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APPENDIX BIOGRAPHIES OF PROJECT TEAM

Biographies for CEUS SSC Project team members are provided in this appendix. As described in Section 2.3 and shown on Figure 2.3-1, there are several organizational levels of project participants. In this appendix, biographies for the CEUS SSC Project management team are presented first. These are followed by the biographies for individual members of the TI Team, Technical Support, Database Manager, Participatory Peer Review Panel, and Sponsor Reviewers, in alphabetical order for each organizational level.

EPRI MANAGEMENT

Robert P. Kassawara, PhD, is EPRI Senior Project Manager for the Structural Reliability and Integrity group at EPRI. Dr. Kassawara is responsible for the technical, financial, and administrative planning and management of EPRI's research and development for seismic engineering for commercial nuclear power plants. Projects include all aspects of the discipline from seismic hazard to equipment qualification. Before joining EPRI in 1985, he managed the engineering analysis section of the Plant Engineering Division of IMPELL in Melville, New York. In this position, he was responsible for performing structural engineering analyses predominantly for the nuclear power industry. Between 1970 and 1981, he managed and contributed to nuclear power plant design and analysis at Combustion Engineering in Windsor, Connecticut. Dr. Kassawara has a BS in civil engineering from the Polytechnic Institute of Brooklyn (1966), and an MS (1968) and PhD (1970) in civil engineering from the University of Illinois.

Jeffrey F. Hamel is EPRI ANT Program Manager in the ANT program within the nuclear sector at EPRI. His current research activities focus on supporting deployment of advanced nuclear plants in the near term, while promoting areas of research to support long-term nuclear sustainability and growth. Specifically, Mr. Hamel oversees research on near-term deployment of advanced light-water-reactor nuclear plants, development of the Next Generation Nuclear Plant GEN IV technology, and technical and commercial support for an integrated spent-fuel management strategy. Before joining EPRI in 2007, he worked at General Electric as the manager of special projects and was responsible for managing and leading new growth for GE's nuclear business, particularly in pressurized water reactor and spent-fuel services. In addition, while at GE, he supported the commercial development of new nuclear power plant projects both domestically and internationally, including development of key engineering, mechanical and electrical equipment necessary for project execution. Mr. Hamel received a BS in marine transportation from the Massachusetts Maritime Academy in Buzzards Bay, Mass., along with a U.S. Coast Guard Merchant Marine license and U.S. Navy Reserve commission. He received his MBA from Santa Clara University in Santa Clara, California.

PROJECT MANAGER

Lawrence A. Salomone, PE, is the Project Manager for the CEUS SSC Project. He is a registered Professional Engineer with 40 years of experience in the environmental and earth sciences. He is the Site Chief Geotechnical Engineer at the Savannah River Site (SRS) in Aiken, S.C., where he has developed and managed a \$100 million geological, seismological, and geotechnical (GSG) characterization program to integrate geotechnical and geo-environmental work for mission-critical nuclear facilities at the SRS. He has directed 35-person and 70-person multidisciplinary groups. As an Associate with Dames and Moore, he directed the licensing, site preparation, and foundation operations for a nuclear power plant. As a research civil engineer for the National Bureau of Standards (now National Institute of Standards and Technology), he performed research to advance geotechnical, earthquake engineering, and energy technology. Mr. Salomone was nominated by the National Capital Section of the American Society of Civil Engineers for the Walter L. Huber Civil Engineering Research Prize for his work in the area of thermal soil mechanics. His work was used to study backfills for the Yucca Mountain high level waste repository, design underground electric transmission lines and develop mesoscale (severe)

weather forecasting models. He currently serves as a consultant to the U.S. House of Representatives and the U.S. Senate on national energy policy issues.

Mr. Salomone established the industry-government partnership to develop a new SSC model for the CEUS. He served as the Department of Energy (DOE) representative supporting the NEI/EPRI New Plant Seismic Issue Resolution Program and interacted with the NRC for its update of seismic regulatory guidance. Currently, he is a member of the Seismic Lessons Learned Panel that advises the DOE Nuclear Facility Safety Program, and he is the EPRI representative on the Joint Management Committee for the Next Generation Attenuation–East Project. He participated in the Pacific Engineering Research Center (PEER) workshops for the Next Generation Attenuation–West Project. He has provided support for the DOE Nuclear Power 2010 program and now serves on the New Carolina Nuclear Power Policy Subcommittee. He is the author or co-author of over 40 published papers and many technical reports. Mr. Salomone earned his BCE in civil engineering from Manhattan College in Riverdale, N.Y., and his MS in geotechnical engineering from the University of California, Los Angeles.

TI TEAM

Kevin J. Coppersmith, PhD, of Coppersmith Consulting, Inc., is the Technical Integrator (TI) lead for the CEUS SSC Project. He has more than 30 years of consulting experience, with primary emphasis in probabilistic hazard analyses (seismic, volcanic, and related geohazards) for design and review of critical facilities within regulated environments. He has pioneered approaches to characterizing earth sciences data and their associated uncertainties for probabilistic seismic hazard analyses (PSHAs) for a range of critical facility sites, including nuclear power plant sites, high-level waste repositories, dams, offshore platforms, pipelines, and bridges. Dr. Coppersmith was a member of SSHAC, which provided PSHA methodology guidance to the NRC, DOE, and EPRI. As a co-principal investigator, he recently completed a study for the NRC on reviewing lessons learned from the application of SSHAC Study Level 3 and 4 methodologies over the past 10 years. He is currently working with NRC research staff to develop a nuclear regulatory (NUREG) series document on detailed implementation guidance for SSHAC Level 3 and 4 studies.

