

Radioactive Sources: Applications and Alternative Technologies

Committee

Thomas K. Kroc

Chair

Thomas K. Kroc, Ph.D., is an Applications Physicist III at the Fermi National Accelerator Laboratory (Fermilab). He presented on electron beam and x-ray medical device sterilization to the FDA General Hospital and Personal Use Devices Panel of the Medical Devices Advisory Committee Meeting in November 2019. He organized a workshop on Medical Device Sterilization to promote the use of electron beams and x-rays held at Fermilab in September of 2019. He was a member of the Non-Isotopic Alternative Technologies Working Group which released a white paper on Non-Isotopic Alternative Technologies in 2019. He was the lead author of a white paper, "Accelerator-driven Medical Sterilization to Replace Co-60 Sources," that was written for the NNSA in 2017. He was a member of the organizing committee of a joint DOE/NCI Workshop on Ion Beam Therapy in January of 2013. For 20 years he worked with the Neutron Therapy Facility at Fermilab which provided external beam radiation therapy for cancer using fast neutrons. He assumed leadership of this program from 2008 until its closure in 2013. His interests include development of accelerator technologies, applications of accelerators and accelerator technologies, medical device sterilization, radiation/matter interactions, and medical physics. Dr. Kroc holds a Ph.D. in Physics (1989) from the University of Illinois at Urbana-Champaign. He earned his undergraduate degree in Engineering Physics (1981) from the Ohio State University.

Robert A. Bari

Member

Robert A. Bari, Ph.D., is senior scientist emeritus at Brookhaven National Laboratory. He has been involved in the design, safety, and security assessments of complex, high-technology facilities since he joined the applied programs at the laboratory in 1974. He has worked on projects and issues regarding nuclear safety, security and nonproliferation technologies, nuclear waste management, and development of advanced nuclear reactors and has directed numerous studies of advanced nuclear energy concepts. He has over 150 publications and has lectured widely on these topics. Dr. Bari is past (2002-2017) international co-chairman of the working group that has developed a comprehensive methodology for evaluation of proliferation resistance and physical protection of all new nuclear energy concepts being proposed within the multinational Generation IV International Forum. He received his Ph.D. in physics from Brandeis University and his B.S. in physics from Rutgers University. Dr. Bari has served as an adjunct faculty member and advisor to several major universities in the field of nuclear technology as well as on the Board of Directors of the American Nuclear Society (ANS). He is past president of the International Association for Probabilistic Safety Assessment and Management and past chairman of the ANS Consensus Standards Committee for Probabilistic Risk Assessment. He is now a member-at-large of the ANS Standards Board and a member of the Consensus Committee for Non-Reactor Nuclear Facility Standards. He was a member of the National Academies committee on "Lessons Learned from the Fukushima Nuclear Accident for Improving Safety and Security of U.S. Nuclear Plants." For his achievements in nuclear safety, Dr. Bari was awarded the Theo J. "Tommy" Thompson Award in 2003 by ANS. In 2004, he received the Brookhaven National Laboratory Award for Outstanding Achievement in Science and Technology. Dr. Bari was awarded membership in the Phi Beta Kappa, Sigma Xi, and Sigma Pi Sigma honor societies and is an elected fellow of ANS and of the American Physical Society.

Deborah W. Bruner

Member

Deborah W. Bruner, RN, Ph.D., FAAN, is Senior Vice President for Research at Emory University. Dr. Bruner is also Professor and Robert W. Woodruff Chair in Nursing, Professor of Radiation Oncology, and a member of the Winship Cancer Institute. She is an internationally renowned researcher and clinical trialist with a focus on patient reported outcomes, symptom management, and comparative effectiveness of radiotherapy modalities. Her global work includes currently leading a project to assist in preparing for opening the first modern radiotherapy in Ethiopia through 3D treatment planning and quality assurance. Dr. Bruner's leadership, especially in the National Cancer Institute sponsored National Clinical Trials Network transcends disciplines and has led to improved health and quality of life and decreased cost outcomes for those treated for cancer. She is a member of the National Academy of Medicine and has won numerous awards for research and mentorship. Dr. Bruner has been continuously funded since 1998 from sponsors including the American Cancer Society, Department of Defense, Oncology Nursing Society, State of Pennsylvania, National Institute of Nursing Research, National Cancer Institute, and the National Institutes of Health. She received her doctorate in nursing research, with a focus on outcomes research, at the University of Pennsylvania.

