “Integration of Physics, Biology and Epidemiology in Radiation Risk Assessment” was chaired by Eric J. Grant with Vice Chair Emily A. Caffrey, who, with their Program Committee, organized an excellent meeting of cutting-edge presentations and superb speakers. More on that below. And the NCRP staff and 2024 Annual Meeting Program Committee are working hard to finalize arrangements for the upcoming meeting in Bethesda on “Advanced and Small Modular Nuclear Power Reactors.” It will be chaired by William E. Kennedy, Jr. with Willie O. Harris and Kathryn A. Higley as co-chairs. The program looks great (more below), and there will be a few changes to our normal schedule of related activities, *e.g.*, an expanded reception replacing the usual Members Only dinner on Sunday evening, that we're looking forward to.

Highlights of 2023 include:

- As always, a high point of the NCRP year was the highly successful Annual Meeting held in March 2023, in person, a distinct pleasure. The Program Committee, headed by Eric J. Grant and Emily A. Caffrey, put together a great program, and it was special to be able to have all our PAC meetings face-to-face and to have lively chats during breaks and receptions. Many thanks go to all involved in the planning and conduct of the very interesting and topical meeting. For any who missed the meeting or want to relive some talks, the recordings can be purchased on the NCRP website (<https://ncrponline.org/>).
- We had a good year for new grants. NCRP received new funding in 2023 from the National Aeronautics and Space Administration (NASA) for an exciting 5 y project, extending the ongoing Million Person Study (MPS), to evaluate cognitive impairment and other adverse outcomes in submariners related to the interaction between radiation and multiple stressors in support of risk assessment for astronauts. The U.S. Department of Energy (DOE) renewed for an additional 5 y of funding the epidemiology studies of DOE workers within the MPS. We also received two awards from the U.S. Food and Drug Administration (FDA) to help fund ongoing projects on patient shielding in medical imaging (SC 4-13) and the development of informational webpages on the use and health effects of wireless technology (SC 8-1). We had continuing funding from numerous federal agencies and other organizations to support the various committees of NCRP and the MPS. These include (in alphabetical order) the American Board of

Radiology (ABR) Foundation, Centers for Disease Control and Prevention (CDC), DOE, FDA, and NASA (more info on funding below).

- In 2023 NCRP published two commentaries and a statement. Descriptions of those NCRP publications are further down in this Message. In addition, seven published papers described work of NCRP or the MPS, and at least 34 presentations about the work of NCRP, including MPS efforts funded through NCRP, were made at various venues by NCRP officers, chairs/members of PACs and SCs and others involved in the projects. In all, it has been a nicely productive year. Many thanks to all who contributed to those activities.
- We currently have five active scientific committee (SCs), including one new SC this year, and a task group (fuller descriptions below).
- In May 2021 and 2022, we held Welcome Webinars for new Council Members since we didn't have an in-person annual meeting either year; this was a time to welcome our newly-elected members, introduce them to each other and to several senior members of Council, and to explain to them more about NCRP. It was super to be able to do the Welcome Luncheon for new members in person at the 2023 Annual Meeting, and we look forward to doing it again this year, as a lasting activity.
- Another relatively new initiative the last couple years is internship and mentoring efforts. We are continuing to expand that effort to get more junior radiation professionals involved with NCRP.
- The awardee selected to receive the 4th John D. Boice Young Investigator Award at the 2024 Annual Meeting is Dr. Lucas Carter, who works at the Memorial Sloan Kettering Cancer Center (more info see: <https://ncrponline.org/>). Congratulations to Luke!
- It was with very mixed feelings in late August that I informed the Board and then all the NCRP Council that I intended to retire as NCRP President at the time of the Annual Meeting in March 2024. The Board has selected Dr. Kathryn A. Higley as the next, the seventh, NCRP President. I have been very honored to have served as NCRP President and to have had the pleasure of working with so many wonderful people in NCRP and with our great Partners. NCRP and our Partners can look forward to a stellar future under the guidance of President Higley.

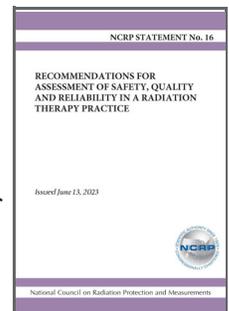
NCRP Publications Completed in 2023:

We are grateful to the members of NCRP SCs who spend many, many hours producing high quality NCRP publications. This year we published the following:



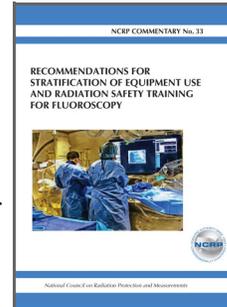
- **NCRP Commentary No. 32**, *Evaluation of a Sex-Specific Difference in Lung Cancer Radiation Risk and Approaches for Improving Lung Cancer Radiation Risk Projection (with a Focus on Application to Space Activities)*, prepared by SC 1-27 (Chair: Michael M. Weil; Co-Chair: David J. Pawel), was published in December 2022. Funded by NASA and DOE, this project examined the risk of lung cancer in populations exposed particularly to chronic (protracted or fractionated) radiation. A main objective was to assess whether there is a sex-specific difference in lung cancer risk from chronic radiation exposure to the lungs such as experienced by astronauts during extended space missions.

- **NCRP Statement No. 16**, *Recommendations for Assessment of Safety, Quality, and Reliability in a Radiation Therapy Practice*, prepared by SC 4-10 (Chair: Steven G. Sutlief; Co-Chair: Michael T. Milano), was published in June 2023. With financial support provided by FDA, the ABR Foundation, and the Conference of Radiation Control Program Directors (CRCPD), the SC organized a successful workshop of stakeholders to help define the characteristics of a radiation therapy practice that prioritizes safety. The Statement provides recommendations on external



assessment (or audit), as well as internal evaluation, of a radiation therapy practice in terms of quality and safety.

- **NCRP Commentary No. 33, *Recommendations for Stratification of Equipment Use and Radiation Safety Training for Fluoroscopy***, prepared by SC 4-12 (Chair: Stephen Balter; Co-Chair: Donald L. Miller), was published in August 2023. Funded, in part, by CRCPD, this Commentary defined an evidence-based, radiation-related classification for fluoroscopically guided procedures based on patient radiation risk; provided radiation-related recommendations for the types of fluoroscopes suitable for each class of procedure; and indicated the extent and content of training that ought to be provided to different categories of facility staff who might enter a room where fluoroscopy is or may be performed.



Committees at Work:

- **SC 1-28, Recommendations on Statistical Approaches to Account for Dose Uncertainties in Radiation Epidemiologic Risk Models** (Co-Chairs: Jonine L. Bernstein and Harry M. Cullings), was established in 2022 with funding from DOE, to review current methods used to incorporate dose uncertainties into dose-response models; hold a workshop to hear from experts about the interpretation of the results of studies with complex dosimetric assessments and substantial dose uncertainties; and prepare a commentary covering studies of external and internal exposures and provide guidance relative to both shared and unshared uncertainty in dose calculations and the statistical uncertainties therein. The final draft of the commentary has been reviewed by Council and Board members, and the SC has nearly completed addressing the comments received and revising the manuscript. Publication is expected no later than May 2024.
- **SC 2-9, Radiation Safety Program Concerns: Transitioning from Operating Facility to Decommissioning Phase** (Chair: Willie O. Harris), was approved by the Board in October 2023 to prepare a report on this timely topic as a number of nuclear reactor facilities are transitioning from operation to decommissioning. The SC (PAC 2) is outlining the document and assigning writing. The report will include lessons learned from completed decommissioning projects and recommend considerations/actions and program modifications to ensure the safe, compliant and effective implementation of radiation safety program principles throughout. Report completion is expected within 2 to 3 y.
- **SC 4-13, Patient Shielding in Medical Imaging** (Chair: Rebecca Milman), started work in September 2022 as a follow-on to the well-received Statement No. 13 on gonadal shielding. The SC goal is to prepare a commentary with updated recommendations, based on scientific evidence, on the use of patient shielding in medical imaging addressing both in-field and out-of-field shielding for various anatomical sites and tissues (e.g., thyroid, breast, gonads), various imaging examinations (e.g., dental x ray, radiography, mammography, computed tomography, and fluoroscopy), and age- and sex-dependent considerations. The SC has had regular virtual meetings and has prepared drafts of most sections of the commentary, making good progress. The effort is funded, in part, by the CDC, the ABR Foundation, and the FDA.
- **SC 6-13, Methods and Models for Estimating Organ Doses from Intakes of Radium** (Chair: Derek W. Jokisch; Vice Chair: Nicole Martinez), is DOE-funded to prepare a commentary describing new and contemporary approaches for obtaining organ doses following intakes of radium. The work will meet several deliverables associated with the MPS. The SC is meeting regularly to prepare a draft document which should be ready for PAC review in the near future.
- **SC 8-1, Informational Webpages on the Use of Wireless Technology and Evidence on Health Effects** (Chair: David A. Savitz), funded by CDC, is a new, and exciting, type of activity for NCRP as the goal is to create authoritative, science-based, informational webpages that can serve as a primary resource to which the CDC and other federal health agencies can refer members of the public seeking

additional information about the use of wireless technology and its known health effects. Several (virtual) meetings have been held this year, as well as an in-person meeting in December. Writing text is well along, including answers for FAQs and background information, and the subcontractor for this effort has a draft website ready. Draft material should be ready for PAC and subject matter expert review shortly.

- **TG 4-9, Task Group for Medical Exposure Assessment in the US Patient Population** (Chair: Jennifer G. Elee), is a joint effort with CRCPD (their Task Force H-58) and funded by CDC, to plan follow-up on NCRP Report No. 184, *Medical Radiation Exposure of Patients in the United States*. The group will determine the feasibility of ongoing collection of data and other information on medical exposures, in particular investing in knowledge transfer of the methodology that was used in Report No. 184. Two workshops have been held in the NCRP office and several virtual meetings, and a draft questionnaire is being developed for CRCPD to send to the states for information gathering.

Other Publications:

Chairs and members of NCRP SCs are encouraged to prepare papers for publication in peer-reviewed journals on the work of their SCs; such resulting articles are listed below. Also listed here are other papers related to NCRP work and papers published on the MPS work done through funding to NCRP.