Dr. Coppersmith has extensive experience in leading SSHAC Level 3 and 4 studies for nuclear facilities. He served as the SSC technical facilitator/integrator (TFI) for SSHAC Level 4 seismic hazard studies at the Yucca Mountain, Nevada, high-level waste repository, and he was the SSC TFI for the PEGASOS SSHAC Level 4 study for four nuclear power plants in Switzerland. He was also the TFI for the probabilistic volcanic hazard analysis conducted in 1996 for Yucca Mountain, as well as for the update to that study completed in 2008. He is the SSC TI lead for SSHAC Level 3 seismic hazard studies for licensing of a nuclear power plant at Thyspunt, South Africa. He also serves on the peer review panel for BC Hydro's SSHAC Level 3 seismic hazard analysis for 41 sites in the service area in British Columbia, Canada. Dr. Coppersmith received his BS in geology from Washington & Lee University in 1974 and his PhD from the University of California, Santa Cruz, in 1979.

Chris Fuller, PhD, is a Senior Geologist with Fugro William Lettis & Associates, Inc., specializing in earthquake geology. Dr. Fuller's work has focused on performing regional and site-specific investigations to assess geologic and seismic hazards for nuclear power plants throughout the United States, and he has utilized SSHAC processes to develop seismic source

characterizations for Turkey, the Meers fault, and the Gulf Coastal region. Dr. Fuller earned his BS (2000), MS (2002), and PhD (2006) in geological sciences from the University of Washington.

Laura Glaser is a Project Geologist for AMEC Geomatrix, Inc., with 4 years of experience in regional and site-specific seismic source characterization for PSHAs. Her project work includes SSHAC Level 2 studies for several sites in the CEUS, eastern Canada, and the United Kingdom. Ms. Glaser is a member of the TI staff for the SSHAC Level 3 seismic hazard studies for the licensing of a nuclear power plant at Thuyspunt, South Africa, performing regional source characterization and site-specific field investigations. Prior to this, Ms. Glaser performed geochemical research, including developing the geochronology of alluvial terraces of the Wind River Range from U-series dating of pedogenic carbonate and determining watershed-scale erosion rates from cosmogenic nuclides and soil–mass balance relationships. Ms. Glaser earned a BA in earth and planetary science from the University of California, Berkeley.

Kathryn L. Hanson is a Principal Geologist with AMEC Geomatrix, Inc. She has over 30 years of applied research and consulting experience, conducting and directing investigations to quantitatively assess geologic hazards to critical facilities in the United States and abroad. Her work has involved integrating earth sciences data and the uncertainty in these data into assessments of seismic, volcanic, and related geohazards in a variety of tectonic environments, both onshore and offshore. She has conducted both probabilistic and deterministic geohazard assessments to support successful siting, engineering, and design of nuclear facilities, dams, pipelines, and other critical facilities. Her consulting experience has emphasized regional and site-specific geologic, seismologic, and geophysical studies to identify and evaluate geohazards such as potential earthquake ground motions and surface faulting. Her work incorporates state-of-the-art methods in the use of geologic data to understand fault behavior and characterize seismic sources. Her recent work involves seismic source characterization and surface faulting investigations in support of Early Site Permits (ESPs) and Combined Construction and Operating License (COL) applications for several potential nuclear power plant sites in central and eastern United States. In addition to writing numerous major consulting reports and abstracts summarizing technical studies, Ms. Hanson was the senior author for NRC NUREG/CR 5503 and has published over 20 papers in peer-reviewed journals and proceedings volumes. She has a BS in geology from Iowa State University and an MS from the University of Oregon.

Ross Hartleb, PhD, is a Senior Geologist with Fugro William Lettis & Associates, Inc., specializing in earthquake geology. He has conducted paleoseismologic studies and post-earthquake surveys in California and Turkey. He has experience performing regional and site investigations to assess geologic and seismic hazards for nuclear power plants throughout the CEUS and has utilized SSHAC processes to develop seismic source characterizations for the Charleston, South Carolina, and northern Caribbean regions. For the CEUS SSC Project, Dr. Hartleb served as a member of the TI team and participated in the development of a paleoliquefaction database and a report on uncertainties related to the collection and interpretation of paleoliquefaction data. Dr. Hartleb earned his BA in geology from Amherst College (1992), his MS in earth science from the University of California, Santa Barbara (1998), and his PhD in earth sciences from the University of Southern California (2006.)