Hubert K. Foy

Member

Hubert K. Foy is founding director and senior research scientist of the African Centre for Science and International Security, headquartered in Accra, Ghana. Also, Mr. Foy is a consultant on issues of nuclear and radiological security in Africa to the International Atomic Energy Agency (IAEA) and US Department of Energy. Additionally, Mr. Foy is an Editorial Board Member and Professional Review Liaison for the International Journal for Nuclear Security. For a decade, Mr. Foy has published and spoken widely on nuclear nonproliferation and disarmament, nuclear and radiological security, space safety and security, and dual-use science and technology. The Bulletin of the Atomic Scientists has published some of his analysis on nuclear security, e.g., "Sustaining progress in nuclear security without the summits—an African view." The Space Safety Magazine has published some of his articles, e.g., "Building the World's First Automated Space Debris Tracker." In 2012, he was a nuclear security fellow at the International School on Nuclear Security in Trieste. In 2011, at the Norwegian Radiation Protection Authority, he was a technical nonproliferation and disarmament fellow for the UK-Norway Initiative. He is a member of the Fissile Material Working Group and Vice-Chair of WGIII of the IAEA International Nuclear Security Education Network. He is a member of the NTI Nuclear Security Index's International Panel of Experts. He holds a master's degree in space studies from the International Space University in France, a master's in international policy studies from the Middlebury Institute of International Studies at Monterey, and a Bachelor of Science in Physics and Computer Science from University of Buea in Cameroon.

Pamela J. Henderson

Member

Pamela J. Henderson retired from the U. S. Nuclear Regulatory Commission (NRC) in March 2017 after 25 years of service. She joined the NRC in 1991 as a Health Physicist in the Region I office. She held a number of progressively more responsible positions in the regional office including Branch Chief in the Division of Nuclear Materials Safety and Branch Chief in the Division of Reactor Safety. In November 2009, she completed the NRC Senior Executive Service Candidate Development Program and received certification of executive qualifications in March 2010. In July 2012, she moved to the NRC headquarters office and took the position of the Deputy Director in the Division of Materials Safety and State Agreements in the Office of Federal and State Materials and Environmental Management Programs. Prior to her tenure at the NRC, she was the Radiation Safety Officer at the University of California, Irvine Medical Center for 9 years. She received a Bachelor's degree in 1976 in Biology and Environmental Studies from Cedar Crest College (Allentown, Pennsylvania), a second Bachelor's degree in 1979 in Chemistry and Nuclear Medicine from Wagner College (Staten Island, New York), and a Master's degree in 1982 in Health Physics from the Georgia Institute of Technology (Atlanta, Georgia).

P. Andrew Karam

Member

Philip Andrew Karam, Ph.D., has been working in various aspects of radiation safety since joining the U.S. Navy's Nuclear Power Program in 1981. His work experience in this field is varied, including instructing naval students in reactor and propulsion plant operations, teaching at the Rochester Institute of Technology, managing the radiation safety program at the University of Rochester and Strong Memorial Hospital, helping to design and operate New York City's radiological and nuclear interdiction system, evaluating radiation safety and criticality safety programs at a uranium enrichment plant, and a great deal of consulting and training for a wide variety of clients. Directly relevant to the aims of this study, Dr. Karam participated in a city-wide audit of radioactive materials security among New York City, participated in an NYPD "red cell" exercise on radioactive materials security, managed the security for several high-activity radioactive sources at the University of Rochester and Strong Memorial Hospital, helped teach an Interpol course on cross-border smuggling of radioactive and nuclear materials, co-authored a booklet on practical aspects of radioactive materials security for the NYC Health Department, and participated in three missions for the International Atomic Energy Agency that included assessments of radioactive materials security in the nations visited. He holds a Ph.D. in Environmental Sciences from the Ohio State University.