- Linet MS, Applegate KE, McCollough CH, Bailey JE, Bright C, Bushberg JT, Chanock SJ, Coleman J, Dalal NH, Dauer LT, Davis PB, Eagar RY, Frija G, Held KD, Kachnic LA, Kiess AP, Klein LW, Kostis O, Miller CW, Miller-Thomas MM, Straus C, Vapiwala N, Wieder JS, Yoo DC, Brink JA, Dalrymple JL. 2023. A multimedia strategy to integrate introductory broad-based radiation science education in US medical schools. *J Am Coll Radiol.* 20(2):251–264.
- Bellamy M, Eckerman K, Dauer L. 2023. Reconstructed lung doses for the million person study cohort of 26,650 Tennessee Eastman Corporation workers employed between 1942 and 1947. *J Radiol Prot.* 43(1):013503.
- Boice JD Jr, Cohen SS, Mumma MT, Howard SC, Yoder RC, Dauer LT. 2023. Mortality among medical radiation workers in the United States, 1965–2016. *Int J Radiat Biol.* 99(2):183–207.
- Boice JF Jr, Cohen SS, Mumma MT, Golden AP, Howard SC, Girardi DJ, Ellis ED, Bellamy MB, Dauer LT, Eckerman KF, Leggett RW. 2023. Mortality among Tennessee Eastman Corporation (TEC) uranium processing workers, 1943–2019. *Int J Radiat Biol.* 99(2):208–228.
- Dauer LT, Walsh L, Mumma MT, Cohen SS, Golden AP, Howard SC, Roemer GE, Boice JD Jr. 2023. Moon, Mars and minds: evaluating Parkinson's disease mortality among U.S. radiation workers and veterans in the million person study of low-dose effects. *Z Med Phys.* 1:S0939-3889(23)00084-3. Online ahead of print. [PMID: 37537100]
- Milder CM, Howard SC, Ellis ED, Golden AP, Cohen SS, Mumma MT, Leggett RW, French B, Zablotska LB, Boice JD. 2023. Third mortality follow-up of the Mallinckrodt uranium processing workers, 1942–2019. *Int J Radiat Biol.* 100(2):161–175.
- Wakeford R, Balonov M, Boice JD Jr, Harrison JD, Niwa O, Preston RJ, Shore RE. 2023. The LNT risk model and radiological protection. *J Radiol Prot.* 43(4). [PMID: 37800304]

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 2023 included:

- Boice JD, Dauer LT. 2023. USTUR – a golden nugget among DOE resources. Virtual presentation at Health Physics Society Winter Workshop on Internal Dosimetry; Feb 7; Corvallis, OR.

- Held KD. 2023. NCRP SC 1-27 (Commentary No. 32) evaluation of a sex-specific difference in lung cancer radiation risk and approaches for improving lung cancer radiation risk assessment. Presentation at NASA Human Research Program Investigators' Workshop; Feb; Galveston, TX.
- Held KD (for Boice JD). 2023. Overview of the Million Person Study and relevance to NRC. Presentation at the Nuclear Regulatory Commission Regulatory Information Conference (RIC); Mar.
- Dauer LT. 2023. U.S. Million Person Study of Low-Level and Low-Dose Rate Health Effects: human health radiation risk assessment in the nuclear power and industrial radiographer cohorts. Presentation at the Nuclear Regulatory Commission Regulatory Information Conference (RIC); Mar.
- Salame-Alfie A. 2023. NCRP Statement 15: respiratory protection for emergency workers responding to a nuclear/radiological incident. Presentation at the 2023 National Radiological Emergency Preparedness Conference; Apr 3.
- Egidio PV. 2023. Overview of NCRP Report 180. Presentation for ICRP Task Group 127; Apr.
- Held, KD. 2023. Radiation chemistry and radiation-induced oxidative stress. Invited lecture in the NASA SHINE (NASA Space Health Impacts for the NASA Experience) course; Apr.
- Held KD. 2023. Radiation protection in cancer-related research, treatment and imaging. John M Yuhas Memorial Lecture, University of Pennsylvania Department of Radiation Oncology; Apr 25; Philadelphia, PA.
- Miller DL. 2023. Training of operators and staff on safe use of fluoroscopy. Presentation at the IAEA International Workshop on Radiation Protection Optimization in Fluoroscopy Guided Interventional Procedures; May; Houston, TX.
- Golden A, et al. 2023. Preliminary results from a mortality study of Rocky Flats Nuclear Workers: a Million Person Study Cohort. Presentation at ISORED 1st Meeting – International Society for Radiation Epidemiology and Dosimetry; May 16.
- Held, KD. 2023. National Council on Radiation Protection and Measurements (NCRP) and Million Person Study (MPS). Presentation for the Naval Surface Warfare Center Carderock Division/UK Ministry of Defense RADIAC Summer School; Jun 13.
- Held, KD. 2023. Important radiation biology concepts for radiation protection. Professional Enrichment Program (PEP) lecture, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Bushberg JT. 2023. Cognitive dissonance; heuristics and logical fallacies in risk perception: why is it so natural for so many to believe so much that is so wrong? Professional Enrichment Program (PEP) lecture, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Salame-Alfie A. 2023. NCRP Statement No. 15: respiratory protection for emergency workers responding to a nuclear/radiological incident, Presentation at the Health Physics Society Annual Meeting; Jul.
- Dauer LT, et al. 2023. Comprehensive dosimetry for the Million Person Study epidemiology, Million Person Study Dosimetry session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Samuels CE, et al. 2023. MPS Hanford Cohort Dosimetry: internal dose reconstruction approaches, Million Person Study Dosimetry session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Bellamy MB. 2023. External radiation doses to the brain in the Hanford Worker Cohort, Million Person Study Dosimetry session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Martinez NE. 2023. Radium dial painter dosimetry: person-centered innovations, Million Person Study Dosimetry session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Cullings HM. 2023. NCRP SC 1-28, recommendations on statistical approaches to account for dose uncertainties in radiation epidemiologic risk models, Million Person Study Dosimetry session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.

- Dauer LT. 2023. The Million Person Study of Low-Level and Low-Dose-Rate Health Effects: importance, information and innovation, Million Person Study Session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Golden AP, et al. 2023. Million Person Study (MPS) Rocky Flats: epidemiologic analyses and comparison to other Department of Energy cohorts, Million Person Study Session, Health Physics Society 68th Annual Meeting; Jul; National Harbor, MD.
- Held, KD. 2023. NCRP and research, Invited presentation at Student/Trainee Workshop, 17th International Congress for Radiation Research; Aug; Montreal, Canada.
- Boice JD, Jr. 2023. Failla Award Lecture: from sanatoriums in Massachusetts to flights to Mars: an adventure in radiation epidemiology, 17th International Congress for Radiation Research; Aug; Montreal, Canada.
- Walsh L. 2023. A Million Person Study radiation related lung cancer mortality risk assessment for three cohorts combined and the challenges arising from the analyses, invited talk at the 17th International Congress for Radiation Research; Aug; Montreal, Canada.
- Dauer L. 2023. The U.S. Million Person Study of Low-Level and Low-Dose-Rate Health Effects: importance, information and innovation, presentation at the 17th International Congress for Radiation Research; Aug; Montreal, Canada.
- Giunta E, et al. 2023. Non-linear cancer survival analysis with big data: colossus software development and testing for radiation epidemiological studies, poster presented at 17th International Congress for Radiation Research; Aug; Montreal, Canada.
- Bushberg JT. 2023. Overview of activities of the National Council on Radiation Protection & Measurements (NCRP), Presentation for the Northern California Chapter of the American Association of Physicists in Medicine & Northern California Chapter of the Health Physics Society Joint Annual Meeting; Oct.
- Balter S, Miller DL. 2023. Review of NCRP Commentary No. 33 procedure classes and training groups, Discussion at Blue Ribbon Panel on Fluoroscopy Safety, American College of Radiology; Oct.
- Held KD. 2023. What is NCRP? (radiation protection in medicine), Recorded talk for ASRT; Oct.
- Dauer L. 2023. U.S. Million Person Study of Low-Level and Low-Dose-Rate Health Effects: importance, information, and innovation, Memorial Sloan Kettering Cancer Center, Population Studies Research Program; Oct 17.
- Seibert JA. 2023. NCRP perspectives, invited talk at the AAPM Quality Measures Roundtable and Stakeholders Perspectives meeting; Oct 20.
- Held KD. 2023. U.S. Million Person Study (MPS) of Low-Level and Low-Dose-Rate Health Effects, invited talk at the RRS Fall Workshop: Where is the Roadmap for a US Low Dose Program?; Oct 27; Bozeman, MT.
- Held KD. 2023. Radiation chemistry; effects of radiation on DNA and chromosomes, Invited Virtual Lecture for Southeast Asian Radiation Oncology Group (SEAROG); Oct 31.
- Held KD. 2023. Dose response relationships *in vitro* and *in vivo*, Invited Virtual Lecture for Southeast Asian Radiation Oncology Group (SEAROG); Nov 28.
- Held KD. 2023. Important radiation biology concepts for radiologic technologists, Recorded talk for ASRT; Dec.
- Dauer L, Boice JD Jr. 2023. MPS with a Focus on NRC cohorts (nuclear power plant workers, industrial radiographers), invited virtual talk for U.S. Nuclear Regulatory Commission, Health Physics Community Seminar; Dec 12.
- Held KD. 2023. Modification of radiation response: biological, chemical, physical, Invited Virtual Lecture for Southeast Asian Radiation Oncology Group (SEAROG); Dec 19.
- Dauer L. 2023. MPS: status and innovations, American Academy of Health Physics (AAHP) Virtual CE Course; Dec 21.

If anyone knows of any publications or presentations that I've missed, please let me know.

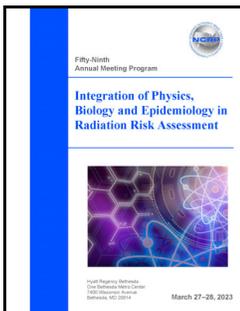
Funding Support Summary:

In 2023, NCRP received new funding from NASA to expand the MPS into broader epidemiology studies, using data from the Centers for Medicare and Medicaid Services to assess incidence, in addition to work on mortality, of neurocognitive dysfunctions, including Parkinson's Disease, in submariners exposed to radiation and multiple other stressors, as surrogate for the multiple stressors experienced by astronauts on long duration missions. We also received from DOE a renewal for an additional 5 y of epidemiology studies of DOE radiation workers and U.S. atomic veterans for radiation risk assessment. Both those projects are part of the ongoing MPS lead by Drs. John D. Boice, Jr. and Lawrence T. Dauer. FDA provided new support to help fund the NCRP work of SC 4-13 on patient shielding in medical imaging and the work of SC 8-1 to provide evidence-based information on a website about wireless technology and health effects. In 2023, we continued with grants and contracts funded by a number of sources including (active SCs during 2023 supported by each in parentheses):

- CDC (SC 4-13, SC 8-1, and TG 4-9)
- DOE (SC 1-28, SC 6-13 and MPS)
- FDA (SC 4-10, 4-13, and 8-1)
- NASA (MPS)

We are grateful for the significant monetary and programmatic support from these federal agencies and other 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 scientific service to the nation as is NCRP's mission. We also continue to have discussions with these agencies and organizations and others about additional opportunities for NCRP to assist them in their missions.