William R. Lettis, PhD, is President of Fugro William Lettis & Associates, Inc. (FWLA). He has over 30 years experience performing regional and site investigations to assess geologic and

seismic hazards for large engineered facilities including bridges, dams, nuclear and fossil fuel plants, pipelines, and liquid natural gas terminals. With over 100 publications, he is a recognized authority on the assessment of seismic hazards, both in the United States and throughout the world. As peer reviewer, Dr. Lettis was chosen to observe the SSHAC Level 3 assessment of potential seismic sources and attenuation models for potential nuclear power plant sites in the United Arab Emirates. He provided recommendations to ensure that the results from the SSHAC meeting formed a solid basis for developing the ground motion response spectra and would be acceptable during regulatory review of the construction license application. He is also the TI for a Level 3 SSHAC assessment of seismic sources for the BC Hydro project and directed the development of the tectonic framework. FWLA has completed studies for 18 of the current COL applications in the United States, and Dr. Lettis was in the lead position of oversight, providing direction and input for the seismic source applications, on all of these projects. Dr. Lettis earned his BS in geology from Humboldt State University (1977) and his MS (1979) and PhD (1982) in geology from the University of California, Berkeley.

Scott Lindvall is a Senior Principal Geologist with Fugro William Lettis & Associates, Inc., specializing in earthquake hazards and paleoseismology. He has been active in paleoseismic research to quantify the past behavior and timing of past earthquakes on active faults and has also performed detailed mapping of surface ruptures as part of several post-earthquake investigations in southern California and abroad. He has directed the geologic and seismic evaluations for multiple ESP and COL applications for new nuclear power plants in the CEUS. These studies have focused on geologic and seismic source characterizations, implementation of the SSHAC process, independent technical review, and support for the NRC licensing process. For the CEUS SSC Project, Mr. Lindvall served as a member of the TI team to develop the seismic source model and participated in the development of a paleoliquefaction database and accompanying report. Mr. Lindvall earned his BS in geology from Stanford University (1984) and his MS in geological sciences from San Diego State University (1988).

Stephen (Steve) McDuffie, PhD, has served as a Seismic Engineer for the Chief of Nuclear Safety (CNS) at DOE since September 2008. In this position he helps the CNS and the Under Secretary for Energy fulfill their Central Technical Authority responsibilities by overseeing seismic hazard characterization and design activities at DOE facilities. Previously, Dr. McDuffie worked for DOE's Richland Operations Office as a facility representative at the Hanford Site for 10 years. In that position he served as a representative of DOE management, overseeing contractor cleanup activities in the field, with a focus on nuclear safety, worker safety, and environmental protection. Before coming to DOE, Dr. McDuffie worked for nearly 6 years for the NRC in Rockville, Maryland. During this time, he held several positions, including serving as a geologist reviewing volcanic hazards, seismic hazards, and groundwater flow at the proposed high-level nuclear waste repository at Yucca Mountain. He also managed NRC licensing casework for, and performed inspections of, fabricators and users of spent nuclear fuel and other radioactive material packagings. Dr. McDuffie earned a BA in geology from Whitman College (1987), an MA (1990) and PhD (1992) in earth and planetary sciences from Johns Hopkins University. He also received an MBA (2002) from Washington State University.

Robin K. McGuire, PhD, is the founder of Risk Engineering, Inc., of Boulder, Colorado, and is currently Vice President of Fugro William Lettis & Associates, Inc. For 30 years he has consulted in seismic hazard analysis, earthquake engineering, and the application of probabilistic methods to engineering problems. He has conducted seismic hazard analyses at sites of major

engineering facilities at over 100 locations within the United States and at over 30 locations in foreign countries, in a range of technical environments. In addition, he has developed earthquake hazard software that is used around the world in engineering, insurance, risk management, government, and research for seismic hazard estimation. Dr. McGuire is the author of over 100 papers and articles on these topics that have been published in technical journals or as technical reports, as well as *Seismic Hazard and Risk Analysis*, a monograph published by the Earthquake Engineering Research Institute (EERI) in 2004. He is a past president of the Seismological Society of America (SSA) and has served on the Board of Directors of both SSA and EERI. Dr. McGuire was elected to the National Academy of Engineering in 2007. He holds degrees in structural engineering from MIT (SB and PhD) and the University of California, Berkeley (MS).

Gerry L. Stirewalt, PhD, PG, is a Senior Geologist with the NRC Office of New Reactors, Division of Site and Environmental Reviews, Geoscience and Geotechnical Engineering Branch 2. He is a registered Professional Geologist and certified Engineering Geologist with extensive practical knowledge of the standard practices required for characterization of site-specific, area, and regional geology, geomorphology, hydrology, paleoseismicity, seismicity, and seismotectonic settings at nuclear power plant sites, including site-specific geophysical and geotechnical in situ and laboratory testing procedures. Dr. Stirewalt has extensive experience in applying this knowledge under regulatory standards and guidelines for surface and subsurface geologic, hydrologic, paleoseismic, seismic, geophysical, and geotechnical field investigations and geologic hazards analysis at nuclear power plant sites. He also has considerable experience with review of applicant Safety Analysis Reports and preparation of NRC Safety Evaluation Reports for nuclear power plants; 3-D geospatial modeling of high-level radioactive waste (HLW) and non-HLW sites for the NRC; technical, regulatory, and programmatic review of DOE plans and technical reports for the civilian HLW management program; and geologic, hydrologic, and geophysical site characterization and public outreach activities for the DOE civilian HLW management program. Dr. Stirewalt earned a BA in geology and mathematics from Catawba College, North Carolina (1964), a PhD in structural geology from the University of North Carolina (1970), and did postdoctoral study in structural geology at Lamont-Doherty Geological Observatory (1969–1971), and the University of British Columbia (1971–1973).

