

Invitation to Comment on Candidates for Multi-Agency Radiological Survey and Site Investigation Manual, Revision 2 (MARSSIM) Review
August 12, 2020

The EPA Science Advisory Board (SAB) Staff Office announced in a Federal Register Notice on May 14, 2020 (85 FR 28943 – 28944) that it was forming a panel to provide independent advice to EPA through the chartered SAB on the draft Multi-Agency Radiological Survey and Site Investigation Manual, Revision 2 by EPA’s Office and Air and Radiation.

To form the panel, the SAB Staff Office sought public nominations of experts to augment the SAB’s Radiation Advisory Committee (RAC) with extensive experience in environmental monitoring and sampling, geology, hydrogeology, measurement protocols for radionuclides, and statistics. Background information on the project and details on the nomination process appeared in the cited notice. Based on qualifications and interest, the SAB Staff Office identified the attached “List of Candidates.” Brief biographical sketches of the thirty-eight (38) candidates are listed below.

The SAB Staff Office Director makes the final decision about who will serve on the panel based on all relevant information. This includes a review of the candidate’s confidential financial disclosure form (EPA Form 3110-48 or Form 450) and an evaluation of a lack of impartiality. For the EPA SAB Staff Office, a balanced committee or panel is characterized by inclusion of candidates who possess the necessary domains of knowledge, the relevant scientific perspectives (which, among other factors, can be influenced by work history and affiliation), and the collective breadth of experience to adequately address the general charge. Specific criteria to be used in evaluating a candidate include: (a) scientific and/or technical expertise, knowledge, and experience (primary factors); (b) availability and willingness to serve; (c) absence of financial conflicts of interest; (d) absence of an appearance of a lack of impartiality; (e) skills working in committees, subcommittees and advisory panels; and (f) diversity of, and balance among scientific expertise and viewpoints for the panel as a whole.

We welcome information, analysis or documentation for the Staff Office to consider in evaluating the candidates. Please provide any comments you may have with respect to the candidates no later than September 2, 2020. Please submit your comments to the attention of Dr. Diana Wong, Designated Federal Officer at wong.diana-m@epa.gov. Please be advised that comments are subject to release under the Freedom of Information Act.

List of Candidates for Radiation Advisory Committee Augmented for MARSSIM (Rev 2) Review

Amundson, Sally A.

Columbia University

Dr. Sally A. Amundson is an Associate Professor of Radiation Oncology in the Center for Radiological Research at the Columbia University Medical Center in New York. She received her Ph.D. in Radiation Biology and Cancer Biology from the Harvard School of Public Health, and did postdoctoral work at the Los Alamos National Laboratory and in the Laboratory of Molecular Pharmacology at the National Cancer Institute (NCI), where she was an adjunct investigator in the National Cancer Institute's Radiation Epidemiology Branch. Her current research uses functional genomics approaches to study low dose radiation and bystander effects, unique effects of space radiation, and the development of gene expression approaches for radiation biodosimetry. Dr. Amundson is also co-director of the Center for High-Throughput Minimally Invasive Radiation Biodosimetry. She is currently funded by the National Institutes of Health (NIH), and has also received funding in the past from the Department of Energy, NASA, and the Biomedical Advanced Research and Development Authority. She has served on study sections for several NIH institutes, and as ad hoc reviewer for NIH, NASA, Health Canada, and the Wellcome Trust (UK). Dr. Amundson has been a member of the National Council on Radiation Protection and Measurements (NCRP) since 2004, and she has served on two National Academy of Science studies. She also served on the Science Advisory Committee of the Radiation Effects Research Foundation (RERF) in Hiroshima from 2009-2014, chairing the RERF scientific review for 2012. Dr. Amundson is an associate editor of Radiation Research. She is a recipient of the Michael Fry Research Award from the Radiation Research Society (RRS), and she has served as a member of the RRS Council.

Benke, Roland

Renaissance Code Development

Dr. Roland Benke is an entrepreneur, technology pioneer, and subject matter expert. He is certified by the American Board of Health Physics, holds a Ph.D. in Nuclear Engineering and Masters in Radiological Health Engineering from the University of Michigan, and is a partner of a successful software development company. From a nationwide call, Dr. Benke was selected from the private sector by the U.S. Department of Homeland Security and the National Nuclear Security Administration to receive specialized FEMA training for responding to major radiological incidents such as dirty bomb attacks and nuclear weapon strikes. Dr. Benke's advanced detection technologies and measurement techniques have been featured in R&D Magazine, customized by the Japan Atomic Energy Agency to detect radioactive hot spots from aerial drone surveys, selected by the U.S. Department of Defense for on-site demonstrations and interactions with NYPD Counterterrorism and the Port Authority of New York & New Jersey, and invited by the U.S. Department of Homeland Security for emerging technology briefings to the Domestic Nuclear Detection Office in Washington, DC. At the Center for Nuclear Waste Regulatory Analyses, he developed radiation detection and health physics guidance for the U.S. Nuclear Regulatory Commission involving MARSSIM and MARSAME. As principal investigator, Dr. Benke led a month-long fieldwork campaign at the Sunset Crater volcanic site involving more than six geologists and engineers collecting airborne particle measurements. He has facilitated and conducted irradiation experiments at domestic and international particle accelerators for the National Aeronautics and Space Administration, including computational radiation shielding assessments. Various federal, state, and local organizations have requested his service as a subject matter expert during simulated emergency response exercises. Dr. Benke served the Swedish Radiation Protection Authority as a subject matter expert in both the initial and main review phases of the safety assessment for a spent nuclear fuel repository in Sweden. He also enjoys lending his expertise as an associate editor of Health Physics, The Radiation Safety Journal, and serving the State of Texas as a member of the Nuclear Sector Working Group.

Cardarelli, Ronald

C. N. Associates, Inc.

Mr. Cardarelli is the owner and founder of C.N. Associates, Inc., a firm established in 1997 that provides radiation protection, remediation and decommissioning services. Mr. Cardarelli received a BS in Environmental Health from the University of Massachusetts at Amherst in 1979 and an MS in Radiation Science from Georgetown University in 1985. Mr. Cardarelli worked as a health physicist

for the Nuclear Regulatory Commission, NMSS Division in Washington DC, from 1982 to 1986, followed by a 12-year employment with Yankee Atomic Electric Company as a Senior Radiological Engineer. Since 1986, Mr. Cardarelli has authored numerous Electric Power Research Institute technical documents, several of which addressed the radiological decommissioning process, including the facilitation and chairing of industry guidelines addressing radiation and groundwater protection programs. Mr. Cardarelli also chaired and facilitated the development of a DOE guidance document for optimizing the use of PPE while performing radiological decommissioning activities. Mr. Cardarelli has recently been intimately involved in many decommissioning projects in the United States and abroad. CN's webpage, CNAssociates.net, lists several of the large organizations that have provided research funding and contracts to Mr. Cardarelli over the last 23 years. All research funding has been through EPRI with the exception of DOE in 1998-99, 2000 and 2003. Mr. Cardarelli has not received any current or recent research grant support from any entities.

Cullings, Harry M.

Radiation Effects Research Foundation (RERF)

Dr. Harry M. Cullings was Chief of the Statistics Department at the Radiation Effects Research Foundation (RERF) in Hiroshima and Nagasaki, Japan, until 2018 and is now a consultant to RERF. He has been conducting research at RERF since 1999. RERF is a public interest foundation funded by the Japanese Ministry of Health, Labour and Welfare (MHLW) and the U.S. Department of Energy (DOE). Dr. Cullings holds a B.S. in Fundamental Sciences from Lehigh University, and an M.S. in Medical Physics and Ph.D. in Analytical Health Sciences (Biometrics) from the University of Colorado Health Sciences Center in Denver, Colorado. He completed a postdoctoral fellowship in Radiation Sciences, funded by the U.S. Department of Energy (DOE) at the University of Pittsburgh. The emphasis of Dr. Cullings' research is on radiation dosimetry and other aspects of radiation epidemiology, including dosimetric uncertainty and applications of spatial statistics. Dr. Cullings has published numerous reports, papers in scientific journals, and book chapters on subjects related to radiation dosimetry and radiation health effects research. He served as a member of the Joint U.S.-Japan Working Group on the Reassessment of Atomic-bomb Dosimetry, which created the Dosimetry System 2002 that is currently in use at RERF. Dr. Cullings' research has been funded strictly through the Radiation Effects Research Foundation, in part through DOE award to the National Academy of Sciences. Dr. Cullings has received no external research funding from government agencies, private companies, or foundations.

Darois, Eric

RSCS Inc.