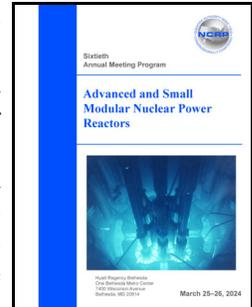
Annual Meetings:



The **59th NCRP Annual Meeting** was held in person in Bethesda on March 27–28, 2023, on the topic of “**Integration of Physics, Biology and Epidemiology in Radiation Risk Assessment.**” The Program Committee, chaired by Eric J. Grant with Vice Chair Emily A. Caffrey, planned a series of cutting-edge talks pointing to an exciting future for radiation protection based on integrating science from a broad realm of disciplines. The theme was emphasized by the highly regarded speakers including the 46th Lauriston Taylor Lecturer, Martha S. Linet, speaking on “Cancer Risks and Public Health Issues Across the Radiation Frequency Spectrum: The Long and the Short of It,” the 19th Annual Sinclair Keynote Address by Michael M. Weil discussing “What do Risk Modelers Want? What Can Biologists Provide?,” and the 6th Tenforde Topical Lecture by Susanne M. Rafelski on “Towards Evaluating Cell Damage *via* Microscopy Imaging and Analysis of Cell Organization.” It was a thought-provoking meeting with super presentations and was so great to be able to interact once again with all our colleagues in person.

The **2024 Annual Meeting**, our 60th, will be on “**Advanced and Small Modular Nuclear Power Reactors**” and will be held March 25–26, 2024. The Program Committee, chaired by William E. Kennedy, Jr. with co-chairs Willie O. Harris and Kathryn A. Higley, has lined up a top-notch slate of speakers to discuss advanced and small modular reactor technology and critical issues. We are particularly honored to have a superb line-up of named speakers including: Dr. Richard A. Meserve, former Chair of NRC and former

President of the Carnegie Institution for Science, to present the 47th Lauriston Taylor Lecture on “Lessons from the Fukushima Daiichi Accident”; Dr. Kathryn Huff, Assistant Secretary, Office of Nuclear Energy, DOE, who will give the 20th Warren K. Sinclair Keynote Address entitled “U.S. Department of Energy, Office of Nuclear Energy Advanced Reactor Research, Design, Development and Demonstration”; and NRC Chair Christopher T. Hanson who has been selected to give the 7th Thomas S. Tenforde Topical Lecture discussing “Embracing Risk-Informed Thinking at the Nuclear Regulatory Commission.” The meeting promises to be a stimulating discussion of how nuclear energy can play an important role as an energy source to replace carbon fuels.



The Board has selected the topic for the 2025 annual meeting to be radiation epidemiology with emphasis on the MPS (exact title to be determined). John D. Boice, Jr. and Lawrence T. Dauer will be Co-Chairs. They are already hard at work on the program for the meeting. Whether the meeting will be in person or virtual will be a future decision, based on finances.

PAC Work:

We had a number of changes in the PACs this year. On the leadership front, Julie M. Sullivan has been added as Co-Chair of PAC 3; Lawrence T. Dauer has stepped down as PAC 4 Co-Chair and has been replaced by Rebecca Milman; and PAC 6 has new Chair Wesley E. Bolch and Co-Chair Jeffrey J. Whicker, replacing long-time Chair Steven L. Simon who we thank for his service in that role. There have also been several new members added to PACs 1 and 7, one transfer from PAC 3 to PAC 1, and PAC 6 has added a “bumper crop” of new members. We welcome all these great additions.

The PACs met in Bethesda on “PAC Sunday” in March and some have continued to meet virtually during the year to discuss PAC business and have scientific presentations and discussions. Several PACs have developed draft proposals that need funding to be moved forward — so many great ideas and needs but such limited resources! We will continue to seek funding sources for these worthy proposals from PACs. The PACs are all eagerly planning their in-person meetings for March 2024 at the Annual Meeting. I continue to meet several times a year with the PAC chairs and find the sessions very helpful as they provide some great ideas for new activities for NCRP and important insight into ongoing in the radiation community and potential funding discussions. Much of the valuable work done by the PACs involves their oversight of and assistance to NCRP scientific committees, described above.

Finances:

Our biggest challenge continues to be the need to build long-term financial stability for the NCRP. There are several items to note with regards to our financial status and efforts:

- As shown in the financial report, we finished 2022 with a small net operational financial gain. In 2023 we had a modest operational gain of revenue over expenses and increases in investments, which combined to give a positive change in NCRP's assets of about \$258,000. We currently predict that 2024 will result in a small financial gain, but there are many uncertainties in the grant funding picture, so it will be critical for new President Higley to continue discussions with potential funding agencies and other organizations, seek out opportunities for expanding funded activities, and, in consultation with the Budget and Finance Committee, to monitor finances closely throughout the coming year.
- Implementation of a modest registration fee for the annual meeting in 2022 and 2023 helped to offset meeting expenses; the fee and donations for the meeting brought in a little over \$25,000 in 2023. The Board continues to discuss ways to hold the annual meeting, a substantial expense when meetings are in person, when there is limited income to off-set the expenses. One consideration is to alternate in-person and virtual annual meetings; more information will come on that possibility in the future.

- Our receipt of several new grants and the renewal of the DOE award, discussed above, helped with the 2023 finances, as did not having in-person meetings of some committees and our substantially decreased rent due to our office move in late 2022. So, we did not have to use the LMA (Loan Management Account) to cover the annual meeting in 2023, and we are hopeful the same will be true in 2024. However, the value of our net assets has only increased slightly in recent years and is still well below levels some years back.
- We thank all the Council members and others who have made donations to NCRP directly or took advantage of the Give with Bing® initiative, and we encourage 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 fundraising opportunities are welcome! We acknowledge the Contributors and Corporate Sponsors, who are listed later in this Annual Report. We greatly value their support, both financial and programmatic.

Million Person Study:

A major component of current NCRP activities continues to be the Million Person Study (MPS), which is coordinated through and is a critical source of income for NCRP (grants from DOE and NASA in 2023). NCRP Past President John D. Boice, Jr., who has so ably led and built this vital epidemiology effort for years, continues to direct the effort, as NCRP Director of Science, with substantial leadership also from Lawrence T. Dauer, now MPS Scientific Coordinator. The MPS is designed to study the 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. The MPS will increase scientific understanding that can improve guidelines and guidance to protect workers and members of the public. Major activities of the MPS in 2023 included:

- receipt in September of a new award from NASA to undertake an exciting expansion of the project to now use data from Centers for Medicare and Medicaid Services to evaluate neurological and cognitive outcomes in submariners exposed not just to radiation but to multiple stressors such as sleep disruption or isolation (the submariners are an excellent surrogate for astronauts on long-duration missions outside Earth's orbit);
- subgroups working on dosimetry and epidemiology of health effects for various study cohorts continue regular biweekly meetings (virtual) as they pursue the project goals and prepare publications on the findings;
- John, Larry and numerous others involved in the MPS participated in several workshops of the entire MPS team and subgroups;
- numerous papers were published related to the MPS in 2023 (listed above); and
- multiple presentations were given by John, Larry, me and others (listed above).

Partnerships:

In addition to our valuable Partnerships with funding agencies, NCRP continues numerous active and fruitful interactions with multiple national and international organizations that are listed on the NCRP website. We value review comments from other organizations like the American Association of Physicists in Medicine on our draft documents. Additionally, NCRP officers serve on advisory committees and boards and review panels of other groups (*e.g.*, Image Gently®, ABR, National Institutes of Health, International Radiation Protection Association); NCRP organizes sessions and provides members to serve as speakers and session chairs at meetings of other entities (*e.g.*, Health Physics Society, Radiation Research Society); and NCRP officers and Board/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). These activities are critical to NCRP's mission and help “spread the word” about NCRP and our activities. 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.

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 in our meetings and activities. We hope that our new and continuing efforts in internships and mentoring will help with that goal and look forward to increasing the efforts. 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 four Distinguished Emeritus Members in 2023.



Paul M. DeLuca, Jr., April 22, 1944 – October 30, 2023, was the Board of Visitors Chair, Emeritus Professor, and Emeritus Provost in the Department of Medical Physics, University of Wisconsin (UW) School of Medicine and Public Health.

Dr. DeLuca was first elected to the NCRP Council in 1996 and became a Distinguished Emeritus Member in 2014. He served on the NCRP Board of Directors from 2008 to 2014 and was Chair of the Nominating Committee from 2004 to 2008 after serving as a member from 2002 to 2003. Dr. DeLuca was a member of the 2010 Annual Meeting Program Committee and served as a Session Chair and Speaker the same year. He was a member of NCRP Program Area Committee 6 on Radiation Measurements and Dosimetry from 1999 to 2012.



Naomi H. Harley, August 4, 1932 – June 11, 2023, was a Research Professor, in the Department of Environmental Medicine, at the NYU School of Medicine.

Dr. Harley was a member of NCRP from 1982 to 2000 and was elected a Distinguished Emeritus Member in 2000. She chaired several scientific committees: (SC) 57-4 which published Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States (NCRP Report No. 78); SC 61, Measurement of Radon and Radon Daughters in Air (NCRP Report No. 97); and SC 85, Risk of Lung Cancer from Radon. She also co-wrote Commentary No. 6, Radon Exposure of the U.S. Population—Status of the Problem. She was a member of SC 73 (Report No. 77, Exposures from the Uranium Series with Emphasis on Radon and Its Daughters) and Advisory Committee 93 on Radiation Measurement and Dosimetry. Dr. Harley delivered the Lauriston S. Taylor Lecture No. 23 entitled “Back to Background: Natural Radiation and Radioactivity Exposed” in 1999. She chaired the 1988 Annual Meeting Program Committee on “Radon” and was member of the 2001 Program Committee where she also made a presentation on “Laboratory Analyses: Environmental and Biological Measurements.”



Bernd Kahn, August 16, 1928 – July 13, 2023, was associate director, Environmental Radiation Laboratory, Electro-Optical Systems Laboratory, Georgia Tech Research Institute, and professor emeritus, Nuclear and Radiological Engineering Program, Woodruff School of Mechanical Engineering, Georgia Institute of Technology.