Gabriel R. Toro, PhD, Senior Principal Engineer with Fugro William Lettis & Associates, Inc., has more than 30 years of experience in PSHA for critical facilities and other applications of probabilistic and statistical methods to the engineering analysis of natural hazards. His project experience includes a number of significant studies that have advanced the state of practice in PSHA. In the EPRI-SOG study, Dr. Toro designed and developed the software for the PSHA calculations and was a key member of the group selecting the ground motion models. As a member of the SSHAC staff, he was a major contributor to the chapter on ground motions, as well as contributing to the chapter on source characterization and to four appendices. He also directed and coordinated the PSHA calculations for the Yucca Mountain and PEGASOS Level 4 PSHA studies. Dr. Toro has made significant contributions to multiple areas of PSHA, including the development of ground motion models for regions with limited data such as the CEUS, the treatment of uncertainty in PSHA inputs, models for temporal clustering in the New Madrid region, and the probabilistic modeling of soil profiles for use in site-response calculations. He has also served as reviewer for PSHA and risk studies in Asia, Africa, and the Americas. Awards he has received include the Fulbright Travel Grant, the OMAE Award from ASME, and the

EERI Outstanding Paper Award. Dr. Toro has a civil engineer's degree from the National University of Colombia, and a Master's and PhD in civil engineering from M.I.T.

Robert R. Youngs, PhD, a Principal Engineer at AMEC Geomatrix, Inc., has more than 35 years of consulting experience, with primary emphasis in hazard and decision analysis. He has pioneered approaches for incorporating earth sciences data and their associated uncertainties into probabilistic hazard analyses. The focus of this work has been on developing quantitative evaluations of hazard by combining statistical data and expert judgment. Dr. Youngs has considerable experience in assessing earthquake hazards in central and eastern North America and implementing SSHAC processes. He was a member of the research teams that developed EPRI's seismic hazard assessment for nuclear power plants in the CEUS and EPRI-sponsored research projects to assess ground motions (1993) and maximum magnitudes (1994) for the CEUS. He was also a member of the project team for the NRC project to develop response spectral shapes for analysis of nuclear facilities (NUREG/CR-6728) in 2001 and the EPRI project to characterize ground motions in the CEUS for analysis of nuclear facilities in 2004. Dr. Youngs has completed seismic hazard analyses of existing and proposed nuclear power plants throughout the United States (including in Alabama, Florida, Louisiana, Michigan, and North Carolina) and internationally, including in Ontario, Canada and Switzerland (PEGASOS project). He earned his BS in civil engineering at California State Polytechnical University, Pomona (1969), and his MS and PhD in geotechnical engineering at the University of California, Berkeley (1982).

TECHNICAL SUPPORT

Serkan Bozkurt, MCP, is a Senior GIS Analyst and Information Manager at AMEC Geomatrix, Inc. He has 14 years of work experience in GIS, information management, and Internet technologies. The focus of his work has been the utilization of spatial models; 3-D visualizations; and GIS analysis and remote sensing technologies to support geosciences projects such as geohazards analysis for oil facilities, offshore platforms, pipelines, nuclear power plants, bridges dams, levees, and other critical facilities. Some of his recent project work includes GIS and information management services for SSHAC Level 2 studies and for sites in the United States, Canada, and the United Kingdom. Prior to joining AMEC, Mr. Bozkurt worked at the U.S. Geological Survey on the Earthquake Hazards Team as a GIS analyst and Web developer. He has contributed to more than 50 scientific publications related to seismic hazard studies. He earned a BS in urban and regional planning from Istanbul Mimar Sinan University (1996) and an M.C.P in GIS and city planning from the Istanbul Mimar Sinan University (2000).

Randolph J. Cumbest, PhD, is a Principal Geologist with Fugro William Lettis & Associates, Inc. (FWLA). He has 15 years experience with Westinghouse Savannah River Co., where he was engaged in various geological and geophysical characterization activities and was technical lead for the Savannah River Site fault characterization program. Dr. Cumbest has been with FWLA since 2007 and has been involved with studies for licensing commercial reactors. He earned his BS in geology from Auburn University (1976), his MS in geology from the University of Georgia (1987), and his PhD in geological sciences from Virginia Polytechnic Institute (1988). In addition, he has had postdoctoral positions as a research associate at Princeton University and as visiting scientist at the Institute of Advanced Studies, The Australian National University.

Valentina Montaldo Falero, PhD, is a Project Scientist for AMEC Geomatrix, Inc., with 10 years of research and consulting experience in probabilistic seismic hazard analysis. The focus of her work has been development and analysis of earthquake catalogs; assessment of recurrence parameters; and quantification of hazard. She has been involved in performing SSHAC Level 2 seismic hazard analyses for nuclear power plants in the CEUS, eastern Canada, and Europe, and in conducting probabilistic seismic hazard studies for dams and other facilities located in western North America (Oregon, Washington, Idaho, and British Columbia). Before joining AMEC Geomatrix, Dr. Montaldo Falero helped develop the national seismic hazard map of Italy and coauthored several scientific publications. She earned a BS/MS in geological sciences from the University of Milan, Italy (2000), and a PhD from the University of Milan-Bicocca, Italy (2006).