Mr. Darois is the executive director of RSCS, and a broad-based American Board of Health Physics-certified professional with more than 40 years of experience in various technical and managerial positions in nuclear power facilities, decommissioning sites, environmental laboratories, fuel fabrication facilities, naturally occurring radioactive material sites, medical and laboratory facilities, and other industrial sites. He has extensive experience in: alpha contamination controls, internal and external dosimetry, groundwater contamination investigations, neutron measurements, instrumentation, decommissioning cost estimation, and statistical analysis. He has authored many professional papers and presentations and provided expertise as a consultant and technical expert to many clients dealing with radiation exposures, radiation detection, and regulatory compliance for both US and international clients. He was the principal investigator for several nuclear industry [Electric Power Research Institute (EPRI)]-guidance documents relating to alpha contamination control programs and groundwater monitoring programs. He holds a B.S. in Radiological Health Physics (HP) and an M.S. in Radiological Sciences and Protection. He is a member of the Nuclear Energy Institute Radiation Protection, Environmental, and Radwaste Decommissioning Issues Task Group. Most of Mr. Darois' 40-plus years of professional experience has involved NRC activity, including oversight and technical review/approvals of License Termination Plans (LTP) and Final Status Survey (FSS) Packages for Energy Solution's Zion and La Cross decommissioning projects, review of characterization plans and dose modeling [i.e., Derived Concentration Guideline Levels (DCGLs)] for the Humboldt Bay and San Onofre Nuclear Generating Station decommissioning sites, participation in multiple NRC meetings for LTP RAI resolutions · all within the last 10 years. Mr. Darois provided oversight of RSCS staff performing radiological work and advanced LTP planning for the NSS, as well as delivering LTP/FSS training to the ship's staff. He served as an expert panel member on NRC's Advisory

Committee on Nuclear Waste.

Dauer, Lawrence

Memorial Sloan-Kettering Cancer Center

Dr. Lawrence T. Dauer is a medical health physicist specializing in radiation protection at Memorial Sloan Kettering Cancer Center. He holds appointments as Associate Attending Physicist in both the Department of Medical Physics and the Department Radiology and serves as the Radiation Safety Manager and Chair of the Emergency Management Committee. Dr. Dauer had almost three decades of experience in the field of radiation protection and health physics, including radiation protection programs for the energy and industrial sectors and operations and research in medical health physics. His current research interests are associated with low-level radiation risks, worker protection, and radiation protection in medicine. His research activities focus on radiation dosimetry, epidemiology, and novel techniques utilizing radioactive materials and radiation producing devices aimed at facilitating the translation of results into improved radiation protection practices that maximize medical benefits to patients while enabling the expansion of successful clinical and protection programs. Dr. Dauer earned a B.S. in Biology and Chemistry from Mount St. Mary College in NY, an M.S. in Health Physics from the Georgia Institute of Technology, and a Ph.D. in Adult Education from Capella University. He is a Diplomat of the American Board of Health Physics certified in comprehensive health physics and a Licensed Medical Physicist in New York State. He served as Chair of the Radiation Safety Committee of the American Association of Physicists in Medicine, President and Executive Council Member of the Medical Physics Section of the Health Physics Society, President of the Greater NY Chapter of the Health Physics Society, and Board Member of the Radiological and Medical Physics Society of NY. He served as member of the Institute of Medicine/National Academies Committee on Research Directions in Human Biological Effects of Low-Level Ionizing Radiation and has served as a consultant to the International Atomic Energy Agency (IAEA). He served as a member of the International Commission on Radiological Protection (ICRP) Committee 3–Radiation Protection in Medicine. He is currently a member of the Board of Directors and a Council member of the National Council on Radiation Protection and Measurements (NCRP), and a member of the Science Committee of the International Organization for Medical Physics (IOMP). To date, Dr. Dauer has received no external research funding from government agencies, private companies, or foundations.

DeVol, Timothy

Clemson University

Timothy A. DeVol, Ph.D., CHP, is the Toshiba Professor of Nuclear Engineering and the director of the Nuclear Environmental Engineering Sciences and Radioactive Waste Management Center at Clemson University. Dr. DeVol has been a professor in the Department of Environmental Engineering and Earth Sciences at Clemson University for over 25 years with primary teaching responsibilities in the areas of nuclear engineering and radiological sciences to include: radiation detection and measurement, environmental risk assessment, radioactive waste management and technical nuclear forensics. Dr. DeVol oversees the Accreditation Board for Engineering and Technology Applied and Natural Science Accreditation Commission accredited Environmental Health Physics educational program at Clemson University. Dr. DeVol's current research funding comes from the U.S. Department of Energy, the U.S. Department of Homeland Security, the Defense Threat Reduction Agency, North Atlantic Treaty Organization, and the U.S. Nuclear Regulatory Commission in the areas of radiological environmental measurements, environmental health physics, homeland security, nuclear forensics, and nuclear education. Dr. DeVol has over 80 refereed publications and over 220 presentations in the field of detection of radioactive materials. He holds three US patents on the development of methods and materials for the detection of radioactivity in the environment. Dr. DeVol was the recipient of the 2003 and the 2011 Clemson University Innovation awards and the 2004 Elda E. Anderson award from the Health Physics Society. He is a member of the American Nuclear Society, the Health Physics Society, and the Institute of Electrical and Electronics Engineering Society. Dr. DeVol is an American Board of Health Physics certified health physicist. Dr. DeVol is currently serving on the National Academies of Sciences, Engineering, and Medicine Review Committee on the Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation. Dr. DeVol holds an MS and a PhD in nuclear engineering from the University of Michigan, Ann Arbor, and a BS in engineering physics from Ohio State University, Columbus.

Fordham, Earl W.

Washington Department of Health

Mr. Earl Fordham, CHP, is the Deputy Director for the State of Washington Office of Radiation Protection. He is a Certified Health Physicist (most recently re-certified in 2012). He is also a professional engineer in the state of Washington (Mechanical Engineer). He has B.S. degrees in Mechanical Engineering from Washington State University and in Physics from the U.S. Naval Academy. As a public employee he is not actively engaged in research and receives no research funding. Mr. Fordham has received no external research funding from either government agencies, private companies, or foundations. His engineering work included the engineering design and specifications for a low-level radioactive waste processing facility that included shielding calculations and component integration. Additionally, he assisted in the state's performance assessment for the low-level radioactive waste disposal site on the Hanford Reservation. He has worked in the radiation industry since joining the active U.S. Navy and serving on board nuclear submarines in the 1980's. While serving in the Navy, Earl qualified as a Nuclear Engineer to oversee nuclear plant operations. His civilian career includes operations at the Fast Flux Test Facility in Washington, oversight of waste operations at the Hanford Low-Level Radioactive Waste disposal site and licensing & inspecting the processing of waste at a radioactive waste broker. While in these positions, he investigated and wrote several reports on numerous radioactive material incidents that utilized the practices and principles (e.g., dose reconstructions) critical to health physics. Recently he volunteered his time to the International Atomic Energy Agency in support of their work to develop safety cases (including safety assessments) for pre-disposal radioactive waste facilities. These week-long overseas missions require several hours of lecture preparations. While in-country Mr. Fordham typically gives 3-5 one-hour presentations to local experts and regulatory personnel. In 2002, Mr. Fordham became the Deputy Director for the state of Washington's radiation control program. He develops and coordinates critical policies with extensive impacts on state of Washington program operations. Through integration of his four work groups (environmental sciences, radioactive materials, waste management and radioactive air emissions) he develops state-wide policy ensuring the health and safety of the public. He has developed an extensive licensing and inspection Office policy for interactions with radioactive materials licensees. He assesses radiological events for public impact and dispatches personnel for observations and surveys. He represents the Department of Health on advisory committees including the Hanford Advisory Board and previously on the Agency for Toxic Substance & Disease Registry. He oversees a \$5 million budget and a staff of 40 people.

Goldin, Eric

Goldin & Associates

Dr. Goldin has over 40 years of professional experience in power reactor health physics, most at the San Onofre Nuclear Generating Station from startup through operation to decommissioning. He managed a team that wrote the San Onofre Unit 1 License Termination Plan, wrote MARSSIM-based survey plans for various plant survey units, wrote MARSAME-based work plans for release of materials and equipment. In addition to Bachelor's and Master's degrees in Nuclear Engineering and a Ph.D. in Biomedical Sciences, he taught radiation biology and health physics classes at San Diego State University for over 20 years and ran a Radiation Protection Technician training program at MiraCosta College. He has no previous service on any advisory committees. Currently, Dr. Goldin is working about half-time on preparation for San Onofre Units 2/3 decommissioning, so he has the capability of serving on the SAB without impact to other activities.

Griffith, William C.