Dr. Kahn was a member of NCRP from 1979 to 1997 and was elected a Distinguished Emeritus Member in 1997. He chaired scientific committees: (SC) 64-5 which published *Public Radiation Exposure from Nuclear Power Generation in the United States* (NCRP Report No. 92) and SC 64-22, *Design of Effective Radiological Effluent Monitoring and Environmental Surveillance Programs* (NCRP Report No. 169). He was a member of several NCRP scientific committees including SC 18A (Report No. 58, *A Handbook of Radioactivity Measurements Procedures*), SC 30 (Report No. 60, *Physical, Chemical, and Biological Properties of Radiocerium Relevant to Radiation Protection Guidelines*), SC 35 (Report No. 50, *Environmental Radiation Measurements*), SC 38 (Waste Disposal), SC 41 (Radiation Resulting from Nuclear Power Generation), SC 63-1 (Public Knowledge), SC 64 (Environmental Issues), and SC 64-15 (Critique of the Publication “Living Without Landfills”). Dr. Kahn was a member of the 1982, 1983 and 2001 Annual Meeting Program Committees on “Radiation Protection and New Medical Diagnostic Approaches,” “Environmental Radioactivity,” and “Fallout from Atmospheric Nuclear Tests—Impact on Science and Society,” respectively.



Richard E. Toohey, September 2, 1945 – November 13, 2023, was a Consulting Health Physicist with M.H. Chew and Associates.

Dr. Toohey was first elected to the NCRP Council in 2006 and became a Distinguished Emeritus Member in 2018. He served on the Board of Directors (2010 to 2016), and on the Budget and Finance Committee (2006 to 2015) — his financial acuity led to his much appreciated service as Chair (2007 to 2015). Dr. Toohey was Chair of the 2012 Annual Meeting Program Committee, and Co-Chair in 2016. Dr. Toohey was the 2016 Warren K. Sinclair Keynote Speaker and spoke on “WARP: Where Are the Radiation Professionals?.” He was Co-Chair of Council Committee 2 (CC 2) on Meeting the Needs of the Nation for Radiation Protection. During his tenure with NCRP, he was Co-Chair of Scientific Committee (SC) 6-9; Staff Consultant for the Million Person Study; and a Member of SC 6-3, SC 6-4, SC 6-9, SC 57-17, and WARP. He was advisor to the NCRP’s Fifth President (John D. Boice, Jr.) from 2012 to 2018.

As you can see from this narrative, 2023 was a productive year for NCRP. I have been proud of our accomplishments during my time as President, and I look forward to another productive year for NCRP in 2024 and into the exciting future under our new President. Despite challenges, there are plentiful opportunities, and it will be wonderful to see NCRP continue to engage with 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 hard-working NCRP staff, Board of Directors, and Council, PAC, and scientific committee members for assistance in all NCRP endeavors. 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. The strong team that you all make has been a joy to be a part of. I thank you for the honor of having been the President of NCRP.

A handwritten signature in black ink, appearing to read "Kathy", with a long horizontal flourish extending to the right.

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 chairs, 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 2023, six new members were elected, and 12 members were re-elected. The six new members were:

Maia Avtandilashvili	Michael A. Lewandowski
Michael B. Bellamy	Rebecca Milman
Jennifer G. Elee	Michael D. O'Hara

2023 Council Membership, Affiliation, and Current Term

Isaf Al-Nabulsi	U.S. Department of Energy	2022–2028
Sally A. Amundson	Columbia University Medical Center	2022–2028
Armin Ansari	U.S. Environmental Protection Agency	2021–2027
A. Iulian Apostoaei	Oak Ridge Center for Risk Analysis, Inc.	2018–2024
Kimberly E. Applegate	University of Kentucky	2019–2025
Maia Avtandilashvili	Washington State University	2023–2029
Edouard I. Azzam	Retired	2018–2024
Michael B. Bellamy	Memorial Sloan Kettering Cancer Center	2023–2029
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	2021–2027
Daniel J. Blumenthal	U.S. Department of Energy	2021–2027

John D. Boice, Jr.	National Council on Radiation Protection and Measurements	2018–2024
Wesley E. Bolch	University of Florida	2023–2029
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	2021–2027
Manuela Buonanno	Columbia University	2022–2028
Jerrold T. Bushberg	University of California, Davis	2020–2026
Emily A. Caffrey	University of Alabama, Birmingham	2021–2027
Polly Y. Chang	SRI International	2023–2029
Jeffrey A. Chapman	Oak Ridge National Laboratory	2021–2027
C. Norman Coleman	National Cancer Institute	2022–2028
Lawrence T. Dauer	Memorial Sloan-Kettering Cancer Center	2018–2024
Sara D. DeCair	U.S. Environmental Protection Agency	2023–2029
Christine A. Donahue	Weiss Associates	2021–2027
Joseph R. Dynlacht	Indiana University School of Medicine	2020–2026
Andrew J. Einstein	Columbia University	2019–2025
Jennifer G. Elee	Louisiana Department of Environmental Quality	2023–2029
K. Frieda Fisher-Tyler	State of Delaware	2020–2026
Patricia A. Fleming	Retired	2021–2027
Donald P. Frush	Duke University Medical Center	2022–2028
Eric M. Goldin	Retired	2021–2027
Eric J. Grant	Radiation Effects Research Foundation	2019–2025
Helen A. Grogan	Cascade Scientific, Inc.	2020–2026
Barbara L. Hamrick	University of California, Irvine Health	2019–2025
Willie O. Harris	CN Associates	2023–2029
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
Janice L. Huff	National Aeronautics and Space Administration	2023–2029
Adam R. Hutter	National Urban Security Technology Laboratory	2019–2025
Randall N. Hyer	Center for Risk Communication	2022–2028
Carol J. Iddins	Radiation Emergency Assistance Center/Training Site	2021–2027
William E. Irwin	Vermont Department of Health	2021–2027
Thomas E. Johnson	Colorado State University	2018–2024
Derek W. Jokisch	Francis Marion University	2021–2027
Cynthia G. Jones	U.S. Nuclear Regulatory Commission	2023–2029
Ziad N. Kazzi	Emory University	2019–2025

William E. Kennedy, Jr.	WE Kennedy Consulting	2022–2028
Gladys A. Klemic	U.S. Department of Homeland Security	2022–2028
Linda A. Kroger	Retired	2022–2028
Evagelia C. Laiakis	Georgetown University	2019–2025
Edwin M. Leidholdt, Jr.	U.S. Department of Veterans Affairs	2018–2024
Michael A. Lewandowski	3M Company	2023–2029
Mark P. Little	National Cancer Institute	2022–2028
Mahadevappa Mahesh	Johns Hopkins Hospital	2021–2027
Nicole E. Martinez	Clemson University	2022–2028
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	U.S. Food and Drug Administration	2018–2024
Rebecca Milman	University of Colorado School of Medicine	2023–2029
Stephen V. Musolino	Brookhaven National Laboratory	2020–2026
Wayne D. Newhauser	Louisiana State University	2019–2025
Michael D. O’Hara	U.S. Food and Drug Administration	2023–2029
Harald Paganetti	Massachusetts General Hospital	2018–2024
David J. Pawel	U.S. Environmental Protection Agency	2023–2029
Leticia S. Pibida	National Institute of Standards and Technology	2018–2024
Kathryn H. Pryor	Retired	2022–2028
Mark J. Rivard	Tufts Medical Center	2023–2029
James C. Root	Memorial Sloan Kettering Cancer Center / Weill Cornell Medical College	2022–2028
Adela Salame-Alfie	Centers for Disease Control and Prevention	2021–2027
David A. Savitz	Brown University	2022–2028
Dörthe Schae	University of California, Los Angeles	2021–2027
Debra M. Scroggs	Retired	2018–2024
J. Anthony Seibert	University of California Davis Medical Center	2020–2026
Kathleen L. Shingleton	Retired	2023–2029
Angela Shogren	U.S. Environmental Protection Agency	2019–2025
Igor Shuryak	Columbia University Medical Center	2018–2024
Steven L. Simon	Retired	2022–2028
Tony C. Slaba	NASA Langley Research Center	2022–2028
David C. Spelic	U.S. Food and Drug Administration	2022–2028
Michael D. Story	University of Texas, Southwestern Medical Center at Dallas	2020–2026
Julie M. Sullivan	U.S. Food and Drug Administration	2019–2025
Steven G. Sutlief	Banner MD Anderson Cancer Center	2018–2024
Julie K. Timins	Retired	2022–2028
Sergei Tolmachev	Washington State University	2020–2026



Michael M. Weil	Colorado State University	2023–2029
Jeffrey J. Whicker	Los Alamos National Laboratory	2023–2029
Robert C. Whitcomb, Jr.	Retired	2020–2026
Jessica S. Wieder	Federal Emergency Management Agency	2023–2029
Jacqueline P. Williams	University of Rochester Medical College	2018–2024
Gayle E. Woloschak	Northwestern University	2021–2027
X. George Xu	University of Science and Technology China	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, <i>Chair</i>	Willie O. Harris*	J. Anthony Seibert
Wesley E. Bolch	Kathryn D. Held	Michael D. Story
Michael A. Boyd	Kathryn A. Higley*	Jeffrey J. Whicker
Brooke R. Buddemeier	Donald L. Miller	Jessica S. Wieder
Polly Y. Chang		

*Elected March 28, 2023.

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, *Vice President Emeritus*
 Kenneth R. Kase, *Vice President Emeritus*
 David A. Schauer, *Executive Director Emeritus*

Lynn R. Anspaugh
 Benjamin R. Archer
 Stephen Balter
 Harold L. Beck
 Joel S. Bedford
 Eleanor A. Blakely
 Andre Bouville
 Leslie A. Braby
 James A. Brink
 Antone L. Brooks
 S.Y. Chen
 Michael L. Corradini
 J. Donald Cossairt
 Allen G. Croff
 Paul M. DeLuca†
 Sarah S. Donaldson
 William P. Dornsife
 Keith F. Eckerman
 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
 Amy Kronenberg*
 Susan M. Langhorst
 John J. Lanza
 Martha S. Linet
 Jill A. Lipoti
 Paul A. Locke
 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
 Stephen M. Seltzer
 Roy E. Shore
 Paul Slovic
 Daniel J. Strom
 Tammy P. Taylor
 John E. Till
 Richard E. Toohey†
 Lawrence W. Townsend
 Robert L. Ullrich
 Richard J. Vetter
 F. Ward Whicker
 Chris G. Whipple

*Elected to Distinguished Emeritus Membership March 28, 2023.

†Deceased during 2023.

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

*Consociate Membership effective March 28, 2023.

†Deceased during 2023.

