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Application from National Council on Radiation Protection and Measurement (NCRP) in Response to:

CDC-RFA-EH21-2103

PROJECT NARRATIVE

a. Background

The National Council on Radiation Protection and Measurements (NCRP) is a nonprofit, 501(c)(3), organization chartered by Congress in 1964 under Public Law 88-376 to provide guidance, based on the best scientific evidence, to the government, industry, and the public on matters related to radiation health protection and measurements. This NCRP mission closely aligns with the goals of CDC/NCEH/RSS as described in the Overview of the Notice of Funding Opportunity (NOFO), namely, to provide scientific guidance on ionizing radiation (IR) and non-ionizing radiation (NIR) health protection and measurements. NCRP has previous and ongoing programs to address the problems outlined in the NOFO Background, specifically: controlling and measuring exposures to workers and members of the public following a radiological emergency; assessing the impact of the increased doses to members of the public due to medical imaging procedures; issues resulting from the production and handling of Technologically Enhanced Natural Occurring Radioactive Materials (TENORM); radiation needs/protection for radiation emergency workers that are not first responders/receivers; radiation health issues related to emerging technologies employing NIR exposures; communication issues on NIR, as well as advancing the science of risk communication and developing products for the public addressing radiation risk from exposure to IR and NIR.

In the last five years NCRP partnered with or received at least partial funding from the CDC to address many topics relevant to those outlined in the NOFO:

- NCRP Report No. 176, *Radiation Safety Aspects of Nanotechnology*, March 2017.
- NCRP Report No. 179, *Guidance for Emergency Responder Dosimetry*, October 2017.
- Proceedings of the 2017 NCRP Annual Meeting on "Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism: Is There a Need for Realignment to Close Remaining Gaps?" published in *Health Physics* [114(2), 109–260, 2018].
- NCRP Commentary No. 27, *Implications of Recent Epidemiologic Studies for the Linear-Nonthreshold Model and Radiation Protection*, April 2018.
- NCRP Report No. 181, *Evaluation of the Relative Effectiveness of Low-Energy Photons and Electrons in Inducing Cancer in Humans*, May 2018.
- NCRP Report No. 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)*. November 2018.
- NCRP Report No. 180, *Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States (2018),* December 2018.
- Proceedings of the 2018 Annual Meeting of the NCRP on "Radiation Protection Responsibility in Medicine" published in *Health Physics* [116(**2**), 111–294, 2019].
- NCRP Commentary No. 28, *Implementation Guidance for Emergency Response Dosimetry,* May 2019.
- Partnered with CRCPD to sponsor the International Atomic Energy Agency (IAEA) Ninth International Symposium on NORM in Denver, September 2019.
- NCRP Report No. 184, *Medical Radiation Exposure of Patients in the United States*, November 2019.

- NCRP Report No. 177, *Radiation Protection in Dentistry and Oral & Maxillofacial Imaging,* December 2019.
- In January 2020, NCRP organized and sponsored a symposium on Radiation Protection in Medicine at the mid-year meeting of the Health Physics Society. This included a plenary lecture and an all-day symposium of 12 speakers discussing NCRP activities.
- NCRP Commentary No. 29, *Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) from the Oil and Gas Industry*, April 2020.
- Papers from the Taylor, Sinclair, and Tenforde Lecturers, and a Summary of the 2019 Annual Meeting of NCRP on "NCRP Meeting the Challenge at 90: Providing Best Answers to Your Most Pressing Questions About Radiation" published in *Health Physics* [118(4):335-381, 2020].
- NCRP Report No. 185, *Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects: Guidance for Researchers and Institutional Review Boards*, May 2020.
- NCRP Report No. 186, *Approaches for Integrating Information from Radiation Biology and Epidemiology to Enhance Low-Dose Health Risk Assessment*, July 2020.
- In July 2020, NCRP co-sponsored, with the NCI Radiation Research Program and NIAID Radiation Countermeasures Program, a Virtual Workshop on "Low Dose Radiation Therapy (LDRT) for COVID-19: Benefits or Risk?". A workshop report was published in *Radiation Research* [194, 452–464 (2020)].
- NCRP Commentary No. 30, *Using Personal Monitoring Data to Derive Organ Doses for Medical Radiation Workers, with a Focus on Lung*, September 2020.
- NCRP Scientific Committee (SC) 3-2, Recommendations for Instrument Response Verification and Calibration for Use in Radiation Emergencies (Co-Chairs: Leticia S. Pibida and Gladys A. Klemic), is preparing a Statement.
- SC 3-3, Respiratory Protection for Emergency Workers Responding to a Nuclear/ Radiological Emergency (Co-Chairs: Armin Ansari and Adela Salame-Alfie), is preparing a Statement.

Other NCRP documents and activities over that same period also are relevant to the NOFO:

- NCRP Report No. 182, *Radiation Safety of Sealed Radioactive Sources,* April 2019.
- NCRP Report No. 183, *Radiation Exposures in Space and the Potential for Central Nervous System Effects (Phase II),* November 2019.
- A Virtual Symposium co-organized by NCRP, Memorial Sloan Kettering Cancer Center, and the Greater New York, Baltimore-Washington, and New Jersey Chapters of the HPS in November 2020 on "Study of One Million Radiation Workers & Veterans".
- NCRP Statement No. 13, *NCRP Recommendations for Ending Routine Gonadal Shielding During Abdominal and Pelvic Radiography,* with a companion document, *Implementation Guidance for Ending Routine Gonadal Shielding During Abdominal and Pelvic Radiography*, and a Gonadal Shielding Trifold Flyer for staff and patients, was released on the NCRP website, January 2021.
- SC 1-27 is preparing a Commentary on *Evaluation of Sex-Specific Differences in Lung Cancer Radiation Risks and Recommendations for Use in Transfer Models*.
- SC 2-8 is preparing a Report on *Operational Radiation Safety Program.*
- SC 4-10 is preparing a Statement on *Error Prevention in Radiation Therapy*.

- SC 4-12 is preparing a Statement on *Risk Management Stratification of Equipment and Training for Fluoroscopy.*
- SC 6-12 is producing a Commentary on *Development of Kinetic and Anatomical Models for Brain Dosimetry for Internally Deposited Radionuclides*.
- The 2021 NCRP Annual Meeting on "Radiation & Flight: A Down-to-Earth Look at Risks" was held (virtually) in April 2021.

As shown by this long list of relevant NCRP publications and activities, NCRP has the capability, experience, and ongoing programs to develop scientific guidance related to radiation health protection and measurements in the public interest. Since our inception, NCRP has assembled the best scientific minds available to evaluate the published scientific evidence to help federal, state, and local agencies in making public health decisions and improving practices. NCRP strives to involve all relevant stakeholders in document development through committee service, special reviews, presentations, or meetings. Furthermore, after consensus documents are published by NCRP, outreach is undertaken to inform the public, government agencies, educators, etc. of the NCRP recommendations and implications of those recommendations.

b. Approach

i. Purpose

NCRP will address the public health problems described in the NOFO Background, i.e., to improve understanding of radiation science by the radiation protection community and assist federal, state, and local public health agencies in making public health decisions, by bringing together the best qualified individuals to evaluate published science and make sound recommendations on topics of concern. Specifically, NCRP names scientific committees (SCs) consisting of members, chairs, and consultants who are leading experts in the specific topic to be considered, with approval of the NCRP Board of Directors. Each committee develops a plan of action and milestones to address the specific topic; holds meetings, in-person and by webinar, to discuss the issues; evaluates all relevant scientific evidence; prepares draft documents; responds to reviews and publishes the final consensus report, commentary, or statement. A strength of the NCRP process is the rigorous, two-step review process, whereby draft documents are reviewed first by the relevant NCRP Program Area Committee (PAC) and subject matter experts, then the entire 100-member Council, before the consensus document is published.

ii. Outcomes

NCRP will develop and provide documents that improve the understanding of radiation science, help authorities in decision-making based on the best available science, and improve public health practices by local, state, and federal agencies. Scientific committees will be convened to develop consensus guidance on the targeted topics outlined below. The reports, commentaries and other documents will be published, and outreach methods developed to assure that information is shared with all stakeholders. When needed, comprehensive guidance reports will be translated into shorter and more operational and actionable recommendations. The approaches to achieve the desired outcomes for each of the targeted topics are described below.

(1) <u>*Monitoring and controlling exposures to emergency workers and the public during radiological emergencies*</u>. In the last several years, NCRP published Report No. 179, *Guidance*

for Emergency Responder Dosimetry, and the follow-on NCRP Commentary No. 28, *Implementation Guidance for Emergency Response Dosimetry,* concise guidance for "boots-on-the-ground" responders. These two documents outlined recommendations for measuring exposures to emergency workers. Currently, NCRP SC 3-2 is preparing a Statement on "Recommendations for Instrument Response Verification and Calibration for Use in Radiation Emergencies" in response to a need identified by state partners for guidance on appropriate maintenance and calibration of dosimetry instrumentation. This Statement should be completed during the current grant period. Related important efforts that are proposed for the upcoming grant period, mostly under the auspices of PAC 3, are:

- A Commentary to resolve inconsistencies in recommendations on reference values for use in screening members of the public for external contamination in the aftermath of a nuclear/radiological incident.
- A document based on the 2017 NCRP Annual Meeting on "*Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism: Is There a Need for Realignment to Close Remaining Gaps?"* This evaluation will provide approaches to help improve federal, state, and local radiological and nuclear incident preparedness.
- A Statement, developed with PAC 6, in which NCRP can provide guidance to inform a U.S. Individual Dosimetry and Biodosimetry (IDB) Network that can improve national radiological triage and medical management of individuals affected by a radiological/nuclear (R/N) mass-casualty incident.

Consensus guidance will be issued with active involvement from local, state, and federal agencies, and other stakeholders (e.g., emergency managers and firefighters) who have been active participants previously in NCRP SCs and PACs. As appropriate, lessons learned from the COVID-19 response will be incorporated into thinking about response to R/N emergencies.

(2) *Radiation needs/protection for emergency workers.* NCRP defines Emergency Workers broadly, including those who assist with evacuations (e.g., bus drivers), clear debris on the roads for emergency vehicles (e.g., public works, sanitation workers), provide nonmedical staff in hospitals, and staff evacuation routes or control access points (e.g., local law enforcement). Many of these workers have not been trained nor are they routinely monitored or prepared to work in a hazardous environment at the moment an incident occurs. Guidance is needed to address the radiation protection requirements for this expanded set of non-radiation emergency workers who are not typical first responders/receivers. Currently, NCRP SC 3-3 is preparing a Statement on Respiratory Protection for Emergency Workers Responding to a Nuclear / Radiological Emergency which will be published late summer/early fall. A subsequent area of work proposed is providing amplifying information on how NCRP's Report No. 180, *Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States (2018)***,** guides radiological protection methodologies for Emergency Workers. This would take the form of a Commentary with recommendations for practical implementation of the methodologies in Report No. 180.

(3) *Production and handling of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM)*. TENORM can be associated with a wide variety of industries including mineral extraction, other forms of mining, phosphate fertilizer and elemental phosphorous production, and water treatment. The presence of TENORM in oil and gas fields has been well documented since the early 1900s. The concentration of the associated radionuclides is highly dependent on the local geology and on the exploration and production technologies employed.

Newer technologies associated with hydraulic fracturing, coupled with horizontal drilling, are termed unconventional oil and gas exploration and production and are now common across numerous states. There is a lack of national recommendations, consistent with the Atomic Energy Act, and no federal regulations of TENORM; hence, regulation of NORM/TENORM waste falls to the states, and this has resulted in inconsistencies across state regulations. NCRP recently published Commentary No. 29 which reviewed practices associated with contemporary methods of oil and gas exploration and production that have potential radiological concerns. The Commentary evaluated the historical and current status of regulations pertinent to management of NORM/TENORM waste from the oil and gas industry and recommended topics for development in a comprehensive, future NCRP report. The Report should provide national environmental and radiation-safety guidelines for the management and disposal of NORM/TENORM waste; be scientifically based and comprehensive with a focus on unconventional oil and gas operations; and address methods to protect human health and the environment from unnecessary radiation exposures. The Report should provide guidance on how to conduct dose assessments, provide institutional controls and practices, perform risk management, and provide training and communications with workers and stakeholders.

(4) *Health issues related to emerging technologies employing non-ionizing radiation exposure.* The emergence of millimeter-wave (MMW) 5th generation (5G) cellular networks into widespread usage has attracted public attention and in many cases concern about potential health effects. While some level of concern may be understandable in the absence of information, the amount of hyperbolic misinformation (especially on some activist websites) on this subject is troubling and counterproductive. 5G deployment has also been accompanied by a steady stream of media pieces expressing various opinions on 5G ranging from the ominous to the exculpatory. This development is due in part to the necessity to offset the great attenuation of MMW by deploying many small cells near subscribers' residences ('densification'), as well as the more widespread use of a portion of the electromagnetic spectrum to which the public has not previously been exposed to any significant extent.

Though research efforts have begun, the effect of 5G networks on population exposures to RF signals has not been as thoroughly researched as have RF exposures at lower frequencies. However, it is anticipated that in all cases exposure levels will remain well below the U.S. and major international exposure limits, and that network operators will be aware of their obligation to maintain their systems within compliant operating parameters. The purpose of this proposed activity is to improve the understanding of NIR science and its potential biological effects and develop authoritative resources to assist those with the responsibility to inform the American public, workers, and the medical community. This effort would take advantage of the relationships of NCRP council members who have had collaborations with other expert organizations such as the IEE/ICES, WHO and ICNIRP, organizations that have prepared some excellent material in this area. In addition, the advancements made in the science of risk communication would be incorporated to assist responsible parties to communicate often complex and controversial topics. Topics to be addressed would include issues such as the controversy and relevance of low level non-thermal (i.e., other than thermal effects) biological effects as they relate to emissions from emerging wireless technology (e.g., 5G) and the methodology used to establishment RF safety standards. Together, the elements outlined below will assist those with a need to communicate effectively about the safety of NIR and make public health decisions within federal, state, and local public health agencies.

NCRP believes there is a need for information to be developed in four main areas:

- A report to summarize the reviews of the scientific literature that have performed; for example, Section C1 of IEEE C95.1-2019 cites 20 reviews through 2017 and the U.S. Food and Drug Administration (FDA) published an in-depth review of epidemiology and laboratory studies on RF relevant to cancer published between 2008 and 2018 with selected updates through August 2019.
- A commentary on public communication, possibly in the form of FAQ's with supporting graphics, to provide readily accessible science-based information for use by local, state, and federal agencies as well as the media, public, and private organizations;
- A commentary on some of the more commonly encountered misstatements or misrepresentations of the science of RF bioeffects that continue to have the effect of creating unnecessary fear and confusion among the public and municipal decision-makers who do not have the scientific background to independently assess the credibility of some of these statements. This will bring some necessary balance to the overwhelming amount of activist-generated information on the internet.
- A report to provide a summary of current research and recommendations for further research to answer open questions regarding the extent of exposure and the health and safety aspects of large-scale 5G wireless deployment.

(5) *Risk communications, including products for the public, addressing risks from low dose ionizing and non-ionizing radiation.* The NOFO emphasizes communications issues and advancing the science of risk communications. NCRP is in a unique position to make multiple contributions to the dissemination of radiation sciences-related information to multiple stakeholders including radiation sciences professionals, government agencies, educators and students, and the general public. We propose the following activities, based in part on the wealth of information already available in NCRP documents.

- Synopses of NCRP documents. NCRP's many documents contain a wealth of up-to-date information and important recommendations but reading an entire document can be onerous. We propose to develop easy-to-read summaries, including graphical material and tables from our documents, that would be freely available as convenient downloads from our website. These would provide succinct explanations of NCRP recommendations, the underlying science and other relevant information tailored to our government agency partners, educators, students, or other public audiences. For our documents that lend themselves to additional formats, we could include slide decks summarizing the work and/or short videos or podcasts discussing the highlights of a publication. We have recent experience in the latter in the form of the educational videos prepared by NCRP Director of Science Dr. Boice with the CDC on radiation epidemiology. To achieve this outcome, a subcommittee under PAC 7 will determine which documents published in the previous 3-5 years should be summarized; work with the chair(s) of the document SC and other SC members, as appropriate, to prepare the summary; and post the summary to the NCRP website. The committee would solicit feedback from our funding agencies and radiation sciences educators (through HPS and RRS, e.g.) for guidance on the documents that would be most useful to have summarized. Going forward, we anticipate providing these summaries on 2-3 NCRP documents per year.
- Educational materials on NCRP website. Educators and students at various levels (high school through post-graduate) use NCRP materials (e.g., the pie-chart of radiation exposures to the public) on radiation protection or radiation sciences, but easier access to such materials

would be helpful. In conjunction with the preceding activity, the Education subcommittee of PAC 7 will develop an offering on our website of radiation-related materials (graphs, tables, etc.) that would be useful to educators that can be downloaded freely. Many NCRP members are faculty members at colleges and universities, and they will be consulted about the material to be included in the website section. This activity will require little expenditure of funds but will be a valuable service to the public, educators, and students.

- Risk communications resources. The Risk Communication subcommittee of PAC 7 has begun to develop an extensive list of Risk Communication Resources. They expect to complete this within the year and post it to the NCRP website as a resource available to the public, educators, or any other interested parties. Subsequently the material will be reviewed and updated regularly. This activity will require little expenditure of funds as it is done on a volunteer basis by PAC 7 members.

(6) *Impact of increased doses to the public from medical imaging*. NCRP has a long history of issuing recommendations on radiation protection in medicine; recent documents are listed in the Background above. For this grant, we propose two new, focused, medically important activities and one continuation effort.

- Uniform methods for assessing, communicating, and mitigating IR risks for implanted and applied medical devices. Implanted (e.g., pacemakers) and applied (e.g., insulin pumps) devices are potentially susceptible to radiation damage, necessitating monitoring or mitigative action before, during, and after radiation procedures, both diagnostic and therapeutic. The proliferation of devices over the past two decades, with ever-increasing miniaturization, indicates that innovation in this field will present an ongoing concern for radiation protection. U.S. makers of pacemakers and other implantable and applied devices offer varied levels of information to practitioners who need to deliver diagnostic and therapeutic radiation to patients with these devices. The published research suffers from shortcomings including small sample sizes, limited duration of relevance due to continual technological advances, and inconsistent guidance to physicians and patients. The proposed Statement will articulate the need for a standardized methodology for device testing, recommend development of methodologies and reporting guidelines by standards development organizations and professional organizations, recommend use of these methodologies and guidelines by manufacturers, and suggest risk level thresholds for communication when mitigation actions are necessary.
- Commentary on protective shielding in imaging procedures. NCRP Statement No. 13, published in January 2021, contained recommendations on ending use of gonadal shielding in routine abdominal and pelvic radiography. This has been a controversial topic, with recommendations and requirements in federal and state regulations that are now outmoded. The recent NCRP Statement will help state regulators, medical professionals, and their patients understand best practices based on current, sound, scientific information. It is important to expand these recommendations to the use of protective shielding more generally. Hence, we propose to prepare a Commentary that would include considerations of the appropriate use of protective shielding of the fetus during radiation procedures and of patients during fluoroscopic, CT, and dental imaging, and of protecting and monitoring caregivers who must be in the room during patient exposures. The Commentary would guide consistent messaging to patients and medical professionals about any recommended changes in long-standing procedures, recognizing the different regulatory umbrellas at play, and,

importantly, including collaboration with CRCPD and relevant professional organizations. We will look to use CDC funding to enable timely completion of this critical document.

- Information collection on medical exposures to patients. NCRP Report No. 184, *Medical Radiation Exposure of Patients in United States* was published in November 2019, with instrumental assistance from CDC, through the contributions of Dr. Ansari. An important issue that arose as the Report neared completion was the preservation of knowledge and databases from the extensive amount of data analyses that went into the Report preparation. It will be important to update the information on medical doses to patients in another 10 years or less, to provide ongoing critical data to the national medical community. The update would be facilitated by planning and careful preservation of the information gleaned and analysis methods used now, as well as encouraging generation and collection of data on selected populations where information was sparse, e.g., exposures in children or underserved populations. We will set up a small *ad hoc* committee to consider how NCRP can assist CDC and the nation in this matter; the committee could consider a process to regularly monitor and update medical patient doses and trends and identify solutions that may be pursued to improve future information collection. It is anticipated that this preliminary activity could lead to a standing NCRP committee at a later date, for which we would seek future funding to continue to monitor trends in radiation doses to patients.

(7) *Radon exposure.* NCRP recognizes that there are issues related to exposure of the public and workers to radon. Some of those include: the differences in recommended action levels from the EPA, NCRP Report No. 180, and some international organizations; differences in occupational levels between NIOSH and NRC; how guidance could be further informed from recently published epidemiology studies of radon exposures; whether occupancy factors in homes should be re-evaluated in light of increased occupancy of household basements (e.g., home offices) in light of the COVID-19 pandemic; and the ever-present need for improved risk communication with the public about radon. Risk communication is addressed in topic (4) above. However, due to the large number of other topics proposed here, we do not propose any work specifically on radon at this time. NCRP, particularly PAC 5, will continue to monitor developments regarding radon exposures for open questions that NCRP could uniquely address and work with CDC in later years to reallocate funds to such projects if that is felt appropriate.

iii. Strategies and Activities

The strategies and activities to achieve the project outcomes, i.e., issuing consensus and operational guidance, including translating guidance into actionable recommendations, as appropriate, will follow approaches used effectively in the past. In brief, for each project area a short concept proposal is developed for approval by the NCRP Board. The concept includes the title, purpose, justification, background, proposed work, timelines, number of meetings, references, budget, and proposed scientific committee, chair(s) and consultant. The committee will be selected based on their expertise and committee needs. As described in the Organizational Capacity section, NCRP has an extensive pool of experts to call on for committee work, including Council members as well as other expert radiation professionals throughout the world. During committee meetings, virtual or in-person, a specific outline of work is agreed upon and writing assignments made. If gaps in needed expertise become apparent, additional members will be added. The President and selected members of the Board, as appropriate, are actively involved and are available to assure that the document will be completed on time, including shepherding the draft documents through the extensive review process. The report or commentary is published, and if more practical operational guidance is recommended, the committee work will continue.

Sharing results is approached in many ways. PAC 7 assists in development of an Outreach Plan for each document which includes key messages and email and social media messages and contacts of agencies, organizations and individuals who may have interest in the document. NCRP encourages each SC to summarize the document findings and publish the synopsis in scientific journals, e.g., Report No. 184 on *Medical Radiation Exposure of Patients in the United States* was summarized in two papers describing different aspects of the Report: Mettler *et al.* in Radiology and Milano *et al.* in Journal of the American College of Radiology. Presentations at scientific conferences and symposia are frequent. The President, PAC chairs, and chairs and members of SCs attend many professional meetings as speakers and promote radiation protection issues, research, and the work of NCRP's committees and the Million Person Study (MPS). For example, in 2020 over 45 presentations were made nationally and internationally on behalf of NCRP (see NCRP Annual Report). NCRP PAC 7 focuses on communications, and we are striving to improve, develop, and enhance methods such as brief video clips (for YouTube or website access) that describe committee reports and activities, tweets, lay summaries for each document and more. We would work with the Radiation Studies Branch in developing better ways to communicate to those who would most benefit from our recommendations.

Collaborations

<u>*CDC*</u>. NCRP has a long history of collaborating with the Radiation Studies Branch and will continue to enhance this partnership. Three members of the Radiation Studies Branch are NCRP Members. Current or recent SC or PAC involvement of CDC staff includes serving on: CC-1 providing comprehensive radiation protection guidance for the United States; CC-2 providing guidance on how to train, engage and retain radiation professionals in the United States; and PAC 3 (chair and 2 members) on Nuclear and Radiological Security and Safety, including SC 3-1P1 & P2 on guidance for emergency response dosimetry, SC 3-2 on instrument calibration and SC 3-3 on respiratory protection. The Radiation Studies Branch personnel have participated in many recent Annual Meetings of the NCRP and chaired the Program Committee for the 2017 annual meeting on *Emergency Preparedness for Nuclear Terrorism: What are Remaining Gaps and is There Need for Realignment of National Efforts?* The NCRP Director of Science (former President) has participated in several CDC program-wide seminar series, and he worked with CDC personnel to develop and present a series of eight, informative, modules on *Radiation Epidemiology for Public Health Decision Making*.

One individual who works for NIOSH is an NCRP member and is on one SC and the 2021 Annual Meeting Program Committee, and another NIOSH employee was Chair of NCRP SC 2-6 that produced Report No. 176, *Radiation Safety Aspects of Nanotechnology*.

NCRP has long had a productive partnership with the Conference of Radiation Control Program Directors (CRCPD). The Executive Director of CRCPD is an NCRP Member and served on the NCRP Board of Directors; CRCPD members or individuals recommended by CRCPD have served on NCRP SCs such as SC 4-9 on medical exposures and SC 5-2 on TENORM and given presentations on NCRP work at national and international meetings; NCRP partnered with

CRCPD and IAEA on the NORM IX Conference in 2019; and the NCRP Director of Science (former President) will present the Villforth Lecture at the 2021 CRCPD annual conference. Importantly, NCRP currently has two subcontracts from CRCPD to help fund the production of Statements on "Recommendations for Instrument Response Verification and Calibration for Use in Radiation Emergencies" (SC 3-2) and on "Error Prevention in Radiation Therapy" (SC 4-10) and "Risk Management Stratification of Equipment and Training for Fluoroscopy" (SC 4-12).

Organizations not funded by CDC. NCRP has long and established partnerships with numerous national and international radiation-related organizations. An enduring relationship has existed with the International Commission on Radiological Protection (ICRP). Dr. Boice served on the Main Commission for many years, and two other NCRP Council members are currently on the Main Commission. The incoming ICRP Vice-Chair is an NCRP member, one of the four ICRP committees is headed by a Council member, and other ICRP committees have Council members as members. The relationship is reciprocal in that ICRP members participate on our committees, such as the incoming ICRP Chair having served as vice-chair of one NCRP committee and consultant on another and another Main Commission member is on an NCRP committee. ICRP members often provide expert reviewers of our documents before release and vice versa. The NCRP President has been liaison to the meetings of the ICRP Special Liaison Organizations.

NCRP also has a long, established partnership with the International Commission on Radiation Units (ICRU). NCRP provides office space for ICRU within our Bethesda headquarters. The ICRU Executive Director is NCRP Operations Manager. The NCRP President participated in the 2018 ICRP-ICRU joint meeting and the 2019 ICRU meeting.

NCRP members are active participants in the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). The head of the US delegation is a Council member and there are seven other Council members involved in UNSCEAR.

Dr. Bushberg, Chair of the NCRP Advisory Panel (AP) on Non-Ionizing Radiation, and other AP members are involved with the IEEE/International Committee on Electromagnetic Safety and regularly interact with and have joint presentations on topics of mutual interest with ICNIRP and the EMBS Committee on Man and Radiation.

NCRP is an active partner with and participant in activities of several radiation-related professional societies. Partnerships with the Health Physics Society (HPS) include: organizing and sponsoring a Special Session on Nuclear Power and Radiation Protection at the 2017 HPS mid-year meeting; organizing and sponsoring a symposium on Emerging Issues in Radiation Waste Management at the 2018 HPS mid-year meeting symposium; organizing and sponsoring a symposium on Radiation Protection in Medicine at the 2020 HPS mid-year meeting; and co-sponsoring, with several HPS chapters and MSKCC, the Virtual Symposium on "Study of One Million Radiation Workers & Veterans" in 2020 (all listed in Background, above). In addition, the NCRP President, Director of Science and other NCRP members have given numerous talks about NCRP, SC work and the MPS at HPS annual meetings and meetings of the Baltimore-Washington Chapter of the HPS.

NCRP has a close relationship with the Radiation Research Society (RRS), in part because the NCRP President is a Past President of RRS. NCRP regularly hosts sessions at RRS meetings; the President gave an RRS webinar about NCRP last spring; numerous RRS members are NCRP members; and the NCRP President, Director of Science and a Council member are Senior Editors on *Radiation Research*, while four other NCRP members are Associate Editors.

NCRP has been asked to assist in the planning of both the 2022 International Radiation Protection Association (IRPA) North American Regional Congress to be in St. Louis in February 2022 and the 16th International Congress of the IRPA in 2024 in Orlando. The NCRP President and other Members will be involved in helping with the program planning.

Over many years, NCRP has had grant support and collaborations with numerous federal agencies including, for example, the NRC, DOE, NASA, EPA, various components of DOD, DHS, and NIH. Currently, in addition to CDC, NCRP has funding from the DOE, NASA and the Navy, including for work related to the Million Person Study (MPS) for determining doses and estimating health risks from radiation exposures to healthy US workers and veterans. Although findings of the MPS are scientifically important for the current CDC grant, it is separate work without financial or programmatic overlap. The President has given two presentations to the Interagency Steering Committee on Radiation Standards (ISCORS): in Dec 2018 on "The Once and Future NCRP" and in April 2021 an "Update on Low Dose Radiation Therapy for COVID-19: Benefits or Risks?" The later was an update to the very successful virtual workshop that NCRP co-sponsored with NCI and NIAID (described above).

NCRP has collaborations and partnerships with several universities, e.g., Harvard Medical School and Vanderbilt University, where the President and Director of Science, respectively, hold faculty positions, and professional societies, e.g., American College of Radiology (ACR), Radiological Society of North America (RSNA), American Board of Radiology (ABR), Society of Pediatric Radiology, as well as others such as HPS and RRS discussed above.

c. Applicant Evaluation and Performance Measurement Plan

The final product for most of the proposed activities under this award will be an NCRP document, i.e., a Report, Commentary or Statement. Because many of the issues and details for evaluating and measuring performance for development of those documents are similar to those discussed in the Work Plan section below, an attempt has been made to minimize duplication, and both sections refer to each other.

The approaches and practices to prepare consensus NCRP documents for radiation protection are generally straightforward. A consensus document is prepared following steps that require committee researching the latest scientific evidence, writing and re-writing drafts, submitting drafts through the review process, rewriting the drafts based on review comments, submitting the agreed-upon document for publication, and presenting the findings to the public before and after publication. Similarly, the plan for evaluating and measuring performance is straightforward but is based on multiple factors listed below. The responsibility for evaluation and measuring performance lies with the President and Senior Vice President. The general approach involves the following evaluation and measures of performance of an SC, but is not limited to:
(1) Selection of experienced Chairs, expert Committee Members and Consultants.
(2) Comparing progress against milestones set by each committee.
(3) Comparing progress with previous committees who met their performance goals, i.e., the publication of a high-quality consensus report or commentary.