University of Washington

Dr. William C. Griffith currently is Principle Research Scientist and Senior Biostatistician of the Institute for Risk Analysis and Risk Communication in the Department of Environmental and Occupational Health Sciences at the University of Washington in Seattle, Washington. He was trained as a biostatistician and has collaborated for over three decades in studies of the dosimetry and health effects of toxicants and toxins. His work has included design, data collection and analysis of laboratory and field-based studies. In particular, he has extensive experience in toxicology, estimation of doses from inhaled materials, and estimation of dose response in terms of age specific incidence rates and prevalence. He has also been active in translating his experience into models that are useful for health

protection through publications and participation in national and international committees. He was part of the team at the Lovelace Inhalation Toxicology Research Institute that was the first to show that diesel exhausts are pulmonary carcinogens in laboratory animals. At the University of Washington, he has been Director of the Risk Characterization Core for the Child Health Center funded by the Environmental Protection Agency and the National Institute of Environmental Health Science. As director he has designed and developed statistical methods for analysis of a community based randomized intervention to test the effectiveness of educating farm workers about how they can decrease the accidental exposures of their children from pesticides they bring home on their clothes. Dr. Griffith is also involved with studying the naturally occurring toxin domoic acid which is taken up by shellfish and consumed by humans. He is currently part of a national consortium funded by the National Institute of Environment Health Sciences to develop models to predict the toxicity of engineered nanomaterials. Dr. Griffith has also collaborated with EPA Region 10, and the states of Oregon and Washington on the application of statistical methods to environmental problems. He has been involved with the Department of Energy's Low Dose Radiation Program to translate laboratory results into mathematical models that will be useful for future regulation of radiation. Currently he serves as a scientific advisor to the U.S. Department of Energy regarding a joint United States/Russia program to study the health effects of radiation around former nuclear weapons sites in Russia.

Hamrick, Barbara L.

University of California, Irvine Medical Center

Barbara L. Hamrick, JD, CHP, is the Radiation Safety Officer at the University of California (UC), Irvine Medical Center. Her responsibilities include oversight of all radiation use in both the medical and research settings. Ms. Hamrick received a B.S. and an M.S. in Physics from UC Irvine. She earned a law degree from Loyola Law School in Los Angeles and is an active member of the California State Bar. In 2002, Ms. Hamrick was certified by the American Board of Health Physics. Prior to joining the UC Irvine Medical Center team, Ms. Hamrick spent nearly 20 years as a health physicist in regulatory programs at the federal, state, and local levels, inspecting, investigating, developing policy and guidance, and making technical assessments of a wide variety of exposure, contamination, or other events resulting from the loss or misuse of radiation sources. During that time, she served as Chair of the Organization of Agreement States (OAS) (2005-06), as well as on numerous committees and working groups convened by the OAS, the U.S. Nuclear Regulatory Commission or the Conference of Radiation Control Program Directors related to the control and safe use of radiation sources. Ms. Hamrick served as a member of the National Academies of Sciences Committee on Lessons Learned from Fukushima (2012-16). Ms. Hamrick also provides peer review for papers submitted for publication to Health Physics, and to the Journal of Endourology. Ms. Hamrick does not engage in funded research.

Harris, Willie

CN Associates

Mr. Willie Harris is an independent consultant currently working as the Principle Health Physicist for CN Associates. Prior to starting for CN Associates in 2020 after his retirement, he worked for Exelon Nuclear for 30 years as the Director of Radiation Protection. Mr. Harris is a Certified Health Physicist specializing in reactor health physics, decommissioning planning, environmental effluents and monitoring, emergency planning, and radiological engineering services. He is currently a council member of the National Council of Radiation Protection (NCRP) and the president of the power reactor section of the Health Physics Society. He holds a B.S. in Radiation Protection from Thomas Edison State University, and an M.B.A from Eastern University. Mr. Harris's work for CN Associates has included decommissioning planning and conduct of Final Status Surveys using MARSSIM, ALARA (as low as is reasonably achievable) assessments, radiation safety program audits, and with the Electric Power Research Institute (EPRI). The work for EPRI has included analysis of new methods and

techniques to improve radiological safety while reducing costs, neutron monitoring, determination of the radiological impact from fuel failures, and subject matter expert advice in topics related to power reactor health physics. Prior to CN Associates, Mr. Harris worked for thirty years at Exelon Nuclear. During this time frame, he held several leadership positions in the company including the Director of Radiation Protection at the corporate offices and the Site Radiation Protection Manager at Limerick Generating Station. While at the corporate offices, he had responsibility for governance, oversight, procedures, and policies in radiation protection for the largest fleet of nuclear power plants in the United States. The Exelon radiation protection programs are recognized as one of the top fleets for radiation protection in the nation. Mr. Harris has served in leadership roles for several industry committees, including the Chairman of the Radiation Protection Working Group for the World Nuclear Association, the Vice Chair for Technical Advisory Committee for EPRI, and a past Chair for the International System of Occupational Exposure (ISOE). In addition, he played significant roles as a member of EPRI's Scientific Advisory Committee for Low Dose Radiation Research and the Nuclear Energy Institute's Radiation Safety Advisory committee. He is currently a member of the NCRP's PAC-2 committee and the budget committee. Mr. Harris has received no current or recent research grant support from any entities.

Hays, David

US Army Corps of Engineers

The US Army Corps of Engineers (USACE) provides radiological release support to many federal agencies. This has led to radiological release experiences outside of the US Army field of view. The USACE Radiation Safety Support Team (RSST) is made up of 20+ Health Physicists (HPs) with varying levels of experience in radiological release surveys. This combination of experience and number of HPs puts USACE in a unique position to support further MARSSIM development outside of that provided in the past. USACE nominates David Hays as the RSST lead for contributing to MARSSIM. With over 30 years' experience in environmental health physics, Mr. Hays has led and or supported radiological release for the USDOD (Army/Navy/Air Force), USDOE, USEPA, and other federal agencies. His germane experience dates from the late 1980s through today. As such, his experience has involved pre and post NUREG-5849 and MARSSIM surveys. His release experience covers many isotopes, various uses (e.g. military, medical, source manufacturing, fuel cycle), and a range of programs (e.g. BRAC, FUSRAP, FUDS, Superfund, Emergency Response) under many different application scenarios (military, industrial, and residential). While at the then Army Environmental Hygiene Agency (now the US Army Public Health Center), he drafted radiological release plans and procedures that served as the basis for later Army documents and procedures that ultimately contributed to MARSSIM. He was a reviewer and commenter on the original drafts of MARSSIM as well as MARSSIM 2 through the US Army review process. In addition to leading and performing surveys, Mr. Hays has prepared and presented classes and technical papers on radiological release and use of MARSSIM. Mr. Hays and the USACE RSST looks forward to working on the further development of MARSSIM.

Inn, Kenneth G.W.

Independent Consultant

Dr. Kenneth G.W. Inn is an Independent Consultant in the determination of the concentration, distribution, speciation and measurement quality assurance/quality control of low level actinide, fission product and activation product radionuclides in environmental and biological systems by ultra-clean radiochemistry and ultra-high sensitive and selective measurement methods. He holds a B.A. from the University of Hawaii, an M.S. from San Diego State University, and a Ph.D. from the University of Arkansas, all in in Radiochemistry. Dr. Inn's has directed programs in low level radionuclide environmental matrix Standard Reference Materials, radionuclide speciation in soils and sediments, and

emergency response [nuclear terrorism or unintentional release] and low-level radiochemistry traceability evaluations. He served as a Research Chemist at the National Bureau of Standards (NBS) between 1978-1988; a Scientific Assistant at NBS, the U.S. Department of Commerce, and at the National Institute of Standards and Technology (NIST) Center for Radiation Research between 1988-1991, a Staff Radiochemist at MACTEC Engineering Services between 1991-1992, a NIST Group Leader in the Office of Radiation Measurements between 1992-1994, and a Radioactivity Group Project Leader in Low-Level Radiochemistry from 1995-2013. Dr. Inn's honors include a Silver Medal at the United States Department of Commerce, an Award of Appreciation at the 35th Annual Bioassay, Analytical, and Environmental Radiochemistry Conference, and the W.J. Youden Award in Interlaboratory Testing from the American Statistical Association. Dr. Inn is a member of the American Chemical Society and Geochemical Society, and a former member of ASTM's environmental test method and radioactivity test method 89-12; ANSI MQA for Rad. Assay Labs & Perf. Crit. for Rad. Bioassay 89-11; MARLAP writing group; DHS/ICLN-Rad Lab Capability Workgroup 06-13; FRPCC 07-13; ISO 17025 NIST assessor 08-13; and NTNFC Reference Material Committee 08-13. Dr. Inn served as an advisor for the U.S. Transuranium and Uranium Registries between 1989-1995. Dr. Inn's research funding sources included NIST appropriations, the Federal Bureau of Investigation, the Department of Homeland Security, the Department of Health and Human Services, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Argentina Nuclear Regulatory Commission, Carlsbad Environmental Monitoring & Research Center, the Centers for Disease Control, Health Canada/Radiation Protection Bureau, Korean Institute of Radiological and Medical Sciences, N.J. Department of Health, and several National Laboratories including Idaho National Laboratory, Los Alamos National Laboratory, and Savannah River National Laboratories.