Administrative Committees

Budget & Finance Committee (appointed by the Board of Directors, March 28, 2023)

William E. Kennedy, Jr., *Chair*

Willie O. Harris

Kathryn A. Higley

Kathleen L. Shingleton

R. Craig Yoder

Nominating Committee (appointed by the Board of Directors, March 28, 2023)

Cary J. Zeitlin, *Chair*

Jonine L. Bernstein

Michael A. Boyd

J. Anthony Seibert

Julie M. Sullivan

Program Committee for 2024 Annual Meeting

(appointed by the Board of Directors, March 28, 2023)

William E. Kennedy, Jr., *Chair*

Willie O. Harris & Kathryn A. Higley, *Co-Chairs*

Wesley E. Bolch

Richard R. Brey

Cynthia G. Jones

Ruth E. McBurney

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
Laura Finger	Technical Staff Consultant
Helen A. Grogan	Technical Staff Consultant
Julie Lima	Technical Staff Consultant
Cindy L. O'Brien	Consultant
Roy E. Shore	Advisor to Director of Science
Kali Thomas	Technical Staff Consultant
Lawrence W. Townsend	Technical Staff Consultant
Linda Walsh	Technical Staff Consultant
Myrna A. Young	Financial Records Manager

Program Area Committees

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 eight program area committees. They are:

Program Area Committees and Committee Chairs

Basic Criteria, Epidemiology, Radiobiology, and Risk	Gayle E. Woloschak Jonine L. Bernstein
Operational Radiation Safety	Willie O. Harris
Nuclear and Radiological Security and Safety	Brooke R. Buddemeier Julie M. Sullivan
Radiation Protection in Medicine	Donald L. Miller Rebecca Milman
Environmental Radiation and Radioactive Waste Issues	William E. Kennedy, Jr.
Radiation Measurements and Dosimetry	Wesley E. Bolch Jeffrey J. Whicker
Radiation Education, Risk Communication, and Outreach	Randall N. Hyer
Nonionizing Radiation	David A. Savitz

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 chairs of new scientific committees with selection of potential committee or advisory members
- Assist in management of scientific committee efforts
- Provide the chair of the nominating committee with potential candidates for Council membership
- Review all draft publications within their program area committee prior to Council review

Basic Criteria, Epidemiology, Radiobiology, & 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, *Co-Chair*

Isaf Al-Nabulsi

Sally A. Amundson

Armin Ansari

A. Iulian Apostoaei

Edouard I. Azzam

Joel S. Bedford

Marjan Boerma

John D. Boice, Jr.

Polly Y. Chang

Harry M. Cullings

Benjamin C. French

Eric J. Grant

Nobuyuki Hamada

Ann R. Kennedy

Amy Kronenberg

Evagelia C. Laiakis

Mark P. Little

Gregory A. Nelson

Harald Paganetti

David J. Pawel

James C. Root

Dörthe Schaue

George Sgouros

Roy E. Shore

Brock Sishc

Tony C. Slaba

Michael D. Story

Michael M. Weil
Jacqueline P. Williams
Lydia B. Zablotska

Active Scientific Committees Under PAC 1

SC 1-28 Recommendations on Statistical Approaches to Account for Dose Uncertainties in Radiation Epidemiologic Risk Models

Status: Revising after Council review

Jonine L. Bernstein, *Co-Chair*

Harry M. Cullings, *Co-Chair*

Michael B. Bellamy

Benjamin C. French

Mark P. Little

Carmen Tekwe

Helen A. Grogan, *Technical Staff Consultant*

Operational Radiation Safety

Vice President, Willie O. Harris

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

Willie O. Harris, *Vice President*

Edgar D. Bailey

Christine A. Donahue

Eric M. Goldin

Barbara L. Hamrick

Michael Lewandowski

Michael L. Littleton

David S. Myers

John W. Poston, Sr.

Kathryn H. Pryor

Debra M. Scroggs

Kathleen L. Shingleton

Glenn M. Sturchio

Joshua Walkowicz

James S. Willison

James G. Yusko

Active Scientific Committees Under PAC 2

SC 2-9 Radiation Safety Program Concerns Transitioning from Operating Facility to Decommissioning Phase

Status: Early drafting

Willie O. Harris, *Chair*

Edgar D. Bailey

Christine A. Donahue

Eric M. Goldin

Barbara L. Hamrick

Michael Lewandowski
Michael L. Littleton
David S. Myers
John W. Poston, Sr.
Kathryn H. Pryor
Debra M. Scroggs
Kathleen L. Shingleton
Glenn M. Sturchio
Joshua Walkowicz
James S. Willison
James G. Yusko

Nuclear & Radiological Security & Safety

Vice President, Brooke R. Buddemeier

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

Brooke R. Buddemeier, *Vice President*
 Julie M. Sullivan, *Co-Chair*
 Armin Ansari (2017 – 2023)
 Judith L. Bader
 Daniel J. Blumenthal
 Thomas W. Chenworth
 C. Norman Coleman
 Sara D. DeCair
 Joseph R. Dynlacht
 K. Frieda Fisher-Tyler
 Carol J. Iddins
 William E. Irwin
 Ziad N. Kazzi
 Gladys A. Klemic
 Stephen V. Musolino
 Michael A. Noska
 Leticia S. Pibida
 Adela Salame-Alfie
 Robert C. Whitcomb, Jr.
 Sean M. Crawford, *Consultant* (2020 – 2022)

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*

Rebecca Milman, *Co-Chair*

Kimberly E. Applegate

Stephen Balter

Edward I. Bluth

Lawrence T. Dauer

Andrew J. Einstein

Jennifer G. Elee

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

Quentin T. Moore

Wayne D. Newhauser

Madan M. Rehani

Mark J. Rivard

J. Anthony Seibert

David C. Spelic

Steven G. Sutlief

Julie E.K. Timins

Shiao Y. Woo

Pat B. Zanzonico

Angela Shogren, *PAC 7 Liaison*

Active Scientific Committees Under PAC 4

SC 4-13 Patient Shielding in Medical Imaging

Status: Drafting

Rebecca Milman, *Chair*

Veeratrishul Allareddy

Kimberly E. Applegate

Jennifer G. Elee

Donald P. Frush

Joel E. Gray

Summer L. Kaplan

Cari Kitahara

Emily Marshall

Sarah McKenney

Quentin T. Moore

Darcy J. Wolfman

Helen A. Grogan, *Technical Staff Consultant*

Completed in 2023

NCRP Statement No. 16, *Recommendations for Assessment of Safety, Quality and Reliability in a Radiation Therapy Practice*, was issued June 13, 2023. The Statement was drafted by Scientific Committee 4-10 Co-Chaired by Steven G. Sutlief and Michael T. Milano. Committee members included Edwin M. Leidholdt, Jr., Lukasz Mazur, Jean Moran, Wayne D. Newhauser, Bruce Thomadsen, Shia Y. Woo, and Technical Staff Consultant, Laura Finger.

NCRP Commentary No. 33, *Recommendations for Stratification of Equipment Use and Radiation Safety Training for Fluoroscopy*, was issued August 11, 2023. The Commentary was drafted by Scientific Committee 4-12 Co-Chaired by Stephen Balter and Donald L. Miller. Committee members included Kimberly E. Applegate, Lisa Bruedigan, George D. Dangas, Dustin A. Gress, Andrew Kuhis-Gilcris, Thomas L. Morgan, Andy Rogers, and Kevin A. Wunderle.

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 (2016 – 2023)
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 (2015 – 2023)

Radiation Measurements & Dosimetry

Vice President, Wesley E. Bolch

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

Wesley E. Bolch, *Vice President*

Jeffrey J. Whicker, *Co-Chair*

Amir A. Bahadori

Michael B. Bellamy

Luiz Bertelli

William F. Blakely

Leslie A. Braby

Richard R. Brey

Emily A. Caffrey

Lukas M. Carter

Shaheen A. Dewji

Raymond A. Guilmette (Member 2006 – 2008; SVP 2008 – 2015; Member 2016 – 2023)

Derek W. Jokisch

Richard T. Kouzes

Nicole Martinez

Deepeesh Poudel

Steven L. Simon (SVP 2006 – 2023)

Sergei Y. Tolmachev

R. Craig Yoder

Cary J. Zeitlin

Sara Dumit, *PAC 7 Liaison*

Active Scientific Committee Under PAC 6

SC 6-13 Methods and Models for Estimating Organ Doses from Intakes of Radium

Status: Drafting

Derek W. Jokisch, *Chair*

Nicole Martinez, *Vice Chair*

Maia Avtandilashvili

Luiz Bertelli

Elizabeth M. Brackett

Emily A. Caffrey

Sara Dumit

Richard Leggett

Caleigh Samuels

Thomas R. LaBone, *Advisor*

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*
 Manuela Buonanno
 Jerrold T. Bushberg
 Donald A. Cool (2020 – 2023)
 Vince Covello
 Sara Dumit
 Thomas E. Johnson
 Michelle Laver
 Paul A. Locke
 Caitlyn Lutfy
 M. Carol McCurley
 Charles W. Miller
 Judith F. Rader
 Angela Shogren
 John E. Till (2016 – 2023)
 Jessica S. Wieder

Nonionizing Radiation

Vice President, David A. Savitz

Goals of Program Area Committee (PAC) 8

- Analyze mechanisms of interaction of nonionizing radiation with biological systems and identify biological responses and potential human health effects.
- Evaluate dosimetry and exposure assessments of humans to nonionizing radiation and procedures for mitigating exposure in public and occupational settings.
- Make recommendations on acceptable exposure levels for nonionizing radiation in occupational, medical and public environments.

Members of PAC 8

David A. Savitz, *Vice President*
Martha S. Linet
Michael D. O'Hara
Martin Rössli
Vijayalaxmi

Active Scientific Committee Under PAC 8

SC 8-1 Development of NCRP Informational Webpages to Provide Authoritative Information About the Use of Wireless Technology and Current Evidence on Health Effects

Status: Preparing for review

David A. Savitz, *Chair*
Manuela Buonanno
Gregory Durgin
Randall N. Hyer
Martha S. Linet
Donald L. Miller
Michael D. O'Hara
Martin Rössli
Vijayalaxmi
Lawrence W. Townsend, *Technical Staff Consultant*

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 2023 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 2023 are:

Australian Radiation Protection and Nuclear Safety Agency

Bundesamt für 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 à l'Énergie 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 in 2023 for NCRP's work through contracts and grants:

American Board of Radiology Foundation
Centers for Disease Control and Prevention
National Aeronautics and Space Administration
U.S. Department of Energy
U.S. Food and Drug Administration

Contributors & Corporate Sponsors

American Academy of Health Physics
 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
 Health Physics Society
 Institute of Electrical and Electronics Engineers
 Nuclear Energy Institute
 Radiological Society of North America
 Society for Pediatric Radiology

Giving Tuesday Donations

Armin J. Ansari	Linda A. Kroger
Edouard I. Azzam	John J. Lanza
Jerrold T. Bushberg	Donald L. Miller
S.Y. Chen	David S. Myers
Helen A. Grogan	Jerome S. Puskin
Willie O. Harris	Adela Salame-Alfie
Kathryn D. Held	Julie M. Sullivan
Derek W. Jokisch	Steven G. Sutlief
Kenneth R. Kase	Julie E.K. Timins
Ziad N. Kazzi	Jeffrey J. Whicker
William E. Kennedy, Jr.	