Roseanne C. Perman, PhD, a Senior Geologist at AMEC Geomatrix, Inc., has more than 30 years of experience as a consulting geologist with an emphasis on geologic hazards. She has managed and participated in a variety of multidisciplinary studies to evaluate potential geologic hazards to critical facilities for public agencies and private organizations and has assisted in developing hazard methodology and policy recommendations for state, federal, and professional organizations. For more than a decade, Dr. Perman's work was focused primarily on DOE studies for DOE to characterize uncertainties surrounding complex technical issues associated with the proposed high-level radioactive waste repository at Yucca Mountain. For the many DOE studies that involved expert elicitation, Dr. Perman had key roles in methodology development, coordination, and documentation. These included SSHAC Level 4 studies to complete a PSHA in 1998, a probabilistic volcanic hazard analysis conducted in 1996, and the update to that study completed in 2008. More recently, Dr. Perman has been involved in seismic source characterization for nuclear facilities located throughout the CEUS and in the Ontario region of Canada. For the CEUS SSC Project she had responsibilities for documentation, including coordination of report production. Dr. Perman earned a B.A. in both geography (1976) and earth science (1981), and an M.A. (1985) and Ph.D. (1988) in paleontology, all from the University of California, Berkeley.

Allison Shumway is a Senior Staff Geologist who joined Fugro William Lettis & Associates, Inc., in 2007. Ms. Shumway's experience in PSHA comes from working collaboratively with Risk Engineering, Inc., for the past 2 years on projects for the nuclear power industries. She earned her BA in geological sciences from the State University of New York at Geneseo (2005) and her MS in earth sciences from the University of Memphis (2007), where her graduate work focused on seismic hazard in the New Madrid seismic zone.

Frank H. Syms, PhD, is a Principal Engineering Geologist with Fugro William Lettis & Associates, Inc. He has been practicing in geology respective to nuclear applications for over 20 years. Much of this experience has been in the southeast respective to the DOE Savannah River site as well as serving in a review capacity for studies conducted for new facilities at Oak Ridge, Tennessee. During the past 4 years, Dr. Syms has concentrated on studies for the licensing of new commercial nuclear power reactors in the United States. His contributions to the CEUS SSC Project included the initial development of the database structure, selection of the data screening criteria, and participation in Workshop 1. Dr. Syms received his BS (1987), MS (1997), and PhD (2002) in geology from the University of South Carolina.

Martitia (Tish) Tuttle, PhD, is Director and Principal Investigator with M. Tuttle & Associates. She has been active in paleoseismology and earthquake hazards research since 1985, conducting

studies of the geologic record of past earthquakes in the central, northeastern, and western United States; northeastern Caribbean; southeastern Canada; western Australia; and western Portugal. She has conducted paleoliquefaction studies in the central United States, including the New Madrid seismic zone and surrounding region since 1992, where she has played a pivotal role in identifying and dating earthquake-induced liquefaction features and assessing the earthquake potential of the region. Dr. Tuttle has participated in post-earthquake surveys of liquefaction features and related ground failures in California, Quebec, and India, and has collaborated in geotechnical studies of liquefaction sites in Massachusetts, Quebec, and the central United States. For the CEUS SSC Project, she served as a resource expert in earthquake-induced liquefaction and paleoseismology and participated in the development of a paleoliquefaction database and a report on uncertainties related to the collection and interpretation of paleoliquefaction data. Dr. Tuttle earned a BS in soil science from Oregon State University (1979), a BS in earth sciences from Portland State University (1983), an MS in earth sciences from University of California, Santa Cruz (1985), and PhD in geology from University of Maryland (1999).

DATABASE MANAGER

David L. Slayter, PG, is a Senior GIS Analyst at Fugro William Lettis & Associates, Inc. He has 19 years of experience in several roles involving the geologic and natural sciences, as a geologist and a GIS scientist. His professional background includes consulting and research, as well as local, state, and federal government experience on projects ranging from spatial analysis to GIS project design. Mr. Slayter has worked on the development of GIS databases for several proposed nuclear power plant license applications. He has also been involved in the development of quality assurance standards for GIS databases and quality control and validation of GIS software. He is a registered Professional Geologist in California and a certified GIS Professional. He currently serves on the Education Committee of the Geospatial Information & Technology Association and the Review Committee of the GIS Certification Institute. Mr. Slayter earned his BS in geology from California State University, Sacramento (1991), and his MA in geography from the University of Oklahoma (2003).