(4) Frequent attendance at meetings, virtual or in-person, by the NCRP President and Senior Vice President and regular monitoring of progress.
(5) The number of meetings, virtual or in-person, held each quarter.
(6) The number of minutes and action items distributed to committee members.
(7) Time to prepare a draft table of contents.
(8) Time to assign members their areas of concentration and writing assignments.
(9) Time to complete the writing assignments
(10) Participation of committee members.
(11) The number of presentations at scientific conferences, meetings, or agencies to stimulate discussions and generate ideas for improvement.
(12) Time to respond to comments received from the extensive review process.

Quality assurance and performance status are actively monitored. A major challenge faced by committee members is that they are volunteers and no compensations are paid except to the staff consultant. Thus, when other duties arise from an employer, they take precedence over committee work. This is a matter of priorities in that practically all employers have given permission to serve on our committees. If work commitments become severe, the SC member usually asks to resign, we ask them to resign, and/or we select another expert to serve.

There will be variation by each committee in the measures listed above. The key evaluation is whether overall progress, as collectively estimated, is sufficient to produce a high-quality consensus document in the time frame desired. The President and Sr Vice President are actively involved to keep progress and performance on schedule. They frequently interact with the chair and staff consultant about whether addition resources, personnel, meetings or help in resolving problems or anything else could be provided to assist or reinvigorate the committee. If it becomes clear that progress is unacceptable and remediation attempts have not helped, NCRP will and has replaced chairs, consultants, or committee members. New committee members or advisors may be asked to complete deficient writing assignments. The goal is to provide the highest quality consensus document possible within agreed-upon time frames. NCRP has found that the critical ingredients for sustained committee progress are the selection of the Chairs and Technical Consultant, coupled with the active involvement of the President.

<u>Review Process.</u> A critical aspect of the NCRP document preparation process is the extensive, two-step, review of documents, which is greatly valued by our funding partners. The comprehensive review process assures that the consensus document is of the highest quality. After the committee has reached consensus on their initial draft document, it is sent for expert review to the appropriate PAC and to outside critical reviewers selected because of their expertise in the subject area. All comments by all reviewers are listed, addressed by appropriate changes in the document, and the decision recorded on how the comment was addressed, usually on a spreadsheet. After this initial expert review, the revised draft document is sent to all Council members, Distinguished Emeritus members, Collaborating and Special Liaison Organizations and is posted on our website for public comment. Upon request, the draft report is sent to all who ask. Again, all comments received are considered individually, and the report revised accordingly by the committee. The reviews by each Council member must be addressed, and all critical comments resolved. A Report or Statement cannot be published if three or more Council members disapprove even after concerted efforts are made by the committee and President to resolve the concerns. The Board of Directors will then make the final decision as to whether to

allow the Report or Statement to be published. Eleven of the 13 Board members must agree after carefully reviewing the concerns raised by Council members. In the case of a Commentary, although the document is sent to all Council and Emeritus members and Collaborating and Special Liaison Organizations asking for review comments, only the Board votes, with 11 of the 13 Board members required to approve for publication.

d. Organizational Capacity to Implement Approach

NCRP is a nongovernment, nonprofit, Congressionally-chartered, public service organization that has addressed significant science and policy issues related to ionizing and non-ionizing radiations for over 90 years. Our Congressional charter defines our mission (below) which is directly consistent with the NOFO requirements. NCRP is 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.

NCRP has been a recognized national and international authority since its inception in 1929 and its charter by Congress in 1964. NCRP has documented experience in formulating guidance and making recommendations in radiation protection and measurement as reflected in over 300 published reports, commentaries, statements, proceedings, scientific publications, and other documents. NCRP has an active committee structure and review process to address the needs of the nation for radiation protection. NCRP continually brings together national and international experts to address emerging issues in radiation protection, e.g., ongoing committees are providing guidance on sex-linked differences in radiation-induced lung cancer risk, operational radiation safety program, calibration of instrumentation for emergency worker dosimetry, respiratory protection of emergency workers, error prevention in radiation therapy, equipment and training in fluoroscopy, and biokinetic models for dosimetry of radionuclides in the brain. NCRP has an existing and effective mechanism to engage participation in these activities from a wide range of individuals from diverse disciplines. Currently, NCRP has 7 active Scientific Committees (2 more in planning stages), 7 PACs and an Advisory Panel on NIR. Currently, there are 99 elected Council members, 67 Distinguished Emeritus members, 101 committee members (53 not on Council), and 126 PAC members (42 not on Council). Members include experts from federal, state, and local governments, the military, medicine, industry, the private sector, universities, national laboratories, and more. This diverse population of radiation specialists assures that the guidance provided is based on state-of-the-art science and of the highest quality. Further, the NCRP outreach is such that specialists from all over the world can be called upon to address important issues facing the nation in radiation protection and measurements.

Scientific committees and PACs are comprised of Council members and other professionals selected based on their scientific expertise. They all serve as individuals, not as representatives of their organization. NCRP committees and NCRP make recommendations and provide guidance on radiation protection issues based on the best scientific evidence available. NCRP does not and cannot make policy decisions; it is for those agencies with regulatory authority to assess, accept or reject the recommendations and guidance provided.

The capability of NCRP to prepare high-quality consensus documents is reflected in its technical breadth and depth in all areas related to radiation protection and measurements, including medicine, health physics, radiation dosimetry, environmental health, dose reconstruction, public health, reactor engineering and technology, and state and federal regulations. NCRP's extensive capabilities in areas of science and protection relevant to the NOFO proposal are reflected among the Council members who have expertise in a plethora of areas including health physics, radiation dosimetry, radiation biology, radiation epidemiology, risk assessment, risk communications, education, environmental health protection, medicine, dose reconstruction, public health, regulations, etc.

NCRP has 7 active Program Area Committees (PACs) and an Advisory Panel (AP).
PAC 1 Basic Criteria, Epidemiology, Radiobiology, and Risk
PAC 2 Operational Radiation Safety
PAC 3 Nuclear and Radiological Security and Safety
PAC 4 Radiation Protection in Medicine
PAC 5 Environmental Radiation and Radioactive Waste Issues
PAC 6 Radiation Measurements and Dosimetry
PAC 7 Radiation Education, Risk Communication, Outreach and Policy
AP Non-Ionizing Radiation

Key NCRP staff include the President and Director of Science (former President) and receive substantial aid from the Sr. Vice President. Their biographical sketches are in Appendix A. NCRP staff include a Director of Operations, Financial Manager, and support staff. NCRP currently has five Technical Staff Consultants working with scientific committees and could expand that number as necessary and an editorial consultant.

As described in the Strategies and Activities section, NCRP collects, analyzes, develops and disseminates information and recommendations on protection against radiation. The proceedings of the annual meetings are published in a peer-reviewed journal. Reports and commentaries are summarized in scientific journals, as described above. Also as described in the Strategies and Activities section, the President, PAC chairs, and SC chairs and members attend many professional meetings as speakers and promote radiation protection issues, research, and the work of NCRP's committees, including work on the MPS. For example, in 2020 over 45 presentations were made nationally and internationally on behalf of NCRP.

NCRP deals directly with radiation measurements, quantities and units reflected in PAC 6 on Radiation Measurements and Dosimetry. Recent and ongoing examples of guidance on dosimetry are SC 6-12 and SC 6-13 looking at lung dose to medical workers, using monitoring badge data and biokinetic models of radionuclides in the brain. NCRP Report 67 on Radiofrequency Electromagnetic Fields – Properties, Quantities and Units, Biophysical

Interactions and Measurements developed and introduced the "specific absorption rate" (SAR) as the unit to use in regulatory guidance for cellular telephones or other RF devices.

As described in more detail above under Collaborations, NCRP has a long history of cooperating with national and international organizations, governmental and private, concerned with all aspects of radiation protection and measurements. They include the ICRP, ICRU, UNSCEAR, CRCPD, RRS, HPS, and many government agencies and universities. NCRP also has a long history of collaborating with the Radiation Studies Branch at CDC.

The impact of NCRP documents is emphasized by the large number of copies of documents published (with full or partial funding from CDC) in the last five years that have been distributed, shown in the Table. As other measures of the wide impact of NCRP, it is noted that in 2018-2020, about 40 papers were published in the literature and over 100 presentations were given at national and international meetings or to professional or governmental groups describing NCRP work (including MPS) by NCRP officers or members or members of SCs. Due to space limitations, it is not possible to list all these publications and presentations, but they are listed in NCRP Annual Reports, available at https://ncrponline.org/ .

NCRP Document #[a]	Publication Date	Thru 2020 Hardcopy & PDF distributions[a]	2021 hardcopy and PDF sales[b] (includes complimentary)	**Total** Hardcopy and PDF combined
C30	Sept. 2020	[redacted]		
R186	July 2020			
R185	May 2020			
C29	April 2020			
R177	Dec. 2019			
R184	Nov. 2019			
C28	May 2019			
R180	Dec. 2018		(b)(4)	
R178	Nov. 2018			
R181	May 2018			
C27	April 2018			
R179	Oct. 2017			
R176	Mar. 2017			
TOTAL				

[a] R, Report; C, Commentary
[b]Data from 2020 NCRP Annual Report includes prior years.
[c]As of April 30, 2021

NCRP has extensive experience in convening and facilitating meetings of scientists and stakeholders. Although the COVID-19 pandemic prevented it in 2020, for the previous 40 years NCRP has held an annual meeting, open to the public, on various topics related to radiation protection, in recent years attracting over 200 registrants each year. For example, in 2019, the annual meeting was on "NCRP Meeting the Challenge at 90: Providing Best Answers to Your Most Pressing Questions About Radiation". Rising to the challenges of not being able to have face-to-face meetings since March 2020, NCRP has participated in the organization and co-sponsoring of several large virtual meetings (described in Background section above): a virtual workshop on "Low Dose Radiation Therapy (LDRT) for COVID-19: Benefits or Risk?" (almost 300 registrants); a virtual workshop on "Study of One Million Radiation Workers & Veterans" (about 400 registrants); and the 2021 NCRP annual meeting (virtual) on "Radiation & Flight: A Down-to-Earth Look at Risks" (425 registrants).

WORK PLAN

Work to be done in Year 1. A detailed work plan is provided here that covers the first year of the five-year project period. A summary of activities for years 2-5 follows. The overview in the Outcomes section provides the general strategy to accomplish the project tasks. Performance measures, major activities, and the person(s) responsible for each specific activity are described. General strategies common to all scientific committees are summarized below and not reiterated each time for each project area. There is occasional overlap between the Work Plan and sections on "Organizational Capacity to Implement the Approach" and "Evaluation and Performance Measurement Plan"; attempts were made to not excessively duplicate, and references to other sections are given when the topic is more comprehensively covered there.

For each project area for which documents will be developed, the work starts with developing a brief proposal for approval by the NCRP Board. The proposal describes the proposed scientific committee, its title, purpose, background, justification, and budget estimates. Once approved, committee chair(s), consultants, and members are selected. The SC members would convene for an initial meeting or web conference to outline the scope of work for the document. Much of the early development would be done in contact with the Radiation Studies Branch.

Quality assurance and performance status is actively monitored, as described above. Progress is measured by timely completion of specific goals established by the committee chair(s) in collaboration with the NCRP President. The President takes an active role during the initial committee work, attending committee meetings and being available for advice on processes and expectations. Contacts with committee chairs and consultants are made by email or webinars to assure that necessary resources are provided, including help in resolving any difficulties arising, and making sure that the committee remains on task. If it should become clear that progress is unacceptable, NCRP will and has replaced chairs, consultants, and committee members. The goal is to have the highest quality consensus document in as short a time as possible.

The review process before publication is extensive and more fully described in the "Evaluation and Performance Measurement Plan." Briefly, draft documents are developed, and agreement is made by the SC to release the report for first review. It is sent to the appropriate PAC and to experts in the field outside of NCRP. Comments are received and resolved by the committee. A revised draft is prepared and sent to Council, and reviews are received. Any comments from a Council member that are marked serious, must be resolved to their satisfaction. Assuming resolution, the draft report is modified by the committee, consensus reached, and the report sent to be published.

The approaches in the first year for each of the topic areas are described below, including major activities. It should be noted that the COVID-19 pandemic over the past year has taught us that a great deal of work can be achieved using webinar meetings rather than face-to-face meetings. Although face-to-face meetings are needed at critical stages of NCRP work, the change in work habits and productivity from the more expensive (due to travel costs) face-to-face meetings to more web-based meetings can "stretch" financial resources somewhat further, allowing inclusion of more activities than might have been possible in the past.

(1) *Monitoring and controlling exposures to emergency workers and the public during radiological emergencies.* Three efforts are planned in this topic over the next 5 years, as described in the Outcomes section. Only the first effort, namely a Commentary to resolve inconsistences in recommendations on reference values, will be initiated in year 1. Year 1 work includes: with the aid of PAC 3, a proposal will be developed and submitted to the Board for approval, an SC will be formed and have initial meetings, probably via the web, to draft a Table of Contents and start writing the document. It is anticipated that it will require 2 years to complete this Commentary. Therefore, the other two activities, assessment of national efforts in emergency preparedness for nuclear terrorism and evaluating the potential need for realignment to close gaps, and a statement providing guidance to inform a U.S. Individual Dosimetry and Biodosimetry (IDB) Network, will be initiated in grant years 2 and 3, respectively.

(2) *Radiation needs/protection for emergency workers.* The Statement from SC 3-3 will be published by the early months of year 1, without need for funding from this new grant. The main new activity in this topic will be producing a Commentary on recommendations for practical implementation of the methodologies in Report 180. This effort will start in mid-to-late year 1 with the development, by PAC 3, of a proposal to the Board for approval, then an SC will be formed and have initial meetings, via the web, to draft a Table of Contents and start early writing of the document. It is anticipated that it will require 2.5 years to complete this Commentary.

(3) *Report on Technologically-Enhanced Naturally-Occurring Radioactive Materials (TENORM).* As described above, NCRP SC 5-2 recently published Commentary No. 29, *Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) from the Oil and Gas Industry*, that recommended topics for development in a comprehensive NCRP report. Hence, a framework is in place for work on this Report to begin immediately. We anticipate that several members of SC 5-2 will be included in an expanded team and that the Staff Consultant from SC 5-2 will also serve. The committee will include representatives from state and federal agencies and other experts as needed to be responsive to the scope of work. During year 1, a proposal for the SC will be developed and approved by the Board, the committee will hold initial meetings (largely virtual, but expect one face-to-face)) to develop a draft outline for a report, writing assignments will be made and frequent web meetings held. It is envisioned that during year 1, significant progress will be made on an initial draft document.

(4) Health issues related to emerging technologies employing NIR exposure. We propose four activities over the 5-year grant period for this topic, with the activities performed in a staged, and, somewhat over lapping, framework. The first activity, starting in year 1, will be the Report to summarize epidemiology and laboratory studies on RF relevant to cancer. The NCRP AP on NIR has already started to assess the state of the available information in this arena, so within 2-3 months of the start of year 1, the AP will submit a proposal to the Board for approval of an SC to begin work on the Report. Once the SC chair(s), members (including some AP members) and staff consultant are identified, the committee will hold initial meetings (largely virtual, but expect one to be face-to-face) to develop the draft Table of Contents, writing assignments will be

made and frequent online meetings held. It is envisioned that during year 1, substantial progress will be made on the review of available literature and initial report drafting.

(5) <u>Risk communications.</u> Three activities are proposed under this topic. Two of the three activities, selection and placement of radiation protection educational materials on the NCRP website and a listing of risk communications resources for the website, are already underway by PAC 7, although effort has been slow because these are not funded or grant-recognized activities. With inclusion of both activities in a funded grant, the level of effort – and hence outcome – will increase. We expect to have new material on both radiation protection educational information and radiation risk communications resource listing on the NCRP website by the end of year 1, with continued development in year 2, and ongoing maintenance and addition of new material as warranted in subsequent years. Because of the need to pace use of our human resources, we propose to only do initial planning of the activity of developing synopses of NCRP documents during year 1 and will ramp up that activity in years 2-3.

(6) <u>Impact of increased doses to the public from medical imaging</u>. The first activity in this topic regarding radiation effects on implanted and applied devices is to be a Statement, and PAC 4 has already written a draft of a proposal for this activity and some possible committee members have been identified. Hence, with the availability of funding, we expect this activity to commence immediately when funding starts with the submission of the proposal to the Board, appointment of the SC chairs, members and staff consultant, and initiation of SC activity with a first online meeting to draft, outline and expand on the key issues already identified. We expect this Statement to be ready for Council review within a year of SC formation and published in year 2. The second activity, a Commentary on protective shielding in imaging procedures, is a follow-on to the recently published, attention-getting Commentary recommending ending gonadal shielding in pelvic and abdominal radiography, as described above. We expect to start preliminary work to develop a proposal for the Board toward the end of Year 1, with full work to commence in Year 2. The third activity, on information collection on medical exposures to patients, will not commence until year 2 or 3, depending on available resources.

The workplan for year 1 is summarized here:

<u>Period of Performance Outcome:</u> Year 1		**<u>Outcome Measure:</u>** Varies with activity, as shown below	
<u>Strategies and Activities</u>	**<u>Process Measure</u>**	**<u>Responsible Position/Party</u>**	**<u>Completion Date</u>**
1. Exposures in rad emergency - Commentary	Proposal approval by Board SC named ToC developed Writing begins	Board/President Board/President Committee w/PO[a] Committee w/PO	1st quarter 1st quarter 2nd quarter 2nd-4th quarter
2. Protection of emergency workers - Commentary	Proposal approval by Board SC named ToC developed Writing begins	Board/President Board/President Committee w/PO Committee w/PO	3rd quarter 3rd quarter 4th quarter 4th quarter
3. TENORM - Report	Proposal approval by Board SC named ToC developed Writing begins	Board/President Board/President Committee w/PO Committee w/PO	1st quarter 1st quarter 2nd quarter 2nd-4th quarter
4.Non-ionizing radiation - Report	Proposal approval by Board SC named	Board/President Board/President	2nd quarter 2nd quarter

	ToC developed Writing begins	Committee w/PO Committee w/PO	3rd quarter 4th quarter
5.Risk communications – educational material and resources listing on NCRP website	Material collection Web design and review Initial info on web Continue material addition to website	PAC 7 PAC 7 w/PO & SVP PAC 7 PAC 7 w/PO & SVP	1st-2nd quarter 2nd-3rd quarter 3rd quarter 4th quarter
6.Doses from medical imaging - Statement	Proposal approval by Board SC named ToC developed Writing begins PAC/SME review	Board/President Board/President Committee w/PO Committee w/PO Committee w/PO	1st quarter 1st quarter 2nd quarter 2nd-3rd quarter 4th quarter

[a]PO, Presidential oversight

Work to be done in years 2-5. Factors that affect committee progress include project size and complexity of the problem. More progress would be made initially for committees where there has been recent work on similar issues, e.g., TENORM. For years 2-5, the work plan for the proposed project areas will be directed to ensuring publishable guidance documents or website materials in a timely manner. Variations are described below.

(1) Exposures to emergency workers and the public during radiological emergencies. It is anticipated that the Commentary to resolve inconsistences in recommendations on reference values that is to be initiated in year 1 will require 2 years to complete, hence work will proceed through year 2, with completion anticipated in year 3. The other two activities, publishing an assessment of national efforts in emergency preparedness for nuclear and producing a statement to provide guidance to inform a U.S. Individual Dosimetry and Biodosimetry (IDB) Network, will be initiated in years 2 and 3, respectively, and require 2 and 1 year, respectively, to complete, thus expecting completion in years 4 and 5 of the grant.

(2) Radiation needs/protection for emergency workers. The Commentary to be produced under this effort will be started in mid-to late year 1 and is expected to require 2.5 years to complete. Therefore, much work on it will be done during years 2 and 3, with completion in year 4.

(3) TENORM. The committee can be constituted quickly and has initial guidance on how to proceed from Commentary No. 29. It is anticipated that a Table of Contents and written drafts of some sections will be done by the start of year 2, with major writing during year 2, followed by PAC/SME review. The main issue might be obtaining nationwide consensus because of the slightly different approaches taken by different state protection agencies. The aim is to complete Council review and have a publishable document ready in early year 4.

(4) Health issues related to emerging technologies employing NIR exposure. With the Report planned initially for this activity well underway by the start of year 2 and planned for completion by the end of year 3, it is expected that, in the course of that activity, areas in need of public communication (planned commentary 1) and commonly encountered misstatements (planned commentary 2) will become evident. In years 2 and 3, respectively, the SCs to develop those two commentaries will begin work. In discussion with colleagues on PAC 7 and with partners such as CDC, FDA, and CRCPD, appropriate SC members will be identified (there may be overlap with those for the initial Report) and work on the Commentaries begun. Since we expect each to

require about 2 years, we expect Commentary 1 to be completed by early in year 4, and Commentary 2 by the end of year 4. Work on the final anticipated report on recommendations for future research will commence during year 3 and finish by the end of year 5.

(5) *Risk communications.* As described above, three activities are proposed in this topic. After initial work on the radiation protection educational material and radiation risk communications resources listing on the website in year 1, we expect to complete most development in year 2, then have ongoing maintenance and addition of new material as warranted in years 3-5 for both those projects. After doing only initial planning of the activity of developing synopses of NCRP documents during year 1, we will emphasize that activity in years 2-4.

(6) Impact of increased doses to the public from medical imaging. We expect the Statement that will be the outcome of the first activity in this topic to be published in year 2. Preliminary work to develop a proposal for the Board on the second activity, a Commentary on protective shielding in imaging procedures, will be done toward the end of Year 1, with full work to commence in Year 2 and expected completion in year 4 or 5. The third activity, on information collection on medical exposures to patients, will not commence until year 2 or 3, depending on available resources, and run through the remainder of the grant period.

(7) *Radon exposure.* As described above, we will monitor developments regarding radon exposures for open questions that NCRP could uniquely address and work with CDC in later years to reallocate funds to initiate such projects if that is felt appropriate.

Period of Performance Outcome: Years 2-5		**Outcome Measure:** Varies with activity, as shown below	
Strategies and Activities	**Process Measure**	**Responsible Position/Party**	**Completion Date**
1.Rad emergency – Commentary 1 Commentary 2 Statement	 Commentary completion Commentary completion Statement completion	 SC[a] w/PO SC w/PO SC w/PO	 End of year 3 End of year 4 End of year 5
2. Emergency workers - Commentary	 Commentary completion	 SC w/PO	 Mid year 4
3. TENORM - Report	Report completion	SC w/PO	Early in year 4
4.NIR – Report 1 Commentary 1 Commentary 2 Report 2	 Report completion Commentary completion Commentary completion Report completion	 SC w/PO SC w/PO SC w/PO SC w/PO	 End of year 3 Early in year 4 End of year 4 End of year 5
5.Risk communications – Educational material Resources listing Synopses	 Material on website Material on website Material on website	 PAC 7 w/PO & SVP PAC 7 w/PO & SVP PAC 7 w/PO & SVP	 Initial by end of year 1; ongoing Initial by end of year 2; ongoing
6.Medical imaging – Statement Commentary Info collection	 Statement completion Commentary completion Info collection progressing	 SC w/PO SC w/PO Ad hoc SC w/PO	 End of year 2 End of year 4 Ongoing

[a]SC, Scientific Committee; PO, Presidential oversight

NCRP BUDGET NARRATIVE – Year 1 (Sept. 1, 2021-Aug. 31, 2022)

(a) Salaries and Wages (Personnel)

Position Title and Name	Annual Salary	Time %	Months	Amount Requested
President (P.I.) Kathryn Held	[redacted]	[redacted]	12 months	[redacted]
Director of Science John Boice	[redacted]	[redacted]	12 months	$ [redacted]
Director of Operations Laura Atwell	[redacted]	[redacted]	12 months	$ [redacted]
Total Personnel				[redacted]

Job Descriptions

Principal Investigator/President: Dr. Held's role as NCRP President is to work with the NCRP Board of Directors, Director of Science, Sr Vice President and Scientific Committee (SC) chairs to: (1) assemble scientific committees and name staff consultants and oversee their work; (2) supervise the Secretariat and coordinate technical and administrative staff; (3) provide the facilities and technical/administrative support to ensure that the committees produce quality work; and (4) ensure timely review and publication of NCRP documents or information on the website. This includes responsibility for oversight of the preparation, review and editing of NCRP publications, as well as preparing reports to CDC.

Director of Science: It is the responsibility of Dr. Boice to work closely with the President, scientific committee chairs and the NCRP Board of Directors to help: (1) assemble the committees and staff consultants; (2) provide technical/administrative support, as needed, to ensure that the committees produce quality reports; and (3) ensure timely review and publication of NCRP documents/reports.

Director of Operations: As NCRP Director of Operations, Ms. Atwell manages the day-to-day operations. Her responsibilities include scheduling SC meetings and web conferences, making routine assignments to office staff in support of committee work, and performing quality control checks on all report sections. Ms. Atwell also provides administrative support to the President.

(b) Fringe Benefits

Annualized fringe benefits are set for the current year at [redacted] based on the itemized fringe costs for employees as shown in the following table.

Total Annualized Fringe Costs, 2020

Medical/Dental	$	[redacted]	
Life Insurance	$		
Annuity	$		

Payroll Taxes	$	[redacted]	
Holidays	$		
Vacation	$		

Total Fringe Annualized Pool [redacted]

Total Salary Base, 2020: [redacted]
(Salary cost minus holiday and vacation)

Fringe Rate = [redacted]

Fringe Rate = (Total Fringe Pool)/(Total Salary Base) as a percentage. *This rate is applied to the requested hours for the staff identified in the Salaries and Wages section of this narrative.*

Fringe benefit calculations:

The requested fringe amounts are based on the time percentages listed in Section (a) Salaries and Wages and the [redacted] fringe rate.

Position and Name	Salary Amount Requested	Fringe Requested
P.I./President (Held)	$ [redacted]	$ [redacted]
Director of Science (Boice)	$	$
Office Manager (Atwell)	$	$
	Total Fringe	**$** [redacted]

(c) Equipment

No equipment will be purchased under this grant.

(d) Supplies

No supplies will be purchased under this grant.

(e) Travel

There is no staff travel associated with this grant. However, on occasion the President and/or Director of Science may attend a meeting of a scientific committee held outside the Bethesda office as part of ongoing evaluation and performance monitoring. Such costs, if incurred, are included in the table below where meeting travel costs are provided as part of the overall attendance assumptions.

Members of NCRP scientific committees voluntarily contribute their services in support of the Council's objectives. Their ability and experience represent the cornerstone of NCRP's scientific program and are a major force for progress in radiation protection and measurement. In the past year, due to the COVID-19 pandemic, NCRP has conducted nearly all our work by virtual meetings, using Teams or Zoom webinars, and that has worked well to allow us to achieve our goals. We anticipate that committee meetings by webinar will continue, more than in the past, but face-to-face meetings have great value for easier exchange of ideas and when discussing more challenging aspects of recommendations to be made in documents. Hence, we anticipate that some committees will have one face-to-face meeting per year, usually in the NCRP office in Bethesda, and the other committee meetings will be virtual. For the face-to-face meetings, expenses (*i.e.,* airfare, hotel, per diem and ground transportation) related to travel of committee members are paid on a cost-reimbursement basis.

Travel information on which the cost proposal is based:
Travel claims processed previously were used to estimate the total cost per person per meeting.

Cost per individual participant for a one and one-half day meeting:

Two nights hotel	$ [redacted]
Two days per diem (meals, incidentals and ground transportation)	$ [redacted]
Average airline fare	$ [redacted]
Total per person	$ [redacted]

Because this is a new grant, we have not yet constituted the proposed committees or selected staff consultants to oversee them. That will be done as soon as funding is available. The following summary of travel for face-to-face meetings of SCs during year 1 is based on expected number of meetings as described in the Work Plan in the Project Narrative and our prior experience with the needs of SCs. Note that several committees are not expected to have face-to-face meetings in year 1.

Project No.	Project Name	# SC Mtgs	# SC Members Traveling	Individuals Traveling, Role on SC	Travel Cost
1	Exposures from radiological emergencies	none			
2	Needs/protection for emergency workers	none			
3	TENORM	1	[redacted]	Chair, Members	$ [redacted]
4	5G	1	[redacted]	Chair, Members	$ [redacted]
5	Risk communications	none			[redacted]
6	Patient doses	1	[redacted]	Chair, Members	$ [redacted]
	TOTAL SC TRAVEL				**$** [redacted]

(f) Contractual Costs (Sr. Vice President, Editor, Staff Consultants)

Senior Vice President: Dr. Jerry Bushberg, NCRP Senior Vice President and Chairman of the

Board, is stepping up to fill some of the void from Dr. Boice's decreased effort. Dr. Bushberg will assist the President on all matters related to: (1) assembling scientific committees and selecting staff consultants; (2) providing support and oversight to ensure that the committees produce quality reports; and (3) ensuring timely review and publication of NCRP documents/reports. Dr. Bushberg is available for these tasks on an as-needed basis, with estimates of his time shown in the Consultants Costs table below.

Editor: [redacted] However, she continues to work for NCRP as a Consultant on an as-needed basis to do editorial tasks. Her responsibility is ensuring clarity, consistency, and quality in the documents prepared by NCRP. In addition, she communicates with the chairs and consultants or other members of the Scientific Committees to resolve issues related to adherence to the NCRP style guidelines, missing or incomplete references, or problems with graphics.

Staff Consultants: NCRP employs staff consultants who are experienced in various aspects of radiation protection and measurements and provide the necessary scientific and administrative support for the scientific committees. Staff consultants are selected based on their area(s) of expertise and past performance. Hourly rates range from [redacted] to $[redacted] (no fringe benefits are paid to staff consultants). The following table lists the possible assignments of staff consultants for the budget period. Because this is a new grant, we have not yet finalized selection of staff consultants to oversee the proposed SCs, however, to give an indication of the capabilities of potential persons for those roles, we list people who currently work or have worked as NCRP staff consultants with expertise in the project areas. Selection of staff consultants will be done as soon as funding is available or prior to the start of the project.