Kersting, Annie B.

Lawrence Livermore National Laboratory

Dr. Annie Kersting is Director of University Relations and Science Education at the Lawrence Livermore National Laboratory (LLNL). She holds a B.S. in Geology and Geophysics from the University of California, Berkeley, and an M.S. and Ph.D. in Geology and Geophysics from the University of Michigan. Dr. Kersting previously served as the Director of the Glenn T. Seaborg Institute in the Physical and Life Sciences Directorate, where she focused together with her deputies, Ian Hutcheon and Dawn Shaughessy, on collaborative research between LLNL and the academic community in nuclear forensics, super heavy element discovery and environmental radiochemistry. Dr. Kersting's research interests include the fields of radiochemistry, isotope geochemistry, and environmental chemistry. Her current research focuses on the geochemical mechanisms that control actinide transport in the soil and groundwater, and on identifying the dominant bio-geo-chemical processes and the underlying mechanisms that control actinide (U, Pu, Np, Am) transport. In particular, she is interested in understanding how nanoparticles facilitate transport of contaminants in both the saturated and unsaturated environment. Dr. Kersting was a Board member of the Nuclear and Radiation Studies Board, National Research Council 2010-2012, and a Committee member on the National Academy Sciences National Research Council, Nuclear and Radiation Studies Board Committee from 2006-2007. She served on the Environmental Management Sciences Program Review Panel of the U.S. Department of Energy's Office of Science in 2006, and she served as a scientific advisor on the Actinide Migration Committee for Rocky Flats from 2000-2003. Her current research funding comes from the Department of Energy's Office of Science, Biological & Environmental Research. As University of Relations Director, she reports to the Director of Science & Technology in the Director's office.

Kolm, Kenneth

Hydrologic Systems Analysis, LLC

Dr. Kenneth E. Kolm is President/Senior Hydrogeologist and Hydrologic and Environmental Systems Specialist at Hydrologic Systems Analysis, LLC., and Associate Professor Emeritus of Environmental Science and Engineering, Colorado School of Mines, Golden, Colorado. He holds a B.S. in Geological Sciences from Lehigh University, Pennsylvania, and an M.S. and Ph.D. in Geology (minor in Ecology) from the University of Wyoming. Dr. Kolm has more than 35 years of professional experience, including 25 years of academic teaching and research, 5 years of Argonne National Laboratory research, and over 10 years of formal private consulting that includes private sector and government work, and litigation support. Dr. Kolm specializes in the fields of hydrogeology, geomorphology, and hydrologic and environmental systems analysis, with an emphasis on groundwater and surface water science and engineering, wetlands environments, expedited environmental site characterization and remediation, and watershed and ecosystem characterization, management, and restoration. He developed the integrated Hydrologic and Environmental Systems Analysis (HESA) for holistic Conceptual Site Model development, and has applied it to mine and resource development and mined-land restoration, municipal management of groundwater system supply and pollution, watershed and site-scale pollution prevention and Superfund cleanup, and water rights and water quality expert witness and litigation support. Dr. Kolm undertakes a geo-based, systems-oriented, multidisciplinary, multi-temporal and multi-scale approach to solving environmental and engineering problems, incorporating the use of both field and laboratory methods and computer and mathematical modeling tools. In addition to his diverse consulting business, Dr. Kolm most recently conducted research with a multidisciplinary team, initially supported by the National Science Foundation and led by anthropologists and archaeologists, regarding the conceptual and mathematical modeling of the paleohydrological system structure and function for the Canyon of the Ancients region. The goal of this HESA-based research was to determine if lack of sustainable drinking water supplies caused the collapse of the Mesa Verde prehistoric societies in the Four Corners Region of the U.S.

Kronenberg, Amy

Lawrence Berkeley National Laboratory

Dr. Amy Kronenberg is a Staff Biophysicist at the Lawrence Berkeley National Laboratory. Her research interests include radiation biology, cancer biology, charged particle radiation biophysics and mutagenesis. She has conducted extensive research on molecular mechanisms of mutagenesis and aspects of genomic instability. She is a Council Member of the National Council on Radiation Protection and Measurements (NCRP). Dr. Kronenberg is very active in national and international professional societies and institutions. She is currently a Senior Editor for the journal Radiation Research and is also a member of the editorial board of the Journal of Radiation Research (Japan). She was an invited speaker at a symposium on radiation carcinogenesis at the Radiation Effects Research Foundation (RERF) in Hiroshima, Japan. She was co-organizer of the American Statistical Association Conference on Radiation and Health (2006), in addition to many other venues. Dr. Kronenberg serves as a member of the External Advisory Board for the National Space Biomedical Research Institute, and as a member of an international review panel for the GSI Helmholtzcenter in Germany. Her research has been supported by Federal funding sources. Dr. Kronenberg received her A.B. in Biology at Brown University, and her Sc.D. in Cancer Biology from the Harvard School of Public Health.

Lanza, John

Florida Department of Health-Escambia

Dr. Lanza has been the Director and Health Officer of the Florida Department of Health in Escambia County since May 1996. Prior to his current role, he served the health department as the Deputy Director, Clinical Director, and Senior Physician for three years. Since 2001, he has been the Public Health and Medical co-chair for the Florida Department of Law Enforcement's Domestic Security Task

Force Northwest Florida. Before his FDOH positions, Dr. Lanza worked as a pediatric emergency department physician in Lakeland, FL and was in private pediatric practice in Longwood, FL. He received his Bachelor of Science in Bio-Medical Electrical Engineering from the University of Florida in 1975. He then received a Master of Science (1976) and a Doctor of Philosophy (1979) degree in Radiological & Nuclear Engineering, also from the University of Florida. Dr. Lanza worked as a radiation physicist for the U.S. Navy's Nuclear Weapons Radiological Controls Program in the Washington D.C. area for three years. Subsequently, Dr. Lanza attended and graduated from the UTESA School of Medicine and then completed a three-year pediatric residency at Sacred Heart Children's Hospital, Pensacola, FL in 1988. Dr. Lanza is a Board-Certified Pediatrician. In 2002, Dr. Lanza completed a Master of Public Health (MPH) degree from the University of South Florida College of Public Health. Currently, he is a Faculty Associate at the University of West Florida College of Health and teaching in the Master of Public Health program in the Department of Public Health as well as holding faculty positions in the Department of Exercise Science and Community Health and the Center for Environmental Diagnostics and Bioremediation. He is also a Clinical Assistant Professor in the Department of Clinical Sciences at the Florida State University College of Medicine (FSUCOM). Dr. Lanza serves on the Residency Advisory Committee for the joint U.S. Army and Navy Aerospace/Occupational Medicine Residency Program at Naval Air Station Pensacola. Dr. Lanza has numerous publications in the fields of health physics, environmental health, and public health preparedness. Most recently, he co-authored the National Council on Radiation Protection & Measurements Report 165, "Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers." As a practicing public health pediatrician, he is interested in promoting a culture emphasizing healthy lifestyles so that our children and adolescents will develop into productive and physically and behaviorally fit adults. He recently authored an article in a special edition of the Florida Medical Association Journal "Healthiest Weight: A Life Course Approach" on overweight and obesity in adolescents.

