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## 11. CONTRIBUTIONS

The work documented within this PA is the result of years of multidisciplinary research and modeling activities accomplished through the efforts of the individuals named in this section. Individuals who directly helped prepare this report are listed in Section 11.1; those who significantly contributed to the work described herein are acknowledged in Section 11.2.

### 11.1. PREPARERS

#### Sebastian E. Aleman

*M.S., Mechanical Engineering, Stanford University, 1981*

*B.S., Applied Physics, California Institute of Technology, 1979*

Mr. Sebastian E. Aleman is a Senior Fellow Engineer in the Environmental Sciences and Dosimetry Group at SRNL and has been a principal engineering code developer and analyst on a wide variety of programs. He has 41 years of technical experience in the theoretical aspects of single-/multi-fluid thermal-hydraulics of nuclear reactors; environmental modeling of groundwater flow and transport; and computational aspects of reactor safety analysis. Mr. Aleman's previous research activities have focused on development of a transient three-dimensional, finite element code designed to simulate isothermal groundwater flow, moisture movement, and solute transport in variably saturated and fully saturated subsurface porous media. Mr. Aleman was responsible for analysis and mathematical modeling of engineering processes in support of High-Level Waste activities at Savannah River and Hanford Waste Treatment Plant (WTP) ion-exchange processes. He was a principal code developer of HyChrom, which models hydrogen isotope separation in the Thermal Cycling Absorption Process. Mr. Aleman's recent research endeavors include development of the SRNL Dose Toolkit, thermal/hyperspectral infrared signature modeling, surface water hydrological code development, modeling of power plant cooling systems, atmospheric fate and transport and heavy water plant simulation. Mr. Aleman has over 30 years of experience in modeling of groundwater flow and transport for performance assessments and special analyses.

For this PA, Mr. Aleman has been one of the principal investigators involved in all critical technical and developmental aspects of the PA. His main contributions to the PA include recalibration of the GSA aquifer flow models; GSA refined aquifer flow models for ELLWF PORFLOW aquifer transport simulations; GSA aquifer flow and transport models to support calculation of ELLWF plume interaction factors; calculation of IHI doses and inventory limits; calculation of Groundwater Pathway doses and inventory limits; and closure analysis for the ELLWF.

**Thomas L. Danielson**

Ph.D., *Materials Science and Engineering, Virginia Polytechnic Institute and State University, 2016*

B.A., *Physics and Mathematics, Monmouth College (Illinois), 2011*

Dr. Danielson is a Senior Scientist A at the Savannah River National Laboratory with 5 years of experience in groundwater hydrology, and over 10 years of experience in code development and numerical simulation. Dr. Danielson has carried out deterministic groundwater modeling for multiple major efforts since joining SRNL, including deactivation and decommissioning of the 235-F facility and a 2018 Special Analysis assessing the impact of a new GSA flow model on operations at the ELLWF. In addition, Dr. Danielson is a member of the DOE-funded, multi-lab/multi-institution ALTEMIS team (Advanced Long-Term Environmental Monitoring Systems) that is working to develop a new paradigm for long-term monitoring of contaminated sites.

In this PA, Dr. Danielson has developed, executed, and documented the conceptual models for contaminant fate and transport from slit and engineered trenches, including special waste forms such as components-in-grout.

**James A. Dyer**

Ph.D., *Environmental Soil Chemistry, University of Delaware, 2003*

MCE, *Environmental Engineering, University of Delaware, 1997*

B.S., *Chemical Engineering, Drexel University, 1985*

Dr. Dyer is an Advisory Engineer in the Environmental and Legacy Management Directorate at Savannah River National Laboratory with over 37 years of experience. Before joining SRNL in 2016, Dr. Dyer spent 32 years with the DuPont Company in Wilmington, DE in various roles including plant process engineering, environmental and chemical engineering consulting, process and product development, and project engineering. He has expertise in metal fate and transport, soil and groundwater remediation, geochemical modeling, reaction kinetics, aqueous thermodynamics, and water and wastewater treatment. Since arriving at SRNL, Dr. Dyer has focused primarily on supporting PA activities at SRS including the E-Area Low-Level Waste Facility and Saltstone Disposal Facility PAs. His PA skillset includes infiltration modeling, closure cap design and performance, radionuclide screening for non-groundwater pathways, and geochemistry. In addition, he has been a technical reviewer on select draft PA documents for Hanford and Oak Ridge.