Project No.	Project Area	Potential Staff Consultant Name
1	Exposures from radiological emergencies	[redacted]
2	Needs/protection for emergency workers	
3	TENORM	
4	5G	TBD
5	Risk communications	[redacted]
6	Patient doses	

Services to be rendered and relevance: The primary role of an NCRP staff consultant is to work closely with committee chairs and the NCRP Secretariat during the development, drafting, editing and final publication of documents. Staff consultants provide technical leadership of committee work and ensure work is completed as required (*i.e.*, to meet grant/contractual delivery schedule). Staff consultants conduct technical reviews of reports, analyses, summaries, and deliverables and report to the President and Sr. Vice President. Staff consultants maintain committee meeting and progress notes and provide these to the NCRP Secretariat for review and as a means of monitoring progress. An annual contract agreement is maintained for each consultant and is monitored by the Director of Operations.

Consultant Costs for Year 1

Role or Project No. (Area)	Consultant	Hours	Rate ($/hr)	Costs/ year	# trips/ year	Travel costs[a]
Sr. Vice President	[redacted]	[redacted]	[redacted]	[redacted]	1	[redacted]
Editor	[redacted]	[redacted]	[redacted]	[redacted]	0	
1. Exposures from radiological emergencies	[redacted]	[redacted]	[redacted]	[redacted]	0	
2. Needs/protection for emergency workers	[redacted]	[redacted]	[redacted]	[redacted]	0	
3. TENORM	[redacted]	[redacted]	[redacted]	[redacted]	1	[redacted]
4. 5G	[redacted]	[redacted]	[redacted]	[redacted]	1	[redacted]
5. Risk communications	[redacted]	[redacted]	[redacted]	[redacted]	0	
6. Patient doses	[redacted]	[redacted]	[redacted]	[redacted]	1	[redacted]
	TOTALS	[redacted]		[redacted]		[redacted]

[a]Travel costs per trip for consultants were calculated as for scientific committee members in Section (e) Travel, above

Total Consultant Costs = [redacted] **(hourly costs) +** [redacted] **(travel) =** [redacted]

Total Direct Costs

First Year Budget Period

(a) Personnel (Salaries and wages): [redacted]
(b) Fringe:
(e) Travel:
(f) Contractual:
Total Direct:

Total Indirect Costs

First Year Budget Period

Total Indirect Costs = [redacted]
Indirect Rate = [redacted]
Total Indirect Costs for the first budget period = [redacted]

*A copy of the current Defense Contract Audit Agency (DCAA) agreement is provided with this grant package in "Other Attachment Forms", filename: Indirect Cost Rate.

CENTERS FOR DISEASE CONTROL AND PREVENTION

Centers for Disease Control and Prevention

NATIONAL CENTER FOR ENVIRONMENTAL HEALTH

Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation

CDC-RFA-EH21-2103

05/15/2021

Table of Contents

Part I. Overview

Applicants must go to the synopsis page of this announcement at www.grants.gov and click on the "Subscribe" button link to ensure they receive notifications of any changes to CDC-RFA-EH21-2103. Applicants also must provide an e-mail address to www.grants.gov to receive notifications of changes.

A. Federal Agency Name:

Centers for Disease Control and Prevention (CDC) / Agency for Toxic Substances and Disease Registry (ATSDR)

B. Notice of Funding Opportunity (NOFO) Title:

Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation

C. Announcement Type: New - Type 1:

This announcement is only for non-research activities supported by CDC. If research is proposed, the application will not be considered. For this purpose, research is defined at https://www.gpo.gov/fdsys/pkg/CFR-2007-title42-vol1/pdf/CFR-2007-title42-vol1-sec52-2.pdf. Guidance on how CDC interprets the definition of research in the context of public health can be found at https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/index.html (See section 45 CFR 46.102(d)).

D. Agency Notice of Funding Opportunity Number:

CDC-RFA-EH21-2103

E. Assistance Listings Number:

93.070

F. Dates:

1. Due Date for Letter of Intent (LOI):

N/A

2. Due Date for Applications:

05/15/2021
11:59 p.m. U.S. Eastern Standard Time, at www.grants.gov.

3. Due Date for Informational Conference Call:

N/A

G. Executive Summary:

1. Summary Paragraph

The purpose of this solicitation is to improve the understanding of radiation science to better protect the American public, workers and emergency responders from exposure to radiation from natural, environmental, medical, and occupational sources as well as nuclear disasters. The results of this work will help improve the understanding of radiation science by the radiation protection community and will assist making public health decisions by federal, state and local public health agencies.
Measurable outcomes of the program will be in alignment with one (or more) of the following performance goal(s) for the National Center for Environmental Health (NCEH):

- Determine human health effects associated with environmental exposures.
- Prevent or reduce illness, injury and death related to environmental factors.
- Build and enhance effective partnerships to improve environmental health capacity.

a. Eligible Applicants:

Open Competition

b. Funding Instrument Type:

G (Grant)

c. Approximate Number of Awards

1

d. Total Period of Performance Funding:

$ 1,500,000
This is the estimated total amount of funding for the entire period of performance; including both direct and indirect costs.

e. Average One Year Award Amount:

$ 300,000
This amount is for the first 12-month budget period and includes both direct and indirect costs.

f. Total Period of Performance Length:

5

g. Estimated Award Date:

September 01, 2021

h. Cost Sharing and / or Matching Requirements:

No
Matching or cost sharing is not required.

Part II. Full Text

A. Funding Opportunity Description

1. Background

a. Overview

The CDC/National Center for Environmental Health (NCEH)/Division of Environmental Health Science and Practice (DEHSP)/Emergency Management, Radiation and Chemical Branch (EMRCB)/Radiation Studies Section (RSS) (NCEH/RSS) seeks to provide funding to develop scientific guidance related to radiation health protection and measurements as detailed below. There are currently several radiation protection issues for workers and members of the public that require serious consideration and study. There are still many unanswered questions with issues pertaining to controlling and measuring exposures to workers and members of the public following a radiological emergency; the impact of the increased doses to the members of the public due to the use of medical imaging procedures; exposure to radon; issues resulting from the production and handling of Technologically Enhanced Natural Occurring Radioactive Materials (TENORM); radiation needs/protection for radiation emergency workers (PPE, etc.) that are not first responders/receivers (ancillary emergency workers); radiation health issues related to emerging technologies employing non-ionizing radiation exposures (e.g., 5G communication networks, ultraviolet disinfection); communication issues on non-ionizing radiation (other than thermal effects); radiation health issues related to gaps identified during national exercises or during response to non-radiation related public health emergencies, etc. Other needs include advancing the science of risk communication and developing products for the public addressing radiation risk from exposure to ionizing radiation particularly for low-dose and low-dose rate exposures as well as from exposure to non-ionizing radiation.

The guidance assembled through this project would be used by States, local public health departments and the federal government, to inform and aid those entities in issuing policies, guidance and recommendations needed in everyday radiation protection and in the public health response to emergencies involving radiation or radioactive materials.

b. Statutory Authorities

This program is authorized under Sections 311 and 317(k)(2) of the Public Health Service Act, [42 U.S.C. Sections 243 and 247b(k)(2)], as amended.

c. Healthy People 2030

This program addresses the "Healthy People 2030" (Healthy People 2030 | health.gov) focus areas of environmental health (Environmental Health - Healthy People 2030 | health.gov), emergency preparedness (Emergency Preparedness - Healthy People 2030 | health.gov), and health communication (Health Communication - Healthy People 2030 | health.gov).

d. Other National Public Health Priorities and Strategies

This announcement is consistent with priorities and strategies in the Department of Health and Human Services and other CDC programs (see CDC - Public Health Systems and Best Practices - STLT Gateway, in particular Essential Public Health Services 1, 2 and 3 (https://www.cdc.gov/publichealthgateway/publichealthservices/essentialhealthservices.html) and CDC - National Health Initiatives, Strategies, and Action Plans - STLT Gateway).

e. Relevant Work

Previous NOFO for this work was entitled Radiation Health Protection and Measurements Involving Radiation or Radioactive Materials - CDC-RFA-EH16-1604, which is attached.

2. CDC Project Description

a. Approach

Bold indicates period of performance outcome.

Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation

Strategies and Activities	Short-Term Outcomes	Long-Term Outcomes
Issue scientific evidence-based documents on the targeted topics. Issue operational guidance on the targeted topics, and where appropriate, translate theoretical guidance into operational and actionable recommendations. Convene scientific groups. Share results.	**Improved understanding of radiation science by the radiation protection community.** **Increase use of radiation science's best evidence for public health decision making by Federal, state and local agencies.** **Improved radiation protection practices by state, local and federal agencies.**	Improve protection of the American public, workers and emergency responders from exposure to radiation from natural, environmental, medical, occupational sources as well as nuclear disasters.

i. Purpose

This NOFO will allow an understanding of radiation science to better protect the American public, workers, and emergency responders from exposure to radiation from natural, environmental, medical, and occupational sources as well as nuclear disasters. The results of this work will improve the understanding of radiation science by the radiation protection community and will assist making public health decisions by federal, state and local public health agencies.

ii. Outcomes

The logic model displays the outcomes that are expected to result from the recipient efforts in the short- and long-term. As noted in the model, three key outcomes are expected to result during the period of performance:

- **Improved understanding of radiation science by the radiation protection community.**

- **Increase use of radiation science's best evidence for public health decision making by Federal, state and local agencies.**
- **Improved radiation protection practices by state, local and federal agencies.**

iii. Strategies and Activities

The logic model presents the strategies and component activities to be undertaken to achieve the period of performance outcomes. These include:

Issue scientific evidence-based documents on the following topics:

- Radiation health protection and measurement practices involving ionizing radiation or radioactive materials
- Factors influencing the determination of radiation dose and estimation of health risks from exposure to radiation
- Radiation needs/protection for radiation emergency workers (PPE, etc.) that are not first responders/receivers (ancillary emergency workers)
- Radiation health issues related to emerging technologies employing non-ionizing radiation exposures
- Handling of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM)

Where applicable, issue operational guidance on the topics listed above, and where appropriate, translate theoretical guidance into operational and actionable recommendations

Convene scientific groups

The recipient will have the proven ability to convene scientific groups or committees with extensive knowledge of the subject areas. The recipient should also be able demonstrate that the composition of such groups or committees is made of experts in their fields and able to advance the knowledge in the subject areas and to the extent possible , ensure that such groups have diverse representation (race, sex, age, geographical location, etc.). The recipient should also be able to demonstrate that the composition of such groups or committees is made of experts in the field and able to advance the knowledge in the subjects areas listed in this NOFO. In addition to scientists, such committees should include, to the extent possible, potential users and other stakeholders, such as Federal, State and Local radiation program experts, to ensure that the guidance developed is based on the latest science and considers practical issues regarding implementation.

Share results

The recipient will have the proven ability to convene and facilitate meetings with scientists and stakeholders to update on progress in the various work products, which may be done at conferences or annual meetings. Additionally, the recipient will have a track record of producing scientific documents and reports that are of the highest quality and relevance to the topics of radiation protection.

The guidance documents assembled through this project would be used by States, local public health departments, as well as the federal government, to inform and aid those entities in issuing policies, guidance and recommendations needed in everyday radiation protection and in the public health response to emergencies involving radiation or radioactive materials.

The recipient should ensure that, in addition to its resources, it collaborates with private sector and international organizations, as needed.

In the event that CDC needs advise on an emerging issue that requires quick response, the recipient would assist CDC in the rapid preparation of publications on issues related to radiological health and safety or emergency situations where timely responses and guidance are needed on an urgent basis. In addition to the preparation of written reports, commentaries, or statements, the recipient should be available for oral consultations on short notice. Peer/expert reviewers should review the documents issued, and any comments made should be incorporated into the final product with the goal of ensuring that they are based on the best available, peer reviewed, radiation science.

1. Collaborations

a. With other CDC programs and CDC-funded organizations:
The recipient will be responsible for showing evidence or partnerships with other groups. (See organizational capacity - ideal candidates should have experience in one or more of the areas, including collaborations with specific entities).
The recipient will have an established partnerships with Conference of Radiation Control Program Directors.

b. With organizations not funded by CDC:
The recipient will be responsible for showing evidence or partnerships with any other groups. (See organizational capacity - ideal candidates should have experience in one or more of the areas, including collaborations with specific entities).
The recipient will have established partnerships with one or more of the following:

- International Commission on Radiological Protection
- International Commission on Radiation Units and Measurements
- International Commission on Non-Ionizing Radiation Protection
- Other national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection

2. Target Populations
N/A

a. Health Disparities
N/A

iv. Funding Strategy
N/A

b. Evaluation and Performance Measurement

i. CDC Evaluation and Performance Measurement Strategy

ii. Applicant Evaluation and Performance Measurement Plan
Applicants must provide an evaluation and performance measurement plan that demonstrates how the recipient will fulfill the requirements described in the CDC Evaluation and Performance Measurement and Project Description sections of this NOFO. At a minimum, the plan must describe:

- How the applicant will collect the performance measures, respond to the evaluation questions, and use evaluation findings for continuous program quality improvement.

- How key program partners will participate in the evaluation and performance measurement planning processes.
- Available data sources, feasibility of collecting appropriate evaluation and performance data, and other relevant data information (e.g., performance measures proposed by the applicant)
- Plans for updating the Data Management Plan (DMP) as new pertinent information becomes available. If applicable, throughout the lifecycle of the project. Updates to DMP should be provided in annual progress reports. The DMP should provide a description of the data that will be produced using these NOFO funds; access to data; data standards ensuring released data have documentation describing methods of collection, what the data represent, and data limitations; and archival and long-term data preservation plans. For more information about CDC's policy on the DMP, see https://www.cdc.gov/grants/additionalrequirements/ar-25.html.

Where the applicant chooses to, or is expected to, take on specific evaluation studies, the applicant should be directed to:

- Describe the type of evaluations (i.e., process, outcome, or both).
- Describe key evaluation questions to be addressed by these evaluations.
- Describe other information (e.g., measures, data sources).

Recipients will be required to submit a more detailed Evaluation and Performance Measurement plan, including a DMP, if applicable, within the first 6 months of award, as described in the Reporting Section of this NOFO.

Applicants are not expected to submit a Data Management Plan.

c. Organizational Capacity of Recipients to Implement the Approach

The ideal recipient would be a recognized national and international authority and have over 20 years of experience in formulating guidance and making recommendations in the field of radiation protection and measurements, and describe their demonstrated ability to bring together national and international experts, as needed, to address the emerging issues in radiation protection.

The ideal recipient should also be able demonstrate that the composition of such groups or committees is made of experts in their fields and able to advance the knowledge in the subject areas listed in this NOFO. In addition to scientists, such committees should include, to the extent possible, potential users and other stakeholders, such as Federal, State and Local radiation program experts, to ensure that the guidance developed is based on the latest science and considers practical issues regarding implementation.

The applicant would have an existing mechanism and describe their approach to engage members from the radiation protection community from a wide range of disciplines and backgrounds including federal, state and local government, military, medical, industrial, and research and academia, to ensure the work is not only state of the art, but is of the highest quality and addresses the needs stated in this NOFO.

The ideal applicant will have the proven ability to convene and facilitate meetings with scientists and stakeholders to update on progress in the various work products, which may be done at conferences or annual meetings. Additionally, the recipient will have a track record of producing scientific documents and reports that are of the highest quality and relevance to the topics of radiation protection.

The ideal recipient should have experience or be able to bring together experts in one or more of the following topic areas:

- Collecting, analyzing, developing and disseminating 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;
- Providing a means by which organizations concerned with the scientific and related aspects of radiation protection and radiation quantities, units and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations;
- Developing basic concepts about radiation quantities, units and measurements, about the application of these concepts, and about radiation protection; and
- Cooperating with national and organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection.
- Formulating and publishing evidence-based documents, based on peer reviewed scientific information.
- Cooperating with the International Commission on Radiological Protection, the International Commission on Radiation Units and Measurements, the Conference of Radiation Control Program Directors, and other national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection.
- Guiding evaluation of research about radiation in the public interest which includes collection, analysis and dissemination of existing data on ionizing radiation, non-ionizing radiation and their effects upon living and non-living matter.
- Providing a platform by which other governmental and non-governmental 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.
- Collaborating and providing guidance information about radiation (ionizing and non-ionizing) to groups concerned with improving their respective protection efforts.

d. Work Plan

Applicants must submit a work plan that covers the first year of the five-year period of performance and a high-level summary of activities for years 2-5. Proposed strategies must be in alignment with the NOFO logic model.

At the beginning of each year, recipient will discuss specific needs with CDC to develop work plan for that year consistent with CDC needs and requirements.

Required elements in a work plan include strategies and their associated performance measures, as well as major activities and the person responsible for each activity.

e. CDC Monitoring and Accountability Approach

Monitoring activities include routine and ongoing communication between CDC and recipients, site visits, and recipient reporting (including work plans, performance, and financial reporting). Consistent with applicable grants regulations and policies, CDC expects the following to be included in post-award monitoring for grants and cooperative agreements:

- Tracking recipient progress in achieving the desired outcomes.
- Ensuring the adequacy of recipient systems that underlie and generate data reports.
- Creating an environment that fosters integrity in program performance and results.

Monitoring may also include the following activities deemed necessary to monitor the award:

- Ensuring that work plans are feasible based on the budget and consistent with the intent of the award.
- Ensuring that recipients are performing at a sufficient level to achieve outcomes within stated timeframes.
- Working with recipients on adjusting the work plan based on achievement of outcomes, evaluation results and changing budgets.
- Monitoring performance measures (both programmatic and financial) to assure satisfactory performance levels.

Monitoring and reporting activities that assist grants management staff (e.g., grants management officers and specialists, and project officers) in the identification, notification, and management of high-risk recipients.

The recipient will work with CDC Radiation Studies Section (RSS) on collaborations.

B. Award Information

1. Funding Instrument Type:

G (Grant)

2. Award Mechanism:

UE1 Studies of Environmental Hazards and Health Effects

3. Fiscal Year:

2021

4. Approximate Total Fiscal Year Funding:

$ 300,000

5. Total Period of Performance Funding:

$ 1,500,000
This amount is subject to the availability of funds.

This is the estimated total amount of funding for the entire period of performance; including both direct and indirect costs.

Estimated Total Funding:
$ 1,500,000

6. Total Period of Performance Length:
5

year(s)

7. Expected Number of Awards:
1

8. Approximate Average Award:

$ 300,000
Per Budget Period

This amount is for the first 12-month budget period and includes both direct and indirect costs.

9. Award Ceiling:
$ 300,000
Per Budget Period

This amount is subject to the availability of funds.

10. Award Floor:
$ 150,000
Per Budget Period

11. Estimated Award Date:
September 01, 2021

12. Budget Period Length:
12 month(s)

Throughout the project period, CDC will continue the award based on the availability of funds, the evidence of satisfactory progress by the recipient (as documented in required reports), and the determination that continued funding is in the best interest of the federal government. The total number of years for which federal support has been approved (project period) will be shown in the "Notice of Award." This information does not constitute a commitment by the federal government to fund the entire period. The total period of performance comprises the initial competitive segment and any subsequent non-competitive continuation award(s).

13. Direct Assistance
Direct Assistance (DA) is not available through this NOFO.

If you are successful and receive a Notice of Award, in accepting the award, you agree that the award and any activities thereunder are subject to all provisions of 45 CFR part 75, currently in effect or implemented during the period of the award, other Department regulations and policies in effect at the time of the award, and applicable statutory provisions.

C. Eligibility Information

1. Eligible Applicants

Eligibility Category:

12 (Nonprofits having a 501(c)(3) status with the IRS, other than institutions of higher education)

25 (Others (see text field entitled "Additional Information on Eligibility" for clarification))

2. Additional Information on Eligibility

public and nonprofit private entities

3. Justification for Less than Maximum Competition

N/A

4. Cost Sharing or Matching

Cost Sharing / Matching Requirement:

No

Matching or cost sharing is not required.

5. Maintenance of Effort

Maintenance of effort is not required for this program.

D. Application and Submission Information

1. Required Registrations

An organization must be registered at the three following locations before it can submit an application for funding at www.grants.gov.

a. Data Universal Numbering System:

All applicant organizations must obtain a Data Universal Numbering System (DUNS) number. A DUNS number is a unique nine-digit identification number provided by Dun & Bradstreet (D&B). It will be used as the Universal Identifier when applying for federal awards or cooperative agreements.

The applicant organization may request a DUNS number by telephone at 1-866-705-5711 (toll free) or internet at http:// fedgov.dnb. com/ webform/ displayHomePage.do. The DUNS number will be provided at no charge.

If funds are awarded to an applicant organization that includes sub-recipients, those sub-recipients must provide their DUNS numbers before accepting any funds.

b. System for Award Management (SAM):

The SAM is the primary registrant database for the federal government and the repository into which an entity must submit information required to conduct business as a recipient. All applicant organizations must register with SAM, and will be assigned a SAM number. All information relevant to the SAM number must be current at all times during which the applicant has an application under consideration for funding by CDC. If an award is made, the SAM information must be maintained until a final financial report is submitted or the final payment is received, whichever is later. The SAM registration process can require 10 or more business days, and registration must be renewed annually. Additional information about registration procedures may be found at https://www.sam.gov/SAM/.

c. Grants.gov:
The first step in submitting an application online is registering your organization at www.grants.gov, the official HHS E-grant Web site. Registration information is located at the "Applicant Registration" option at www.grants.gov.
All applicant organizations must register at www.grants.gov. The one-time registration process usually takes not more than five days to complete. Applicants should start the registration process as early as possible.

Step	System	Requirements	Duration	Follow Up
1	Data Universal Number System (DUNS)	1. Click on http:// fedgov.dnb.com/ webform 2. Select Begin DUNS search/request process 3. Select your country or territory and follow the instructions to obtain your DUNS 9-digit # 4. Request appropriate staff member(s) to obtain DUNS number, verify & update information under DUNS number	1-2 Business Days	To confirm that you have been issued a new DUNS number check online at (http:// fedgov.dnb.com/ webform) or call 1-866-705-5711
2	System for Award Management (SAM) formerly Central Contractor Registration (CCR)	1. Retrieve organizations DUNS number 2. Go to https://www.sam.gov/SAM/ and designate an E-Biz POC (note CCR username will not work in SAM and you will need to have an active SAM account before you can register on grants.gov)	3-5 Business Days but up to 2 weeks and must be renewed once a year	For SAM Customer Service Contact https://fsd.gov/ fsd-gov/ home.do Calls: 866-606-8220
3	Grants.gov	1. Set up an individual account in Grants.gov using organization new DUNS number to become an authorized organization representative (AOR)	Same day but can take 8 weeks to be fully registered and approved in the system (note, applicants MUST obtain a DUNS number and SAM account	Register early! Log into grants.gov and check AOR status until it shows you have been approved

		2. Once the account is set up the E-BIZ POC will be notified via email 3. Log into grants.gov using the password the E-BIZ POC received and create new password 4. This authorizes the AOR to submit applications on behalf of the organization	before applying on grants.gov)	

2. Request Application Package

Applicants may access the application package at www.grants.gov.

3. Application Package

Applicants must download the SF-424, Application for Federal Assistance, package associated with this notice of funding opportunity at www.grants.gov.

4. Submission Dates and Times

If the application is not submitted by the deadline published in the NOFO, it will not be processed. Office of Grants Services (OGS) personnel will notify the applicant that their application did not meet the deadline. The applicant must receive pre-approval to submit a paper application (see Other Submission Requirements section for additional details). If the applicant is authorized to submit a paper application, it must be received by the deadline provided by OGS.

a. Letter of Intent Deadline (must be emailed or postmarked by)

b. Application Deadline

Number Of Days from Publication 60

05/15/2021

11:59 pm U.S. Eastern Standard Time, at www.grants.gov. If Grants.gov is inoperable and cannot receive applications, and circumstances preclude advance notification of an extension, then applications must be submitted by the first business day on which grants.gov operations resume.

Due Date for Information Conference Call

N/A

5. CDC Assurances and Certifications

All applicants are required to sign and submit "Assurances and Certifications" documents indicated at http://wwwn.cdc.gov/ grantassurances/ (S(mj444mxct51lnrv1hljjjmaa)) /Homepage.aspx.

Applicants may follow either of the following processes:

- Complete the applicable assurances and certifications with each application submission, name the file "Assurances and Certifications" and upload it as a PDF file with at www.grants.gov

- Complete the applicable assurances and certifications and submit them directly to CDC on an annual basis at http://wwwn.cdc.gov/ grantassurances/ (S(mj444mxct51lnrv1hljjjmaa))/ Homepage.aspx

Assurances and certifications submitted directly to CDC will be kept on file for one year and will apply to all applications submitted to CDC by the applicant within one year of the submission date.

Risk Assessment Questionnaire Requirement

CDC is required to conduct pre-award risk assessments to determine the risk an applicant poses to meeting federal programmatic and administrative requirements by taking into account issues such as financial instability, insufficient management systems, non-compliance with award conditions, the charging of unallowable costs, and inexperience. The risk assessment will include an evaluation of the applicant's CDC Risk Questionnaire, located at https://www.cdc.gov/grants/documents/PPMR-G-CDC-Risk-Questionnaire.pdf, as well as a review of the applicant's history in all available systems; including OMB-designated repositories of government-wide eligibility and financial integrity systems (see 45 CFR 75.205(a)), and other sources of historical information. These systems include, but are not limited to: FAPIIS (https://www.fapiis.gov/), including past performance on federal contracts as per Duncan Hunter National Defense Authorization Act of 2009; Do Not Pay list; and System for Award Management (SAM) exclusions.

CDC requires all applicants to complete the Risk Questionnaire, OMB Control Number 0920-1132 annually. This questionnaire, which is located at https://www.cdc.gov/grants/documents/PPMR-G-CDC-Risk-Questionnaire.pdf, along with supporting documentation must be submitted with your application by the closing date of the Notice of Funding Opportunity Announcement. If your organization has completed CDC's Risk Questionnaire within the past 12 months of the closing date of this NOFO, then you must submit a copy of that questionnaire, or submit a letter signed by the authorized organization representative to include the original submission date, organization's EIN and DUNS.

When uploading supporting documentation for the Risk Questionnaire into this application package, clearly label the documents for easy identification of the type of documentation. For example, a copy of Procurement policy submitted in response to the questionnaire may be labeled using the following format: Risk Questionnaire Supporting Documents _ Procurement Policy.

Duplication of Efforts

Applicants are responsible for reporting if this application will result in programmatic, budgetary, or commitment overlap with another application or award (i.e. grant, cooperative agreement, or contract) submitted to another funding source in the same fiscal year. Programmatic overlap occurs when (1) substantially the same project is proposed in more than one application or is submitted to two or more funding sources for review and funding consideration or (2) a specific objective and the project design for accomplishing the objective are the same or closely related in two or more applications or awards, regardless of the funding source. Budgetary overlap occurs when duplicate or equivalent budgetary items (e.g., equipment, salaries) are requested in an application but already are provided by another source. Commitment overlap occurs when an individual's time commitment exceeds 100 percent, whether or not salary support is requested in the application. Overlap, whether programmatic, budgetary, or commitment of an individual's effort greater than 100 percent, is not permitted. Any overlap will be resolved by the CDC with the applicant and the PD/PI prior to award.

Report Submission: The applicant must upload the report in Grants.gov under "Other Attachment Forms." The document should be labeled: "Report on Programmatic, Budgetary, and Commitment Overlap."

6. Content and Form of Application Submission

Applicants are required to include all of the following documents with their application package at www.grants.gov.

7. Letter of Intent

LOI is not requested or required as part of the application for this NOFO.

8. Table of Contents

(There is no page limit. The table of contents is not included in the project narrative page limit.): The applicant must provide, as a separate attachment, the "Table of Contents" for the entire submission package.

Provide a detailed table of contents for the entire submission package that includes all of the documents in the application and headings in the "Project Narrative" section. Name the file "Table of Contents" and upload it as a PDF file under "Other Attachment Forms" at www.grants.gov.

9. Project Abstract Summary

A project abstract is included on the mandatory documents list and must be submitted at www.grants.gov. The project abstract must be a self-contained, brief summary of the proposed project including the purpose and outcomes. This summary must not include any proprietary or confidential information. Applicants must enter the summary in the "Project Abstract Summary" text box at www.grants.gov.

10. Project Narrative

(Unless specified in the "H. Other Information" section, maximum of 20 pages, single spaced, 12 point font, 1-inch margins, number all pages. This includes the work plan. Content beyond the specified page number will not be reviewed.)

Applicants must submit a Project Narrative with the application forms. Applicants must name this file "Project Narrative" and upload it at www.grants.gov. The Project Narrative must include **all** of the following headings (including subheadings): Background, Approach, Applicant Evaluation and Performance Measurement Plan, Organizational Capacity of Applicants to Implement the Approach, and Work Plan. The Project Narrative must be succinct, self-explanatory, and in the order outlined in this section. It must address outcomes and activities to be conducted over the entire period of performance as identified in the CDC Project Description section. Applicants should use the federal plain language guidelines and Clear Communication Index to respond to this Notice of Funding Opportunity. Note that recipients should also use these tools when creating public communication materials supported by this NOFO. Failure to follow the guidance and format may negatively impact scoring of the application.

a. Background

Applicants must provide a description of relevant background information that includes the context of the problem (See CDC Background).

b. Approach

i. Purpose

Applicants must describe in 2-3 sentences specifically how their application will address the public health problem as described in the CDC Background section.

ii. Outcomes

Applicants must clearly identify the outcomes they expect to achieve by the end of the project period, as identified in the logic model in the Approach section of the CDC Project Description. Outcomes are the results that the program intends to achieve and usually indicate the intended direction of change (e.g., increase, decrease).

iii. Strategies and Activities

Applicants must provide a clear and concise description of the strategies and activities they will use to achieve the period of performance outcomes. Applicants must select existing evidence-based strategies that meet their needs, or describe in the Applicant Evaluation and Performance Measurement Plan how these strategies will be evaluated over the course of the project period. See the Strategies and Activities section of the CDC Project Description.

1. Collaborations

Applicants must describe how they will collaborate with programs and organizations either internal or external to CDC. Applicants must address the Collaboration requirements as described in the CDC Project Description.