Litman, Robert

Independent Consultant

Robert Litman is an independent consultant with Environmental Management Support Inc. and with ChemStaff. He was an Assistant Professor of Chemistry at the University of Lowell for six years and served in several positions related to chemistry at Seabrook Station Nuclear Power Plant for the next 22 years. In 2002 he became an independent consultant and has worked in the areas of radiochemical analysis, radiochemistry training, gamma and alpha spectrometry analysis and method development, development of rapid radiochemical techniques following a radiological emergency, developed laboratory guides for response to radiological emergencies, under contract with Environmental Management Support Inc. from 2002 to present. He has also provided guidance on nuclear power plant corrosion control, assessment of radiological data and control of radiological effluents from 2002 to present under ChemStaff, Inc. Dr Litman was an independent consultant for the NRC from 1995-2018 on the evaluations and responses to GSI-191 Post-LOCA Chemical Effects in Nuclear Power Plant containment recirculation sumps. Under this contract he served as a technical reviewer for "Phenomena Identification and Ranking Table Evaluation of Chemical Effects Associated with Generic Safety Issue 191", NUREG-1918, co-author of "NRC Staff Review Guidance Regarding Generic Letter 2004-02 Closure in the Area of Plant-Specific Chemical Effect Evaluations", (March 2008), as well as several designs and chemical effects modifications at several nuclear power plants. In separate areas of contract to the NRC Dr. Litman was co-author of Regulatory Guide 4.15 Rev 2 "QUALITY ASSURANCE FOR RADIOLOGICAL MONITORING PROGRAMS (INCEPTION THROUGH NORMAL OPERATIONS TO LICENSE TERMINATION) — EFFLUENT STREAMS AND THE ENVIRONMENT", and provided training to the NRC staff on the Multi-Agency Radiological Laboratory Analytical Protocols Manual. He is currently working on methods of analysis for

NORM/TENORM in liquid and solid wastes and byproducts under contract with Environmental Management Support Inc., and under separate contracts for the same analytical work under ChemStaff. He is also assisting in the development and improvement of analyses for fission products and transuranics under DOE contract. Dr. Litman has participated as a volunteer in the National Analytical Management Program of DOE for the past 4 years and has delivered eight webinars related to radiochemical analyses. Dr. Litman has not received any research grants within the last two years.

Meck, Robert

Science and Technology Systems, LLC

Dr. Robert A. Meck is the President of his radiation protection consulting company, Science and Technology Systems, LLC. He holds a B.S. in mathematics from the University of Oregon, an M.S. in Radiological Physics, with a minor in Nuclear Engineering, from Oregon State University, and a Ph.D. in Biophysics from the University of California, Berkeley. He began his career as a reactor Health Physics Technical Assistant at what is now the Idaho National Engineering Laboratory. He has worked as a university Radiation Safety Officer, a basic research scientist in cell kinetics as an Assistant Professor at the University of Miami, and an Emergency Preparedness Specialist at Florida Power and Light, Co. For twenty-five years, he was on the technical staff of the U.S. Nuclear Regulatory Commission (NRC), where he was a Senior Health Physicist. His accomplishments include the roles of co-founder and NRC lead of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Workgroup—a multi-agency workgroup with members from the Department of Defense, Department of Energy, Environmental Protection Agency, and the NRC. He received the Vice-Presidential Hammer Award for the publication of MARSSIM and an EPA bronze medal for the publication of the Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME). He was the Radiation Protection Inspector for the International Atomic Energy Agency's Operational Safety Review Team at the Blayais, France nuclear power plant. His current research is focused on operational measurements of radioactivity and the chemical and radiological toxicities of uranium in the workplace.

Merritt, Robert W.

Independent Consultant

Prior to his retirement at the end of 2017, Rob Merritt was a manager in the geoscience domain for Elf and then Total for more than three decades. He received a BS in Geology from the University of Kansas before pursuing a MS in Structural Geology at the University of Texas. He has worked in petroleum industry settings throughout the United States, onshore and offshore, from Alaska to the Gulf of Mexico and a dozen states in between. Mr. Merritt is recognized as an expert in oil and gas industry data sources, and has had a hand in the design and development of a number of successful commercial and public database systems. His primary focus has been on the application of information technology to improving efficiency in the exploration and production of oil and gas, both in his own organization and as part of industry-wide consortia, including chairing national client users groups for major information suppliers like Petroleum Information (now IHS Markit) and leadership roles in petroleum industry standards development initiatives like POSC (now Energistics), where beside chairing the Well and Production Data Design Committee, he directed the Well Industry Pilot Project which performed the first commercial tests of this standard. Because the innovative use of information has the potential to benefit so many fields of endeavor, he has participated in a number of activities beyond the normal scope of a geologist or geoinformation specialist, including nuclear waste storage, minimization of environmental impact of industrial activities in the Arctic, disaster response following Hurricanes Ivan and Katrina, venture capital analysis, and as an expert witness in pipeline litigation. This year, Mr. Merritt was awarded company-wide recognition for his role in the Smart Predictive Analytics project, which used artificial intelligence algorithms to allow better prediction of the performance of new wells.

Opsomer, Jean

Westat

Dr. Jean Opsomer is Vice President at Westat. He is responsible for the statistical and survey methodology of several large-scale survey projects, currently including the Survey of Doctorate Recipients (SDR) and the Population Assessment of Tobacco and Health (PATH) Study. Dr. Opsomer was previously a faculty member in the Departments of Statistics at Colorado State University, where he also served as department chair, and at Iowa State University. His main research interests are in survey statistics, nonparametric methods and environmental statistics. He is a Fellow of the American Statistical Association and the Institute of Mathematical Statistics and an Elected Member of the International Statistical Institute. He has served on several panels for the National Academies of Sciences, Engineering and Medicine and is currently a member of the Advisory Committee on Statistical Methods for Statistics Canada and of the Committee on Energy Statistics of the Energy Information Administration.

Quinn, Dennis

DAQ, Inc.

Mr. Dennis Quinn is owner of DAQ, Inc., a health and safety consulting firm specializing in reactor health physics, environmental effluents and monitoring, emergency planning, and radiological engineering services. He holds a B.S. in Marine Engineering from the U.S. Merchant Marine Academy, and an M.S. in Environmental Engineering/Radiological Health from Rensselaer Polytechnic Institute. Mr. Quinn's work at DAQ has included tritium groundwater monitoring support, effluent dose calculations, Emergency Plan support & training, Radiation Safety Officer for a Nuclear Regulatory Commission (NRC) licensee, ALARA (as low as is reasonably achievable) assessments, dose reconstruction, decommissioning planning and characterization, shielding calculations, reactor decommissioning, radium building remediation, and radiation safety program audits. Prior to DAQ, Mr. Quinn worked for four years as Principal Health Physicist at Cabrera Services, Inc., a health and safety consulting firm specializing in radiological engineering, remediation, and health physics services. Before Cabrera Services, he worked for twenty-two years at the New York Power Authority, Indian Point 3 Nuclear Power Plant, serving in successive positions of increased responsibility. At the Plant, he first served for twelve years as Radiological Engineer, where he was responsible for essentially all radiological engineering at the operational power reactor with responsibility for development and maintenance of the following programs: dosimetry, ALARA, respiratory protection, worker training, and radiological environmental monitoring. He also provided technical support in the areas of operational health physics, effluent monitoring, radioactive waste, and emergency planning. He then served for eight years at the Plant as Radiological & Environmental Services Manager, during which he managed the Plant's radiation protection, emergency planning, environmental monitoring, chemistry, and radioactive waste programs. He then served at the Plant for two years as General Manager for Support Services within the following departments: Radiation Protection, Nuclear Licensing, Security and Safety, Training, Emergency Planning, Documents and Records, and Operational Review/Corrective Action. Mr. Quinn currently receives contract funding working with various clients including Entergy Corporation, PW Grosser as a subcontractor at Brookhaven National Laboratory, Electric Power Research Institute, and Memorial Sloan Kettering Cancer Center. Mr. Quinn has received no current or recent research grant support from any entities.

Reese, James

Tidewater, Inc.

James Reese has been practicing health physics for 41 years. Expertise in regulatory affairs, radiation protection, operational health physics, MARSSIM, inspections and audits, NORM, training, licensing, radiological risk and pathway analysis, emergency preparedness, decommissioning, and transportation.

Responsible for the planning of the field implementation of the radiological safety program, and overall management of the field implementation of all radiological phases of assigned projects from inception to completion of the project. Mr. Reese received his B.S. in health physics from Virginia Tech. He has been registered with the American Board of Health Physics as a Certified Health Physicist since 2010. He has served as the President Decommissioning Section of Health Physics Society, President of Sierra Nevada Chapter of Health Physics Society, President of Environment and Radon Section of Health Physics Society.

Reese,Shane

State of California, CDPH

Mr. Shane Reese is a Health Physicist with the California Department of Public Health and holds a certification from the National Registry of Radiation Protection Technologists (NRRPT). Mr. Reese has 12 year of experience in health physics. Mr. Reese's work at CDPH involves regulatory oversight of licensee's facilities involved with radiological remediation and MARSSIM closure projects throughout the State of California. Licensee projects involve soil and water remediations following the CERCLA/MARSSIM process, power reactor decommissioning and license termination, laboratory release, and structural remediation and release. This work involves all aspects for MARSSIM implementation from Historical Assessments to Final Status Surveys and Reports. Mr. Reese also preforms risk and exposure assessments and pathway modeling to support MARSSIM closures. Mr. Reese previously managed base realignment and closure (BRAC) Department of Defense (DoD) sites within California including Hunters Point Shipyard, Treasure Island Naval Station, Mare Island Shipyard, and Alameda Naval Station. Mr. Reese regulated California sites and provided guidance towards achieving unrestricted radiological release while utilizing Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance. Prior to joining CDPH, Mr. Reese worked as a Health Physicist for several consulting firms including, Cabrera Services, Tidewater, Inc, Philotechnics LTD. He was a team lead in the MARSSIM decommissioning at the Rancho Seco Nuclear Power Station Phase II decommissioning. Mr. Reese was a board member of the Decommissioning Section of the Health Physics Society. Mr. Reese does not have any research funding sources.