PARTICIPATORY PEER REVIEW PANEL

Jon P. Ake, PhD, is currently Senior Seismologist in the Office of Research, Division of Engineering of the NRC. His duties include overseeing research on a broad range of seismic related issues for hazard assessment and integration with risk analyses. Dr. Ake began his career conducting research on explosively generated ground motions, the dynamic response of earth media, and applications of signal analysis to ground shock problems. He subsequently worked as a consulting geophysicist with responsibility for operating a 21-station seismic network in central Colorado and performing high-resolution seismic refraction and reflection studies and other engineering geophysical investigations (magnetic, electrical, and gravity). In 1989 he joined the U.S. Bureau of Reclamation, where his responsibilities included conducting, reviewing, and coordinating probabilistic seismic hazard studies, integrating the results with engineering analyses, and incorporating them into quantitative risk assessments. Dr. Ake served as a member of the expert panel that characterized seismic sources for a PSHA for the proposed high-level waste repository at Yucca Mountain. He also served in a liaison role to the DOE on seismic hazard issues for the Yucca Mountain Project, in which he assisted in the coordination and

preparation of documents on disruptive events that became part of the license application to the NRC.

Dr. Ake has served on the Dam Safety Advisory Team to the U.S. Bureau of Reclamation; the Federal Interagency Committee on Dam Safety; the U.S.-Japan Panel on Wind and Seismic Effects; the Consortium of Strong Motion Operators (COSMOS); and ANS/ANSI Committees 2.27 (Criteria for Investigations of Nuclear Facilities Sites for Seismic Hazard Assessments), 2.29 (Probabilistic Seismic Hazard Analysis), and 2.20 (Seismic Instrumentation for Nuclear Facilities). He has acted as a peer reviewer for the University of California Campus Earthquake Safety Program, BC Hydro, U.S. Army Corps of Engineers, DOE, California Department of Water Resources, Federal Energy Regulatory Commission, and the USGS, among others. He is currently a member of the DOE Seismic Lessons Learned Panel and Next Generation Attenuation–East projects. Dr. Ake obtained a BA in geology and physics from Western State College in Colorado and an MS and PhD in geophysics from the New Mexico Institute of Mining and Technology.

Walter J. Arabasz, PhD, is Co-Chairman of the PPRP for the CEUS SSC Project. He has worked since 1974 as a seismologist at the University of Utah, where he is now Research Professor Emeritus of Geology and Geophysics. From 1985 to June 2010 he was Director of the University of Utah Seismograph Stations. He has more than 40 years of professional experience in research, project management, consulting, and occasional teaching in seismology, seismotectonics, and earthquake hazard assessment. He is the author or co-author of 46 published papers, 94 published abstracts, and many technical reports. In addition, he has served on numerous national and state advisory and policy-making committees for earthquake risk reduction and U.S. network seismology.

Since 1977 Dr. Arabasz has routinely provided professional consulting services and peer review on earthquake hazard assessments for dams, nuclear facilities, and other critical construction, including services for engineering firms, the International Atomic Energy Agency, DOE, the U.S. Bureau of Reclamation, EPRI, Los Alamos National Laboratory, and the state of Utah, among others. He has had broad experience in implementing PSHA, beginning with participation as a member of the PSHA methodology team in the original EPRI seismic hazard characterization of the CEUS (1985–1987). As a member of the National Research Council’s Panel on Seismic Hazard Evaluation (1992–1996), he observed the development of and formally reviewed recommendations for PSHA made by the Senior Seismic Hazard Analysis Committee (SSHAC). Honors include the U.S. Geological Survey’s John Wesley Powell Award, the Western States Seismic Policy Council Lifetime Achievement Award in Earthquake Risk Reduction, and the [Utah] Governor’s Medal for Science and Technology. Dr. Arabasz earned a BS in geology at Boston College (1964), an MS in geology at the California Institute of Technology (1966), and a PhD in geology and geophysics at the California Institute of Technology (1971).

William J. Hinze, PhD, is Emeritus Professor of Geophysics at Purdue University. Before coming to Purdue, where he taught for 26 years, he served at the U.S. Army Engineering Research and Development Laboratory, worked as an industrial exploration geophysicist, and later taught at Michigan State University for 13 years. He has supervised approximately 100 graduate students during his professional career. In addition to having extensive university teaching experience, Dr. Hinze has experience in research and industrial consulting on the

geological and engineering applications of gravity and magnetic fields. He has authored or co-authored more than 130 journal publications and has co-edited or co-authored four books. He has been a member of numerous government and scientific panels dealing with gravity and magnetic fields, geophysics and geology of continents, continental drilling, digital geoscience data, seismotectonics, and nuclear waste disposal. From 1990 to 1996, he served as associate editor of geophysics and then senior editor of the *Journal of Geophysical Research–Solid Earth*. He served on the NRC’s Advisory Committee on Nuclear Waste from 1989 to 1997 and from 2005 to 2008. He is recipient of the Institute on Lake Superior Geology’s Goldich Medal and the American Geophysical Union’s Kaula Award. Dr. Hinze is a member of the Society of Exploration Geophysicists and the American Geophysical Union, and he is a Fellow of the Geological Society of America. Currently he serves as Earth Science Consultant to the NRC’s Advisory Committee on Reactor Safeguards. He obtained a PhD in geophysics from the University of Wisconsin–Madison.