2. Target Populations and Health Disparities

Applicants must describe the specific target population(s) in their jurisdiction and explain how such a target will achieve the goals of the award and/or alleviate health disparities. The applicants must also address how they will include specific populations that can benefit from the program that is described in the Approach section. Applicants must address the Target Populations and Health Disparities requirements as described in the CDC Project Description.

c. Applicant Evaluation and Performance Measurement Plan

Applicants must provide an evaluation and performance measurement plan that demonstrates how the recipient will fulfill the requirements described in the CDC Evaluation and Performance Measurement and Project Description sections of this NOFO. At a minimum, the plan must describe:

- How applicant will collect the performance measures, respond to the evaluation questions, and use evaluation findings for continuous program quality improvement. The Paperwork Reduction Act of 1995 (PRA): Applicants are advised that any activities involving information collections (e.g., surveys, questionnaires, applications, audits, data requests, reporting, recordkeeping and disclosure requirements) from 10 or more individuals or non-Federal entities, including State and local governmental agencies, and funded or sponsored by the Federal Government are subject to review and approval by the Office of Management and Budget. For further information about CDC's requirements under PRA see http://www.hhs.gov/ ocio/policy/collection/.
- How key program partners will participate in the evaluation and performance measurement planning processes.
- Available data sources, feasibility of collecting appropriate evaluation and performance data, data management plan (DMP), and other relevant data information (e.g., performance measures proposed by the applicant).

Where the applicant chooses to, or is expected to, take on specific evaluation studies, they should be directed to:

- Describe the type of evaluations (i.e., process, outcome, or both).
- Describe key evaluation questions to be addressed by these evaluations.
- Describe other information (e.g., measures, data sources).

Recipients will be required to submit a more detailed Evaluation and Performance Measurement plan (including the DMP elements) within the first 6 months of award, as described in the Reporting Section of this NOFO.

d. Organizational Capacity of Applicants to Implement the Approach

Applicants must address the organizational capacity requirements as described in the CDC Project Description.

11. Work Plan

(Included in the Project Narrative's page limit)

Applicants must prepare a work plan consistent with the CDC Project Description Work Plan section. The work plan integrates and delineates more specifically how the recipient plans to carry out achieving the period of performance outcomes, strategies and activities, evaluation and performance measurement.

12. Budget Narrative

Applicants must submit an itemized budget narrative. When developing the budget narrative, applicants must consider whether the proposed budget is reasonable and consistent with the purpose, outcomes, and program strategy outlined in the project narrative. The budget must include:

- Salaries and wages
- Fringe benefits

- Consultant costs
- Equipment
- Supplies
- Travel
- Other categories
- Contractual costs
- Total Direct costs
- Total Indirect costs

Indirect costs could include the cost of collecting, managing, sharing and preserving data.

Indirect costs on grants awarded to foreign organizations and foreign public entities and performed fully outside of the territorial limits of the U.S. may be paid to support the costs of compliance with federal requirements at a fixed rate of eight percent of MTDC exclusive of tuition and related fees, direct expenditures for equipment, and subawards in excess of \$25,000. Negotiated indirect costs may be paid to the American University, Beirut, and the World Health Organization.

If applicable and consistent with the cited statutory authority for this announcement, applicant entities may use funds for activities as they relate to the intent of this NOFO to meet national standards or seek health department accreditation through the Public Health Accreditation Board (see: http://www.phaboard.org). Applicant entities to whom this provision applies include state, local, territorial governments (including the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, the Commonwealth of the Northern Marianna Islands, American Samoa, Guam, the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau), or their bona fide agents, political subdivisions of states (in consultation with states), federally recognized or state-recognized American Indian or Alaska Native tribal governments, and American Indian or Alaska Native tribally designated organizations. Activities include those that enable a public health organization to deliver public health services such as activities that ensure a capable and qualified workforce, up-to-date information systems, and the capability to assess and respond to public health needs. Use of these funds must focus on achieving a minimum of one national standard that supports the intent of the NOFO. Proposed activities must be included in the budget narrative and must indicate which standards will be addressed.

Vital records data, including births and deaths, are used to inform public health program and policy decisions. If applicable and consistent with the cited statutory authority for this NOFO, applicant entities are encouraged to collaborate with and support their jurisdiction's vital records office (VRO) to improve vital records data timeliness, quality and access, and to advance public health goals. Recipients may, for example, use funds to support efforts to build VRO capacity through partnerships; provide technical and/or financial assistance to improve vital records timeliness, quality or access; or support vital records improvement efforts, as approved by CDC.

Applicants must name this file "Budget Narrative" and upload it as a PDF file at www.grants.gov. If requesting indirect costs in the budget, a copy of the indirect cost-rate agreement is required. If the indirect costs are requested, include a copy of the current negotiated federal indirect cost rate agreement or a cost allocation plan approval letter for those Recipients under such a plan. Applicants must name this file “Indirect Cost Rate” and upload it at www.grants.gov.

13. Funds Tracking

Proper fiscal oversight is critical to maintaining public trust in the stewardship of federal funds. Effective October 1, 2013, a new HHS policy on subaccounts requires the CDC to set up payment subaccounts within the Payment Management System (PMS) for all new grant awards. Funds awarded in support of approved activities and drawdown instructions will be identified on the Notice of Award in a newly established PMS subaccount (P subaccount). Recipients will be required to draw down funds from award-specific accounts in the PMS. Ultimately, the subaccounts will provide recipients and CDC a more detailed and precise understanding of financial transactions. The successful applicant will be required to track funds by P-accounts/sub accounts for each project/cooperative agreement awarded. Applicants are encouraged to demonstrate a record of fiscal responsibility and the ability to provide sufficient and effective oversight. Financial management systems must meet the requirements as described 45 CFR 75 which include, but are not limited to, the following:

- Records that identify adequately the source and application of funds for federally-funded activities.
- Effective control over, and accountability for, all funds, property, and other assets.
- Comparison of expenditures with budget amounts for each Federal award.
- Written procedures to implement payment requirements.
- Written procedures for determining cost allowability.
- Written procedures for financial reporting and monitoring.

14. Intergovernmental Review

Your application is subject to Intergovernmental Review of Federal Programs, as governed by Executive Order 12372 (https://www.archives.gov/federal- register/codification/executive-order/12372.html). This order sets up a system for state and local review of proposed federal assistance applications. You should contact your state single point of contact (SPOC) as early as possible to alert the SPOC to prospective applications, and to receive instructions on your state's process. Click on the following link to get the current SPOC list: https://www.whitehouse.gov/wp-content/uploads/2020/04/SPOC-4-13-20.pdf.

15. Pilot Program for Enhancement of Employee Whistleblower Protections

Pilot Program for Enhancement of Employee Whistleblower Protections: All applicants will be subject to a term and condition that applies the terms of 48 Code of Federal Regulations (CFR) section 3.908 to the award and requires that recipients inform their employees in writing (in the predominant native language of the workforce) of employee whistleblower rights and protections under 41 U.S.C. 4712.

16. Copyright Interests Provisions

This provision is intended to ensure that the public has access to the results and accomplishments of public health activities funded by CDC. Pursuant to applicable grant regulations and CDC's Public Access Policy, Recipient agrees to submit into the National Institutes of Health (NIH) Manuscript Submission (NIHMS) system an electronic version of the final, peer-reviewed manuscript of any such work developed under this award upon acceptance for publication, to be made publicly available no later than 12 months after the official date of publication. Also at the time of submission, Recipient and/or the Recipient's submitting author must specify the date the final manuscript will be publicly accessible through PubMed Central (PMC). Recipient and/or Recipient's submitting author must also post the manuscript through PMC within twelve (12) months of the publisher's official date of final publication; however the author is strongly encouraged to make the subject manuscript available as soon as possible. The recipient must obtain prior approval from the CDC for any exception to this provision.

The author's final, peer-reviewed manuscript is defined as the final version accepted for journal publication, and includes all modifications from the publishing peer review process, and all graphics and supplemental material associated with the article. Recipient and its submitting authors working under this award are responsible for ensuring that any publishing or copyright agreements concerning submitted articles reserve adequate right to fully comply with this provision and the license reserved by CDC. The manuscript will be hosted in both PMC and the CDC Stacks institutional repository system. In progress reports for this award, recipient must identify publications subject to the CDC Public Access Policy by using the applicable NIHMS identification number for up to three (3) months after the publication date and the PubMed Central identification number (PMCID) thereafter.

17. Funding Restrictions

Restrictions that must be considered while planning the programs and writing the budget are:

- Recipients may not use funds for research.
- Recipients may not use funds for clinical care except as allowed by law.
- Recipients may use funds only for reasonable program purposes, including personnel, travel, supplies, and services.
- Generally, recipients may not use funds to purchase furniture or equipment. Any such proposed spending must be clearly identified in the budget.
- Reimbursement of pre-award costs generally is not allowed, unless the CDC provides written approval to the recipient.
- Other than for normal and recognized executive-legislative relationships, no funds may be used for:
  - publicity or propaganda purposes, for the preparation, distribution, or use of any material designed to support or defeat the enactment of legislation before any legislative body

- the salary or expenses of any grant or contract recipient, or agent acting for such recipient, related to any activity designed to influence the enactment of legislation, appropriations, regulation, administrative action, or Executive order proposed or pending before any legislative body

- See Additional Requirement (AR) 12 for detailed guidance on this prohibition and additional guidance on lobbying for CDC recipients.
- The direct and primary recipient in a cooperative agreement program must perform a substantial role in carrying out project outcomes and not merely serve as a conduit for an award to another party or provider who is ineligible.

18. Data Management Plan

As identified in the Evaluation and Performance Measurement section, applications involving data collection or generation must include a Data Management Plan (DMP) as part of their evaluation and performance measurement plan unless CDC has stated that CDC will take on the responsibility of creating the DMP. The DMP describes plans for assurance of the quality of the public health data through the data's lifecycle and plans to deposit the data in a repository to preserve and to make the data accessible in a timely manner. See web link for additional information:
https://www.cdc.gov/grants/additionalrequirements/ar-25.html

19. Other Submission Requirements

a. Electronic Submission:

Applications must be submitted electronically by using the forms and instructions posted for this notice of funding opportunity at www.grants.gov. Applicants can complete the application package using Workspace, which allows forms to be filled out online or offline. All application attachments must be submitted using a PDF file format. Instructions and training for using Workspace can be found at www.grants.gov under the "Workspace Overview" option.

b. Tracking Number: Applications submitted through www.grants.gov are time/date stamped electronically and assigned a tracking number. The applicant's Authorized Organization Representative (AOR) will be sent an e-mail notice of receipt when www.grants.gov receives the application. The tracking number documents that the application has been submitted and initiates the required electronic validation process before the application is made available to CDC.

c. Validation Process: Application submission is not concluded until the validation process is completed successfully. After the application package is submitted, the applicant will receive a "submission receipt" e-mail generated by www.grants.gov. A second e-mail message to applicants will then be generated by www.grants.gov that will either validate or reject the submitted application package. This validation process may take as long as two business days. Applicants are strongly encouraged to check the status of their application to ensure that submission of their package has been completed and no submission errors have occurred. Applicants also are strongly encouraged to allocate ample time for filing to guarantee that their application can be submitted and validated by the deadline published in the NOFO. Non-validated applications will not be accepted after the published application deadline date.

If you do not receive a "validation" e-mail within two business days of application submission, please contact www.grants.gov. For instructions on how to track your application, refer to the e-mail message generated at the time of application submission or the Grants.gov Online User Guide.

https:// www.grants.gov/help/html/help/index.htm? callingApp=custom#t= Get_Started%2FGet_Started. htm

d. Technical Difficulties: If technical difficulties are encountered at www.grants.gov, applicants should contact Customer Service at www.grants.gov. The www.grants.gov Contact Center is available 24 hours a day, 7 days a week, except federal holidays. The Contact Center is available by phone at 1-800-518-4726 or by e-mail at support@grants.gov. Application submissions sent by e-mail or fax, or on CDs or thumb drives will not be accepted. Please note that www.grants.gov is managed by HHS.

e. Paper Submission: If technical difficulties are encountered at www.grants.gov, applicants should call the www.grants.gov Contact Center at 1-800-518-4726 or e-mail them at support@grants.gov for assistance. After consulting with the Contact Center, if the technical difficulties remain unresolved and electronic submission is not possible, applicants may e-mail CDC GMO/GMS, before the deadline, and request permission to submit a paper application. Such requests are handled on a case-by-case basis.

An applicant's request for permission to submit a paper application must:

1. Include the www.grants.gov case number assigned to the inquiry
2. Describe the difficulties that prevent electronic submission and the efforts taken with the www.grants.gov Contact Center to submit electronically; and
3. Be received via e-mail to the GMS/GMO listed below at least three calendar days before the application deadline. Paper applications submitted without prior approval will not be considered.

   If a paper application is authorized, OGS will advise the applicant of specific instructions for submitting the application (e.g., original and two hard copies of the application by U.S. mail or express delivery service).

E. Review and Selection Process

1. Review and Selection Process: Applications will be reviewed in three phases

a. Phase 1 Review

All applications will be initially reviewed for eligibility and completeness by CDC Office of Grants Services. Complete applications will be reviewed for responsiveness by the Grants Management Officials and Program Officials. Non-responsive applications will not advance to Phase II review. Applicants will be notified that their applications did not meet eligibility and/or published submission requirements.

b. Phase II Review

A review panel will evaluate complete, eligible applications in accordance with the criteria below.

i. Approach
ii. Evaluation and Performance Measurement
iii. Applicant’s Organizational Capacity to Implement the Approach

Not more than thirty days after the Phase II review is completed, applicants will be notified electronically if their application does not meet eligibility or published submission requirements

i. Approach **Maximum Points:** 30

The extent to which the applicant is able provide measures of effectiveness that will demonstrate the accomplishment of the various objectives identified. Measures of effectiveness must relate to the performance goals stated in the “Purpose” section of this announcement. Measures of effectiveness must be objective, quantitative and measure the intended outcome of the proposed program. The measures of effectiveness must be included in the application and will be an element of the evaluation of the submitted application.

ii. Evaluation and Performance Measurement **Maximum Points:** 30

The extent to which the applicant is able to provide an evaluation and performance measurement plan that demonstrates how the applicant will fulfill the requirements described in the CDC Evaluation and Performance Measurements and Project Description sections of this NOFO. At a minimum, the plan must describe:

- How the applicant will collect and report on the process and outcome measures listed in the CDC Evaluation and Performance Measurements and Project Description sections of this NOFO.
- How the applicant will document and report collaboration with national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection, as appropriate and necessary to conduct the work described in this NOFO.

iii. Applicant's Organizational Capacity to Implement the Approach **Maximum Points:** 40

The extent to which the applicant provided measures of effectiveness that relate to the performance goals included in the Purpose section. Is a recognized national and international authority with ample expertise formulating guidance and making recommendations in the field of radiation protection and measurements and bringing together national and international experts, as needed, to address the emerging issues in radiation protection.
The extent to which the applicant describes their experience in one or more of the following topic areas:

- Collecting, analyzing, developing and disseminating 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;
- Providing a means by which organizations concerned with the scientific and related aspects of radiation protection and radiation quantities, units and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations;

- Developing basic concepts about radiation quantities, units and measurements, about the application of these concepts, and about radiation protection; and
- Cooperation with national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection.
- Formulating and publishing scientific evidence-based documents based on peer reviewed scientific information.
- Cooperates 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.
- Guides evaluation of research about radiation in the public interest which includes collection analysis and dissemination of existing data on ionizing radiation, non-ionizing radiation and their effects upon living and non-living matter.
- Provides a platform by which other governmental and non-governmental 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.
- Collaborates and provides guidance information about radiation (ionizing and non-ionizing) to groups concerned with improving their respective protection efforts.

Budget **Maximum Points:** 0

Budget will be reviewed, but will not be scored.

i. Approach	**Maximum Points:** 0
ii. Evaluation and Performance Measurement	**Maximum Points:** 0
iii. Applicant's Organizational Capacity to Implement the Approach	**Maximum Points:** 0
Budget	**Maximum Points:** 0

c. Phase III Review

Applications will be funded in order by score and rank determined by the review panel.

Review of risk posed by applicants.

Prior to making a Federal award, CDC is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any OMB-designated repositories of government-wide eligibility qualification or financial integrity information as appropriate. See also suspension and debarment requirements at 2 CFR parts 180 and 376.

In accordance 41 U.S.C. 2313, CDC is required to review the non-public segment of the OMB-designated integrity and performance system accessible through SAM (currently the Federal Recipient Performance and Integrity Information System (FAPIIS)) prior to making a Federal award where the Federal share is expected to exceed the simplified acquisition threshold, defined in 41 U.S.C. 134, over the period of performance. At a minimum, the information in the system for a prior Federal award recipient must demonstrate a satisfactory record of executing programs or activities under Federal grants, cooperative agreements, or procurement awards; and integrity and business ethics. CDC may make a Federal award to a recipient who does not fully meet these standards, if it is determined that the information is not relevant to the current Federal award under consideration or there are specific conditions that can appropriately mitigate the effects of the non-Federal entity's risk in accordance with 45 CFR §75.207.

CDC's framework for evaluating the risks posed by an applicant may incorporate results of the evaluation of the applicant's eligibility or the quality of its application. If it is determined that a Federal award will be made, special conditions that correspond to the degree of risk assessed may be applied to the Federal award. The evaluation criteria is described in this Notice of Funding Opportunity.

In evaluating risks posed by applicants, CDC will use a risk-based approach and may consider any items such as the following:

(1) Financial stability;

(2) Quality of management systems and ability to meet the management standards prescribed in this part;

(3) History of performance. The applicant's record in managing Federal awards, if it is a prior recipient of Federal awards, including timeliness of compliance with applicable reporting requirements, conformance to the terms and conditions of previous Federal awards, and if applicable, the extent to which any previously awarded amounts will be expended prior to future awards;

(4) Reports and findings from audits performed under subpart F 45 CFR 75 or the reports and findings of any other available audits; and

(5) The applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities.

CDC must comply with the guidelines on government-wide suspension and debarment in 2 CFR part 180, and require non-Federal entities to comply with these provisions. These provisions restrict Federal awards, subawards and contracts with certain parties that are debarred, suspended or otherwise excluded from or ineligible for participation in Federal programs or activities.

2. Announcement and Anticipated Award Dates

The successful applicant should anticipate notice of funding by July 29, 2021, with a start date of September 1, 2021.

F. Award Administration Information

1. Award Notices

Recipients will receive an electronic copy of the Notice of Award (NOA) from CDC OGS. The NOA shall be the only binding, authorizing document between the recipient and CDC. The NOA will be signed by an authorized GMO and emailed to the Recipient Business Officer listed in application and the Program Director.

Any applicant awarded funds in response to this Notice of Funding Opportunity will be subject to the DUNS, SAM Registration, and Federal Funding Accountability And Transparency Act Of 2006 (FFATA) requirements.

Unsuccessful applicants will receive notification of these results by e-mail with delivery receipt or by U.S. mail.

2. Administrative and National Policy Requirements

Recipients must comply with the administrative and public policy requirements outlined in 45 CFR Part 75 and the HHS Grants Policy Statement, as appropriate.

Brief descriptions of relevant provisions are available at http://www.cdc.gov/grants/additionalrequirements/index.html#ui-id-17.

The HHS Grants Policy Statement is available at http://www.hhs.gov/sites/default/files/grants/grants/policies-regulations/hhsgps107.pdf.

The full text of the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for HHS Awards, 45 CFR 75, can be found at: https://www.ecfr.gov/cgi-bin/text-idx?node=pt45.1.75

3. Reporting

Reporting provides continuous program monitoring and identifies successes and challenges that recipients encounter throughout the project period. Also, reporting is a requirement for recipients who want to apply for yearly continuation of funding. Reporting helps CDC and recipients because it:

- Helps target support to recipients;
- Provides CDC with periodic data to monitor recipient progress toward meeting the Notice of Funding Opportunity outcomes and overall performance;
- Allows CDC to track performance measures and evaluation findings for continuous quality and program improvement throughout the period of performance and to determine applicability of evidence-based approaches to different populations, settings, and contexts; and
- Enables CDC to assess the overall effectiveness and influence of the NOFO.

The table below summarizes required and optional reports. All required reports must be sent electronically to GMS listed in the "Agency Contacts" section of the NOFO copying the CDC Project Officer.

Report	***When?***	***Required?***
Annual Performance Report (APR)	*No later than 120 days before end of budget period. Serves as yearly continuation application.*	Yes

Federal Financial Reporting Forms	*90 days after the end of the budget period.*	Yes
Final Performance and Financial Report	*90 days after end of project period.*	Yes
Payment Management System (PMS) Reporting	*Quarterly reports due January 30; April 30; July 30; and October 30.*	Yes

a. Recipient Evaluation and Performance Measurement Plan (required)
With support from CDC, recipients must elaborate on their initial applicant evaluation and performance measurement plan. This plan must be no more than 20 pages; recipients must submit the plan 6 months into the award. HHS/CDC will review and approve the recipient's monitoring and evaluation plan to ensure that it is appropriate for the activities to be undertaken as part of the agreement, for compliance with the monitoring and evaluation guidance established by HHS/CDC, or other guidance otherwise applicable to this Agreement.

Recipient Evaluation and Performance Measurement Plan (required): This plan should provide additional detail on the following:

Performance Measurement

• Performance measures and targets
• The frequency that performance data are to be collected.
• How performance data will be reported.
• How quality of performance data will be assured.
• How performance measurement will yield findings to demonstrate progress towards achieving NOFO goals (e.g., reaching target populations or achieving expected outcomes).
• Dissemination channels and audiences.
• Other information requested as determined by the CDC program.

Evaluation

• The types of evaluations to be conducted (e.g. process or outcome evaluations).
• The frequency that evaluations will be conducted.
• How evaluation reports will be published on a publically available website.
• How evaluation findings will be used to ensure continuous quality and program improvement.
• How evaluation will yield findings to demonstrate the value of the NOFO (e.g., effect on improving public health outcomes, effectiveness of NOFO, cost-effectiveness or cost-benefit).
• Dissemination channels and audiences.

HHS/CDC or its designee will also undertake monitoring and evaluation of the defined activities within the agreement. The recipient must ensure reasonable access by HHS/CDC or its designee to all necessary sites, documentation, individuals and information to monitor, evaluate and verify the appropriate implementation the activities and use of HHS/CDC funding under this Agreement.

b. Annual Performance Report (APR) (required)
The recipient must submit the APR via www.Grantsolutions.gov no later than 120 days prior to the end of the budget period. This report must not exceed 45 pages excluding administrative reporting. Attachments are not allowed, but web links are allowed.

This report must include the following:

- **Performance Measures:** Recipients must report on performance measures for each budget period and update measures, if needed.
- **Evaluation Results:** Recipients must report evaluation results for the work completed to date (including findings from process or outcome evaluations).
- **Work Plan:** Recipients must update work plan each budget period to reflect any changes in period of performance outcomes, activities, timeline, etc.
- **Successes**
    - o Recipients must report progress on completing activities and progress towards achieving the period of performance outcomes described in the logic model and work plan.
    - o Recipients must describe any additional successes (e.g. identified through evaluation results or lessons learned) achieved in the past year.
    - o Recipients must describe success stories.
- **Challenges**
    - o Recipients must describe any challenges that hindered or might hinder their ability to complete the work plan activities and achieve the period of performance outcomes.
    - o Recipients must describe any additional challenges (e.g., identified through evaluation results or lessons learned) encountered in the past year.
- **CDC Program Support to Recipients**
    - o Recipients must describe how CDC could help them overcome challenges to complete activities in the work plan and achieving period of performance outcomes.
- **Administrative Reporting** (No page limit)
    - o SF-424A Budget Information-Non-Construction Programs.
    - o Budget Narrative – Must use the format outlined in "Content and Form of Application Submission, Budget Narrative" section.
    - o Indirect Cost Rate Agreement.

The recipients must submit the Annual Performance Report via www.Grantsolutions.gov no later than 120 days prior to the end of the budget period.

c. Performance Measure Reporting (optional)
CDC programs may require more frequent reporting of performance measures than annually in the APR. If this is the case, CDC programs must specify reporting frequency, data fields, and format for recipients at the beginning of the award period.

d. Federal Financial Reporting (FFR) (required)
The annual FFR form (SF-425) is required and must be submitted 90 days after the end of the budget period through the Payment Management System (PMS). The report must include only those funds authorized and disbursed during the timeframe covered by the report. The final FFR must indicate the exact balance of unobligated funds, and may not reflect any unliquidated obligations. There must be no discrepancies between the final FFR expenditure data and the Payment Management System's (PMS) cash transaction data. Failure to submit the required information by the due date may adversely affect the future funding of the project. If the information cannot be provided by the due date, recipients are required to submit a letter of explanation to OGS and include the date by which the Grants Officer will receive information.

e. Final Performance and Financial Report (required)
The Final Performance Report is due 90 days after the end of the period of performance. The Final FFR is due 90 days after the end of the period of performance and must be submitted through the Payment Management System (PMS). CDC programs must indicate that this report should not exceed 40 pages. This report covers the entire period of performance and can include information previously reported in APRs. At a minimum, this report must include the following:

- Performance Measures – Recipients must report final performance data for all process and outcome performance measures.
- Evaluation Results – Recipients must report final evaluation results for the period of performance for any evaluations conducted.
- Impact/Results/Success Stories – Recipients must use their performance measure results and their evaluation findings to describe the effects or results of the work completed over the project period, and can include some success stories.
- A final Data Management Plan that includes the location of the data collected during the funded period, for example, repository name and link data set(s)
- Additional forms as described in the Notice of Award (e.g., Equipment Inventory Report, Final Invention Statement).

4. Federal Funding Accountability and Transparency Act of 2006 (FFATA)

Federal Funding Accountability and Transparency Act of 2006 (FFATA), P.L. 109–282, as amended by section 6202 of P.L. 110–252 requires full disclosure of all entities and organizations receiving Federal funds including awards, contracts, loans, other assistance, and payments through a single publicly accessible Web site, http://www.USASpending.gov.

Compliance with this law is primarily the responsibility of the Federal agency. However, two elements of the law require information to be collected and reported by applicants: 1) information on executive compensation when not already reported through the SAM, and 2) similar information on all sub-awards/subcontracts/consortiums over $25,000.

For the full text of the requirements under the FFATA and HHS guidelines, go to:

- https://www.gpo.gov/fdsys/pkg/PLAW-109publ282/pdf/PLAW-109publ282.pdf,
- https://www. fsrs.gov/documents /ffata_legislation_ 110_252.pdf
- http://www.hhs.gov/grants/grants/grants-policies-regulations/index.html#FFATA.

5. Reporting of Foreign Taxes (International/Foreign projects only)

A. Valued Added Tax (VAT) and Customs Duties – Customs and import duties, consular fees, customs surtax, valued added taxes, and other related charges are hereby authorized as an allowable cost for costs incurred for non-host governmental entities operating where no applicable tax exemption exists. This waiver does not apply to countries where a bilateral agreement (or similar legal document) is already in place providing applicable tax exemptions and it is not applicable to Ministries of Health. Successful applicants will receive information on VAT requirements via their Notice of Award.

B. The U.S. Department of State requires that agencies collect and report information on the amount of taxes assessed, reimbursed and not reimbursed by a foreign government against commodities financed with funds appropriated by the U.S. Department of State, Foreign Operations and Related Programs Appropriations Act (SFOAA) ("United States foreign assistance funds"). Outlined below are the specifics of this requirement:

1) Annual Report: The recipient must submit a report on or before November 16 for each foreign country on the amount of foreign taxes charged, as of September 30 of the same year, by a foreign government on commodity purchase transactions valued at 500 USD or more financed with United States foreign assistance funds under this grant during the prior United States fiscal year (October 1 – September 30), and the amount reimbursed and unreimbursed by the foreign government. [Reports are required even if the recipient did not pay any taxes during the reporting period.]

2) Quarterly Report: The recipient must quarterly submit a report on the amount of foreign taxes charged by a foreign government on commodity purchase transactions valued at 500 USD or more financed with United States foreign assistance funds under this grant. This report shall be submitted no later than two weeks following the end of each quarter: April 15, July 15, October 15 and January 15.

3) Terms: For purposes of this clause:
"Commodity" means any material, article, supplies, goods, or equipment;
"Foreign government" includes any foreign government entity;
"Foreign taxes" means value-added taxes and custom duties assessed by a foreign government on a commodity. It does not include foreign sales taxes.

4) Where: Submit the reports to the Director and Deputy Director of the CDC office in the country(ies) in which you are carrying out the activities associated with this cooperative

agreement. In countries where there is no CDC office, send reports to VATreporting@cdc.gov.

5) Contents of Reports: The reports must contain:

a. recipient name;
b. contact name with phone, fax, and e-mail;
c. agreement number(s) if reporting by agreement(s);
d. reporting period;
e. amount of foreign taxes assessed by each foreign government;
f. amount of any foreign taxes reimbursed by each foreign government;
g. amount of foreign taxes unreimbursed by each foreign government.

6) Subagreements. The recipient must include this reporting requirement in all applicable subgrants and other subagreements.

6. Termination

CDC may impose other enforcement actions in accordance with 45 CFR 75.371- Remedies for Noncompliance, as appropriate.

The Federal award may be terminated in whole or in part as follows:

(1) By the HHS awarding agency or pass-through entity, if the non-Federal entity fails to comply with the terms and conditions of the award;

(2) By the HHS awarding agency or pass-through entity for cause;

(3) By the HHS awarding agency or pass-through entity with the consent of the non-Federal entity, in which case the two parties must agree upon the termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated; or

(4) By the non-Federal entity upon sending to the HHS awarding agency or pass-through entity written notification setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated. However, if the HHS awarding agency or pass-through entity determines in the case of partial termination that the reduced or modified portion of the Federal award or subaward will not accomplish the purposes for which the Federal award was made, the HHS awarding agency or pass-through entity may terminate the Federal award in its entirety.

G. Agency Contacts

CDC encourages inquiries concerning this notice of funding opportunity.

Program Office Contact

For programmatic technical assistance, contact:

First Name:
Maryann

Last Name:
Schlemmer

Project Officer

Department of Health and Human Services
Centers for Disease Control and Prevention

Address:

Telephone:

(770) 488-3752

Email:

AAQ8@cdc.gov

Grants Staff Contact

For **financial, awards management, or budget assistance,** contact:

First Name:

Judith (Julie)

Last Name:

Davis

Grants Management Specialist
Department of Health and Human Services
Office of Grants Services

Address:

Center for Disease Control,

2960 Brandywine Rd

Atlanta, GA 30341

Telephone:

770-488-2936

Email:

xxg6@cdc.gov

For assistance with **submission difficulties related to** www.grants.gov, contact the Contact Center by phone at 1-800-518-4726.

Hours of Operation: 24 hours a day, 7 days a week, except on federal holidays.

CDC Telecommunications for persons with hearing loss is available at: TTY 1-888-232-6348

H. Other Information

Following is a list of acceptable attachments **applicants** can upload as PDF files as part of their application at www.grants.gov. Applicants may not attach documents other than those listed; if other documents are attached, applications will not be reviewed.