Roberts,Sarah

EnergySolutions

Sarah Roberts, vice president for EnergySolutions, manages daily and long-term operations of the environmental assessment program and provides leadership and technical direction to the management team and program staff. She responsible for managing tactical and financial operations for a large portfolio of small and large-scale field survey projects, and she specializes in independent assessments of environmental cleanup. She also performs corporate strategic planning. She has worked in the field of decommissioning since 1995 and has held various positions including program director, radiological engineer, radiological safety manager, and project leader; and has supported license termination and property release activities at both Department of Energy and Nuclear Regulatory Commission-licensed sites.

Sims, Kenneth

University of Wyoming

Dr. Kenneth Sims is a Professor at the University of Wyoming and a former tenured Research Scientist at Woods Hole Oceanographic Institution. He uses isotopic and chemical tracers to study geologic processes in the earth and other planetary bodies. Dr. Sims has ninety peer-reviewed scientific publications focusing on the study of mantle melting, oceanic and continental crustal genesis, volcanology, hydrology, planetary core-formation, climate change, and oceanography. Dr. Sims earned his BA, with honors, in Geology from Colorado College, his MSc from the Institute of Meteoritics at the University of New Mexico; and his PhD from the University of California, Berkeley. His field

experience ranges from ocean floor geology using manned and unmanned submersibles to geologic studies of active volcanoes at high altitudes in technical terrain. Dr. Sims is a “National Geographic Explorer” and has received numerous awards for both his research and teaching. His research is funded by the US National Science Foundation, National Geographic Society, the US Department of Energy, Woods Hole Oceanographic Institution and the University of Wyoming.

Smith, Eric

Virginia Tech

Dr. Eric Smith is a professor in the Virginia Tech Department of Statistics. An acknowledged expert in the application of statistical methods to environmental and ecological applications, he is the author or coauthor of more than 120 peer reviewed papers, 45 book chapters, and two books, Dr. Smith is a Fellow of the American Statistical Association, an Elected member of the International Statistics Institute, and he has received the Distinguished Achievement Award from the American Statistical Association's Section on Environmental Statistics. Dr. Smith has served on eleven workshops, panels and committees, including: * Panel Member for EPA's Science Advisory Board review of Lake Erie Phosphorus Levels (2015-16) * Member NRC Panel on Effective Approaches for Monitoring and Assessing Gulf of Mexico Restoration Activities (2015-16) * Panel member for the Scientific Advisory Board reviewing EPA's technical support document: National-Scale Mercury Risk Assessment Supporting the 25 Appropriate and Necessary Finding for Coal and Oil-Fired Electric Generating Units (2011). * Deepwater Horizon SEAMAP Surveys Planning Committee Workshop (2010).

Smith, Richard

University of North Carolina

Richard L. Smith is Mark L. Reed III Distinguished Professor of Statistics and Professor of Biostatistics in the University of North Carolina, Chapel Hill. He is also Director of the Statistical and Applied Mathematical Sciences Institute, a Mathematical Sciences Institute supported by the National Science Foundation. Dr. Smith holds a B.A. in Mathematics from Oxford University, and a Ph.D. in Operations Research from Cornell University. He previously held academic positions at Imperial College (London), the University of Surrey (Guildford, England) and Cambridge University. Dr. Smith's main research interest is environmental statistics and associated areas of methodological research such as spatial statistics, time series analysis and extreme value theory. He is particularly interested in statistical aspects of climate change research, and in air pollution including its health effects. Dr. Smith is a Fellow of the American Statistical Association and the Institute of Mathematical Statistics, an Elected Member of the International Statistical Institute, and has won the Guy Medal in Silver of the Royal Statistical Society, and the Distinguished Achievement Medal of the Section on Statistics and the Environment, American Statistical Association. In 2004, he was the J. Stuart Hunter Lecturer of The International Environmetrics Society. Dr. Smith is also a Chartered Statistician of the Royal Statistical Society. He is currently a member of the Research Committee of the Health Effects Institute.

Stram, Daniel O.

University of Southern California

Dr. Daniel Stram is Professor of Biostatistics at the University of Southern California Keck School of Medicine. His work has focused upon developing and applying modern biostatistical methods to a wide variety of epidemiological, and clinical studies, including large scale studies of the genetics of adult cancers, and studies of the risk of cancer and other diseases in relation to radiation exposure. His research interests include measurement error analysis, meta-analysis, longitudinal modeling, association-based studies of genetic susceptibility to cancer, and general exposure-response modeling in cancer epidemiology. He is currently the senior biostatistician for many of the genetic studies taking place at the University of Southern California, and he is a lead investigator for statistical analysis of a large cohort of former workers in Russia who were occupationally exposed to radiation during the

production of plutonium. He has contributed to the statistical design and/or analysis of numerous prospective cohort studies including the Six Cities Study, the Atomic Bomb Survivors Study, the Chinese Singapore Health Study, the Colorado Plateau Uranium Miners Study, the California Teachers Study, and the Multiethnic Cohort Study. Dr. Stram received his B.A. degree in Mathematics with distinction from Tufts University. His PhD degree in Applied Statistics is from Temple University, and he performed postdoctoral work in biostatistics at the Harvard University School of Public Health. Dr. Stram worked for the Radiation Effects Research Foundation in Japan for 3 years studying the health of the atomic bomb survivors, and was a visiting faculty member for 6 months at the Whitehead Institute of Harvard and MIT, involved in the development of methods for the statistical analysis of large scale genetics data. Dr. Stram's work is supported by the National Institutes of Health and the Department of Energy. He has served on numerous committees and review groups sponsored by the National Institutes of Health, the Environmental Protection Agency (EPA), and the National Academy of Sciences (NAS). He is currently a member of the Nuclear and Radiation Studies Board of the NAS, and served as chair of the EPA's Radiation Advisory Committee. Dr. Stram teaches regularly within the graduate program of the Biostatistics Division of the University. He is the author of over 200 papers, several book chapters, and of a recent book on the statistical design and analysis of genetic association studies.

Swift, Peter

Sandia National Laboratories

Dr. Peter Swift has retired in June 2020 from Sandia National Laboratories as a Senior Scientist with 30 years of experience in high-level radioactive waste management and disposal. He is a geologist by training, and he served from 2011 to 2020 as the National Technical Director of the U.S. Department of Energy's Office of Nuclear Energy Spent Fuel and Waste Technology Research and Development Campaign. In that role he provided technical leadership for the DOE's research and development activities relevant to the storage, transportation, and permanent disposal of spent nuclear fuel and high-level radioactive waste. Prior experience includes key roles in the certification and licensing processes for both the Waste Isolation Pilot Plant (a mined repository for transuranic waste operating in New Mexico) and the formerly proposed Yucca Mountain repository for spent nuclear fuel and high-level radioactive waste in Nevada. Specific to the Yucca Mountain project, which was suspended by Congressional action in 2010, he led the total system performance assessment effort that developed estimates of the long-term safety of the site and then served as the Chief Scientist for the program's Lead Laboratory during the 2008 submittal of the license application to the Nuclear Regulatory Commission. In addition to a broad background in the earth sciences, Dr. Swift has expertise in using probabilistic modeling of complex systems to address environmental regulatory requirements. Dr. Swift has authored or coauthored approximately 20 peer-reviewed publications, 34 technical reports, and 53 conference papers, and has made more than 50 public presentations to regulators and external technical oversight boards, including testimony to the US House of Representatives in 2011. He has been an invited speaker to the National Academy of Sciences Board on Radioactive Waste Management, the Blue Ribbon Commission on America's Nuclear Future, and multiple university programs. He has served as a member of the External Advisory Board for the University of California, Berkeley, Department of Nuclear Engineering, the Lawrence Berkeley National Laboratory's Earth Sciences Division Review Panel, the Sandia National Laboratories' Geoscience Research Foundation Management Board, and the State of New York's Independent Expert Review Team for the West Valley Environmental Impact Statement. Dr. Swift received a Ph.D. in Geosciences from the University of Arizona in 1987, Master's and Bachelor's degrees in Geology from the University of Wyoming in 1982 and 1980, and a B.A. in English from Yale University in 1974. He is a Fellow of the Geological Society of America and a member of the American Geophysical Society, the Geochemical Society, and the American Association for the Advancement of Science. The large majority of Dr. Swift's research funding in the past two years has come from the U.S. DOE's Office of Nuclear Energy through Sandia

National Laboratories; the small balance of his other funding support in the last two years has come entirely from Sandia National Laboratories internal sources.