Ann Marie (Annie) Kammerer, PhD, is currently a Senior Seismologist and Earthquake Engineer in the Office of Nuclear Regulatory Research at the NRC, where she coordinates and manages the Seismic Research Program. In this role, she is responsible for overseeing research on a broad range of seismic topics ranging from seismic hazard to seismic risk assessments for nuclear facilities. She is project manager for the NRC research project titled “Practical Procedures for the Implementation of the SSHAC Guidelines and for Updating Hazards,” which will result in a new NUREG-series report intended as a companion document to the original SSHAC report. She is also the NRC project manager and representative on the Joint Management Committee for the Next Generation Attenuation–East project, which is developing ground-motion prediction equations for Central and Eastern North America for use with the CEUS SSC for Nuclear Facilities model.

In addition to her experience at the NRC, Dr. Kammerer has 15 years of experience in private consulting on seismic topics. Before joining the NRC in 2006, she was a consultant with the international design firm, Arup. As seismic hazard lead for the Americas, she was responsible for consulting in a wide variety of areas, including geotechnical earthquake engineering, seismology, and risk assessment. Dr. Kammerer has authored two dozen publications, including technical reports, journal articles, a book chapter, conference proceedings and papers, and an ASCE special publication. She was the project manager and a principal author of Regulatory Guide 1.208 and is assisting the International Atomic Energy Agency with the update of Safety Guide NS-G-3.5. She is also the project manager for the updates to regulatory guides on liquefaction assessments and determination of floor spectra and is responsible for the development of a new regulatory guidance on technology-neutral performance-based engineering of nuclear power plants. Dr. Kammerer holds three degrees, with minors in seismology and structural engineering, from the University of California, Berkeley: a BS in civil engineering, an MS in geotechnical engineering, and a PhD in geotechnical earthquake engineering.

Jeffrey K. Kimball is a Technical Specialist (Seismologist) on the staff of the Defense Nuclear Facilities Safety Board. He is responsible for technical issues involving natural phenomena hazards, nuclear facility safety and design, and general oversight of defense nuclear facilities. He has 30 years of experience with the evaluation and characterization of natural phenomena hazards and the design of critical facilities to resist these hazards. He has full knowledge of a wide range of nuclear facility regulations, regulatory guides, standards, manuals, guides, and review plans associated with nuclear facility design and evaluation. From 1990 to 2006, Mr.

Kimball was the group lead for engineering design in the DOE National Nuclear Security Administration. He supervised technical staff responsible for technical review of nuclear facility designs and safety analysis. He led the development of seismic site characterization at numerous DOE sites, including the definition of the design basis earthquake, and led preparation of DOE standards and guides to define requirements and procedures to complete assessment of natural phenomena hazards.

Mr. Kimball was the DOE sponsor for the program that led to the “Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts,” commonly referred to as the SSHAC guidelines. From 1987 to 1990, he was a geophysicist in the DOE Office of Radioactive Waste, responsible for establishing the baseline site characterization plan for the Yucca Mountain high-level waste repository site. Before that, from 1984 to 1987, he was a senior geophysicist with Roy F. Weston Inc., participating in the review and development of environmental assessments for nine candidate high-level waste sites, and comparing and ranking sites for site characterization. From 1980 to 1984, he was a geophysicist with the NRC, participating in the review of safety analysis reports and developing appropriate sections of those reports. Mr. Kimball holds a BS in atmospheric and oceanic sciences and an MS in geosciences (geophysics/seismology), both from the University of Michigan.

Donald P. Moore, PE, is a Consulting Engineer with Southern Nuclear Operating Company. He has over 40 years experience in seismic analysis, seismic design, seismic qualification, and seismic hazard assessment of nuclear power plant structures, systems, and components. He has provided technical leadership through EPRI and NEI in many areas, such as implementation of seismic margin assessment methodology, the resolution of USI A-46 on equipment seismic qualification, the methodology for response to individual plant examination of external events (IPEEE) for seismic activity, and seismic analysis of unanchored spent fuel dry casks at independent spent-fuel storage facilities. He has participated in the development of industry codes and standards for nuclear facilities, such as ASCE-4, ASCE/SEI 43-05, IEEE-344, and ASME code revisions.

Mr. Moore was a member of the EPRI industry task group that provided NRC comments on new regulations and regulatory guides for ESPs and COLs. He also participated in the peer review of the seismic analysis of Westinghouse AP600, and in NRC research on the seismic response of unanchored spent-fuel casks. He is a member of the NEI Seismic Issues Task Force and the EPRI Technical Review and Advisory Group, which are involved in resolving seismic issues with ESPs and COLs. Mr. Moore has been a member of the Technical Advisory Group for a number of COL applicants for the Site Safety Analysis Report section 2.5 (Geology, Seismology, and Geotechnical Engineering). He has co-authored a number of technical papers on seismic analysis and design. He is currently the Technical Interface for Southern Nuclear for the seismic portion of the Vogtle ESP and COL. Mr. Moore holds a BS in civil engineering from University of Alabama and an MS in engineering from The University of Alabama at Birmingham. He is a licensed Professional Engineer.