- Project Abstract
- Project Narrative
- Budget Narrative
- CDC Assurances and Certifications

- Report on Programmatic, Budgetary and Commitment Overlap
- Table of Contents for Entire Submission

For international NOFOs:

- SF424
- SF424A
- Funding Preference Deliverables

Optional attachments, as determined by CDC programs:

Resumes / CVs

Position descriptions

Organization Charts

Non-profit organization IRS status forms, if applicable

Indirect Cost Rate, if applicable

I. Glossary

Activities: The actual events or actions that take place as a part of the program.

Administrative and National Policy Requirements, Additional Requirements (ARs): Administrative requirements found in 45 CFR Part 75 and other requirements mandated by statute or CDC policy. All ARs are listed in the Template for CDC programs. CDC programs must indicate which ARs are relevant to the NOFO; recipients must comply with the ARs listed in the NOFO. To view brief descriptions of relevant provisions, see http:// www.cdc.gov/ grants/ additional requirements/ index.html. Note that 2 CFR 200 supersedes the administrative requirements (A-110 & A-102), cost principles (A-21, A-87 & A-122) and audit requirements (A-50, A-89 & A-133).

Approved but Unfunded: Approved but unfunded refers to applications recommended for approval during the objective review process; however, they were not recommended for funding by the program office and/or the grants management office.

Assistance Listings: A government-wide compendium published by the General Services Administration (available on-line in searchable format as well as in printable format as a .pdf file) that describes domestic assistance programs administered by the Federal Government.

Assistance Listings Number: A unique number assigned to each program and NOFO throughout its lifecycle that enables data and funding tracking and transparency

Award: Financial assistance that provides support or stimulation to accomplish a public purpose. Awards include grants and other agreements (e.g., cooperative agreements) in the form of money, or property in lieu of money, by the federal government to an eligible applicant.

Budget Period or Budget Year: The duration of each individual funding period within the project period. Traditionally, budget periods are 12 months or 1 year.

Carryover: Unobligated federal funds remaining at the end of any budget period that, with the approval of the GMO or under an automatic authority, may be carried over to another budget period to cover allowable costs of that budget period either as an offset or additional authorization. Obligated but liquidated funds are not considered carryover.

CDC Assurances and Certifications: Standard government-wide grant application forms.

Competing Continuation Award: A financial assistance mechanism that adds funds to a grant and adds one or more budget periods to the previously established period of performance (i.e., extends the "life" of the award).

Continuous Quality Improvement: A system that seeks to improve the provision of services with an emphasis on future results.

Contracts: An award instrument used to acquire (by purchase, lease, or barter) property or services for the direct benefit or use of the Federal Government.

Cooperative Agreement: A financial assistance award with the same kind of interagency relationship as a grant except that it provides for substantial involvement by the federal agency funding the award. Substantial involvement means that the recipient can expect federal programmatic collaboration or participation in carrying out the effort under the award.

Cost Sharing or Matching: Refers to program costs not borne by the Federal Government but by the recipients. It may include the value of allowable third-party, in-kind contributions, as well as expenditures by the recipient.

Direct Assistance: A financial assistance mechanism, which must be specifically authorized by statute, whereby goods or services are provided to recipients in lieu of cash. DA generally involves the assignment of federal personnel or the provision of equipment or supplies, such as vaccines. DA is primarily used to support payroll and travel expenses of CDC employees assigned to state, tribal, local, and territorial (STLT) health agencies that are recipients of grants and cooperative agreements. Most legislative authorities that provide financial assistance to STLT health agencies allow for the use of DA. http:// www.cdc.gov /grants /additionalrequirements /index.html.

DUNS: The Dun and Bradstreet (D&B) Data Universal Numbering System (DUNS) number is a nine-digit number assigned by Dun and Bradstreet Information Services. When applying for Federal awards or cooperative agreements, all applicant organizations must obtain a DUNS number as the Universal Identifier. DUNS number assignment is free. If requested by telephone, a DUNS number will be provided immediately at no charge. If requested via the Internet, obtaining a DUNS number may take one to two days at no charge. If an organization does not know its DUNS number or needs to register for one, visit Dun & Bradstreet at http://fedgov.dnb.com/ webform/displayHomePage.do.

Evaluation (program evaluation): The systematic collection of information about the activities, characteristics, and outcomes of programs (which may include interventions, policies, and specific projects) to make judgments about that program, improve program effectiveness, and/or inform decisions about future program development.

Evaluation Plan: A written document describing the overall approach that will be used to guide an evaluation, including why the evaluation is being conducted, how the findings will likely be used, and the design and data collection sources and methods. The plan specifies what will be done, how it will be done, who will do it, and when it will be done. The NOFO evaluation plan is used to describe how the recipient and/or CDC will determine whether activities are implemented appropriately and outcomes are achieved.

Federal Funding Accountability and Transparency Act of 2006 (FFATA): Requires that information about federal awards, including awards, contracts, loans, and other assistance and payments, be available to the public on a single website at www.USAspending.gov.

Fiscal Year: The year for which budget dollars are allocated annually. The federal fiscal year starts October 1 and ends September 30.

Grant: A legal instrument used by the federal government to transfer anything of value to a recipient for public support or stimulation authorized by statute. Financial assistance may be money or property. The definition does not include a federal procurement subject to the Federal Acquisition Regulation; technical assistance (which provides services instead of money); or assistance in the form of revenue sharing, loans, loan guarantees, interest subsidies, insurance, or direct payments of any kind to a person or persons. The main difference between a grant and a cooperative agreement is that in a grant there is no anticipated substantial programmatic involvement by the federal government under the award.

Grants.gov: A "storefront" web portal for electronic data collection (forms and reports) for federal grant-making agencies at www.grants.gov.

Grants Management Officer (GMO): The individual designated to serve as the HHS official responsible for the business management aspects of a particular grant(s) or cooperative agreement(s). The GMO serves as the counterpart to the business officer of the recipient organization. In this capacity, the GMO is responsible for all business management matters associated with the review, negotiation, award, and administration of grants and interprets grants administration policies and provisions. The GMO works closely with the program or project officer who is responsible for the scientific, technical, and programmatic aspects of the grant.

Grants Management Specialist (GMS): A federal staff member who oversees the business and other non-programmatic aspects of one or more grants and/or cooperative agreements. These activities include, but are not limited to, evaluating grant applications for administrative content and compliance with regulations and guidelines, negotiating grants, providing consultation and technical assistance to recipients, post-award administration and closing out grants.

Health Disparities: Differences in health outcomes and their determinants among segments of the population as defined by social, demographic, environmental, or geographic category.

Health Equity: Striving for the highest possible standard of health for all people and giving special attention to the needs of those at greatest risk of poor health, based on social conditions.

Health Inequities: Systematic, unfair, and avoidable differences in health outcomes and their determinants between segments of the population, such as by socioeconomic status (SES), demographics, or geography.

Healthy People 2030: National health objectives aimed at improving the health of all Americans by encouraging collaboration across sectors, guiding people toward making informed health decisions, and measuring the effects of prevention activities.

Inclusion: Both the meaningful involvement of a community's members in all stages of the program process and the maximum involvement of the target population that the intervention will benefit. Inclusion ensures that the views, perspectives, and needs of affected communities, care providers, and key partners are considered.

Indirect Costs: Costs that are incurred for common or joint objectives and not readily and specifically identifiable with a particular sponsored project, program, or activity; nevertheless, these costs are necessary to the operations of the organization. For example, the costs of operating and maintaining facilities, depreciation, and administrative salaries generally are considered indirect costs.

Intergovernmental Review: Executive Order 12372 governs applications subject to Intergovernmental Review of Federal Programs. This order sets up a system for state and local governmental review of proposed federal assistance applications. Contact the state single point of contact (SPOC) to alert the SPOC to prospective applications and to receive instructions on the State's process. Visit the following web address to get the current SPOC list: https://www.whitehouse.gov/wp-content/uploads/2017/11/Intergovernmental_-Review-_SPOC_01_2018_OFFM.pdf.

Letter of Intent (LOI): A preliminary, non-binding indication of an organization's intent to submit an application.

Lobbying: Direct lobbying includes any attempt to influence legislation, appropriations, regulations, administrative actions, executive orders (legislation or other orders), or other similar deliberations at any level of government through communication that directly expresses a view on proposed or pending legislation or other orders, and which is directed to staff members or other employees of a legislative body, government officials, or employees who participate in formulating legislation or other orders. Grass roots lobbying includes efforts directed at inducing or encouraging members of the public to contact their elected representatives at the federal, state, or local levels to urge support of, or opposition to, proposed or pending legislative proposals.

Logic Model: A visual representation showing the sequence of related events connecting the activities of a program with the programs' desired outcomes and results.

Maintenance of Effort: A requirement contained in authorizing legislation, or applicable regulations that a recipient must agree to contribute and maintain a specified level of financial effort from its own resources or other non-government sources to be eligible to receive federal grant funds. This requirement is typically given in terms of meeting a previous base-year dollar amount.

Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA): Document that describes a bilateral or multilateral agreement between parties expressing a convergence of will between the parties, indicating an intended common line of action. It is often used in cases where the parties either do not imply a legal commitment or cannot create a legally enforceable agreement.

Nonprofit Organization: Any corporation, trust, association, cooperative, or other organization that is operated primarily for scientific, educational, service, charitable, or similar purposes in the public interest; is not organized for profit; and uses net proceeds to maintain, improve, or expand the operations of the organization. Nonprofit organizations include institutions of higher educations, hospitals, and tribal organizations (that is, Indian entities other than federally recognized Indian tribal governments).

Notice of Award (NoA): The official document, signed (or the electronic equivalent of signature) by a Grants Management Officer that: (1) notifies the recipient of the award of a grant; (2) contains or references all the terms and conditions of the grant and Federal funding limits and obligations; and (3) provides the documentary basis for recording the obligation of Federal funds in the HHS accounting system.

Objective Review: A process that involves the thorough and consistent examination of applications based on an unbiased evaluation of scientific or technical merit or other relevant aspects of the proposal. The review is intended to provide advice to the persons responsible for making award decisions.

Outcome: The results of program operations or activities; the effects triggered by the program. For example, increased knowledge, changed attitudes or beliefs, reduced tobacco use, reduced morbidity and mortality.

Performance Measurement: The ongoing monitoring and reporting of program accomplishments, particularly progress toward pre-established goals, typically conducted by program or agency management. Performance measurement may address the type or level of program activities conducted (process), the direct products and services delivered by a program (outputs), or the results of those products and services (outcomes). A "program" may be any activity, project, function, or policy that has an identifiable purpose or set of objectives.

Period of performance –formerly known as the project period - : The time during which the recipient may incur obligations to carry out the work authorized under the Federal award. The start and end dates of the period of performance must be included in the Federal award.

Period of Performance Outcome: An outcome that will occur by the end of the NOFO's funding period

Plain Writing Act of 2010: The Plain Writing Act of 2010 requires that federal agencies use clear communication that the public can understand and use. NOFOs must be written in clear, consistent language so that any reader can understand expectations and intended outcomes of the funded program. CDC programs should use NOFO plain writing tips when writing NOFOs.

Program Strategies: Strategies are groupings of related activities, usually expressed as general headers (e.g., Partnerships, Assessment, Policy) or as brief statements (e.g., Form partnerships, Conduct assessments, Formulate policies).

Program Official: Person responsible for developing the NOFO; can be either a project officer, program manager, branch chief, division leader, policy official, center leader, or similar staff member.

Public Health Accreditation Board (PHAB): A nonprofit organization that works to promote and protect the health of the public by advancing the quality and performance of public health departments in the U.S. through national public health department accreditation http://www.phaboard.org.

Social Determinants of Health: Conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.

Statute: An act of the legislature; a particular law enacted and established by the will of the legislative department of government, expressed with the requisite formalities. In foreign or civil law any particular municipal law or usage, though resting for its authority on judicial decisions, or the practice of nations.

Statutory Authority: Authority provided by legal statute that establishes a federal financial assistance program or award.

System for Award Management (SAM): The primary vendor database for the U.S. federal government. SAM validates applicant information and electronically shares secure and encrypted data with federal agencies' finance offices to facilitate paperless payments through Electronic Funds Transfer (EFT). SAM stores organizational information, allowing www.grants.gov to verify identity and pre-fill organizational information on grant applications.

Technical Assistance: Advice, assistance, or training pertaining to program development, implementation, maintenance, or evaluation that is provided by the funding agency.

Work Plan: The summary of period of performance outcomes, strategies and activities, personnel and/or partners who will complete the activities, and the timeline for completion. The work plan will outline the details of all necessary activities that will be supported through the approved budget.

NOFO-specific Glossary and Acronyms

Budget Narrative File(s)

*** Mandatory Budget Narrative Filename:** 1235-Budget Narrative.pdf

Add Mandatory Budget Narrative | Delete Mandatory Budget Narrative | View Mandatory Budget Narrative

To add more Budget Narrative attachments, please use the attachment buttons below.

Add Optional Budget Narrative | Delete Optional Budget Narrative | View Optional Budget Narrative

Other Attachment File(s)

* **Mandatory Other Attachment Filename:** 1236-NCRP 501_c_3.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

OMB Number: 4040-0019
Expiration Date: 02/28/2022

Project Abstract Summary

This Project Abstract Summary form must be submitted or the application will be considered incomplete. Ensure the Project Abstract field succinctly describes the project in plain language that the public can understand and use without the full proposal. Use 4,000 characters or less. Do not include personally identifiable, sensitive or proprietary information. Refer to Agency instructions for any additional Project Abstract field requirements. If the application is funded, your project abstract information (as submitted) will be made available to public websites and/or databases including USAspending.gov.

Funding Opportunity Number

CDC-RFA-EH21-2103

CFDA(s)

93.070

Applicant Name

National Council on Radiation Protection and Measurements

Descriptive Title of Applicant's Project

Radiation Protection Guidance from NCRP Related to Public Health

Project Abstract

The National Council on Radiation Protection and Measurements (NCRP) is a nonprofit, Congressionally-chartered organization with the mission to provide guidance, based on the best scientific evidence, to the government, industry, and the public on matters related to radiation health protection and measurements. NCRP will develop consensus guidance on Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation. Based on the most up-to-date radiation science knowledge available, reports and other documents will be prepared to help federal, state, and local agencies in making public health decisions and improving practices. The work from the targeted project areas will contribute to improved understanding of radiation to better protect the public, workers, and emergency responders from exposures to ionizing and non-ionizing radiation from natural, medical, and occupational sources, as well as radiological disasters. The net result will be improving comprehensive radiation protection guidance for the United States. Six major project areas are proposed:

(1) In the area of monitoring and controlling exposures to workers and the public during radiological emergencies, a commentary will be prepared to resolve inconsistencies in recommendations regarding screening members of the public for external contamination after a nuclear/radiological incident, a document will be prepared to assess national efforts in emergency preparedness and recognize gaps in need of attention, and a focused statement will be developed to provide guidance to inform on a dosimetry and biodosimetry network to improve triage and medical management in the event of a mass-casualty radiation incident.
(2) A commentary will be prepared with recommendations for practical implementation of methodologies described previously in an NCRP report to improve use of radiation protection equipment and practices for radiation emergency workers, defined as those who assist in critical roles in a radiological/nuclear emergency but are not trained or routinely monitored for radiation exposures.
(3) A comprehensive report will be written to provide national environmental and radiation safety guidelines for the management and disposal of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM), in particular, addressing methods to protect human health and the environment from unnecessary radiation exposures.
(4) A series of documents will be prepared evaluating the state-of-the-knowledge about health effects of millimeter-wave 5th generation (5G) networks, risk communications with the public about these possible effects, including preparing scientifically-based information related to widely held misconceptions and misinformation about these networks, and recommendations for future research to help allay fears of the public.
(5) Several avenues will be employed to improve communications to the public of risks from both ionizing and non-ionizing radiation. These will include improving public access to published NCRP information and recommendations, developing educational materials for educators, students, and members of the public to be available on the NCRP website, and providing extensive collation of resources on radiation risk communications.
(6) Extending NCRP's long history of providing recommendations on radiation protection in medicine, new documents will address risks from radiation exposure of implanted and applied devices (e.g., pacemakers and insulin pumps) and use of protective shielding in imaging procedures. Further, protocols will be developed for updating prior collection of critical information on medical radiation exposures of patients.

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-Project Narrative.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

Application for Federal Assistance SF-424

* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
☐ Preapplication	☒ New	
☒ Application	☐ Continuation	* Other (Specify):
☐ Changed/Corrected Application	☐ Revision	

* 3. Date Received: 05/16/2021
4. Applicant Identifier:

5a. Federal Entity Identifier:
5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:
7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: National Council on Radiation Protection and Measurements
* b. Employer/Taxpayer Identification Number (EIN/TIN): 52-0806696
* c. Organizational DUNS: 0977839140000

d. Address:

* Street1: 7910 Woodmont Ave, Suite 400
Street2:
* City: Bethesda
County/Parish:
* State: MD: Maryland
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 20814-3095

e. Organizational Unit:

Department Name:
Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Dr.
* First Name: Kathryn
Middle Name:
* Last Name: Held
Suffix:

Title: President

Organizational Affiliation:

* Telephone Number: 301-657-2652
Fax Number:

* Email: held@ncrponline.org

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

M: Nonprofit with 501C3 IRS Status (Other than Institution of Higher Education)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Centers for Disease Control - NCEH

11. Catalog of Federal Domestic Assistance Number:

93.070

CFDA Title:

Environmental Public Health and Emergency Response

*** 12. Funding Opportunity Number:**

CDC-RFA-EH21-2103

* Title:

Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation

13. Competition Identification Number:

CDC-RFA-EH21-2103

Title:

Radiation Health Protection Involving Ionizing and Non-Ionizing Radiation

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Radiation Protection Guidance from NCRP Related to Public Health

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: 08 | * b. Program/Project: 08

Attach an additional list of Program/Project Congressional Districts if needed.

[ ] Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 09/01/2021 | * b. End Date: 08/31/2026

18. Estimated Funding ($):

* a. Federal	(b)(4)
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	(b)(4)

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on [ ].

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

[ ] Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Dr. | * First Name: Kathryn

Middle Name:

* Last Name: Held

Suffix:

* Title: President

* Telephone Number: (b)(6) | Fax Number:

* Email: held@ncrponline.org

* Signature of Authorized Representative: Laura J Atwell | * Date Signed: 05/16/2021

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds: Federal (c)	Estimated Unobligated Funds: Non-Federal (d)	New or Revised Budget: Federal (e)	New or Revised Budget: Non-Federal (f)	New or Revised Budget: Total (g)
1. CDC-RFA-EH21-2103		$	$	$ 300,000.00	$	$ 300,000.00
2.						
3.						
4.						
5. Totals		$	$	$ 300,000.00	$	$ 300,000.00

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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
	CDC-RFA-EH21-2103				
a. Personnel	$ [redacted]	$	$	$	$ [redacted]
b. Fringe Benefits	[redacted]				[redacted]
c. Travel	[redacted]				[redacted]
d. Equipment					
e. Supplies					
f. Contractual	[redacted]				[redacted]
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)	[redacted]				$ [redacted]
j. Indirect Charges	[redacted]				$ [redacted]
k. TOTALS (sum of 6i and 6j)	$ 300,000.00	$	$	$	$ 300,000.00
7. Program Income	$	$	$	$	$

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Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1A

SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. CDC-RFA-EH21-2103	$	$	$	$
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 300,000.00	$ [redacted]	$ [redacted]	$ [redacted]	$ [redacted]
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 300,000.00	$ [redacted]	$ [redacted]	$ [redacted]	$ [redacted]

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)			
	(b)First	(c) Second	(d) Third	(e) Fourth
16. CDC-RFA-EH21-2103	$ 300,000.00	$ 300,000.00	$ 300,000.00	$ 300,000.00
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 300,000.00	$ 300,000.00	$ 300,000.00	$ 300,000.00

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges: DCAA-approved indirect rate is 104.82%

23. Remarks:

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Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 2

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013
Expiration Date: 02/28/2022

1. * Type of Federal Action:
- [ ] a. contract
- [x] b. grant
- [ ] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:
- [ ] a. bid/offer/application
- [x] b. initial award
- [ ] c. post-award

3. * Report Type:
- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[x] Prime [ ] SubAwardee

* Name: National Council on Radiation Protection and Measurements

* Street 1: 7910 Woodmont Ave, Suite 400 Street 2:

* City: Bethesda State: MD: Maryland Zip: 20814

Congressional District, if known: 08

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

6. * Federal Department/Agency: CDC

7. * Federal Program Name/Description: Environmental Public Health and Emergency Response

CFDA Number, *if applicable:* 93.070

8. Federal Action Number, *if known:*

9. Award Amount, *if known:* $

10. a. Name and Address of Lobbying Registrant:

Prefix: * First Name: n/a Middle Name:

* Last Name: n/a Suffix:

* Street 1: Street 2:

* City: State: Zip:

b. Individual Performing Services (including address if different from No. 10a)

Prefix: * First Name: n/a Middle Name:

* Last Name: n/a Suffix:

* Street 1: Street 2:

* City: State: Zip:

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

*** Signature:** Laura J Atwell

***Name:** Prefix: * First Name: Kathryn Middle Name:

* Last Name: Held Suffix:

Title: President **Telephone No.:** 301-657-2652 **Date:** 05/16/2021

Federal Use Only:

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Standard Form - LLL (Rev. 7-97)

Manifest for Grant Application # GRANT13365120

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 24930 bytes)

Forms Included in Zip File(total 7):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 15995 bytes)
2. Form Project_AbstractSummary_2_0-V2.0.pdf (size 18416 bytes)
3. Form SF424_3_0-V3.0.pdf (size 24069 bytes)
4. Form BudgetNarrativeAttachments_1_2-V1.2.pdf (size 16948 bytes)
5. Form SF424A-V1.0.pdf (size 22719 bytes)
6. Form SFLLL_2_0-V2.0.pdf (size 19721 bytes)
7. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15869 bytes)

Attachments Included in Zip File (total 10):

1. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1240-Risk-Questionnaire.pdf application/pdf (size 208579 bytes)
2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1241-Risk Questionnaire-HR Policies.pdf application/pdf (size 250987 bytes)
3. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1234-Project Narrative.pdf application/pdf (size 399176 bytes)
4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1238-Assurances and Certifications.pdf application/pdf (size 956955 bytes)
5. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1239-Appendix A.pdf application/pdf (size 613699 bytes)
6. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1242-Risk Questionnaire-Accounting Policies.pdf application/pdf (size 167519 bytes)
7. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1243-Table of Contents.pdf application/pdf (size 151472 bytes)

8. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-NCRP 501_c_3.pdf application/pdf (size 129571 bytes)

9. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-Indirect Cost Rate.pdf application/pdf (size 159065 bytes)

10. BudgetNarrativeAttachments_1_2 BudgetNarrativeAttachments_1_2-Attachments-1235-Budget Narrative.pdf application/pdf (size 269128 bytes)

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

Notice of Award

Award# 1 NUE1EH001460-01-00
FAIN# NUE1EH001460
Federal Award Date: 08/03/2021

Recipient Information

1. Recipient Name

National Council on Radiation Protection and Measurements
7910 Woodmont Ave Ste 400
Bethesda, MD 20814-3076
[NO DATA]

2. Congressional District of Recipient
08

3. Payment System Identifier (ID)
1520806696A1

4. Employer Identification Number (EIN)
520806696

5. Data Universal Numbering System (DUNS)
097783914

6. Recipient's Unique Entity Identifier

7. Project Director or Principal Investigator

Dr. Kathryn Held
held@ncrponline.org
301-657-2652

8. Authorized Official

Ms. Laura Atwell
laura.atwell@ncrponline.org
301-657-2652

Federal Agency Information
CDC Office of Financial Resources

9. Awarding Agency Contact Information
Judith Davis
xxg6@cdc.gov
770-488-2936

10. Program Official Contact Information
Ms. Maryann Schlemmer
Public Health Advisor
aaq8@cdc.gov
770-488-3752

Federal Award Information

11. Award Number
1 NUE1EH001460-01-00

12. Unique Federal Award Identification Number (FAIN)
NUE1EH001460

13. Statutory Authority
Section 317(k)(2) of the Public Health Service Act, [42 U.S.C. Section 247b(k)(2)], as amended

14. Federal Award Project Title
Radiation Protection Guidance from NCRP Related to Public Health

15. Assistance Listing Number
93.070

16. Assistance Listing Program Title
Environmental Public Health and Emergency Response

17. Award Action Type
New

18. Is the Award R&D?
No

Summary Federal Award Financial Information

19. Budget Period Start Date 09/01/2021 **- End Date** 08/31/2022	
20. Total Amount of Federal Funds Obligated by this Action	$300,000.00
20a. Direct Cost Amount	$[redacted] (b)(4)
20b. Indirect Cost Amount	$[redacted]
21. Authorized Carryover	$0.00
22. Offset	$0.00
23. Total Amount of Federal Funds Obligated this budget period	$0.00
24. Total Approved Cost Sharing or Matching, where applicable	$0.00
25. Total Federal and Non-Federal Approved this Budget Period	$300,000.00
26. Project Period Start Date 09/01/2021 **- End Date** 08/31/2026	
27. Total Amount of the Federal Award including Approved Cost Sharing or Matching this Project Period	Not Available

28. Authorized Treatment of Program Income
ADDITIONAL COSTS

29. Grants Management Officer – Signature
Lakita Reid

30. Remarks

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

Notice of Award

Award# 1 NUE1EH001460-01-00
FAIN# NUE1EH001460
Federal Award Date: 08/03/2021

Recipient Information

Recipient Name

National Council on Radiation Protection and Measurements
7910 Woodmont Ave Ste 400
Bethesda, MD 20814-3076
[NO DATA]

Congressional District of Recipient

08

Payment Account Number and Type

1520806696A1

Employer Identification Number (EIN) Data

520806696

Universal Numbering System (DUNS)

097783914

Recipient's Unique Entity Identifier

Not Available

31. Assistance Type

Project Grant

32. Type of Award

Other

33. Approved Budget

(Excludes Direct Assistance)

I. Financial Assistance from the Federal Awarding Agency Only
II. Total project costs including grant funds and all other financial participation

a. Salaries and Wages	[redacted]
b. Fringe Benefits	
c. Total Personnel Costs	
d. Equipment	$0.00
e. Supplies	$0.00
f. Travel	$0.00
g. Construction	$0.00
h. Other	[redacted]
i. Contractual	
j. TOTAL DIRECT COSTS	[redacted]
k. INDIRECT COSTS	[redacted]
l. TOTAL APPROVED BUDGET	[redacted]
m. Federal Share	$300,000.00
n. Non-Federal Share	$0.00

34. Accounting Classification Codes

FY-ACCOUNT NO.	DOCUMENT NO.	ADMINISTRATIVE CODE	OBJECT CLASS	AMT ACTION FINANCIAL ASSISTANCE	APPROPRIATION
1-939015L	21NUE1EH001460	EH	41.51	[redacted]	75-21-0947
1-93905WH	21NUE1EH001460	EH	41.51		75-21-0947
1-9390EKK	21NUE1EH001460	EH	41.51		75-21-0956
1-9390EZA	21NUE1EH001460	EH	41.51		75-21-0943
1-9390H30	21NUE1EH001460	EH	41.51		75-21-0943
1-9390H39	21NUE1EH001460	EH	41.51		75-21-0943
1-9390H63	21NUE1EH001460	EH	41.51		75-21-0943
1-9390H7Y	21NUE1EH001460	EH	41.51		75-21-0943
1-939ZRHB	21NUE1EH001460	EH	41.51		75-21-0947

Direct Assistance

BUDGET CATEGORIES	PREVIOUS AMOUNT (A)	AMOUNT THIS ACTION (B)	TOTAL (A + B)
Personnel	$0.00	$0.00	$0.00
Fringe Benefits	$0.00	$0.00	$0.00
Travel	$0.00	$0.00	$0.00
Equipment	$0.00	$0.00	$0.00
Supplies	$0.00	$0.00	$0.00
Contractual	$0.00	$0.00	$0.00
Construction	$0.00	$0.00	$0.00
Other	$0.00	$0.00	$0.00
Total	$0.00	$0.00	$0.00

AWARD ATTACHMENTS

National Council on Radiation Protection and Measurements 1 NUE1EH001460-01-00

1. T&C Yr 1

AWARD INFORMATION

Incorporation: In addition to the federal laws, regulations, policies, and CDC General Terms and Conditions for Non-research awards at https://www.cdc.gov/grants/federalregulationspolicies/index.html, the Centers for Disease Control and Prevention (CDC) hereby incorporates Notice of Funding Opportunity (NOFO) number EH21-2103, entitled Radiation Protection Guidance from NCRP Related to Public Health, and application dated April 30, 2021, as may be amended, which are hereby made a part of this Non-research award, hereinafter referred to as the Notice of Award (NoA).

Approved Funding: Funding in the amount of $300,000 is approved for the Year 1 budget period, which is September 1, 2021 through August 31, 2022. All future year funding will be based on satisfactory programmatic progress and the availability of funds.

The federal award amount is subject to adjustment based on total allowable costs incurred and/or the value of any third-party in-kind contribution when applicable.

Note: Refer to the Payment Information section for Payment Management System (PMS) subaccount information.

Financial Assistance Mechanism: Grant

Expanded Authority: The recipient is permitted the following expanded authority in the administration of the award.

☒ Carryover of unobligated balances from one budget period to a subsequent budget period. Unobligated funds may be used for purposes within the scope of the project as originally approved. Recipients will report use, or intended use, of unobligated funds in Section 12 "Remarks" of the annual Federal Financial Report. If the GMO determines that some or all of the unobligated funds are not necessary to complete the project, the GMO may restrict the recipient's authority to automatically carry over unobligated balances in the future, use the balance to reduce or offset CDC funding for a subsequent budget period, or use a combination of these actions.

Addition alternative: Under this alternative, program income is added to the funds committed to the project/program and is used to further eligible project/program objectives.

Note: The disposition of program income must have written prior approval from the GMO.

FUNDING RESTRICTIONS AND LIMITATIONS

Indirect Costs:

Indirect costs are approved based on the recipient's approved Cost Allocation Plan dated December 28, 2020.

REPORTING REQUIREMENTS

Progress and Monitoring: Performance information collection initiated under this grant/cooperative agreement has been approved by the Office of Management and Budget under **OMB Number 0920-1132**, **"Performance Progress and Monitoring Report",**

Expiration Date 10/31/2022. The components of the PPMR are available for download at: https://www.cdc.gov/grants/alreadyhavegrant/Reporting.html .