Linda A. Kroger

Member

Linda A. Kroger, MS, is Assistant Clinical Professor of Radiology at the University of California (UC) Davis School of Medicine and has served as the Radiation Safety Officer for the UC Davis Health System for the past 17 years. Prior to her arrival at UC Davis, Ms. Kroger worked for private industry in biopharmacology research and drug development. She transitioned to cancer research when she joined UC Davis in 1988. From 1988 through 2000, her research focused on the development of new radiopharmaceuticals for both diagnostic imaging and treatment of non-Hodgkin's lymphoma and breast cancer. Since assuming her role as Radiation Safety Officer in 2003, she has focused on regulatory compliance, quality assurance issues as well as education of medical students, residents and fellows with the overall goal of improving workplace radiation safety. Ms. Kroger oversees the nonclinical aspects of nuclear medicine training for the radiology residency program at UC Davis. In addition, she has taken an interest in radiologic emergency preparedness. Ms. Kroger has authored or co-authored more than 50 peer-reviewed journal articles and has presented at numerous scientific conferences. She is active in the Health Physics Society including serving as president of the Medical Section as well as being an active participant on National Council for Radiation Protection and Measurements (NCRP) committees since 2005, co-author of two NCRP reports, and a member of the NCRP Council since 2016. Ms. Kroger received her Bachelor's degree and her Master's degree from Rutgers University and has been with UC Davis for 31 years.

Michael O. McWilliams

Member

Michael O. McWilliams, Ph.D., is professor emeritus of geological and environmental science at Stanford University. He began his career at Stanford in 1977 as a postdoctoral scientist and joined the Stanford faculty in 1980. His research specialities are geophysics and geochemistry as applied to earth science, particularly global tectonics, earth resources and isotope science. Apart from research leadership at Stanford, he has served in a variety of academic and government leadership and governance roles, including as Chief Executive of GNS Science [New Zealand], Chief of the CSIRO Division of Earth Science and Resource Engineering [Australia], and Director of the John DeLaeter Centre of Isotope Science. Most recently, Dr. McWilliams built CSIRO's Deep Earth Imaging Future Science Platform, aimed at helping discover future minerals, energy and water resources using new geophysical methods, advanced data analytics and mathematical techniques to provide better imagery of the subsurface from sparse, incomplete and noisy data. Dr. McWilliams received a Bachelor's degree in Physics from St. Lawrence University, an M.Sc. in Geophysics from the University of Toronto, and a Ph.D. in geophysics from the Australian National University.

Cathleen M. Roughan

Member

Cathleen (Kate) M. Roughan is the Team Leader, Disused Sealed Radioactive Sources Management (DSRS), Division of Nuclear Fuel Cycle and Waste Technology, IAEA, and is responsible for overseeing a team of professionals and assisting Member States of the IAEA with the safe, secure and sustainable management of DSRS. She has worked in preparing guidance documents, training courses, expert missions and has developed and implemented tools and technology for supporting proper end of life management options of DSRS (reuse, recycle, removal, storage, disposal and alternative technologies). Previously she was the Director, Regulatory Affairs and Quality Assurance for QSA-Global Inc in Burlington, Massachusetts (1983-2013), where she implemented the worldwide regulatory compliance program for the manufacture of sealed sources and devices used in industrial radiography, gauges and medical applications. This included obtaining and maintaining all necessary licenses and authorizations to manufacture, use, transport and dispose of radioactive sources and devices under the umbrella of the safety, quality assurance and security programs. Ms. Roughan received a BS in Biology from Southeastern Massachusetts University, Dartmouth, Massachusetts, and a MS in Radiological Health from University of Lowell, Lowell, Massachusetts.