Szabo,Zoltan

US Geological Survey

Mr. Szabo is a Research Hydrologist and a Principal Investigator (PI) at the U.S. Geological Survey (USGS). He has been studying the transport of the contaminant constituents, with most interest to radionuclides and the more soluble trace elements: arsenic, manganese, mercury, and lead. His research on occurrence and transport of these constituents has taken place in aquifers in NJ, and in as many as 20 major aquifers nationwide, culminating in definition of Ra isotope ratios in groundwater, Po-210 and Pb-210 occurrence in groundwater, an improved understanding of U, As, Mn, Pb, and Hg mobility in groundwaters, geochemical co-occurrence, and metal speciation associated with redox transitions. He has a specific background in geology/geochemistry (MSc, Ohio State University, 1984), with training in isotope geochemistry, mass spectrometry, gamma spectroscopy, and geochemical modeling that are all applicable. His research has included use of analytical methods, statistics, and modeling analysis. He helped design a series of laboratory studies comparing the alpha and gamma spectroscopic methods for Ra224 analysis (Focazio et al., 2001), and a series of laboratory inter-comparison studies for the gamma spectroscopic methods for Ra224 analysis (Szabo et al., 1998), which resulted in approval (in 2005) of the Ra-224 gamma spectral method as Standard Method 7005-E by the American Public Health Association (see 21st ed). He provided data to the USEPA Radionuclide Rule Revision Team when setting radionuclide standards for drinking water (2000), and to the NJ Dept. Environmental Protection when revising their standards for both radionuclides and arsenic in drinking water (2004). He led the effort to provide a National Radium Assessment for the USGS and USEPA (multi-agency funding) that showed the geochemical environments of radium occurrence in the major aquifers of the United States leading to a national summary (Szabo et al., 2012). He has recently completed similar regional efforts for characterizing radionuclides and arsenic regionally, including for the Gulf Coastal Plain aquifer in Texas (Oden and Szabo, 2015), and the Cambrian-Ordovician aquifers of the upper Midwest (Stackelberg et al., 2018). He is currently working on completing the USGS-funded lead-210 and polonium-210 in groundwater occurrence studies (Szabo et al., 2020; Szabo et al., in review). He has served on numerous Science Advisory Board and External Advisory Committees employing his expertise for radionuclide analysis, sampling techniques, fate-and-transport topics, and arsenic.

Ulsh,Brant

M.H. Chew & Associates

Dr. Brant Ulsh is a Certified Health Physicist, and has over thirty years of academic training, and governmental, academic, and private industry work experience in radiation fields including health physics, radiation biology, radiation ecology, and nuclear engineering. Dr. Ulsh's diverse work experience includes regulatory compliance at nuclear power plants and Department of Energy sites, environmental monitoring, and radiation dose reconstruction. He is currently a Principal Health Physicist with M. H. Chew & Associates in Cincinnati, and he serves as the Editor-In-Chief for the Health Physics journal. From 2003-2012, Dr. Ulsh served as a Senior Research Health Scientist with the National Institute for Occupational Safety and Health in the largest radiation worker compensation program in the world. In that position, he had extensive interaction with the Presidentially-appointed Advisory Board on Radiation Worker Health. Dr. Ulsh's research interests and expertise focus on the biological and environmental effects of low doses of radiation on humans and the environment. He has performed only unfunded research in these areas over the past two years. He earned a Bachelor of Science degree in Nuclear Engineering and a Master of Science degree in Health Physics, both from the University of Cincinnati, and a Ph.D. in Radiological Health Sciences from Colorado State University. Dr. Ulsh completed a postdoctoral appointment at the McMaster University Institute of Applied

Radiation Sciences in Canada, with a research focus on low-dose radiation biology. He has authored one book chapter, 19 peer-reviewed publications, 23 scientific presentations, 10 scientific poster presentations, and 6 scientific abstracts. He serves as an affiliate faculty member of Colorado State University, and the Northern Ontario School of Medicine. Dr. Ulsh has held numerous leadership positions in both the Cincinnati Radiation Society, and the Health Physics Society, and he served as a member of the International Radiation Protection Association Radiation Protection Strategy and Practice Committee.

Wall, Donald

Washington State University

Dr. Wall has been the Director of the Washington State University Nuclear Science Center (WSU NSC) since 2006. Dr. Wall has a B.S. in Chemistry from Eastern Michigan University, an M.S. in Inorganic Chemistry and Ph.D. in Inorganic and Radiochemistry from Florida State University. He has worked in the commercial, academic and National Laboratory sectors and has extensive experience in regulatory compliance for both the U.S. Environmental Protection Agency (U.S. EPA) and the U.S. Nuclear Regulatory Commission (U.S. NRC). Dr. Wall was the Division Supervisor for the Volatile Organics Analysis Division at Savannah Laboratories and Environmental Services where he supervised a staff that carried out analyses for chemical contamination of surface waters, ground waters and soils by methods described in the SW-846 standards of the U.S. EPA. At Sandia National Laboratories he worked on the Nuclear Waste Management Program with focus on the Waste Isolation Pilot Plant (WIPP)—the only operating deep geological nuclear waste repository in the world. The WIPP is regulated by the U.S. EPA with authority to issue regulations regarding spent nuclear fuel, high-level radioactive waste and transuranic waste. Dr. Wall studied the behavior of radioactive materials, including uranium, neptunium, plutonium and americium in ground waters that are typical around the WIPP site and compiled and published a thermodynamic database for the chemical behavior of radioactive materials in ground water systems. Dr. Wall also contributed to the probabilistic risk assessment for radioactive releases from the WIPP site and the impact on radiation doses to members of the public for the purpose of documenting regulatory compliance through the 2004 Compliance Recertification Application which was submitted to the U.S. EPA. Dr. Wall has also been an Associate Director in the College of Engineering at New Mexico State University (NMSU) which acts as an independent agency to monitor compliance with U.S. EPA regulations for on-site and off-site radiation exposure to personnel and members of the public. At NMSU he supervised the radiation monitoring program, including environmental sampling and radiochemical analyses of air, water and soils in the environment surrounding the WIPP site. At Washington State University, Dr. Wall is the Director of the WSU NSC. The WSU NSC operates the University's 1 megawatt TRIGA research nuclear reactor—one of only 12 university-based research nuclear reactors in the U.S. that are licensed to operate at 1 MW or greater. Radioactive material research and production at WSU is carried out at the WSU NSC. Dr. Wall has held a Nuclear Plant Senior Reactor Operator license (issued by the U.S. NRC) since 2007. He is responsible for facility safety and security, including compliance with the regulations of the State of Washington and the U.S. NRC, as promulgated by Title 10, Code of Federal Regulations. Dr. Wall's oversight of WSU NSC facility operations includes nuclear reactor and radiochemistry laboratory use, experimental radiation safety analyses, nuclear reactor facility radiation safety and security and the handling and use of Special Nuclear Material. Dr. Wall has overseen the refueling and conversion of the WSU reactor from High Enriched Uranium (HEU) to Low Enriched Uranium (LEU) fuel, shipping nuclear fuel from France to the United States in compliance with International Atomic Energy Agency standards and shipping spent HEU nuclear fuel in compliance with U.S. NRC regulations. He also managed the renewal of the WSU reactor facility operating license (License R-76), which was granted by the U.S. NRC in 2011. He has received awards by the Global Threat Reduction Initiative, Office of Global Threat Reduction, U.S. Department of Energy and the award for Meritorious Performance in

Nuclear Operations by the Operations and Power Division of the American Nuclear Society. Dr. Wall has testified on nuclear science, technology and radioactive waste management before the State of Washington Senate Environment, Water & Energy Committee and before the U.S. NRC Board of Commissioners regarding research nuclear reactor facility licensing. His research interests include the study of the environmental behavior of fission products, application of novel materials to control radioactive contamination and the chemical behavior of nuclear power reactor cooling systems in an effort to control radiation exposure to nuclear plant operations personnel. He has been funded by the U.S. Department of Energy and the Electric Power Research Institute. Dr. Wall brings experience in U.S. EPA regulatory compliance with regard to chemical contamination in the environment, radioactive waste management and radiation dose to the public as well as compliance with U.S. NRC regulations that are applicable to nuclear reactor operations and nuclear science research facilities.