Required Disclosures for Federal Awardee Performance and Integrity Information System (FAPIIS): Consistent with 45 CFR 75.113, applicants and recipients must disclose in a timely manner, in writing to the CDC, with a copy to the HHS Office of Inspector General (OIG), all information related to violations of federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the federal award. Subrecipients must disclose, in a timely manner in writing to the prime recipient (pass through entity) and the HHS OIG, all information related to violations of federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the federal award. Disclosures must be sent in writing to the CDC and to the HHS OIG at the following addresses:

CDC, Office of Grants Services
Julie Davis, Grants Management Specialist
Centers for Disease Control and Prevention
2939 Flowers Rd
Atlanta, GA 30341
Email: xxg6@cdc.gov (Include "Mandatory Grant Disclosures" in subject line)

AND

U.S. Department of Health and Human Services
Office of the Inspector General
ATTN: Mandatory Grant Disclosures, Intake Coordinator
330 Independence Avenue, SW
Cohen Building, Room 5527
Washington, DC 20201

Fax: (202)-205-0604 (Include "Mandatory Grant Disclosures" in subject line) or
Email: MandatoryGranteeDisclosures@oig.hhs.gov

Recipients must include this mandatory disclosure requirement in all subawards and contracts under this award.

Failure to make required disclosures can result in any of the remedies described in 45 CFR 75.371. Remedies for noncompliance, including suspension or debarment (See 2 CFR parts 180 and 376, and 31 U.S.C. 3321).

CDC is required to report any termination of a federal award prior to the end of the period of performance due to material failure to comply with the terms and conditions of this award in the OMB-designated integrity and performance system accessible through SAM (currently FAPIIS). (45 CFR 75.372(b)) CDC must also notify the recipient if the federal award is terminated for failure to comply with the federal statutes, regulations, or terms and conditions of the federal award. (45 CFR 75.373(b))

PAYMENT INFORMATION

The HHS Office of the Inspector General (OIG) maintains a toll-free number (1-800-HHS-TIPS [1-800-447-8477]) for receiving information concerning fraud, waste, or abuse under grants and cooperative agreements. Information also may be submitted by e-mail to hhstips@oig.hhs.gov or *by mail to Office of the Inspector General, Department of Health and Human Services, Attn: HOTLINE, 330 Independence Ave., SW, Washington DC 20201. Such reports are treated as sensitive material and submitters may decline to give their names if they choose to remain anonymous.*

Payment Management System Subaccount: Funds awarded in support of approved activities have been obligated in a subaccount in the PMS, herein identified as the "P Account". Funds must be used in support of approved activities in the NOFO and the approved application.

The grant document number identified on the bottom of Page 1 of the Notice of Award must be known in order to draw down funds.

PROGRAM OR FUNDING SPECIFIC CLOSEOUT REQUIREMENTS

Final Performance Progress and Evaluation Report: This report should include the information specified in the NOFO and is submitted 90 days following the end of the period of performance via www.grantsolutions.gov . At a minimum, the report will include the following:

- Statement of progress made toward the achievement of originally stated aims.
- Description of results (positive or negative) considered significant.
- List of publications resulting from the project, with plans, if any, for further publication.

Additional guidance may be provided by the GMS and found at:
https://www.cdc.gov/grants/alreadyhavegrant/Reporting.html

CDC Staff Contacts

Grants Management Specialist: The GMS is the federal staff member responsible for the day-to-day management of grants and cooperative agreements. The GMS is the primary contact of recipients for business and administrative matters pertinent to grant awards.

GMS Contact:
Julie Davis, Grants Management Specialist
Centers for Disease Control and Prevention
Office of Financial Resources
2939 Flowers Rd.
Atlanta, GA 30341
Telephone: 770-488-2936
Email: xxg6@cdc.gov

Program/Project Officer: The PO is the federal official responsible for monitoring the programmatic, scientific, and/or technical aspects of grants and cooperative agreements, as well as contributing to the effort of the award under cooperative agreements.

Programmatic Contact:
Maryann L Schlemmer
Public Health Advisor
National Center for Environmental Health
Centers for Disease Control & Prevention
4770 Buford Highway, MS-F59
Atlanta, GA 30341

Tel 770-488-3752
Email: aaq8@cdv.gov

Grants Management Officer: The GMO is the federal official responsible for the business and other non-programmatic aspects of grant awards. The GMO is the only official authorized to obligate federal funds and is responsible for signing the NoA, including revisions to the NoA that change the terms and conditions. The GMO serves as the counterpart to the business officer of the recipient organization.

GMO Contact:
Lakita Reid
Centers for Disease Control and Prevention
Office of Financial Resources (OFR)
2939 Flowers Rd.
Atlanta, GA 30341
Phone: 770-488-2742
Wtl9@cdc.gov

U. S. TREASURY DEPARTMENT
INTERNAL REVENUE SERVICE
WASHINGTON, D. C. 20224

MAR 12 1965

IN REPLY REFER TO
Form M-4280
T:R:EO-3-SK

PURPOSE	
Educational, Scientific, [illegible]	
ADDRESS INQUIRIES & FILE RETURNS WITH DISTRICT OF INTERNAL REVENUE Baltimore, Maryland	
FORM 990-A REQUIRED [X] YES [ ] NO	ACCOUNTING PERIOD ENDING December 31

National Council on Radiation
Protection and Measurements
4000 Brandywine Place, N. W.
Washington, D. C.

Gentlemen:

On the basis of your stated purposes and the understanding that your operations will continue as evidenced to date or will conform to those proposed in your ruling application, we have concluded that you are exempt from Federal income tax as an organization described in section 501(c)(3) of the Internal Revenue Code. Any changes in operation from those described, or in your character or purposes, must be reported immediately to your District Director for consideration of their effect upon your exempt status. You must also report any change in your name and address.

You are not required to file Federal income tax returns so long as you retain an exempt status, unless you are subject to the tax on unrelated business income imposed by section 511 of the Code, in which event you are required to file Form 990-T. Our determination as to your liability for filing the annual information return, Form 990-A, is set forth above. That return, if required, must be filed on or before the 15th day of the fifth month after the close of your annual accounting period indicated above.

Contributions made to you are deductible by donors as provided in section 170 of the Code. Bequests, legacies, devises, transfers or gifts to or for your use are deductible for Federal estate and gift tax purposes under the provisions of section 2055, 2106 and 2522 of the Code.

You are not liable for the taxes imposed under the Federal Insurance Contributions Act (social security taxes) unless you file a waiver of exemption certificate as provided in such act. You are not liable for the tax imposed under the Federal Unemployment Tax Act. Inquiries about the waiver of exemption certificate for social security taxes should be addressed to your District Director, as should any questions concerning excise, employment or other Federal taxes.

Your District Director is being advised of this action.

This ruling supersedes our ruling dated December 21, 1964.

Very truly yours,

(Signed) R. J. Stakem

Chief, Exempt Organizations Branch

FORM M-4280 (5-64)

GPO 880-948

DEFENSE CONTRACT AUDIT AGENCY
EASTERN REGION
CHESAPEAKE BAY BRANCH OFFICE
10025 GOVERNOR WARFIELD PARKWAY, SUITE 220
COLUMBIA, MD 21044-3329
TELEPHONE (571) 448-2073
FAX (410) 997-0509
E-MAIL ADDRESS: DCAA-FAO1571@DCAA.MIL

IN REPLY REFER TO
01571-2021J15500001 December 28, 2020

National Council on Radiation Protection
ATTN: Dr. Kathy Held, President
7910 Woodmont Avenue, Suite 400
Bethesda, Maryland 20814-3095
Email: Kathy.Held@ncrponline.org

Subject: Establishing Provisional Billing Rates for National Council on Radiation Protection for Fiscal Year 2021

Dear Dr. Held:

In accordance with Federal Acquisition Regulation (FAR) 42.704, Billing Rates, we established the National Council on Radiation Protection (NCRP)'s provisional billing rate for Fiscal Year 2021 as follows:

Indirect Pool	Provisional Billing Rate	Allocation Base Description
Overhead	[redacted] (b)(4)	The base consists of direct costs including labor, travel, consultants, and other direct costs.

NCRP should immediately begin using the established billing rates in preparing requests for interim contract payments (SF 1443 (Request for Progress Payment), SF 1034 (Public Voucher), "Cost Voucher" in WAWF). All contract payments should be adjusted to reflect these provisional rates.

The scope of the work performed does not constitute an audit or attestation engagement under Generally Accepted Government Auditing Standards (GAGAS).

The subject rates are for billing purposes only and you should not use these rates for other applications such as cost proposals or forward pricing rates. By establishing the billing rates DCAA is not performing management functions or making management decisions for you. The billing rates are not final, nor do they relieve you of the responsibility to submit final indirect cost rates as required by FAR 52.216-7 (d). The billing rates do not apply to contracts that contain ceiling rates, unless the ceiling rates are higher than the established billing rates. Establishing billing rates also does not constitute acceptance of any NCRP accounting practices.

In accordance with FAR 42.704 once established, billing rates may be prospectively or retroactively revised by mutual agreement of the contracting officer (or cognizant Federal agency official) or auditor and the contractor at either party's request, to prevent substantial overpayment or underpayment. When agreement cannot be reached, the billing rates may be unilaterally determined by the contracting officer (or cognizant Federal agency official).

Should you discover information that may have a significant impact on the established billing rates or if your actual indirect cost rates for the fiscal year or certified final cost indirect rate proposal differ significantly from the established rates, please notify us immediately.

If you have any questions, please contact Ms. Rakia Stancil, Auditor, at rakia.stancil@dcaa.mil, or Mr. Keith Petrie, Supervisory Auditor, at keith.petrie@dcaa.mil.

Sincerely,

Digitally signed by HOUGHTALING.CHARLES.C.1241942712
Date: 2020.12.28 14:29:01 -05'00'

Charles C. Houghtaling
Branch Manager
DCAA Chesapeake Bay Branch Office

Copy furnished:
Myra Ruffin, Administrative Contracting Officer, DCMA Baltimore
Email: myra.ruffin2.civ@mail.mil

ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

Note: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standard or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standard for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685- 1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §§794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to non- discrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Title II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327- 333), regarding labor standards for federally assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetland pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Costal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§ 469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984.

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
Kathryn D Held	President
APPLICANT ORGANIZATION	**DATE SUBMITTED**
National Council on Radiation Protection and Measurements (NCRP)	May 17, 2021

CERTIFICATIONS

1. Certification Regarding Debarment and Suspension

The undersigned (authorized official signing for the applicant organization) certifies, to the best of his or her knowledge and belief, that the applicant, defined as the primary participant in accordance with 45 CFR Part 76, and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal Department or agency.

(b) Have not, within a 3-year period preceding this proposal, been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

(c) Are not presently indicted or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification.

(d) Have not, within a 3-year period preceding this application/proposal, had one or more public transactions (Federal, State, or local) terminated for cause or default.

Should the applicant not be able to provide this certification, an explanation as to why should be placed after the assurances page in the application package. The applicant agrees by submitting this proposal that it will include, without modification, the clause titled "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion – Lower Tier Covered Transactions" in all lower tier covered transactions (i.e., transactions with sub-grantees and/or contractors) and in all solicitations for lower tier covered transactions in accordance with 45 CFR Part 76.

2. Certification Regarding Drug-Free Workplace Requirements

The undersigned (authorized official signing for the applicant organization) certifies that the applicant will, or will continue to, provide a drug-free work-place in accordance with 45 CFR Part 76 by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(b) Establishing an ongoing drug-free awareness program to inform employees about –
(1) The dangers of drug abuse in the workplace.
(2) The grantee's policy of maintaining a drug-free workplace.
(3) Any available drug counseling, rehabilitation, and employee assistance programs.
(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a) above.

(d) Notifying the employee in the statement required by paragraph (a), above, that as a condition of employment under the grant, the employee will –
(1) Abide by the terms of the statement.
(2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction.

(e) Notifying the agency in writing within ten calendar days after receiving notice under paragraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant.

(f) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (d)(2), with respect to any employee who is so convicted –
(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended.
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e), and (f).

For purposes of paragraph (e) regarding agency notification of criminal drug convictions, the DHHS has designated the following central point for receipt of such notices:

Office of Grants and Acquisition Management
Office of Grants Management
Office of the Assistant Secretary for Management and Budget
Department of Health and Human Services
200 Independence Avenue, S.W., Room 517-D
Washington, D.C. 20201

3. Certification Regarding Lobbying

Title 31, United States Code, Section 1352, entitled “Limitation on use of appropriated funds to influence certain Federal contracting and financial transactions,” generally prohibits recipients of Federal grants and cooperative agreements from using Federal (appropriated) funds for lobbying the Executive or Legislative Branches of the Federal Government in connection with a SPECIFIC grant or cooperative agreement. Section 1352 also requires that each person who requests or receives a Federal grant or cooperative agreement must disclose lobbying undertaken with non-Federal (non-appropriated) funds. These requirements apply to grants and cooperative agreements EXCEEDING $100,000 in total costs (45 CFR Part 93).

The undersigned (authorized official signing for the applicant organization) certifies, to the best of his or her knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure of Lobbying Activities,” in accordance with its instructions.

(c) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

4. Certification Regarding Program Fraud Civil Remedies Act (PFCRA)

The undersigned (authorized official signing for the applicant organization) certifies that the statements herein are true, complete, and accurate to the best of his or her knowledge, and that he or she is aware that any false, fictitious, or fraudulent statements or claims may subject him or her to criminal, civil, or administrative penalties. The undersigned agrees that the applicant organization will comply with the Public Health Service terms and conditions of award if a grant is awarded as a result of this application.

5. Certification Regarding Environmental Tobacco Smoke

Public Law 103-227, also known as the Pro-Children Act of 1994 (ACT), requires that smoking not be permitted in any portion of any indoor facility owned or leased or contracted for by an entity and used routinely or regularly for the provision of health, day care, early childhood development services, education or library services to children under the age of 18, if the services are funded by Federal programs either directly or through State or local governments, by Federal grant, contract, loan, or loan guarantee. The law also applies to children's services that are provided in indoor facilities that are constructed, operated, or maintained with such Federal funds. The law does not apply to children's services provided in private residence, portions of facilities used for inpatient drug or alcohol treatment, service providers whose sole source of applicable Federal funds is Medicare or Medicaid, or facilities where WIC coupons are redeemed.

Failure to comply with the provisions of the law may result in the imposition of a civil monetary penalty of up to $1,000 for each violation and/or the imposition of an administrative compliance order on the responsible entity.

By signing the certification, the undersigned certifies that the applicant organization will comply with the requirements of the Act and will not allow smoking within any portion of any indoor facility used for the provision of services for children as defined by the Act.

The applicant organization agrees that it will require that the language of this certification be included in any sub-awards which contain provisions for children's services and that all sub-recipients shall certify accordingly.

The Public Health Services strongly encourage all grant recipients to provide a smoke-free workplace and promote the non-use of tobacco products. This is consistent with the PHS mission to protect and advance the physical and mental health of the American people.

Signature of Authorized Certifying Official:	**Title:**
Kathryn D Held	President
Applicant Organization *(Please Print)*:	**Date Signed & Submitted:**
National Council on Radiation Protection and Measurements (NCRP)	May 17, 2021

NCRP Application re CDC-RFA-EH21-2103

Appendix A

Biosketches of Key Personnel

Kathryn D. Held, President
Jerrold T. Bushberg, Sr. Vice President
John D. Boice, Jr., Director of Science

OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Held, Kathryn D.

eRA COMMONS USER NAME (credential, e.g., agency login): KDHELD

POSITION TITLE: President, NCRP; Associate Radiation Biologist, Massachusetts General Hospital; Associate Professor, Harvard Medical School

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Thiel College, Greenville, PA	B.A.	05/1975	Chemistry
University of Texas, Austin, TX	Ph.D.	05/1979	Biological Sciences
Cancer Research Campaign Gray Laboratory, Northwood, UK	Postdoctoral	07/1981	Radiation Biology

A. Personal Statement

I have been involved in radiation biology research and teaching for over 35 years, with emphasis in cellular and molecular mechanisms of radiation damage, particularly with relevance to clinical use of radiation in cancer treatment and effects of space radiation. I have conducted studies on mechanisms of action of radiation modifiers, radiation chemistry, DNA damage and repair, cellular pathways and intercellular signaling by reactive oxygen species, and chemical and biological effects of charged particles. I have had federal funding or been a co-I on federal grants since 1985, including having been PI on an NCI-funded program project grant and PI on grants from NCI, DOE low dose program, DoD breast cancer program, NASA space radiation program, and NIAID's radiation countermeasures program. I have served on advisory boards and review panels for NIH, DOE, DOD, NASA, NAS/NRC, ABR, Brookhaven National Lab and others. I have taught extensively at MGH/HMS and MIT, and as a visiting professor/lecturer at universities world-wide, as well as being a Distinguished Visiting Professor at Gunma University, Japan. I have been a member of the National Council on Radiation Protection and Measurements (NCRP) since 2006, have served on numerous NCRP committees, was chair of the 2011 Annual Meeting Program Committee, served on the Board of Directors from 2008-2014, and was Scientific Vice President of Program Area Committee (PAC) 1. After about two years as Executive Director/Chief Science Officer of NCRP, I became President in January 2019.

B. Positions and Honors

Positions and Employment

1975-1977	Teaching Assistant, Division of Biological Sciences, University of Texas at Austin
1975-1979	Research Assistant, Laboratory of Radiation Biology, University of Texas at Austin
1979-1980	NSF National Needs Postdoctoral Fellow, CRC Gray Laboratory, Northwood, England
1980-1981	Cancer Research Campaign Fellow, CRC Gray Laboratory, Northwood, England
1981-1985	Associate Consultant in Radiation Biology, Mayo Clinic and Mayo Foundation
1981-1985	Assistant Professor of Oncology, Mayo Medical School
1985-1987	Assistant Radiation Biologist, Dept. of Radiation Medicine, Massachusetts General Hospital
1985-1991	Assistant Professor of Radiation Oncology (Radiation Biology) Harvard Medical School
1988-1991	Lecturer, Department of Nuclear Engineering, Massachusetts Institute of Technology
1996-2001	Sr. Lecturer II, Department of Physics, Suffolk University
1999-2002	Lecturer, Department of Nuclear Engineering, Massachusetts Institute of Technology
1987-	Associate Radiation Biologist, Dept. of Radiation Oncology, Massachusetts General Hospital
1992-	Associate Professor of Radiation Oncology (Radiation Biology), Harvard Medical School
2012-2016	Lecturer, Department of Nuclear Science and Engineering, MIT

2015- Distinguished Visiting Professor, Radiation Oncology, Gunma University, Japan
2016-2018 Executive Director and Chief Science Officer, National Council on Radiation Protection and Measurements (NCRP)
2019- President, NCRP

Other Experience and Professional Memberships

1989-1993 Member, Gerontology and Geriatrics Review Committee, National Institute on Aging
1987- Member, Editorial Board, Associate Editor (5 years), International Journal of Radiation Biology
1996-1998 Member, Radiological Sciences I Review Panel, USAMRMC Breast Cancer Research Program
1993-1997 Member, NIH Reviewers Reserve
1997-2005 Associate Editor, Radiation Research
1998-2002 Member, Radiation Study Section, National Institutes of Health
2001 Member, RON Review Panel, USAMRMC Breast Cancer Research Program
2001-2018 Member, Chair, BNL Scientific Advisory Committee for Radiation Research
2002- Member, multiple NIH ad hoc review panels
2005 Co-Chair, NIAID Review Panel for Centers for Countermeasures Against Radiation
2006- Member, National Council on Radiation Protection and Measurement (NCRP)
2007-2014 Member, Board of Directors, NCRP
2007- Member, various NASA/NSBRI Peer Review Panels
2007-2011 Vice-President-Elect, Vice President/Chair of Program Committee, President, Past-President, Radiation Research Society (RRS)
2009- Member (Chair from 2018), Radiation Oncology Test Assembly Panel, American Board of Radiology (ABR)
2010-2011 Chair, Program Committee, NCRP 2011 Annual Meeting
2011- Sr. Editor, Radiation Research
2011 Member, NRC/NAS Committee for Evaluation of Space Radiation Cancer Risk Model
2012 Member, NASA Space Radiation *ad hoc* Expert Panel on CNS Risks
2012-2013 Member, Organizing Committee, DOE-NCI Workshop on Ion Beam Therapy
2013-2016 Member, Scientific Committees 1-22 and 1-24, NCRP
2014-2018 Member, Task Group-256, American Association of Physicists in Medicine (AAPM)
2015-2017 Member, Scientific Advisory Committee, NSBRI Center for Space Radiation Research (CSRR)
2015-2016 Member, Organizing Committee, NCI Workshop on Biology Relevant to Particle Therapy
2016-2020 Member, Board of Directors, Radiation Research Foundation

C. Contributions to Science

1. Mechanisms of radiation-induced bystander effects. A major emphasis in our lab has been elucidating molecular signaling pathways involved in radiation-induced cell-cell communication. Although traditionally, it had been thought that radiation effects resulted only from radiation deposition in DNA in cell nuclei, it is now clear that unirradiated cells can be altered by signals from irradiated cells. Understanding this bystander effect has potential clinical significance: its occurrence suggests that the “target” for radiation-induced cancer may be much larger than a single irradiated cell nucleus, and that “out-of-field” effects in radiotherapy may alter normal tissue or tumor responses distant from the irradiated tumor. We were among the first to use a transwell insert system that is now used widely in bystander studies and to show that reactive oxygen species are involved in the signaling process. Subsequently, we demonstrated that other oxidative stresses, e.g., photodynamic therapy, also induce bystander effects and that DNA double strand break repair status of the bystander cells, but not of the irradiated cells, is important for expression of the effect. Although most cell types studied have demonstrated radiation-induced bystander signaling, we found that chondrosarcoma cells, which are clinically radiation resistant, can send a bystander signal but do not respond to it. In recent ongoing work, we found that this is due to the DNA repair-related protein ATR, and we continue to investigate the pathway details.

a. Yang H, Asaad N, Held KD. Medium-mediated intercellular communication is involved in bystander responses of X-ray irradiated normal human fibroblasts. *Oncogene* 2005; 24:2096-2103.
b. Chakraborty A, Held KD, Prise KM, Liber HL, Redmond RW. Bystander effects induced by diffusing mediators following photodynamic stress. *Radiat Res.*, 2009; 172:74-81. PMCID: PMC2735195
c. Zhang Y, Zhou, J, Baldwin J, Held KD, Prise KM, Redmond RW, Liber HL. Ionizing radiation-induced bystander mutagenesis and adaptation: Quantitative and temporal aspects. *Mutat. Res.*, 2009; 671:20-25. PMCID: PMC2783982.
d. Wakatsuki M, Magpayo N, Kawamura H, Held KD. The lack of a bystander response induced by X-rays, protons and heavy ions in chondrosarcoma cells. *Int J Radiat Oncol Biol Phys* 2012; 84(1):e103-8.

2. Charged particle-induced bystander signaling. Space radiation, to which astronauts are exposed, contains high energy charged particles, mostly protons but also heavier ions, but the particle fluence rate is very low, making exposures "ideal" bystander situations, in that particles traverse only a small number of cells along their tracks, but many cells could be exposed to bystander signals. Our studies to further understanding of the occurrence and importance of bystander effects from very low fluences of charged particles have shown that ROS are critically involved in heavy ion-induced bystander effects, the signaling occurs rapidly, the signal is produced by irradiated cells for several hours and the signal has a lifetime in medium of several hours. Of critical importance is our finding that the bystander effect occurs at very low iron ion fluences, as low as 200 particles/cm^2, and the fraction of cells expressing bystander damage is independent of radiation quality (LET, linear energy transfer), but the particle fluence (dose) threshold at which the effect is induced does depend on LET. Furthermore, the magnitude of the effect can be modified by altering the combination of particles in terms of dose and sequence. These complex effects suggest that the bystander response could be important for radiation-induced cancer in astronauts, although at this stage predicting the magnitude of the response requires additional data and understanding.

a. Yang H, Anzenberg V, Held KD. The time dependence of bystander responses induced by iron ion irradiation in normal skin fibroblasts. *Radiat Res* 2007; 168:292-298.
b. Held KD. Effects of low fluences of radiations found in space on cellular systems. *Int J Radiat Biol.* 2009; 85:379-390.
c. Yang H, Magpayo N, Rusek A, Chiang I-H, Sivertz M, Held KD. Effects of very low particle fluences in irradiated and bystander cells. *Radiat Res.*, 2011a; 176(6):695-705.
d. Yang H, Magpayo N, Held KD. Combined effects of low dose energetic protons and iron ions in irradiated and bystander human fibroblasts. *Int J Radiat Biol.*, 2011b; 87(3):311-319.

3. Charged particle radiation biology in the context of cancer therapy. In recent years there have been an increasing number of proton therapy centers in the US, but many important radiation biology questions remain unanswered. To improve the use of protons in cancer treatment, we have been addressing several issues. First, we have demonstrated that substantial out-of-field cell killing can occur in cells distant from proton irradiated cells in a system designed to mimic clinical exposures. Second, with the increasing use of actively scanning proton beams, in contrast to the passive scattering beams previously used, it is important to confirm that the biological effects are identical for the two approaches, which we have done. Third, although it has long been accepted that the RBE for protons compared to Co-60 gamma-rays is 1.1, and this generic value is used clinically, it is based primarily on data from rodent cells, with limited data on human cancer cells. Given the increasing evidence for considerable genomic heterogeneity, including in DNA repair pathways, across cancers, there is a need to re-examine the RBE for human cancers. Our studies showed that about 30% of human lung cancer cell lines exhibited reduced clonogenic survival after protons compared with X-rays, and in 3 lines, the increased RBE correlated with alterations in the Fanconi anemia/BRCA pathway of DNA repair. The data suggest that use of a generic RBE for cancers should be revisited and that functional biomarkers, such as 53BP1 foci, may be used to identify cancers with increased sensitivity to proton radiation. Most recently, we have been quantifying RBE values for helium, carbon and oxygen ions as a function of depth along the Bragg curve for several human cancer cell lines.

a. Liu Q, Ghosh P, Magpayo N, Tang S, Testa M, Biggs P, Paganetti H, Efstathiou JA, Lu HM, Held KD, Willers H. Lung cancer cell line screen links Fanconi anemia/BRCA pathway defects to increased relative biological effectiveness of proton radiation. *Int J Radiat Oncol Biol Phys.* 2015; 91(5):1081-1089.
b. Hagiwara Y, Niimi A, Isono M, Yamauchi M, Yasuhara T, Limsirichaikul S, Oike T, Sato H, Held KD, Nakano T, Shibato A. 3D-structured illumination microscopy reveals clustered DNA double-strand break formation in widespread γH2AX foci after high LET heavy-ion particle radiation. Oncotarget 2017 Nov 25; 8(65):109370-109381. PMID: 29312614.
c. Paganetti H, Blakely E, Carabe-Fernandez A, Carlson DJ, Das IJ, Dong L, Grosshans D, Held KD, Mohan R, Moiseenko V, Niemierko A, Stewart RD, Willers H. Report of the AAPM TG-256 on the relative biological effectiveness of proton beams in radiation therapy. Med Phys. 2019 Mar;46(3):e53-e78. PMID:30661238.
d. Hagiwara Y, Oike T, Niimi A, Sato H, Limsirichaikul S, Held KD, Nakano T, Shibata A. Clustered DNA double-strand break formation and the repair pathway following heavy-ion irradiation. J Rad Res. 2019 Jan 1;60(1):69-79. PMID: 30476166.

4. Other aspects of cancer therapy-relevant radiation biology. We continue to be involved in other studies of relevance to cancer therapy. For example, we have recently evaluated the potential for an increasing role of immunotherapy in combination with radiation therapy, especially charged particle therapy, and have been developing a high-throughput screen for assaying associations between molecularly targeted radiation sensitizers with genomic biomarkers. In recent work we have been evaluating gold nanoparticle induced radiosensitization with photons, protons and carbon ions (Lin et al. unpublished), showing that the increased cell killing depends on radiation quality and cell type.

a. Durante M, Reppingen N, Held KD. Immunologically augmented cancer treatment using modern radiotherapy. *Trends Mol Med.* 2013; 19(9):565-582. PMID: 23831337.
b. Sato H, Niimi A, Yasuhara T, Permata TBM, Hagiwara Y, Isono M, Nuryadi E, Sekine R, Oike T, Kakoti S, Yoshimoto Y, Held KD, Susuki Y, Kono K, Miyagawa K, Makano T, Shibata A. DNA double-strand break repair pathway regulates PD-L1 expression in cancer cells. Nat Commun. 2017 Nov 24;8(1):1751. PMID: 29170499.
c. Permata TBM, Hagiwara Y, Sato H, Yasuhara T, Oike T, Gondhowiardjo S, Held KD, Nakano T, Shibata A. Base excision repair regulated PD-L1 expression in cancer cells. Oncogene. 2019 Jun;38(23):4452-4466 PMID: 30755733.
d. Schuemann J, McNamara A, Ramos-Méndez J, Perl J, Held KD, Paganetti H, Incerti S, Faddegon B. TOPAS-nBio – An extension to the TOPAS simulation toolkit for cellular and sub-cellular radiobiology. Radiat Res. 2019 Feb;191(2):125-138. PMID: 30609382.