Stephen J. Wagner

Member

Stephen J. Wagner, Ph.D., is senior director of the Transfusion Innovation Department of the American Red Cross's Holland Laboratory for the Biomedical Sciences in Rockville, Maryland. Dr. Wagner received the Daymon Runyon-Walter Winchell Fellowship Grant from the National Cancer Institute and the National Tiffany Award from the American Red Cross for outstanding technical achievement. Dr. Wagner has taught at Bowling Green State University and has been a member of the American Society for Microbiology, the American Society for Photobiology, the American Association of Blood Banks, the International Society for Blood Transfusion, and the American Society for Hematology. He served on the 2008 National Academies study, "Radiation Source: Use and Replacement." Dr. Wagner received his B.S. in chemistry from the University of Maryland, College Park, and his M.S. and Ph.D. in biophysics from the Pennsylvania State University.

David L. Weimer

Member

David L. Weimer, Ph.D., is the Edwin E. Witte Professor of Political Economy at University of Wisconsin-Madison. His research focuses broadly on policy craft and institutional design. Although most of his recent research has addressed issues in health policy, he has done policy-relevant research in the areas of energy security, natural resource policy, education, criminal justice, and research methods. In 2006, Weimer served as president of the Association for Public Policy Analysis and Management. In 2008, he was elected a Fellow of the National Academy of Public Administration, and in 2013, he served as president of the Society for Benefit-Cost Analysis. He is a faculty affiliate of UW-Madison's Center for Demography of Health and Aging. Dr. Weimer served on the 2008 National Academies study on Radiation Sources Use and Replacement. He earned a B.S. in engineering and applied science from the University of Rochester. He holds an MA in statistics, MPP, and Ph.D. in Public Policy, all earned from the University of California, Berkeley.

John A. Williamson

Member

John Williamson is the administrator of the Florida Bureau of Radiation Control's Environmental Radiation Programs. As such, he oversees statewide programs for radiological emergency response and training, the environmental radiation laboratory, environmental monitoring and surveillance for the phosphate mining industry and the nuclear power plants, inspection of radioactive low level waste shipments, calibration and repair of radiation detection instruments, and preventative radiological/nuclear detection. He is a member of the Conference of Radiation Control Program Directors (CRCPD), serving as the chair of the Task Force on Inter-Organizational Activities and serving on the Government Coordinating Council, Nuclear Sector representing CRCPD. He is also one of two Governor appointed Florida commissioners on the Southeast Low Level Radioactive Waste Compact, and currently serves as the vice-chair/chair elect of the Compact. Mr. Williamson serves as the Florida Governor's authorized representative for notification of Part 71, Part 73 and Part 37 shipments of radioactive material. His interests include development of the Radiation Response Volunteer Corps, improved security of radioactive material shipments and improvements in radiation emergency response. He has been with the bureau since 1992. Mr. Williamson holds a M.S. in Chemistry from the University of South Carolina (1989) and earned an undergraduate degree in chemistry from the University of Tampa in Tampa, Florida, in 1986.

Ourania Kosti

Staff Officer

Ourania (Rania) Kosti, Ph.D., is a Senior Program Officer at the Nuclear and Radiation Studies Board (NRSB) of the National Academies of Sciences, Engineering, and Medicine. Dr. Kosti's interests within the NRSB focus on radiation health effects, and she is the Principal Investigator for the National Academies' Radiation Effects Research Foundation Program that supports studies of the atomic bombing survivors in Japan. Prior to her current appointment, she was a postdoctoral fellow at the Lombardi Comprehensive Cancer Center at Georgetown University Hospital in Washington, DC, where she conducted research on biomarker development for early cancer detection using case-control epidemiological study designs. She focused primarily on prostate, breast, and liver cancers and trying to identify those individuals who are at high risk of developing malignancies. Dr. Kosti also trained at the National Cancer Institute (2005-2007). She received a B.S. in biochemistry from the University of Surrey, United Kingdom, an M.S. in molecular medicine from the University College London, and a Ph.D. in molecular endocrinology from St. Bartholomew's Hospital in London, United Kingdom.