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
2023	Cancer Risks and Public Health Issues Across the Radiation Frequency Spectrum: The Long and the Short of It	Martha S. Linet
2022	Long-Term Radiation Animal Studies: A Story Continues	Gayle Woloschak
2021	Taking Up Space: The Path to Understanding Radiation Risks	Robert L. Ullrich
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 <i>What Ifs</i> , <i>Wows</i> , and <i>Who Cares</i> 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: <i>Unde Venimus Quoque Imus</i>	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
2023	What do Risk Modelers Want? What Can Biologists Provide?	Michael M. Weil
2022	Developing a Long-Term Strategy for Low-Dose Radiation Research in the United States	Joe W. Gray
2021	Perception of Radiation Risk from the Astronaut Office	Serena M. Auñón-Chancellor
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.

Thomas S. Tenforde Topical Lectures

Year	Title	Lecturer
2023	Towards Evaluating Cell Damage <i>via</i> Microscopy Imaging and Analysis of Cell Organization	Susanne M. Rafelski
2022	Opportunities in Radiation Science: Applying Our Collective Knowledge to the Challenges of Our Time	Jill A. Lipoti
2021	Collision or Cooperation? The Law, Ethics & Science of Personalized Risk Assessments for Space & Air Travel	Paul A. Locke
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

*John D. Boice, Jr.
Young Investigator Award*

Year	Recipient
2023	Michael B. Bellamy
2022	Sara Dumit
2021	Deepesh Poudel

Annual Meetings

Year	Topic
2023	Integration of Physics, Biology and Epidemiology in Radiation Risk Assessment
2022	Opportunities in Radiation Science: From Low Dose to Climate Change
2021	Radiation & Flight: A Down-to-Earth Look at Risks
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

2023 Annual Meeting

The Fifty-Ninth Annual Meeting of NCRP was held March 27–28, 2023. The topic of the meeting was “Integration of Physics, Biology and Epidemiology in Radiation Risk Assessment.” The sessions and presentations were as follows:

Nineteenth Annual Warren K. Sinclair Keynote Address

What do Risk Modelers Want? What Can Biologists Provide?, Michael M. Weil

Setting the Stage with Epidemiology

What Dose-Response Modeling Can, and Cannot, Tell Us About the Biological Mechanisms of Radiation Health Effects, Dale L. Preston

Radiation-Related Cardiovascular Disease: Clinical and Epidemiological Studies, Andrew Einstein

Overview of NCRP Report No. 186: Approaches for Integrating Information from Radiation

Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment,

R. Julian Preston

Mechanistic Underpinnings: Cancer and Cardiovascular Disease

Low-Dose Effects: Insights from Low and High Linear-Energy Transfer Radiation,
Albert J. Fornace, Jr.

Using Genomics to Investigate Radiation-Related Thyroid Cancer Following the Chernobyl
Accident in 1986, Stephen J. Chanock

Precision Medicine with Induced Pluripotent Stem Cells and Application in Space Radiation
Risk Assessment, Joseph C. Wu

Mechanistic Underpinnings for Radiation-Induced Cardiovascular Disease, Marjan Boerma

Models and Extrapolations

Human Biosamples for Translational Radiation Studies, Roy E. Shore

An Overview of Approaches for Developing Bioindicators for Risk Estimation at Low Doses
and Dose Rates, Dmitry Klokov

Mathematical Modeling Approaches in Oncology: Can Calculus Cure Cancer?, Helen M. Byrne

Estimating Radiation Risks at Very Low Doses: Radiobiologists, Epidemiologists and Modelers
Can Do this Together, David J. Brenner

New Technologies Provide Opportunities to Advance Radiation Research, James A. Lederer

Forty-Sixth Lauriston S. Taylor Lecture on Radiation Protection & Measurements

Cancer Risks and Public Health Issues Across the Radiation Frequency Spectrum: The Long
and the Short of It, Martha S. Linet

Sixth Thomas S. Tenforde Topical Lecture

Towards Evaluating Cell Damage *via* Microscopy Imaging and Analysis of Cell Organization
Susanne M. Rafelski

Research Needs for Filling the Gaps

Epidemiology v2.0: Some Ideas for the Path Forward, Jonine L. Bernstein

Can Artificial Intelligence Improve Risk Assessment for Radiation-induced Adverse Health
Outcomes?, Issam El Naqa

Computational Biology for Future Modeling of Diseases: Is Artificial Intelligence the Way
of the Future?, Afshin Beheshti

Looking Forward: Where do We go from Here?, Simon Bouffler

Panel Discussion

Simon Bouffler, *Moderator*

Afshin Beheshti

Jonine L. Bernstein

Issam El Naqa

Susanne M. Rafelski

Wrap-Up

Eric J. Grant, *Program Chair*

Emily A. Caffrey, *Program Vice Chair*

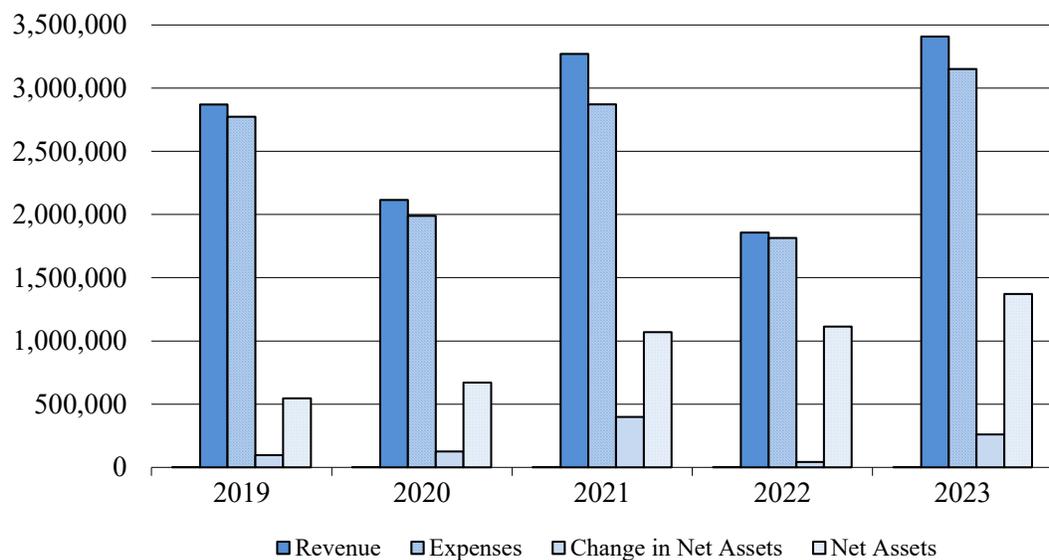
NCRP Vision for the Future and Program Area Committee Activities

Kathryn D. Held, *President*

Financial Summary

The table and bar graph presented below exhibit NCRP’s year-end financial data for 2023 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
2019	2,869,835	2,773,607	96,228	545,512
2020	2,114,498	1,989,180	125,318	670,830
2021	3,270,626	2,871,740	398,886	1,069,716
2022	1,857,388	1,814,299	43,089	1,112,805
2023	3,409,221	3,150,741	258,480	1,371,285



Appendix 1. Finances

Exhibit A Statement of Financial Position For the year ended December 31, 2023 (unaudited)

Current Assets

Cash and cash equivalents	\$ 170,553
Investments [at market]	1,284,344
Accounts receivable:	
Publications	4,040
Grants and contracts	228,722
International Commission on Radiation Units and Measurements	1,062
Inventory—publications	53,381
Prepaid expenses and other assets	178,166
Total current assets	<u>1,920,268</u>

Property and Equipment [at cost]

Furniture and equipment	183,222
Website	41,524
Less accumulated depreciation	(180,429)
Total property and equipment	<u>44,317</u>

Right of use asset, net	<u>591,929</u>
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TOTAL ASSETS	<u><u>2,556,514</u></u>
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Liabilities

Accounts payable and accrued expenses	377,737
Deferred revenue	40,000
Lease liability, current	57,505
Total current liabilities	<u>475,242</u>

Other Liabilities

Accrued post-retirement benefits	175,563
Lease liability, noncurrent	534,424
Total other liabilities	<u>709,987</u>



TOTAL LIABILITIES	<u><u>1,185,229</u></u>
Net Assets	
Without donor restrictions	972,310
With donor restrictions	<u>398,975</u>
TOTAL NET ASSETS	<u><u>1,371,285</u></u>
TOTAL LIABILITIES AND NET ASSETS	<u><u>\$ 2,556,514</u></u>

Exhibit B Statement of Activities For the year ended December 31, 2023 (unaudited)

	Net Assets without Donor Restrictions	Net Assets with Donor Restrictions	Total
Revenue and Other Increases			
Contracts and grants	\$ 2,874,041	\$ —	\$ 2,874,041
Contributions	120,914	2,000	122,914
Corporate sponsorship	5,000	—	5,000
Contributed professional services	61,450	—	61,450
Sales of publications	124,313	—	124,313
Dividends and interest	35,498	4,393	39,891
Net realized and unrealized gain on investments	126,888	5,314	132,202
Professional and administrative services	49,410	—	49,410
Total revenue and other increases	3,397,514	11,707	3,409,221
Expenses and Other Decreases			
Program costs:			
Contracts and grants	2,281,991	—	2,281,991
Publications	46,174	—	46,174
Contributed professional services	61,450	—	61,450
Total program costs	2,389,615	—	2,389,615
Management and general expenses	775,806	—	775,806
Total expenses	3,165,421	—	3,165,421
Investment fees	12,084	—	12,084
Post-retirement benefit change	(26,764)	—	(26,764)
	3,150,741	—	3,150,741
Change in Net Assets	246,773	11,707	258,480
Net Assets at Beginning of Year	725,537	387,268	1,112,805
Net Assets at End of Year	\$ 972,310	\$ 398,975	\$ 1,371,285

Exhibit C
Statement of Cash Flow
For the year ended December 31, 2023
(unaudited)