Mark D. Petersen, PhD, is currently the Chief of the U.S. National Seismic Hazard Mapping Project of the U.S. Geological Survey in Golden, Colo., and also serves as a National Coordinator for the USGS Earthquake Hazards Program. Dr. Petersen was lead in developing the 1996 California state hazard maps (California Geological Survey) and the 2008 National Seismic Hazard Maps (USGS). He is responsible for the USGS seismic hazard maps that are applied in

many modern building codes, implemented in earthquake insurance rates, and considered for public policy decisions. Dr. Petersen has served on several scientific committees, including the Working Group on California Earthquake Probabilities (1999, 2002, 2008); the Working Group on Utah Earthquake Probabilities (2010); the Science Advisory Board for the California Earthquake Authority (2003–2005); the Utah Seismic Safety Commission (2002–2010); the Global Earthquake Model (GEM) Modeling Advisory Group (2009–2010); the Advisory Board for the Swiss Seismological Service (2009); PEER Next Generation Attenuation Relations groups (2003–2010); and the PPRP for the CEUS SSC Project (2008–2010). In addition to the U.S. hazard analyses, he has conducted seismic hazard assessments for Europe (Turkey); central Asia; Southeast Asia (India, Thailand, Cambodia, Vietnam, Laos, Indonesia, Singapore, Malaysia); Central America and the Caribbean (Panama, Puerto Rico, Virgin Islands); and South America (all countries). Dr. Petersen has a BS and MS in geology from Brigham Young University, and an MPhil and PhD from Columbia University’s Lamont-Doherty Earth Observatory.

J. Carl Stepp, PhD, of Earthquake Hazards Solutions, is Co-Chairman of the Participatory Peer Review Panel (PPRP) for the CEUS SSC Project. Dr. Stepp has more than 40 years experience developing PSHA methods and developing probabilistic seismic design bases, primarily for nuclear power generation plants and other critical facilities. During his professional career he has been a research seismologist for the U.S. Coast and Geodetic Survey for approximately 10 years; he was chief of the Geology, Seismology, and Geotechnical Engineering Branch at the NRC, in charge of the application of seismic hazard assessment in nuclear facilities seismic regulation for 7 years; he headed research and development of seismic hazard, seismic design, and seismic regulation technologies for 10 years as director of the Seismic Center at EPRI; and he provided consulting services in seismic hazard assessment and seismic safety regulation for approximately 20 years. At the NRC, he supervised early implementation of the nuclear seismic regulation 10 CFR, Part 100, Appendix A for reviews of 53 nuclear power plant construction and operating license applications, and the development of geology, seismology, and geotechnical engineering sections of the NRC’s Standard Review Plan. At EPRI, Dr. Stepp managed a broad program of nuclear plant seismic safety research and technology development, including methods for probabilistic seismic hazard assessment and for predicting earthquake-generated ground motion. He was technical lead for EPRI, interacting with both the NRC and industry to incorporate the integrated results of EPRI’s seismic research and technology development into seismic regulations, including the 10 CFR Part 100.23 rule making and the development of Regulatory Guide 1.165 and Revision 3 of the related Standard Review Plan sections.

Dr. Stepp directed development of the PSHA for the Yucca Mountain, Nevada, high-level nuclear waste site; he chaired the development of Preclosure Seismic Design Methodology for a Geologic Repository at Yucca Mountain, and he chaired the Seismic Review Panel for development of the Yucca Mountain license application. He served as a member of the EPRI Technical Review and Advisory Group, supporting the NEI/EPRI New Plant Seismic Issue Resolution Program and interacting with the NRC to update Regulatory Guide 1.208 and the related sections of the Standard Review Plan. Currently he is Chairman of the PPRP for the BC Hydro PSHA Project and a member of the Seismic Lessons Learned Panel that advises the DOE Nuclear Facility Safety Program. Dr. Stepp holds a BS in geology from Oklahoma State University, an MS in geophysics from the University of Utah, and a PhD in geophysics from Pennsylvania State University.

SPONSOR REVIEWERS

Brent Gutierrez, PhD, PE, CEM, is the Natural Phenomena Hazards Engineering Manager for DOE's Savannah River Operations Office located in Aiken, S.C. He has more than 22 years of engineering experience in the mitigation of natural phenomena hazards for nuclear facilities inclusive of hazard evaluation and geotechnical, structural, and mechanical engineering. His current responsibilities include developing mitigation policy for the Natural Phenomena Hazards Department and promulgating this policy into Savannah River's engineering standards and practice. Dr. Gutierrez received a BS and MS in mechanical engineering from Mississippi State University and a PhD in mechanical engineering from the University of South Carolina.

Clifford G. Munson, PhD, is Senior Technical Advisor in the Division of Site and Environmental Reviews, Office of New Reactors for the NRC. He is the principal reviewer of new nuclear plant siting applications in the areas of geology, seismology, and geotechnical engineering for the NRC. He has developed and updated several regulatory guidance documents pertaining to siting, including Chapter 2.5 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants"; Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)"; and Regulatory Guide 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion." Dr. Munson joined the NRC in 1995 as a geophysicist, becoming a senior geophysicist in 2003, then a branch chief in 2008 until he took his current position in November 2009. He has a BS in statistics (1987) from Brigham Young University and an MS (1991) and PhD in geophysics (1995) from the University of Wisconsin–Madison.