Wang, Wei-Hsung

Louisiana State University

Dr. Wei-Hsung Wang is a professor of the Center for Energy Studies at Louisiana State University (LSU), an adjunct faculty member in the Departments of Environmental Sciences and Physics & Astronomy at LSU as well as the Pennington Biomedical Research Center, and a clinical professor of radiology at LSU Health Sciences Center New Orleans. He teaches Radiation Protection and Exposure Evaluation, Environmental Radiological Evaluation and Remediation, and Nuclear Facility Safety courses. He is also Director of Radiation Safety Office at LSU and administers a comprehensive radiological control program under a broad scope radioactive material license. Dr. Wang received his B.S. in geology from National Taiwan University, M.S. in environmental health engineering from Northwestern University, and Ph.D. in health physics from Purdue University. He is certified by the American Board of Health Physics (ABHP) and the Board of Certified Safety Professionals. He is a member of the ABHP Part II Panel of Examiners (Vice Chair 2015; Chair 2016), the Health Physics Society (HPS), and Sigma Xi and served as a co-academic dean of the 2014 HPS Professional Development School on Radiation Safety in Medicine. Dr. Wang's research interests center on the development of feasible solutions to practical radiological protection, radiation detection, and environmental impact issues, through the application of a diverse background in bionucleonics, environmental health engineering, industrial hygiene, non-ionizing radiation, radiation instrumentation, and radiochemistry. The majority of his work has emphasized operational radiation safety, radiation detection instrumentation, air monitoring methodology, radioactive waste management, gamma-ray spectroscopy, radiation dosimetry, environmental radiation, and radiological emergency response planning and preparedness. He is a Fellow of the HPS and was the Herman Cember Memorial Lecturer at the 2013 American Industrial Hygiene Conference and Exhibition in Montreal, Canada. He has served as a reviewer for Health Physics, Medical Physics, Nuclear Instruments and Methods in Physics Research, and Nuclear Science and Techniques. He also holds a U.S. patent on a real-time video radiation exposure monitoring system. Dr. Wang is a technical advisor to the Secretary of the Louisiana Department of Health. He was selected to participate in the 2016 Nuclear Tour de France to promote and develop exchanges about the status and knowledge of nuclear development and achievements in France and in the U.S. in different technical fields. After the Fukushima nuclear incident in Japan, he served as a radiological expert on the U.S. National Oceanic and Atmospheric Administration Radiological Ideas Workshop. He was also an invited panelist on the U.S. Nuclear Regulatory Commission (NRC) Radiation Protection Standards Workshop to discuss the potential changes to the NRC's radiation protection regulations and guidance in light of recommendations in ICRP Publication 103. Dr. Wang's current and recent research is not supported by extramural funding.

Williams, W. Alexander

Retired

Dr. W. Alexander Williams earned his Bachelor of Science in Chemistry with Distinction and his Doctor of Philosophy (Chemistry) from the University of Virginia. He joined the U.S. Environmental Protection Agency in 1978, working on the groundwater geochemistry of radionuclides. In 1981, he became an EPA federal agency liaison with the Department of Energy, the Department of Defense, and the Nuclear Regulatory Commission. He led the EPA review of the environmental impacts of those agencies, including environmental impact statements, proposed regulations, and on-going activities. In 1991, Dr. Williams accepted a position with the Department of Energy (DOE) in its newly formed environmental management organization. For seven years, he served as the site designation manager in the Formerly Utilized Sites Remedial Action Program (FUSRAP), where he performed the historic site investigations and arranged for and participated in radiological surveys for the designation of sites into FUSRAP. Consequently, thirteen additional sites were added to FUSRAP. He also reviewed over 400 radiological survey reports for site designation decisions in other DOE programs. Dr. Williams led the effort to develop tools for determining safe radiological cleanup criteria for sites. He was a sponsor for the development of the RESidual RADioactivity (RESRAD) computer code at Argonne National Laboratory, providing both technical and programmatic input to the code. He led an initiative to provide training in the RESRAD code to State, Federal, and contractor personnel. AS a result, RESRAD became the industry standard for deriving the cleanup criteria at radiological sites and was formally approved for use by the Nuclear Regulatory Commission. As a technical expert for radiological release of real and personal property, he was appointed as the DOE representation to the interagency workgroup developing the MARSSIM and MARSAME radiological survey manuals. His work on the clearance of personal property led DOE to authorize the use of commercial waste landfills for certain specified wastes, with a significant cost savings. Dr. Williams retired from the Federal government in 2014, with 37 years of service. He works in the local school system as a substitute science teacher.

Yoder, R. Craig

Independent Consultant

Dr. R. Craig Yoder is currently an independent consultant in radiation dosimetry having retired in 2015 from his executive officer position as Senior Vice President, Technology and Innovation at Landauer Inc., a dosimetry services company. He received a B.S. degree in Pre-Medicine from Davidson College, and M.S and Ph.D. degrees in Bionucleonics from Purdue University. He also completed the Executive Program conducted by the Stanford University Graduate School of Business. As a Certified Health Physicist since 1982, Dr. Yoder is an internationally recognized expert in radiation dosimetry, radiological calibrations and uncertainties in dosimetry measurements as they pertain to occupational, environmental and patient monitoring of exposures to external sources of radiation. Much of his scientific career has focused on the development of radiation measurement technologies, methods and products. His 32-year career directing Landauer's radiation dosimetry services used by tens of thousands of institutions to monitor more than 1.7 million workers has given him a unique and expansive perspective on the patterns of radiation exposure received by different worker groups and industries that he has shared in support of various epidemiology studies including the Million Worker Study and a long-term National Cancer Institute examination of US radiological technologists. He managed the development of Landauer's initial product for indoor radon monitoring that was used by the Environmental Protection Agency's residential radon survey. Dr. Yoder directed Landauer's international expansion efforts and oversaw the establishment of accredited dosimetry laboratories in 8 countries including Japan where the laboratory has been instrumental in monitoring of thousands of children following the Fukushima nuclear accident. Dr. Yoder's research was fully supported by Landauer and he receives no outside funding from government sources. His early career activities included research in radiation calibrations and dosimeter performance testing at the Pacific Northwest Laboratory operated by Battelle Memorial Institute where some of his work was supported by the Nuclear Regulatory Commission and Department of Energy. Prior to joining Landauer, Dr. Yoder was a

corporate health physicist for the Pennsylvania Power and Light Company supporting the construction and early operation of the Susquehanna Steam Electric Station, a nuclear-powered electric generating plant. Dr. Yoder is a council member of the National Council on Radiation Protection (NCRP) and a member of the Health Physics Society and American Association of Physicists in Medicine. He currently chairs an Advisory Board for the School of Health Sciences, Purdue University and is a member of an Advisory Board for the Radiological Sciences Program for the Illinois Institute of Technology. Dr Yoder has been certified in Health Physics since 1982 by the American Academy of Health Physics.

Zhu, Yiliang

University of New Mexico

Yiliang Zhu, PhD, is professor in the Department of Internal Medicine, School of Medicine, the University of New Mexico (UNM). He directs the Biostatistics, Epidemiology, and Research Design Core for the Clinical and Translational Science Center at UNM and that of the Mountain West Clinical and Translational Research Infrastructure Network, a consortium of thirteen universities in seven mountain west states. Prior to joining UNM in 2017, he was at the University of South Florida for over two decades where he was the founding director of the first Biostatistics PhD program in the state of Florida. He was a recipient of Fulbright Scholar in Public Policy (2012-13) and a Science and Technology Policy Fellow of the American Association for Advancement of Science with US Environmental Protection Agency (2013-15). Dr. Zhu's research interests range from statistical and computational methods, quantitative risk assessment including dose-response modeling and uncertainty analysis, disease surveillance, evaluation of clinical outcomes and healthcare systems, pathway-informed heterogeneous data integration, to international and rural health. He directs a 18-year cohort study of health ecosystem in northwestern Loess Plateau rural China. His current and recent research received funding from the National Institutes of Health, PICORI, and Arnold Foundation. Dr. Zhu served on "the Advisory Committee on Organ Transplantation" for the Department of Health and Human Services, the committees to review "the IRIS process", "State of the Science Evaluation of Nonmonotonic Dose Responses as They Apply to Endocrine Disruptors", "Sciences for the Future of EPA", "Toxicological Review of Dioxin and Related Compounds", "Toxicological Review of Tetrachloroethylene", and "Toxicological Review of Formaldehyde" for the National Academies of Science, Engineering, and Medicine, among others. He has also served on a number of EPA review panels for IRIS and SACC EPA's STAR review panels, and National Institute of Health Study Sections in clinical science, environmental health. Dr. Zhu received a BSc from Shanghai University (of Science and Technology) in Computer Science and Applied Mathematics, MSc from Queen's University (Canada), PhD from the University of Toronto in Statistics, and post-doctoral training in environmental health and risk assessment at the Environmental Health Center/Health Canada.