Cash flows from operating activities:	
Change in net assets	\$ 258,480
Adjustments to reconcile change in net assets to cash provided by operating activities	
Depreciation and amortization	2,013
Net realized and unrealized gain on investments	(132,202)
(Increase) decrease in assets:	
Accounts receivable	1,248
Inventory—publications	1,822
Prepaid expenses and other assets	(147,675)
Increase (decrease) in liabilities:	
Accounts payable and accrued expenses	50,042
Deferred revenue	40,000
Accrued post-retirement benefits	(23,375)
Net cash provided by operating activities	<u>50,353</u>
Cash flows from investing activities:	
Purchase of equipment	(1,919)
Purchase of investments	(933,649)
Sale of investments	954,814
Net cash used by investing activities	<u>19,246</u>
Cash flows from financing activities:	
Net repayments on line of credit	—
Net increase in cash and cash equivalents	69,599
Cash and cash equivalents at beginning of year	<u>100,954</u>
Cash and cash equivalents at end of year	<u>\$ 170,553</u>

Schedule 1 Schedule of Contracts and Grants Revenue For the year ended December 31, 2023 *(unaudited)*

Contracts

U.S. Food and Drug Administration	\$ 19,300
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Total contracts	19,300
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Grants

Centers for Disease Control and Prevention	387,393
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National Aeronautics and Space Administration	1,813,868
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U.S. Department of Energy	653,480
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Total grants	2,854,741
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Total contracts and grants revenue	\$ 2,874,041
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Schedule 2
Schedule of Contributions & Corporate Sponsorship Revenue
For the year ended December 31, 2023

(unaudited)

Contributions

American Academy of Health Physics	\$ 1,000
American Association of Physicists in Medicine	5,400
American College of Radiology	25,000
American Registry of Radiologic Technologists	6,000
American Roentgen Ray Society	7,500
American Society of Radiologic Technologists	10,000
Council on Radionuclides and Radiopharmaceuticals	2,500
Health Physics Society	10,000
Individuals	20,014
Institute of Electrical and Electronics Engineers	5,000
Radiological Society of North America	25,000
Society of Pediatric Radiology	500

Total contributions

\$ 117,914

Corporate Sponsors

Nuclear Energy Institute	\$ 5,000
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Total Corporate Sponsors

\$ 5,000

Appendix 2. Publications

Distribution of NCRP Publications

(during the period May 16, 1931 through December 31, 2023)

No.	Title and Year of Publication	Number of Copies Distributed				All Sources Combined
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	
			2023			
		Hardcopy	E-Pub			
NCRP Reports						
187	Operational Radiation Safety Program (2022)	__d	26	181	553	553
186	Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment (2020)	__d	5	34	381	381
185	Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards (2020)	__d	4	62	600	600
184	Medical Radiation Exposure of Patients in the United States (2019)	__d	3	106	1,080	1,080
183	Radiation Exposure in Space and the Potential for Central Nervous System Effects: Phase II (2019)	__d	1	16	284	284
182	Radiation Safety of Sealed Radioactive Sources (2019)	__d	0	36	555	555
181	Evaluation of the Relative Effectiveness of Low-Energy Photons and Electrons in Inducing Cancer in Humans (2018)	__d	1	18	427	427
180	Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States (2018) (2018)	__d	8	47	823	823
179	Guidance for Emergency Response Dosimetry (2017)	__d	4	24	534	534
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	1	17	297	297
177	Radiation Protection in Dentistry and Oral & Maxillofacial Imaging (2019)	__d	4	138	1,069	1,069
176	Radiation Safety Aspects of Nanotechnology (2017)	__d	0	13	313	313
175	Decision Making for Late-Phase Recovery from Major Nuclear or Radiological Incidents (2014)	__d	0	25	763	763
174	Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance (2013)	__d	1	108	1,913	1,913

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
173	Investigation of Radiological Incidents (2012)	__d	2	17	925	925
172	Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States (2012)	__d	0	99	1,900	1,900
171	Uncertainties in the Estimation of Radiation Risks and Probability of Disease Causation (2012)	__d	0	17	944	944
170	Second Primary Cancers and Cardiovascular Disease After Radiation Therapy (2011)	__d	0	17	861	861
169	Design of Effective Radiological Effluent Monitoring and Environmental Surveillance Programs (2010)	__d	2	9	501	501
168	Radiation Dose Management for Fluoroscopically-Guided Interventional Medical Procedures (2010)	__d	1	152	2,444	2,444
167	Potential Impact of Genetic Susceptibility and Previous Radiation Exposure on Radiation Risk for Astronauts (2010)	__d	1	8	389	389
166	Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (2010)	__d	0	17	680	680
165	Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers (2010)	__d	1	58	1,652	1,652
164	Uncertainties in Internal Radiation Dosimetry (2009)	__d	0	13	593	593
163	Radiation Dose Reconstruction: Principles and Practices (2009)	__d	1	18	979	979
162	Self Assessment of Radiation-Safety Programs (2009)	__d	3	19	1,150	1,150
161	Management of Persons Contaminated with Radionuclides (2009)	__d	0	41	2,100	2,100
160	Ionizing Radiation Exposure of the Population of the United States (2009)	__d	0	93	3,399	3,399
159	Risk to the Thyroid from Ionizing Radiation (2008)	__d	0	10	684	684
158	Uncertainties in the Measurement and Dosimetry of External Radiation (2007)	__d	0	24	1,475	1,475
157	Radiation Protection in Educational Institutions (2007)	__d	1	13	1,200	1,200
156	Development of a Biokinetic Model for Radionuclide-Contaminated Wounds and Procedures for Their Assessment, Dosimetry and Treatment (2006)	__d	0	8	1,054	1,054
155	Management of Radionuclide Therapy Patients (2006)	__d	0	131	2,545	2,545
154	Cesium-137 in the Environment: Radioecology and Approaches to Assessment and Management (2006)	__d	0	9	798	798

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
153	Information Needed to Make Radiation Protection Recommendations for Space Missions Beyond Low-Earth Orbit (2006)	__d	0	13	975	975
152	Performance Assessment of Near-Surface Facilities for Disposal of Low-Level Radioactive Waste (2005)	__d	1	8	763	763
151	Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (2005)	__d	0	822	8,781	8,781
150	Extrapolation of Radiation-Induced Cancer Risks from Nonhuman Experimental Systems to Humans (2005)	__d	0	6	955	955
149	A Guide to Mammography and Other Breast Imaging Procedures (2004)	__d	0	24	1,769	1,769
148	Radiation Protection in Veterinary Medicine (2004)	__d	2	40	1,751	1,751
147	Structural Shielding Design for Medical X-Ray Imaging Facilities (2004)	__d	6	390	8,199	8,199
	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	0	7	1,290	1,290
145	Radiation Protection in Dentistry (2003)	__d	0	75	3,421	3,421
144	Radiation Protection for Particle Accelerator Facilities (2003)	__d	2	69	3,199	3,199
143	Management Techniques for Laboratories and Other Small Institutional Generators to Minimize Off-Site Disposal of Low-Level Radioactive Waste (2003)	__d	0	8	928	928
142	Operational Radiation Safety Program for Astronauts in Low-Earth Orbit: A Basic Framework (2002)	__d	0	8	1,381	1,381
141	Managing Potentially Radioactive Scrap Metal (2002)	__d	0	7	1,450	1,450
140	Exposure Criteria for Medical Diagnostic Ultrasound: II. Criteria Based on All Known Mechanisms (2002)	__d	1	8	1,147	1,147
139	Risk-Based Classification of Radioactive and Hazardous Chemical Wastes (2002)	__d	0	6	1,174	1,174
138	Management of Terrorist Events Involving Radioactive Material (2001)	__d	2	16	7,949	7,949
137	Fluence-Based and Microdosimetric Event-Based Methods for Radiation Protection in Space (2001)	__d	0	8	986	986
136	Evaluation of the Linear-Nonthreshold Dose-Response Model for Ionizing Radiation (2001)	__d	0	14	1,884	1,884
135	Liver Cancer Risk from Internally-Deposited Radionuclides (2001)	__d	0	5	1,291	1,291

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
134	Operational Radiation Safety Training (2000)	__d	2	23	1,866	1,866
133	Radiation Protection for Procedures Performed Outside the Radiology Department (2000)	__d	0	42	2,271	2,271
132	Radiation Protection Guidance for Activities in Low-Earth Orbit (2000)	__d	0	13	1,281	1,281
131	Scientific Basis for Evaluating the Risks to Populations from Space Applications of Plutonium (2001)	__d	0	7	969	969
130	Biological Effects and Exposure Limits for “Hot Particles” (1999)	__d	0	14	1,393	1,393
129	Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies (1999)	__d	0	4	1,890	1,890
128	Radionuclide Exposure of the Embryo/Fetus (1998)	__d	1	14	2,056	2,056
127	Operational Radiation Safety Program (1998)	__d	0	21	3,094	3,094
126	Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection (1997)	__d	0	11	2,199	2,199
125	Deposition, Retention and Dosimetry of Inhaled Radioactive Substances (1997)	__d	0	8	2,789	2,789
124	Sources and Magnitude of Occupational and Public Exposures from Nuclear Medicine Procedures (1996)	__d	1	18	3,669	3,669
123	Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground (1996)	__d	4	26	3,582	3,582
122	Use of Personal Monitors to Estimate Effective Dose Equivalent and Effective Dose to Workers for External Exposure to Low-LET Radiation (1995)	__d	0	29	3,970	3,970
121	Principles and Application of Collective Dose in Radiation Protection (1995)	__d	0	9	2,699	2,699
120	Dose Control at Nuclear Power Plants (1994)	__d	0	10	3,202	3,202
119	A Practical Guide to the Determination of Human Exposure to Radiofrequency Fields (1993)	__d	0	16	3,794	3,794
118	Radiation Protection in the Mineral Extraction Industry (1993)	__d	0	5	2,813	2,813
117	Research Needs for Radiation Protection (1993)	__d	0	12	2,156	2,156
116	Limitation of Exposure to Ionizing Radiation (1993)	__d	4	145	8,967	8,967
115	Risk Estimates for Radiation Protection (1993)	__d	0	16	3,639	3,639
114	Maintaining Radiation Protection Records (1992)	__d	1	9	2,738	2,738
113	Exposure Criteria for Medical Diagnostic Ultrasound: I. Criteria Based on Thermal Mechanisms (1992)	__d	0	6	3,494	3,494