5. Education and service. I devote a substantial amount of time to teaching and service to the scientific, academic, and radiation protection communities. I highlight a few examples here. I teach radiation biology to radiation oncology medical and physics residents, graduate students, and radiology residents at MGH/HMS as well as at other institutions in the US and abroad (30-40 contact hours a year) and taught radiation biophysics to undergrad and grad students at MIT (about 30 contact hours a year). I have written questions for the ABR radiation biology exam for over 15 years and have served on the ABR test assembly panel for 5 years, now chair. For 4 years, I was Associate Editor of the ASTRO Radiation/Cancer Biology Practice Exam and Study Guides, which were freely available on the ASTRO website. Within the National Council on Radiation Protection and Measurements (NCRP), I have served on the Board of Directors, as Scientific VP (3 years), chair of the Program Committee for the 2011 NCRP Annual Meeting, was on NCRP Scientific Committee (SC) 1-22 that prepared NCRP Commentary No. 23 and SC 1-24 that prepared NCRP Commentary No. 25, Executive Director/Chief Science Officer from 2016-2018, and am now President of NCRP. I was President of the Radiation Research Society in 2010, prior to that serving as VP and Chair of the Program Committee for the 2009 Annual Meeting. I have served on many review panels and advisory boards for US agencies as well as abroad.

a. Dynlacht JR, Zeman EM, Held KD, Deye J, Vikram B, Joiner MC. Education and training needs in the radiation sciences: Problems and potential solutions. Radiat Res 2015; 184(5):449-455.
b. Held KD, Blakely EA, Story MD, Lowenstein DI. Invited Commentary: Use of the NASA Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory (BNL) to conduct charged particle radiobiology studies relevant to ion therapy. Radiat Res 2016; 185(6):563-7.
c. Mohan R, Held KD, Story MD, Grosshans D, Capala J. Proceedings of the National Cancer Institute Workshop on Charged Particle Radiobiology. Int J Radiat Oncol Biol Phys. 2018 Mar 15, 100(4):816-831. PMID: 29485053.
d. Prasanna PG, *et al.*, Held KD. Low-Dose Radiation Therapy (LDRT) for COVID-19: Benefits or Risks? Radiat Res. 2020 Nov 10;194(5):452-464. PMID: 33045077.

List of Published Work

http://www.ncbi.nlm.nih.gov/sites/myncbi/kathryn.held.1/bibliograpahy/44130321/public/?sort=date&direction=ascending

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
John D. Boice, Jr.	NCRP Director of Science; VUMC Professor of Medicine
eRA COMMONS USER NAME: Boicej	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
The University of Texas at El Paso, TX	BS	1967	Physics/Mathematics
Rensselaer Polytechnic Institute, Troy, NY	MS	1968	Nuclear Engineering and Science
Harvard University, School of Public Health,	SM	1974	Medical Physics
Boston, MA	ScD	1977	Epidemiology

A. Personal Statement

For over 40 years, I have conducted large-scale, national and international epidemiologic studies into the causes of cancer and other disease. During 27 years of service in the U.S. Public Health Service, I developed and became the first chief of the Radiation Epidemiology Branch at the National Cancer Institute, establishing programs of research in all major areas of radiation epidemiology, with major projects dealing with populations exposed to medical, occupational, military, and environmental radiation. These and current research efforts include comprehensive dose reconstruction and tracing activities, biospecimen collection, pathological tissue review, genetic-environmental interaction analyses, community outreach, and educational material development (including video presentations and distribution). Many of the resulting publications have been used to formulate public health measures to reduce population exposure to radiation and other agents to prevent associated diseases. Key professional services included President of the National Council on Radiation Protection and Measurements, Main Commissioner of the International Commission on Radiological Protection, and U.S. delegate to United Nations Scientific Committee on the Effects of Atomic Radiation Currently I direct the Million Person Study of Workers and Veterans, examining health risks following radiation exposures and serve on the steering committees of *Image Gently* and the *Childhood Cancer Survivor Study*.

B. Positions and Honors

<u>Positions and Employment</u>

2000-	Professor, Department of Medicine, Vanderbilt University Medical Center, Nashville, TN
2019-	Director of Science, National Council on Radiation Protection and Measurements
2012-2018	President, National Council on Radiation Protection and Measurements (NCRP)
1996-2011	Scientific Director, International Epidemiology Institute, Rockville, MD
1984-1996	Branch Chief, Radiation Epidemiology Branch, NCI, Bethesda, MD
1979-1983	Section Head, Radiation Studies Section, National Cancer Institute (NCI), Bethesda, MD
1976-1977	Epidemiologist, Bureau of Radiological Health, FDA, Rockville, MD

<u>Other Experience and Professional Memberships</u>

2018 –	Member, Steering Committee for the *Image Gently*® Alliance
2010-	Senior Editor, Radiation Research
1994-	Steering Committee, Childhood Cancer Survivor Study, St Jude Children's Research Hospital
2018-2021	Member (Elected), Board of Directors of the Oak Ridge Associated Universities
2014-2018	Co-Chair, NCRP Committee on Radiation Protection Guidance for the United States (2018)
2007-2010	Vice Chair, NCRP Committee on Second Cancers and Cardiac Effects after Radiotherapy
2005-2014	Member, Veterans' Advisory Board on Dose Reconstruction (VBDR)
1999-2005	Consultant, NAS BEIR VII Committee
1998-2001	Member, IARC Monograph Working Group on Ionizing Radiation
1997-2017	Main Commission, International Commission on Radiation Protection
1993-2018	Advisor, U.S. Delegation to United Nations Scientific Committee on the Effects of Atomic Radiation
1987-2015	Associate Editor, Journal of the National Cancer Institute
1986-	Member, American Association for Cancer Research
1979-	Member (Elected), National Council on Radiation Protection and Measurements

Honors

2021	John C. Villforth Lecturer, Conference of Radiation Control Program Directors
2020	National Cancer Institute Director's Award
2019	John D. Boice Jr. Young Investigator Award Established in 2019 by the NCRP
2019	Herbert M. Parker Lecturer, Parker Foundation, Richland WA
2017	John S. Laughlin Visiting Professor, Memorial Sloan-Kettering Cancer Center
2016	Distinguished Public Health Service Award, Health Physics Society
2016	Sievert Award, International Radiation Protection Association
2015	John A. Rock, M.D. Visiting Scholar, Louisiana State University, School of Public Health
2014	Elected Fellow, Health Physics Society
2014	47th Annual Aubrey O. Hampton Lecture, Massachusetts General Hospital
2013	Colloquium Lecture, Johns Hopkins University Applied Physics Laboratory
2012	Dade Moeller Lectureship Award, Health Physics Society
2011	Featured Speaker, DOE Integrated Safety Management Champions Workshop
2010	Elis Berven Lecture, Swedish Society of Oncology
2009	Lauriston Taylor Lecturer, National Council on Radiation Protection and Measurement
2008	Alumni Award of Merit, Harvard School of Public Health
2007	Distinguished Scientific Achievement Award, Health Physics Society
2002	R. S. Landauer Memorial Lecture, Health Physics Society
1999	Distinguished Alumnus Award, The University of Texas at El Paso
1995	E. O. Lawrence Award, Department of Energy
1994	Gorgas Medal, Association of Military Surgeons of the United States
1991	Distinguished Service Medal, Public Health Service

C. Contribution to Science

1. Radiation-induced breast cancer. I was the first to quantify the risk of breast cancer following frequent low dose radiation exposures in young women. This research led to the first pooling of breast cancer data sets to enhance understanding, and was a focus of the first NIH consensus conference in 1978 on the risk/benefit considerations for mammographic screening of asymptomatic women. I was the first to quantify the risk of contralateral breast cancer following radiotherapy for primary breast cancer which led to a change in treatment practices to reduce the unnecessary scatter radiation to the opposite breast. This research continues today to learn the genetic determinants that interact with radiation to cause secondary breast cancers.

   a. **BOICE JD Jr**, Monson RR. Breast cancer in women after repeated fluoroscopic examinations of the chest. J Natl Cancer Inst 59:823–832, 1977.
   b. **BOICE JD Jr**, Land CE, Shore RE, Norman JE, Tokunaga M. Risk of breast cancer following low dose radiation exposure. Radiology 131:589–597, 1979.
   c. **BOICE JD Jr**, Harvey EB, Blettner M, Stovall M, Flannery JT. Cancer in the contralateral breast after radiotherapy for breast cancer. N Engl J Med 326:781–785, 1992.
   d. Reiner AS, Robson ME, Mellemkjær L, Tischkowitz M, John EM, Lynch CF, Brooks JD, **BOICE JD**, et al. WECARE Study Collaborative Group, Bernstein JL. Radiation treatment, ATM, BRCA1/2, and CHEK2*1100delC pathogenic variants and risk of contralateral breast cancer. J Natl Cancer Inst 112(12):1275-1279, 2020.

2. Leukemia and second cancers following treatments for childhood and adult cancer. In the early days of widespread chemotherapy uses to prolong life, it became apparent that some of the modalities carried a late effects burden. With colleagues at the NCI, we set up programs to evaluate the adverse effects of adjuvant treatment and revealed a high risk of leukemia that led to changes in treatment which lowered morbidity while keeping survival high. I was an initial member of the steering committee of the Childhood Cancer Survivor Study (and still am a member) which has provided critically important guidance on survivor issues. I've published extensively on the risk of second cancers in national and international monographs. I directed the international study of Cervical Cancer which, at the time, was one of only three comprehensive studies quantifying the risk of radiation-induced cancers with this

knowledge used by national and international committees to help set guidance to protect workers and the public from the adverse effects of radiation.

a. Robison LL, Armstrong GT, Bhatia S, **BOICE JD,** Chow EJ, Davies SM, Donaldson SS, Green DM, Hammond S, Meadows AT, Mulvihill JJ, Nathan PC, Neglia JP, Packer RJ, Rajaraman P, Sklar CA, Stovall M, Strong LC, Yasui Y, Zeltzer LK. The Childhood Cancer Survivor Study: A National Cancer Institute supported resource for outcome and intervention research. J Clin Oncol 27:2308–2318, 2009.
b. **BOICE JD Jr**, Storm HH, Curtis RE, Jensen OM, Kleinerman RA, Jensen HS, Flannery JT, Fraumeni JF Jr (eds). Multiple Primary Cancers in Connecticut and Denmark. NCI Monograph, Vol 68. Bethesda, MD: National Institutes of Health, 1985, 434.
c. Travis LB, Hill DA, Dores GM, Gospodarowicz M, van Leeuwen FE, Holowaty E, Glimelius B, Andersson M, Wiklund T, van't Veer MB, Glimelius I, Storm H, Pukkala E, Stovall M, Curtis R, **BOICE JD Jr**, Gilbert E. Breast cancer following radiotherapy and chemotherapy among young women treated for Hodgkin's disease. JAMA 390:465–475, 2003.
d. Moskowitz CS, Chou JF, Wolden SL, Bernstein JL, Malhotra J, Friedman DN, Mubdi NZ, Henderson TO, Leisenring WM, Stovall M, Hammond S, Smith SA, **BOICE JD JR**, Hudson MM, Diller LR, Bhatia S, Kenney L, Neglia JP, Begg CB, Robison LL, Oeffinger KC. Breast cancer after chest radiation therapy for a childhood cancer. J Clin Oncol 32:2217-2223, 2014.

3. Radiation-induced lung cancer. In the 1980s the risk of radon-induced lung cancer (more specifically, the decay products of radon) was not clearly defined. I coordinated an international study of underground miners which led to the quantification of risk that became the foundation of the National Academies report on the Biological Effects of Ionizing Radiation (BEIR VI) which led to protection guidance for both workers and the public. I then directed and collaborated in the first studies of radon-induced lung cancer in homes with one unique study of underground dwellers in China. Recently for NASA, I have been conducting studies to address the sex-specific differences in radiation-induced lung cancer.

a. Lubin JH, **BOICE JD Jr**, Edling C, Hornung RW, Howe GR, Kung E, Kusiak RA, Morrison HI, Radford EP, Samet JM, Tirmarche M, Woodard A, Yao SX, Pierce DA. Lung cancer in radon-exposed miners and estimation of risk from indoor exposure. J Natl Cancer Inst 87:817–827, 1995.
b. Lubin JH, **BOICE JD Jr**. Lung cancer risk from residential radon: meta-analysis of eight epidemiologic studies. J Natl Cancer Inst 89:49–57, 1997.
c. Lubin JH, Wang ZY, **BOICE JD Jr**, Xu ZY, Blot WJ, Wang LD, Kleinerman RA. Risk of lung cancer and residential radon in China: pooled results of two studies. Int J Cancer 109:132-137, 2004.
d. **BOICE JD Jr**, Ellis ED, Golden AP, Zablotska LB, Mumma MT, Cohen SS. Sex-specific lung cancer risk among radiation workers in the Million Person Study and among TB-fluoroscopy patients. Int J Radiat Biol. 2019 Jan 7, 2019 [Epub ahead of print]

4. Genetic effects in the children of exposed parents. There is little evidence that gonadal irradiation of parents can lead to heritable genetic effects in their children. Further there are serious concerns of cancer survivors who are able to have children as to whether their treatments might have damaged their cells in such a way as to cause serious effects in any children they have or might have. I directed an international consortium on the Genetic Consequences of Cancer Treatment and directed nationwide studies in the United States, Denmark and Finland. We found encouraging news. The radiotherapy received by cancer survivors that did not lead to infertility, was not associated with any measure of genetic effects in their children: congenital malformation, still birth, neonatal death, or even changes in minisatellite frequencies. However, uterine damage following treatments with radiation of young girls and before menarche was associated with still birth, neonatal death and children born with low birth weight. Such survivors are now considered high risk pregnancies which requires special monitoring during the gestational period.

a. Signorello LB, Mulvihill JJ, Green DM, Munro HM, Stovall M, Weathers RE, Mertens AC, Whitton JA, Robison LL, **BOICE JD Jr**. Stillbirth and neonatal death in relation to radiation exposure before conception: a retrospective cohort study. Lancet 376:624–630, 2010
b. Signorello LB, Mulvihill JJ, Green DM, Munro HM, Stovall M, Tawn EJ, Weathers RE, Mertens AC, Whitton JA, Robison LL, **BOICE JD Jr**. Congenital anomalies in the children of cancer survivors: A report from the Childhood Cancer Survivor Study. J Clin Oncol 30:239–245, 2012

c. Winther JF, Olsen JH, Wu H, Shyr Y, Mulvihill JJ, Stovall M, Nielsen A, Schmiegelow M, **BOICE JD Jr**. Genetic disease in the children of Danish survivors of childhood and adolescent cancer. J Clin Oncol 30:27-33, 2012.

d. **BOICE JD JR**. The likelihood of adverse pregnancy outcomes and genetic disease (transgenerational effects) from exposure to radioactive fallout from the 1945 TRINITY atomic bomb test. Health Phys 19(4):494-503, 2020

5. Occupational studies of radiation exposed populations. I am directing the Million Person Study of Low Dose Radiation Health Effects. It is designed to provide critically needed information on radiation effects – we know a lot when exposures are brief (such as among atomic bomb survivors) but there is insufficient data on the effects of gradual, prolonged exposures as we all experience in life, work, and travel. The need for such research is recognized by Congress and the last two appropriation bills signed by the President included line items specifically to provide funding for "a study of one million U.S. workers and veterans". We are studying a million workers and veterans from: the DOE Manhattan Project; DOD atomic veterans who participated at 100 atmospheric weapons tests; NRC nuclear power plant workers, industrial radiographers, early medical workers (technologists, oncologists, radiologists, nuclear medicine workers), radium dial painters, and nuclear submariners.

a. **BOICE JD JR**, Cohen SS, Mumma MT, Ellis ED. The Million Person Study, whence it came and why. Int J Radiat Biol. Mar 4, 2019 [Epub ahead of print].

b. Simon SL, Bailey SM, Beck HL, **BOICE JD**, Bouville A, Brill AB, Cornforth MN, Inskip PD, McKenna MJ, Mumma MT, Salazar SI, Ukwuani A. Estimation of radiation doses to U.S. military test participants from nuclear testing: a comparison of historical film-badge measurements, dose reconstruction, and retrospective biodosimetry. Radiat Res 191:297-310, 2019.

c. **BOICE JD Jr**, Cohen SS, Mumma MT, Chen H, Golden AP, Beck HL, Till JE. Mortality among US military participants at eight aboveground nuclear weapons test series. Int J Radiat Biol. 2020 Jun 30:1-64. [Online ahead of print] [PMID: 32602389]

d. **BOICE JD Jr**, Cohen SS, Mumma MT, Golden AP, Howard S, Girardi DJ, Dupree Ellis ED, Bellamy M, Dauer LT, Samuels C, Eckerman KF, Leggett R. Mortality among workers at the Los Alamos National Laboratory, 1943-2017. Int J Radiat Biol. (2021, In Press)

6. Studies of Non-ionizing radiation. During the 1990s there was concern that low frequency EMF fields might be related to increases in childhood leukemia and that use of cellular telephones and exposure to radiofrequency waves might be related to increases in brain tumor. While at the NCI, I developed studies of EMF exposure and published extensively on mobile phone use and cancer risk. Notably were the prospective cohort studies of large populations in Denmark. These studies were reassuring in that no associations were revealed between nonionizing radiation and cancer risk in humans.

a. Friedman DR, Hatch EE, Tarone R, Kaune WT, Kleinerman RA, Wacholder S, **BOICE JD Jr**, Linet MS. Childhood exposure to magnetic fields: residential area measurements compared to personal dosimetry. Epidemiology 7:151-155, 1996.

b. Kleinerman RA, Linet MS, Hatch EE, Wacholder S, Tarone RE, Severson RK, Kaune WT, Friedman DR, Haines CM, Muirhead CR, **BOICE JD Jr**, Robison LL. Magnetic field exposure assessment in a case-control study of childhood leukemia. Epidemiology 8:575-583, 1997.

c. Schüz J, Jacobsen R, Olsen JH, **BOICE JD Jr**, McLaughlin JK, Johansen C. Cellular telephone use and cancer risk: update of a nationwide Danish cohort. J Natl Cancer Inst 98:1707-1713, 2006.

d. **BOICE JD Jr**, Tarone RE. Cell phones, children and cancer (Editorial). J Natl Cancer Inst 103:1211-1213, 2011.

I have over 540 publications and book chapters. A complete List of Published Work in MyBibliography: https://www.ncbi.nlm.nih.gov/myncbi/john.boice.1/bibliography/public/

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Jerrold Talmadge Bushberg	Clinical Professor of Radiology and Radiation Oncology, University of California, Davis School of Medicine; Director Emeritus Medical Health Physics
eRA COMMONS USER NAME (credential, e.g., agency login)	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (*if applicable*)	MM/YY	FIELD OF STUDY
University of California, Davis	B.S.	06/75	Physiology
Purdue University	M.S	01/80	Bionucleonics
U.S. Department of Energy National Training Fellowship: Yale University and Mayo Clinic		06/79	Radiation Biology and Radiation Therapy Physics
Purdue University	Ph.D	07/82	Bionucleonics

Please refer to the application instructions in order to complete sections A, B, C, and D of the Biographical Sketch.

A. Personal Statement

Jerrold T. Bushberg is Clinical Professor of Radiology and Clinical Professor of Radiation Oncology at the University of California (UC) Davis School of Medicine. He served as Associate Chair of Radiology (Radiation Biology & Medical Health Physics) until 2018 and was awarded Emeritus status by the UC Davis Chancellor as Director of Medical/Health Programs at that time. Dr. Bushberg is Chair of the Board of Directors and Senior Vice-President of the United States National Council on Radiation Protection and Measurements. He is an expert on the biological effects, safety, and interactions of ionizing and non-ionizing radiation and holds multiple radiation detection technology patents. With over 35 years of experience he has served as a subject matter expert and an adviser to government agencies and institutions throughout the nation and around the world including U.S. Department of Homeland Security , the FDA 's Center for Devices and Radiological Health, the World Health Organization, and the International Atomic Energy Agency in the areas of ionizing and non-ionizing radiation protection, risk communication , medical physics and radiological emergency medical management . A former Commander in the U.S. Naval Reserve, among other assignments, CDR Bushberg served as Executive Officer of the Chemical/Biological/Nuclear Technical Unit 120 Pacific, a highly skilled multidisciplinary military emergency response and advisory team based out of the Alameda Naval Air Station in California. Dr. Bushberg is an elected fellow of the American Association of Physicists in Medicine and the Health Physics Society. He is certified by several national professional boards with specific sub-specialty certification in radiation protection and medical physics and currently serves as a Director of the American Board of Medical Physics and served as Vice-Chair from (2015- 2018). Dr. Bushberg was awarded the Warren K. Sinclair Medal for Excellence in Radiation Science by the NCRP in 2014 and received the Christiansen Distinguished Alumnus award from Purdue University in 2016. Prior to coming to the UC Davis Health System as technical director of Nuclear Medicine, Dr. Bushberg was on the faculty of Yale University School of Medicine department of Radiology where his research was focused on radiopharmaceutical development. Dr. Bushberg has responsibility for medical postgraduate education in medical physics, radiation (ionizing and non-ionizing) biology and protection. The 3rd edition of the textbook "The Essential Physics of Medical Imaging," authored by Bushberg, Seibert, Leidholdt, and Boone, is used extensively by radiology residency programs throughout the United States.

Dr. Bushberg is currently Senior Vice-President and Chairman of the Board of the National Council on Radiation Protection Measurements (NCRP), a congressionally chartered non-profit scientific advisory organization. He also served as chair and scientific vice-president of the NCRP Radiation Protection in Medicine program advisory committee from 2005-201. Dr. Bushberg was a co-author or served as a subject matter expert for several the NCRP scientific committees (SC); publications and projects including: SC 4-3 on Diagnostic Reference Levels in Medical Imaging: Recommendations for Application in the United States; SC 4-4 on Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant, and. Council Committee 1, Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States and SC 4-7 on Evaluating and Communicating Radiation Risks for Studies Involving Human Subjects Guidance for Researchers and Institutional Review Boards. In addition, Dr. Bushberg is involved in several other NCRP initiatives focused on optimization and education related to medical imaging (especially CT & image guided interventional radiological procedures). Dr. Bushberg has also served as an expert in Radiological Emergency Medical Management. He was the lead or co-author on several important publications in this area including: Nuclear/Radiological Terrorism: Emergency Department Management of Radiation Casualties, published in the Journal of Emergency Medicine; NCRP publications from SC 2-1 Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism; and NCRP report: 165 Responding to Radiological and Nuclear Terrorism: A Guide for Decision Makers published in 2010. Dr. Bushberg is the author of numerous book chapters, including the Merck Manual chapter on management of radiation injury, and has several technology patents in the areas of radiation detection and radiological emergency medical response.

Dr. Bushberg currently chairs NCRP's scientific advisory committee on Non-ionizing Radiation Safety and was co-author of SC 89-6 which issued guidance on Wireless Telecommunications Radiofrequency Safety Issues. Dr. Bushberg was elected and currently serves as Vice-chair of the International Engineering in Medicine and Biology Society Committee on Man and Radiation (COMAR). In addition, he is a member of the main scientific body of International Committee on Electromagnetic Safety (ICES) which reviews and evaluates the scientific literature on the biological effects of nonionizing electromagnetic radiation and establishes exposure standards. He also serves on the ICES Risk Assessment Working Group that is responsible for evaluating and characterizing the risks of nonionizing electromagnetic radiation.

B. Positions and Honors

1982- 1984	Yale University School of Medicine Department of Diagnostic Radiology Section of Nuclear Medicine State of Connecticut, Office of the Governor Executive Appointment	Assistant Professor Advisor, Radiological Health and Emergency Response
1982-1984	Emergency Management Institute Federal Emergency Management Agency National Emergency Training Center, Emmitsburg, MD	Adjunct Faculty-Consultant
1984-1989	UC Davis Medical Center and UC Davis School of Medicine University of California, Davis	Assistant Professor, Technical Director of Nuclear Medicine, and UCDMC Radiation Safety Officer
1989- 1991	UC Davis Medical Center and UC Davis School of Medicine University of California, Davis	Associate Clinical Professor, Technical Director of Nuclear Medicine and UCDMC Radiation Safety Officer
1989- 1992	Executive Appointment: Governor George Deukmejian, State of California	Chairman, Advisory Committee on Nuclear Emergency Planning

1992- 1995	UC Davis Medical Center and UC Davis School of Medicine University of California, Davis	Associate Clinical Professor, Technical Director of Nuclear Medicine Director of Health Physics Programs
1995-1999	UC Davis Medical Center and UC Davis School of Medicine University of California, Davis	Associate Clinical Professor, Radiology/Nuclear Medicine, Manager of Environmental Health and Safety and Director of Health Physics Programs
1999-2004	UC Davis Health System (UCDHS includes the UC Davis Medical Center, Primary Care Network and School of Medicine. University of California, Davis	Clinical Professor, Radiology/Nuclear Medicine, Department Head Environmental Health, Safety and Security Services. Director of Emergency Preparedness UCDHS Director of UCD & UCDHS Health Physics Programs
2004- Present	UC Davis Health System (UCDHS includes the UC Davis Medical Center, Primary Care Network and School of Medicine. University of California, Davis	Associate Chair of Radiology 2016-18 Assistant Chair of Radiology 2014-16 (Radiation Biology & Medical Health Physics) Clinical Professor, Radiology/Nuclear Medicine, and Clinical Professor Radiation Oncology 2004--Present Department Head Environmental Health, Safety and Security Services. Director of Emergency Preparedness UCDHS 2004-2018 Director of UCD & UCDHS Medical/Health Physics Programs (Director Emeritus 2018) Asst. Director, Hospital Division of Administrative and Professional Services 2007-2018

Honors, Awards, Appointments: Please list honors, awards or appointments and dates received.

2018 Chancellor's Emeritus Appointment
2017 Appointment Vice-Chair: American Board of Medical Physics
2016 John C. Christiansen Distinguished Alumnus award, Purdue University School of Health Sciences.
2016 Appointment, Associate-Chair, Department of Radiology
2014 Elected fellow of the Health Physics Society
2014 *Warren K. Sinclair Medal for Excellence in Radiation Science* by National Council on Radiation Protection & Measurements.
2012 Appointment to Board of Directors: American Board of Medical Physics
2012 Elected fellow of the American Association of Physicists in Medicine
2011 Appointment as NCRP Senior Vice-President and Chairman of the Board
2007 Appointment U.S. expert delegation to the international scientific community on Scientific and Technical Issues for Mobile Communication Systems established by the Federal Communications Commission
2005 Appointment as Scientific Vice-President and Director of NCRP
2004 Appointment as radiation and nuclear Subject Matter Expert, Office of WMD Operations and Incident Management Science and Technology Directorate, U.S. Department of Homeland Security
2002 Elected to Council NCRP
2001 Appointment to International Council on Man and Radiation (COMAR)
2000 University of California, Davis Health System Director's Award for Excellence and Achievement
1998 Elected to International Council on Electromagnetic Safety (ICES)
1981 Jenkins Research Award, Purdue University, Department of Bionucleonics
1980 Sigma Xi, National Research Honorary
1980 Phi Kappa Phi, National Academic Honorary
1979 National Research Service Award, U. S. Department of Health, Education and Welfare
1979 National Training Fellowship, U. S. Department of Energy, Yale University and Mayo Clinic
1978 Eta Sigma Gamma, National Professional Honorary in Health Sciences

C. Selected Peer-reviewed Publications

Bushberg, J.T.; Chou, C.K.; Foster, et al. IEEE Committee on Man and Radiation—COMAR Technical Information Statement: Health and Safety Issues Concerning Exposure of the General Public to Electromagnetic Energy from 5G Wireless Communications Networks, Health Physics- Volume 119 - Issue 2 - p 236-246, 2020

Bailey WH; Bodemann R; Bushberg JT, et al. Synopsis of IEEE Std C95.1TM-2019 "IEEE Standard for Safety Levels With Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz"; IEEE Access (Volume: 7) 171346 – 171356, 2019.
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8910342

Kase K, Bushberg J., Mettler F., Summary of NCRP 2019 Annual Meeting, NCRP Meeting the Challenge at 90: Providing Best Answers to Your Most Pressing Questions About Radiation March 2020Health physics 118(4):335-348

Bushberg JT., Tupin JR (2017). RF Safety analysis of a novel ultra-wideband fetal monitoring system. Health Phys. 112(5):478–485.

McCullough CH, Bushberg JT, Fletcher, JG, Eckel LJ (2015). Answers to common questions about the use and safety of CT scans. Mayo Clin Proc. 90(10):1380-1392.

Bushberg JT. Eleventh Annual Warren K. Sinclair keynote address: Science, Radiation Protection and NCRP: building on the past, looking to the future. Health Phys 108(2):115–123; 2015.

Bushberg JT, Foster KR, Hatfield JB, et al. IEEE Committee on Man and Radiation—COMAR Technical Information Statement Radiofrequency Safety and Utility Smart Meters Health Phys 108 (3); 2015

Balter, S, Bushberg J, Chambers C, et al. Outline of Administrative Policies for Quality Assurance and Peer Review of Tissue Reactions Associated with Fluoroscopically-Guided Interventions NCRP Statement No. 11, December 31, 2014 http://ncrponline.org/wpcontent/themes/ncrp/PDFs/Statement_11.pdf

Sierzenski, P, Linton, O, Amis S, Courtney D, Larson A, Mahesh M, Novelline R, Frush D, Mettler F, Timins J, Tenforde T, Boice J, Brink J, Bushberg J, Schauer, D., Applications of Justification and Optimization in Medical Imaging: Examples of Clinical Guidance for Computed Tomography Use in Emergency Medicine J Am Coll Radiol 2014;11:36-44.

Cagnon, C, Boone J, Bushberg J, et al. Radiation Dose from Airport Scanners Report of AAPM Task Group 217 American Association of Physicists in Medicine, ISBN: 978-1-936366-24-88 http://www.aapm.org/pubs/reports/RPT_217.pdf., 2013

Schauer, DA, Bushberg JT, Balter S, Brink JA. Medical Exposure to Ionizing Radiation: Important Developments Since NCRP Report 160. In: Advances in Medical Physics 2006, Anthony Wolbarst, et al, (Eds.), Medical Physics Publishing Madison, Wisconsin, 2012.

Badawi RD, Kroger LA , Bushberg JT. Essential Science of Nuclear Radiology. In: Brant WE and Helms CA (Eds.), Fundamentals of Diagnostic Radiology 4th Ed. Lippincott, Williams and Wilkins, Philadelphia, PA, 2012

Bushberg JT Radiation Injury, In: The Merck Manual 19th Edition., Merck Research Laboratories, Division Of Merck & Co., Inc. Whitehouse Station, NJ, 2011.

COMAR Technical Information Statement: Expert Reviews on Potential Health Effects of Radiofrequency Electromagnetic Fields and Comments on the BioInitiative Report. Health Physics 97(4):348-356, 2009

Bushberg, JT, Kroger, LA, Hartman, M, Leidholdt, Jr, EM, Miller,K, Derlet, R, Wraa, C. Nuclear/Radiological Terrorism: Emergency Department Management of Radiation Casualties, Journal of Emergency Medicine, Vol. 32, No. 1, pp. 71–85, 2007.

Bassen H, Schaefer DJ, Zaremba L, Bushberg J, Ziskin M, Foster KR. IEEE Committee On Man And Radiation (COMAR) technical information statement: Exposure of medical personnel to electromagnetic fields from open magnetic resonance imaging systems, Health Phys. 2005 Dec;89 (6):684-689.