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
112	Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination (1991)	__d	2	28	4,357	4,357
111	Developing Radiation Emergency Plans for Academic, Medical and Industrial Facilities (1991)	__d	0	7	4,342	4,342
110	Some Aspects of Strontium Radiobiology (1991)	__d	0	7	2,745	2,745
109	Effects of Ionizing Radiation on Aquatic Organisms (1991)	__d	0	5	2,397	2,397
108	Conceptual Basis for Calculations of Absorbed-Dose Distributions (1991)	__d	0	14	3,476	3,476
107	Implementation of the Principle of As Low As Reasonably Achievable (ALARA) for Medical and Dental Personnel (1990)	__d	0	22	3,763	3,763
106	Limit for Exposure to "Hot Particles" on the Skin (1990)	__d	0	5	3,087	3,087
105	Radiation Protection for Medical and Allied Health Personnel (1989)	__d	0	27	7,267	7,267
104	The Relative Biological Effectiveness of Radiations of Different Quality (1990)	__d	0	14	2,758	2,758
103	Control of Radon in Houses (1989)	__d	0	15	4,004	4,004
102	Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies up to 50 MeV (Equipment Design, Performance and Use) (1989)	__d	3	36	8,458	8,458
101	Exposure of the U.S. Population from Occupational Radiation (1989)	__d	0	5	4,391	4,391
100	Exposure of the U.S. Population from Diagnostic Medical Radiation (1989)	__d	0	10	5,211	5,211
99	Quality Assurance for Diagnostic Imaging (1988)	__d	0	50	5,640	5,640
98	Guidance on Radiation Received in Space Activities (1989)	__d	0	13	3,609	3,609
97	Measurement of Radon and Radon Daughters in Air (1988)	__d	1	11	4,467	4,467
96	Comparative Carcinogenicity of Ionizing Radiation and Chemicals (1989)	__d	0	11	4,285	4,285
95	Radiation Exposure of the U.S. Population from Consumer Products and Miscellaneous Sources (1987)	__d	0	8	4,496	4,496
94	Exposure of the Population in the United States and Canada from Natural Background Radiation (1987)	__d	0	8	4,666	4,666
93	Ionizing Radiation Exposure of the Population of the United States (1987)	__d	0	13	7,659	7,659
92	Public Radiation Exposure from Nuclear Power Generation in the United States (1987)	__d	0	5	3,846	3,846

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
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	4	3,042	3,042
89	Genetic Effects from Internally Deposited Radionuclides (1987)	__d	0	6	4,125	4,125
88	Radiation Alarms and Access Control Systems (1986)	__d	0	7	5,004	5,004
87	Use of Bioassay Procedures for Assessment of Internal Radionuclide Deposition (1987)	__d	0	13	4,455	4,455
86	Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields (1986)	__d	0	7	5,573	5,573
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	9	4,463	4,463
83	The Experimental Basis for Absorbed-Dose Calculations in Medical Uses of Radionuclides (1985)	__d	0	7	3,769	3,769
82	SI Units in Radiation Protection and Measurements (1985)	__d	0	9	4,928	4,928
81	Carbon-14 in the Environment (1985)	__d	0	5	4,161	4,161
80	Induction of Thyroid Cancer by Ionizing Radiation (1985)	__d	0	5	4,442	4,442
79	Neutron Contamination from Medical Electron Accelerators (1984)	__d	0	43	5,539	5,539
78	Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States (1984)	__d	1	6	6,643	6,643
77	Exposures from the Uranium Series with Emphasis on Radon and Its Daughters (1984)	__d	0	5	6,807	6,807
76	Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment (1984)	__d	1	6	6,846	6,846
75	Iodine-129: Evaluation of Release from Nuclear Power Generation (1983)	__d	0	4	6,083	6,083
74	Biological Effects of Ultrasound: Mechanisms and Clinical Implications (1983)	__d	0	10	11,451	11,451
73	Protection in Nuclear Medicine and Ultrasound Diagnostic Procedures in Children (1983)	__d	0	6	5,690	5,690
72	Radiation Protection and Measurement for Low-Voltage Neutron Generators (1983)	__d	10	10	4,641	4,641
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	6	5,625	5,625

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
69	Dosimetry of X-Ray and Gamma-Ray Beams for Radiation Therapy in the Energy Range 10 keV to 50 MeV (1981)	__d	0	15	5,399	5,399
68	Radiation Protection in Pediatric Radiology (1981)	__d	0	9	4,763	4,763
67	Radiofrequency Electromagnetic Fields—Properties, Quantities and Units, Biophysical Interaction and Measurements (1981)	__d	0	7	5,674	5,674
66	Mammography (1980)	__d	0	0	4,598	4,598
65	Management of Persons Accidentally Contaminated with Radionuclides (1980)	__d	0	17	18,702	18,702
64	Influence of Dose and Its Distribution in Time on Dose-Response Relationships for Low-LET Radiations (1980)	__d	0	5	5,440	5,440
63	Tritium and Other Radionuclide Labeled Organic Compounds Incorporated in Genetic Material (1979)	__d	0	5	4,468	4,468
62	Tritium in the Environment (1979)	__d	0	7	4,130	4,130
61	Radiation Safety Training Criteria for Industrial Radiography (1978)	__d	0	5	6,330	6,330
60	Physical, Chemical and Biological Properties of Radium Relevant to Radiation Protection Guidelines (1979)	__d	0	5	4,181	4,181
59	Operational Radiation Safety Program (1979)	__d	0	0	8,046	8,046
58	A Handbook of Radioactivity Measurements Procedures (1978)	__d	0	17	14,048	14,048
57	Instrumentation and Monitoring Methods for Radiation Protection (1978)	__d	0	18	11,297	11,297
56	Radiation Exposure from Consumer Products and Miscellaneous Sources (1977)	__d	0	0	5,905	5,905
55	Protection of the Thyroid Gland in the Event of Releases of Radioiodine (1977)	__d	0	7	7,028	7,028
54	Medical Radiation Exposure of Pregnant and Potentially Pregnant Women (1977)	__d	3	16	11,118	11,118
53	Review of NCRP Radiation Dose Limit for Embryo and Fetus in Occupationally Exposed Women (1977)	__d	0	0	9,289	9,289
52	Cesium-137 from the Environment to Man: Metabolism and Dose (1977)	__d	0	4	4,870	4,870
51	Radiation Protection Design Guidelines for 0.1-100 MeV Particle Accelerator Facilities (1977)	__d	0	0	8,515	8,515
50	Environmental Radiation Measurements (1976)	__d	0	8	8,122	8,122

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
49	Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies up to 10 MeV (1976)	__d	0	144	19,097	19,097
	Adjunct to NCRP Report 49 (1976)	__d	0	0	2,797	2,797
48	Radiation Protection for Medical and Allied Health Personnel (1976)	__d	__e	0	14,359	14,359
47	Tritium Measurement Techniques (1976)	__d	1	5	6,554	6,554
46	Alpha-Emitting Particles in Lungs (1975)	__d	0	4	6,249	6,249
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	6	6,714	6,714
43	Review of the Current State of Radiation Protection Philosophy (1975)	__d	__e	3	9,725	9,725
42	Radiological Factors Affecting Decision-Making in a Nuclear Attack (1974)	__d	0	6	47,425	47,425
41	Specification of Gamma-Ray Brachytherapy Sources (1974)	__d	0	12	5,747	5,747
40	Protection Against Radiation from Brachytherapy Sources (1972)	__d	0	45	10,316	10,316
39	Basic Radiation Protection Criteria (1971)	__d	__e	0	40,393	40,393
38	Protection Against Neutron Radiation (1971)	__d	1	20	9,337	9,337
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	9,955	34,405
29	Exposure to Radiation in an Emergency	55,705	__e	0	3,679	59,384
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

No.	Title and Year of Publication	Number of Copies Distributed				
		Government Printing Office ^a	by NCRP Secretariat ^b		Total NCRP Publications ^c	All Sources Combined
			2023			
			Hardcopy	E-Pub		
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
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	1	0	7,661	58,161
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

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4	Radium Protection (1938)	10,086	__e	0	0	10,086
3	X-Ray Protection (1936)	16,490	__e	0	0	16,490
2	Radium Protection (1934)	__g	__e	0	0	0
1	X-Ray Protection (1931)	1,596	__e	0	0	1,596
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NCRP Commentaries

33	Recommendations for Stratification of Equipment Use and Radiation Safety Training for Fluoroscopy (2023)	__d	22	168	190	190
32	Evaluation of a Sex-Specific Difference in Lung Cancer Radiation Risk Projection (with a Focus on Application to Space Activities (2022)	__d	27	64	91	91
31	Development of Kinetic and Anatomical Models for Brain Dosimetry for Internally Deposited Radionuclides (2022)	__d	1	19	115	115
30	Using Personal Monitoring Data to Derive Organ Doses for Medical Radiation Workers, with a Focus on Lung (2020)	__d	0	18	215	215
29	Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced NORM (TENORM) from the Oil and Gas Industry (2020)	__d	1	14	224	224
28	Implementation Guidance for Emergency Response Dosimetry	__d	0	31	915	915
27	Implications of Recent Epidemiologic Studies for the Linear-Nonthreshold Model and Radiation Protection (2018)	__d	0	35	852	852
26	Guidance on Radiation Dose Limits for the Lens of the Eye (2016)	__d	1	37	763	763
25	Potential for Central Nervous System Effects from Radiation Exposure During Space Activities Phase I: Overview (2016)	__d	0	10	228	228
24	Health Effects of Low Doses of Radiation: Perspectives on Integrating Radiation Biology and Epidemiology (2015)	__d	0	16	721	721
23	Radiation Protection for Space Activities: Supplement to Previous Recommendations (2014)	__d	0	10	346	346
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20	Radiation Protection and Measurement Issues Related to Cargo Scanning With Accelerator-Produced High-Energy X Rays (2007)	__d	1	10	577	577
19	Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism (2005)	__d	2	15	1,667	1,667
18	Biological Effects of Modulated Radiofrequency Fields (2003)	__d	1	7	738	738
17	Pulsed Fast Neutron Analysis System Used in Security Surveillance (2003)	__d	0	4	646	646
16	Screening of Humans for Security Purposes Using Ionizing Radiation Scanning Systems (2003)	__d	0	10	922	922
15	Evaluating the Reliability of Biokinetic and Dosimetric Models and Parameters Used to Assess Individual Doses for Risk Assessment Purposes (1998)	__d	0	6	850	850
14	A Guide for Uncertainty Analysis in Dose and Risk Assessments Related to Environmental Contamination (1996)	__d	0	4	1,827	1,827
13	An Introduction to Efficacy in Diagnostic Radiology and Nuclear Medicine (Justification of Medical Radiation Exposure) (1995)	__d	0	10	1,645	1,645
12	Radiation Exposure and High-Altitude Flight (1995)	__d	0	10	883	883
11	Dose Limits for Individuals Who Receive Exposure from Radionuclide Therapy Patients (1995)	__d	0	19	1,747	1,747
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7	Misadministration of Radioactive Material in Medicine—Scientific Background (1991)	__d	0	6	1,315	1,315
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Statements

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NCRP Annual Meeting Proceedings

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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
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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		__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	__j	384	384
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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
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