Bushberg, JT. The AAPM/RSNA physics tutorial for residents. X-ray interactions. Radiographics, 1998 Mar-Apr, 2):457-68.

Bushberg, JT. Radiodosimetry in nuclear medicine. Western Journal of Medicine, 1996 Nov, 165(5):301.

Krag DN, Ford P, Smith L, Bushberg JT. Clinical immunoscintigraphy of recurrent ovarian cancer with In-111-CYT-103. Archives of Surgery 1993; 128: p. 819-823.

Cagnon CH, Benedict SH, Mankovich NJ, Bushberg JT, Whiting J, Seibert AJ. An investigation of exposure rates in high level fluoroscopy for image enhancement. Radiology 1991: 178: p. 643-646

Bushberg JT. Medical response and management of radiation accidents. IAEA/RCA Proceedings. ISBN 9588631/7/2: Mar 1988.p. 249-264.

Downing D, Aburano T, Bushberg J, Hoffer P. The effect of methylene diphosphonate on the tissue distribution of gallium-67. Journal of Nuclear Medicine 1985, 26(10):1202-1205.

Weiner RE, Schreiber GJ, Hoffer PB, Bushberg JT. Compounds which mediate Ga-67 transfer from lactoferrin to ferritin. Journal of Nuclear Medicine 26:908-916.

Bushberg JT, Hoffer PB, Schreiber GJ, Lawson AJ, Lawson JP, Lord P. Comparative uptake of Ga-67 and Tc-99m MDP in a benign noninfected bone lesion (fracture). Investigative Radiology 1985, 20(4):498-503.

Lipton MJ, Doherty PW, Goodwin DA, Bushberg JT, Prager R, Meares CF. Evaluation of catheter thrombogenicity in vivo with Indium-labeled platelets. 1980, Radiology 135:191-194.

Hoffer PB, Samuel A, Bushberg JT, Thakur ML. Deferoxamine Mesylate (Desferal): a contrast-enhancing agent for gallium-67 imaging. Radiology 1979 131:775-779.

Hoffer PB, Samuel A, Bushberg, JT, Thakur M. Effect of deferoxamine on tissue and tumor retention of gallium-67: concise communication. Journal of Nuclear Medicine1979, 20:248-251.

Goodwin DA, Bushberg JT, Doherty PW, Lipton MJ, Conley FK, Diamanti CI, Meares CF. Indium-111-labeled autologous platelets for location of vascular thrombi in humans. 1978, Journal of Nuclear Medicine 19(6):626-634.

Form Approved
OMB Control Number 0920-1132
Expiration Date: 10/31/2022

Attachment G
PERFORMANCE PROGRESS and MONITORING REPORT
OFR Risk Questionnaire

Risk Questionnaire

Instructions: Prior to making an award, the Centers for Disease Control (CDC) evaluates the degree of risk posed by an applicant.

In filling out the Risk Questionnaire, each question should be answered as completely as possible, using extra pages if necessary. Please return your completed questionnaire to [Name of Contact].

General Information

Legal Name of Organization	National Council on Radiation Protection and Measurements
In which country (or countries) does your organization propose to operate for this NOFO? Please list all separated by commas.	United States
In which country is the headquarters or general office of your organization located?	United States
Please identify what type of organization you are (non-profit, for-profit, educational institution, other)?	Non-profit organization
Is your organization incorporated or legally registered?	Yes If not, please explain:

Operational Risk

Personnel	Does your organization have a President/Director/Chief Executive Officer and Chief Financial Officer?	Yes If not, please explain:
	Does your organization have written human resource (HR) policies and procedures?	Yes, enclosed If not, please explain:
	List the number of employees within your organization.	Full Time Employees [redacted] (b)(4) Part-time Employees: [redacted] (b)(4) Volunteers: [redacted]
Programmatic Performance	Has your organization managed U.S. Government grants or cooperative agreements within the last 36 months?	Received CDC grant within the last 3 years

Financial Risk

Accounting System	Does your organization have written accounting policies and procedures?	[redacted] (b)(4) Explanation:
	Can your accounting records separate the receipts and payments of a federal grant from the receipts and payments of your organization's other activities?	[redacted] (b)(4)
	Can your accounting records summarize expenditures from a federal grant according to different budget categories such as salaries, rent, supplies and equipment?	
Internal Controls	Does your organization have systems, policies, and procedures for tracking and approving hours worked by employees, contractors, and volunteers?	
	Does your organization have internal controls and anti-corruption ethics codes that are emphasized by leadership?	
	Does your organization have written project management policies, procedures, and systems?	If no, please provide an explanation:
	Is your organization familiar with U.S. government regulations concerning costs which can be charged to U.S. grants (Title 2, U.S. Code of Federal Regulations, Part 200, Subpart E)?	
Cash Management	Does your organization have a bank account registered in its name and that is capable of segregating grant funds from other funds?	If not, please explain how you plan to manage funds from a potential award?
Going Concern	What percent of your organization's capital is from federal funding? (percentage = total federal funding in previous FY/ organization's annual gross revenue in previous FY)	[redacted] (b)(4)
	What is the dollar amount of your total current assets? (i.e. cash and other assets that are expected to be converted to cash within the next twelve months)	$ [redacted] (b)(4)
	What is the dollar amount of your total current liabilities? (i.e. amounts due to be paid to creditors within the next twelve months)	$
	What is the dollar amount of your total debt?	$
	What is the dollar amount of your total assets? (e.g. cash, fixed assets, accounts receivable, etc.)	$

Compliance Risk

Audit	Does your organization have regular independent audits that you contract and pay for?	Yes
	If yes, who performs the audit?	Councilor, Buchanan and Mitchell (CBM)
	What was the date of the most recent audit and what was the result?	Date: 06/19/2020 Opinion: YE2019 audit: No significant deficiencies. Determined to

RESET SAVE PRINT EMAIL

From: Jerrold Bushberg
Sent: Tue, 8 Dec 2020 17:50:39 +0000
To: Dynlacht, Joseph R; Gayle Woloschak; Ansari, Armin (CDC/DDNID/NCEH/DEHSP)
Cc: Kathy Held
Subject: Re: any impressions from the NAS report on RF exposures

Dr Savitz is an epidemiologist whose primary work has been evaluating potential biological of ELF Electromagnetic fields from power Transmission lines. He’s not particularly well-versed in biological fax at RF or microwave frequencies
Jerrold Bushberg PhD
Chair, Board of Directors
Senior Vice-President
NCRP
From: Dynlacht, Joseph R <jdynlach@iupui.edu>

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

Background

This subject is controversial and has generated strong views among some members of the public and even some individuals in the scientific community. This is, in no small part, due to the amount of poor-quality scientific research that has found its way into the literature over the years and that has been too often sensationalized by the media without adequate perspective or balance. Inaccurate and misleading information has been echoed on many activist websites, and the Center for Disease Control and Prevention (CDC) and others are concerned that it is seeding distrust and undermining confidence in federal health and safety standards set to protect the public from harmful levels of exposure to nonionizing radiation.

The emergence of millimeter-wave fifth-generation (5G) cellular networks into widespread usage has exacerbated the situation, attracting even more public attention and causing concern about potential health effects. While concern is to be expected, and the public is entitled to information on what is and is not known regarding such exposures, the hyperbole and misinformation (especially on some activist websites) on this subject are not helpful in enabling the public to be informed and make evidence-based decisions regarding policy.

Scope

The scope will focus on the telecommunications sector of nonionizing radiation, but there will also be information on extremely low frequencies. Optical, laser, and ultraviolet will not be addressed in this current effort. This project would take advantage of the relationships of Council members who have had previous collaborations with other expert organizations such as the Institute of Electrical and Electronics Engineers/International Committee on Electromagnetic Safety, the World Health Organization, and the International Commission on Non-Ionizing Radiation Protection. All these organizations have prepared some excellent material in this area. In addition, the advancements made in the science of risk communication would be incorporated with the assistance from PAC 7 to help with the communication of often complex and controversial topics. Some of the topics to be addressed would include issues such as the controversy and relevance of low-level nonthermal (*i.e.*, other than thermal effects) biological effects as they relate to emissions from wireless technology and the methodology used to establishment RF safety standards. The intent is to provide an unbiased, authoritative resource for those with a need to communicate effectively about the safety of nonionizing radiation.

Membership

 David A. Savitz , Chair

 Manuela Buonanno

 Gregory Durgin

 Randall N. Hyer

 Martha S. Linet

 Donald L. Miller

 Michael D. O'Hara

 David B. Richardson

 Martin Röösli

 Vijayalaxmi

Back To Top

Last modified: February 24, 2022

Feature Publication

National Council on Radiation Protection and Measurements

Non-Ionizing Radiation Website
January 2023 Status

Q1 Accomplishments:

Website Development:

- Designed and fine-tuned mockups for:
  - Landing Page (Desktop + Mobile)
  - Get the Facts - FAQs (Desktop + Mobile)
  - Resources (Mobile)
- Created content types for:
  - Resources
  - Get the Facts
- Implemented designs for:
  - Get the Facts (Desktop)
  - About Us (Mobile)

Content Development:

- FAQs:
  - Assigned FAQs to specific committee members and consolidated answers
  - First 15 answers complete (ready to publish)
- Science of EMF:
  - Developed background on electromagnetic radiation
  - Developed background on how cell phones use EMF
- Research:
  - Received description about Epidemiology
  - In Vivo research assigned to Vijay
  - Reviewed video resources

National Council on Radiation Protection and Measurements

Non-Ionizing Radiation Website
April 2023 Status

Q2 Projections:

Website Development:

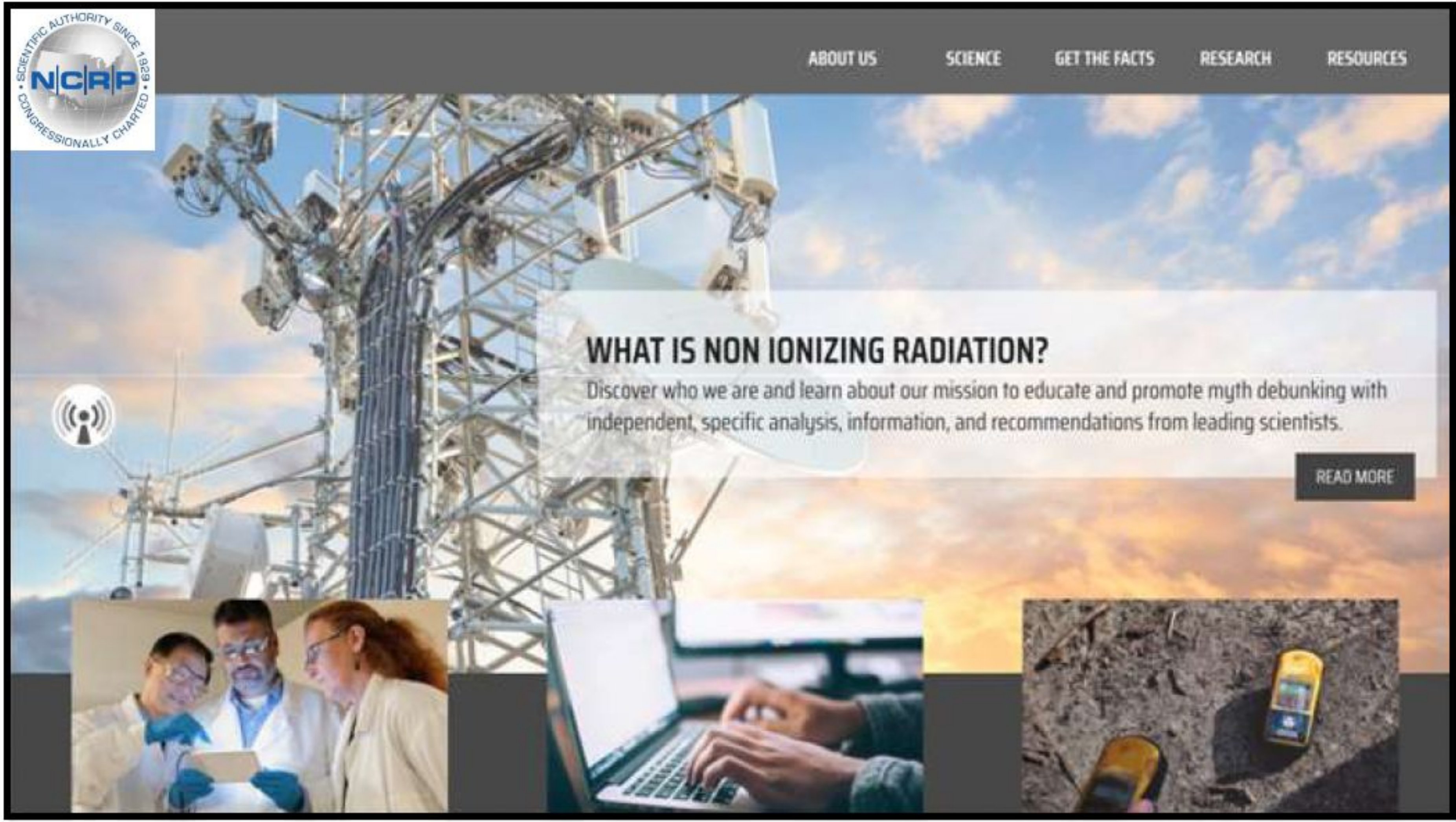
- Get the Facts
  - Create template and implement design (Mobile)
- Landing Page
  - Create template and implement design
- Resources
  - Create template and implement design
- Science
  - Create wireframes and mockups
  - Create content types
- Continue logo development

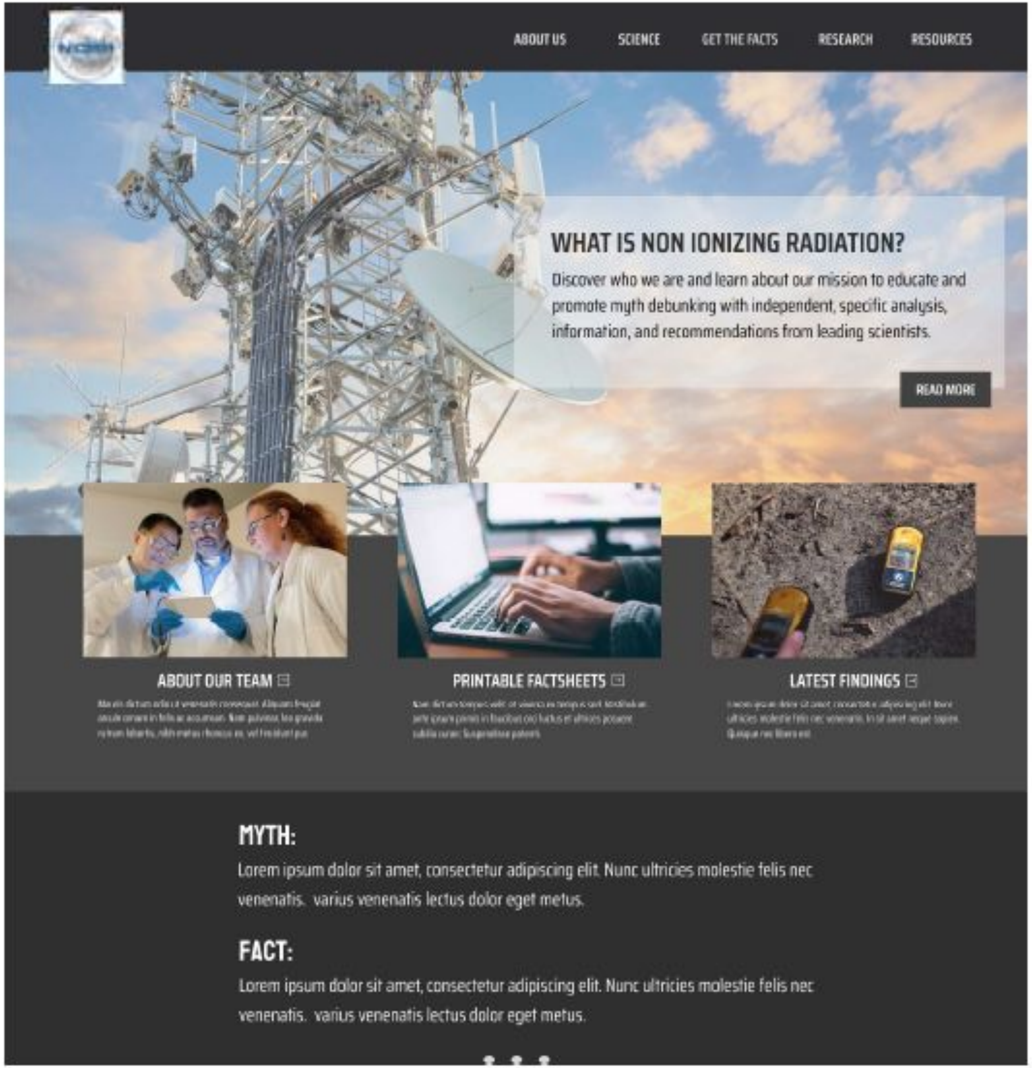
Out for Committee Review:

- Science of EMF:
  - Background on Electromagnetic Radiation and How cell phones use EMF

Editing & Developing:

- Research Sections:
  - Continue editing descriptions for Epidemiology and In Vivo research
- FAQs Section:
  - Review any additional answers from committee
- Science of EMF Section
  - Background on Non-Ionizing Radiation and Radio Frequency


SCIENTIFIC AUTHORITY SINCE 1929
NCRP
CONGRESSIONALLY CHARTED
ABOUT US
SCIENCE
GET THE FACTS
RESEARCH
RESOURCES
WHAT IS NON IONIZING RADIATION?
Discover who we are and learn about our mission to educate and promote myth debunking with independent, specific analysis, information, and recommendations from leading scientists.
READ MORE



MYTH vs FACT

IS CELL PHONE USE HARMFUL?

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ARE YOU BEING EXPOSED TO RADIATION?

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Frequently Asked Questions:

Do cell phones cause cancer?

People are concerned about whether radiation emitted by cell phones may cause brain and central nervous system cancers. Cell phones emit non-ionizing radiation (low energy) which is a completely different energy than ionizing radiation, the latter found to increase risks of these cancers. Research carried out over many years by different experts in multiple countries using the best designed scientific studies in very large numbers of people show no consistent increase in malignant or benign brain and central nervous system cancers in adults or in children who are heavy users of cell phones. Although the number of cell phone users have greatly increased from the mid-1990s to the present time, the occurrence of these cancers has not increased which again indicate that cell phone use is not related to these cancers.

What we know about cell phones and cancer

- What about cognitive, sleep, or other disorders?
- Is it safe to live near a cell site?
- Are my children at risk for exposure to EMF because they live, play, or attend school near a power station/cell phone tower/power transmission lines?
- Will the new 5G cell tower base station affect me?
- Do more cell towers imply more exposure?
- Is it safe if there is a base station antenna across the street/at the same height from my apartment window?
- How does modulation or pulsed RF energy affect exposure or health outcomes?
- Are children more sensitive for EMF?
- My child sleeps next to their phone, is this affecting them?
- Is it true that exposure to microwave radiation from the use of AirPods is greater than that from cell phones?
- How does wireless exposure affect a pregnant mother or her fetus?
- What are the regulations in other countries?

OUR RESOURCES

WE ENCOURAGE KNOWLEDGE SHARING. SPREAD THE WORD.

Printable Posters & Factsheets

World Health Organization:

Key facts about electromagnetic fields and public health: mobile phones. "Are there any health effects?

Ionizing radiation, health effects and protective measures

Federal Communications Commission:

Wireless Devices and Health Concerns

Human Exposure to Radio Frequency Fields: Guidelines for Cellular Antenna Sites

Infographics

From: Jerrold Bushberg <jerrold.bushberg@ncrponline.org>
Sent: Monday, October 18, 2021 2:51 PM
To: Kathy Held <Kathy.Held@ncrponline.org>; Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <asa4@cdc.gov>
Subject: Re: Avocados

Armin:

Would it be a conflict of interest to have you on the SC 8.1 committee for NI Radiation. Your experience would certainly be an asset

Jerrold Bushberg PhD

Chair, Board of Directors

Senior Vice-President

NCRP

INSIDE HAB: WHO WE ARE

The Hass Avocado Board (HAB) exists to help make avocados America's most popular fruit.

HAB is the only avocado organization that equips the entire global industry for success by collecting, focusing and distributing investments to maintain and expand demand for avocados in the United States.

HAB provides the industry with consolidated supply and market data, conducts nutrition research, educates health professionals, and brings people together from all corners of the industry to collectively work towards growth that benefits everyone. The organization also collects and reallocates funds to California and importer associations to benefit specific countries of origin in promoting their avocado brands to customers and consumers across the United States.

Inside HAB

From: Ansari, Armin (CDC/DDNID/NCEH/DEHSP)
Sent: Mon, 18 Oct 2021 18:56:42 +0000
To: Jerrold Bushberg; Kathy Held
Subject: RE: Avocados

If I participate as an "observer" I don't think there will be any issues. I participated as observer for SC 1-26 also.

From: Jerrold Bushberg <jerrold.bushberg@ncrponline.org>
Sent: Monday, October 18, 2021 2:51 PM
To: Kathy Held <Kathy.Held@ncrponline.org>; Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <asa4@cdc.gov>
Subject: Re: Avocados

Good one. BTW. Would it be a conflict of interest to have you on the SC 8.1 committee for NI Radiation. Your experience would certainly be an asset

Jerrold Bushberg PhD
Chair, Board of Directors
Senior Vice-President
NCRP

From: Ansari, Armin (CDC/DDNID/NCEH/DEHSP)
Sent: Tue, 19 May 2020 14:45:34 +0000
To: Laura Atwell; Christine Donahue; Donald Miller; Miller, Donald (FDA/CDRH); Kathy Held; Whicker, J; Jerrold Bushberg; jess.wieder; Lanza, John J; Bernstein, Jonine L./Epidemiology-Biostatistics; Dauer, Lawrence/Medical Physics; Michael Story; Boyd, Mike; Wes Bolch
Subject: RE: New member for Advisory Panel on Nonionizing Radiation - vote required

Approve.

Armin Ansari

From: Laura Atwell <laura.atwell@ncrponline.org>
Sent: Tuesday, May 19, 2020 10:20 AM
To: Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <asa4@cdc.gov>; Christine Donahue (b)(6)>; Donald Miller (b)(6) Miller, Donald (FDA/CDRH) <Donald.Miller@fda.hhs.gov>; Kathy Held <Kathy.Held@ncrponline.org>; Whicker, J <whicker_jeffrey_j@lanl.gov>; Jerrold Bushberg <jerrold.bushberg@ncrponline.org>; jess.wieder (b)(6)>; Lanza, John J <johnj.lanza@flhealth.gov>; Bernstein, Jonine L./Epidemiology-Biostatistics <BernsteJ@mskcc.org>; Dauer, Lawrence/Medical Physics <dauerl@mskcc.org>; Michael Story <michael.story@utsw.edu>; Boyd, Mike <boyd.mike@epa.gov>; Wes Bolch <wbolch@ufl.edu>
Subject: New member for Advisory Panel on Nonionizing Radiation - vote required

Dear all,

Dr. Bushberg would like to add Dr. Vijayalaxmi to the Advisory Panel on Nonionizing Radiation. His CV is attached. We are seeking Board approval for this action.

Please return this email with your vote of approve, disapprove or abstain as soon as possible.
Thanks.

Laura Atwell
Director of Operations
7910 Woodmont Avenue, Suite 400
Bethesda, MD 20814-3095
Email: atwell@ncrponline.org
voice: 301.657.2652
fax: 301.560.8005
http://NCRPonline.org

From: Savitz, David <david_savitz@brown.edu>
Sent: Monday, October 18, 2021 3:52 PM
To: Jerrold Bushberg <jerrold.bushberg@ncrponline.org>
Cc: Kathy Held <Kathy.Held@ncrponline.org>; Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <aansari@cdc.gov>
Subject: Re: Avocados

Thanks, Jerry -- Armin, I'm new to NCRP but infer that "observer" is something different than "member" -- but maybe that's a technicality. It would be great to have your help in crafting the questions and answers to address, in either case.

David

On Mon, Oct 18, 2021 at 3:27 PM Jerrold Bushberg <jerrold.bushberg@ncrponline.org> wrote:

Great. Thanks. I'll let Dr Savitz know by copy of this email

Jerrold Bushberg PhD

Chair, Board of Directors

Senior Vice-President

NCRP

From: John Boice [redacted] (b)(6) >
Sent: Saturday, August 1, 2020 2:01 PM
To: Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <asa4@cdc.gov>
Subject: "Possible" new funding for MPS and the NCREB

I've been attempting a few new initiatives for obtaining additional funding for the Million Person Study (and of course our National Center for Radiation Epidemiology and Biology).

I've contacted DTRA (attached is our atomic vets paper which they appreciated), and Paul Blake sent a complimentary article in Forbes (attached). Paul said he'd get back, but that funding and budgets remain uncertain.

Most recently, and FYI, Admiral Mies wanted to help and he sent out a global email to many of his high-level contacts (government agency directors, lab directors, university regents, private companies, NTI and NNSA and more). He attached a new "information sheet" I prepared for his use with the help of John Till and Larry Dauer (attached).

I really don't know whether we'll have any positive responses, but if there are, I have been thinking about where the funds might be "provided": Vanderbilt, NCRP or CDC Foundation.

So, the heads up question would be, IF a non-government group wishes to provide resources to CDC Foundation, is this still an avenue open for us? I'm assuming that a government agency, for example a national laboratory, would not be able to provide funds to CDC Foundation.

With best wishes,

John

From: John Boice
Sent: Sat, 1 Aug 2020 19:49:04 -0400
To: Ansari, Armin (CDC/DDNID/NCEH/DEHSP)
Subject: Re: "Possible" new funding for MPS and the NCREB

Hi Armin

Thanks! Who knows... if we keep knocking on lots of doors a few may open!
And glad to know that the CDCF mechanism is still viable.

Best wishes
John

On Sat, Aug 1, 2020 at 7:19 PM Ansari, Armin (CDC/DDNID/NCEH/DEHSP)
<asa4@cdc.gov> wrote:

Hi John,

It's great to know there is hope to get additional funding and any possible door is getting knocked in!

In response to your question, ABSOLUTELY! While the CDCF is not actively pursuing funding for MPS, the mechanism is still there if a donor wants to contribute.

I need to ask about any government source of funding. I am not sure about it, but I will ask.

Best,

Armin

From: John Boice (b)(6)
Sent: Monday, January 20, 2020 12:47 PM
To: Ansari, Armin (CDC/DDNID/NCEH/DEHSP) <asa4@cdc.gov>
Subject: NDI costs potentially free since CDC funded_MPS Workshop_Flight dosimetry

Hi Armin

Here are eclectic 3 items. I'm immersed in NASA and MPS stuff but wanted to send you these items FYI and to consider...

1. The attached NIH/CDC announcements says that **NDI costs would be covered for qualified NIH investigators**. I think we qualify... And we'll pursue for clarification ... But perhaps you've heard of this. I think "CDC-supported investigator" should qualify as "NIH-supported investigator".

"NIH-supported investigators" refers to extramural investigators actively funded by the NIH, contract investigators working under an active contract with the
NIH, and intramural researchers employed by the NIH.

CDC provides NCRP a grant No. 5 NUE1EH001315-04-00
Title Radiation Protection Guidance from NCRP Related to Public Health

This would be an incredible cost savings since each time we go to NDI it's ~$5 per person... We have several hundred thousands remaining!

2. Your grant with us covers dosimetry for the MPS. **We have workshops 3 times per year**. I just invited NASA and they decided to come - Steve Blattnig. It's Feb 12-14 in Oak Ridge. I know about your reducing travel but wanted to give you an option to attend or listen. I've attached last years agenda... this year will be about the same. If of interest, I'll ask Ashley Golden to arrange.

3. Remember that your grant included **dosimetry for flight crew** but was put on hold to do more on emergency response and new NCRP committee set up. If I could get cost sharing from say NASA, would this still be of interest, *small* cost sharing? Or no longer of interest? The Annual Meeting is the catalyst for me since I saw so many of the potential committee members speaking!

4. Any news on CDCF ?

Best wishes

John

Dr. Jerrold Bushberg Industry Ties

2002: Cellular one promotional video featuring Dr. Jerrold Bushberg

Planning Commission. "Dr. Jerrold Bushberg of the University of California, Davis, reassured the public on behalf of Pacific Telesis."
2004: Santa Rosa Singular Wireless
2006: Bidwell Park CA playground for Crown Castle
2006: Fountain Valley, T-Mobile Antennas
2007: Pasadena Star
2007: Palos Verdas Crown Castle
2007: East Whittier school board- Consultant for T Mobile
2008: Oceanside CA for PlanCom Inc- AT&T antennas
2009: Huntington Beach T Mobile
2009: Tonto Hills for NewPath Networks LLC
2010: Paradise Valley AZ for NewPath Networks
2011 Lakeport City Council- retained by PG and E
2011: City of Davis CA for Crown Castle
2012: Mira Mesa (seems to be At and T)
2013 Santa Barbara Crown Castle
2013 Santa Fe AT & T
2014: San Marcos "**Jerrold Bushberg**, AT&T RF expert"
2014: Los Angeles CA RICS Project
2014: City of Tracy CA for AT&T
2014 Town of Ross CA Crown Castle Sprint
2015: Oakland CA Crown Castle
2015: letter to Morgan Hunt of Crown Castle
2015: San Francisco CA for Crown Castle
2016:Oakland CA Crown Castle (page 37 of 66), Sept 7 2016
2016: Oakland CA for Crown Castle, *May 4, 2016*
2018: Millbrae, CA for Verizon
2018: Palo Alto ARCHITECTURAL REVIEW BOARD MINUTES: December 6, 2018
"I am a consultant retained by Crown Castle to do the analysis that's before you, and was reviewed by outside counsel, or outside experts."
2018: Hillsborough for Crown Castle
2019: Los Altos CA
2019: Palo Alto CA for Crown Castle, Verizon
2020: Bushberg presented an "Introduction to Potential Health Considerations of 5G Networks" at the Beverly Hills California Health and Safety Commission Meeting on February 24, 2020 and referenced the RFIWG *despite the fact that it is defunct* (See Agenda, Watch video, See full transcript).
2021: Hillsborough for Crown Castle
2022: Napa Valley,CA "for Applicant", Link to Meeting Video
2022: Testifying. to New Hampshire Lawmakers on behalf of wireless industry