For this PA, Dr. Dyer has been one of the principal investigators, focusing on the infiltration model, closure cap design and performance, cap subsidence, and the development and technical editing of the PA report.

## Maximilian B. Gorenssek

Ph.D., *Chemical Engineering, Princeton University, 1981*  
M.S., *Chemical Engineering, Case Western Reserve University, 1977*  
B.S., *Chemical Engineering, Case Western Reserve University, 1977*  
Registered Professional Engineer (Ohio, #48101; New Jersey, #24GE031294)

Dr. Gorenssek is a Senior Fellow Engineer with the Savannah River National Laboratory and has over 40 years of professional experience. Current areas of research include modeling and simulation of a variety of chemical processes, from biomass pyrolysis to carbon capture to high-temperature water-splitting hydrogen production to nuclear waste treatment. Before joining SRNL in 2002, he worked in the commercial chemical industry, covering the range from bench and pilot-scale process development and catalyst testing, through steady-state and dynamic modeling and simulation of plant processes and flowsheet development, to plant and licensing technical support. Dr. Gorenssek has 4 U.S. and 3 international patents, and about 40 peer-reviewed scientific publications and book chapters. He is a Fellow of the AIChE, a Director and past Chair of AIChE's Nuclear Engineering Division, and the 2020 recipient of the Division's Robert E. Wilson Award.

For this study, Dr. Gorenssek developed the tritium source term for TPBAR disposal in the ILV; performed LA WV vadose zone flow and transport and aquifer transport modeling; design checked ILV vadose zone flow and transport and aquifer transport modeling; and collaborated on the sensitivity and uncertainty analysis.

## L. Larry Hamm

Ph.D., *Chemical Engineering, University of South Carolina, 1982*  
M.S., *Chemical Engineering, University of South Carolina, 1981*  
B.S., *Chemical Engineering, University of South Carolina, 1979*

Dr. Hamm has worked on DOE-funded projects for ~42 years and currently serves as an Advisory Engineer at SRNL. He has been a technical contributor, technical director, and program manager for a wide variety of DOE nuclear reactor, waste management, and environmental cleanup-related programs. Dr. Hamm has worked at SRNL, LANL, and as an Adjunct Professor at the University of South Carolina (USC). For many of these projects, he has served not only as a technical contributor but also as the technical leader (e.g., SRS Reactor Restart Program, Accelerator Production of Tritium Project, LANL's Chief Engr. for New Production Heavy Water Reactor Program, Fission Product Removal by Ion-Exchange programs, and Hanford Waste Tank Hydrogen Safety Issue). Dr. Hamm has taught both undergraduate and graduate courses at USC for ten years focusing on chemical and nuclear engineering subject material. His overall focus throughout his career has been associated primarily with the nuclear fuel cycle (i.e., "from cradle-to-grave"). In the mid-1990s, Dr. Hamm co-authored the FACT code used for modeling subsurface contaminant transport at various U.S. DOE waste sites and, more specifically, the first comprehensive groundwater flow model of the GSA at SRS.

Starting in 2005, Dr. Hamm was one of the original key staff members who created the 2008 ELLWF PA and many of its subsequent SAs and UDQEs. Based on his extensive knowledge associated with ongoing ELLWF performance assessment activities, in 2017, Dr. Hamm was chosen as the overall technical lead for the 2022 PA effort. He has been involved in almost every technical aspect of the 2022 PA project from its conception (e.g., establishing its performance assessment methodology) to helping perform several of the key computational tasks (e.g., GW/IHI screening, plume interaction profiles, plume interaction factors, inventory limits and trigger values, and closure analysis).

## Thong Hang

Master of Business Administration, *University of South Carolina*, 1998  
Ph.D., *Chemical Engineering, Rice University*, 1986  
Master of Chemical Engineering, *Technical University of Berlin, Germany*, 1981  
B.S., *Chemical Engineering, Cologne School of Engineering, Germany*, 1977

Dr. Hang is a Senior Fellow Engineer at Savannah River National Laboratory with over 15 years of experience related to groundwater modeling using PORFLOW. He has been involved in the evaluation of subsidence for non-crushable containers in slit trenches; modeling of Tc-99-containing waste disposal in Saltstone vaults; studies of Salt Disposal Unit (SDU) design optimization and alternate future SDU locations; and analysis of the impact of cover overhang on vadose zone transport.

For this study, Dr. Hang has been one of the principal investigators focusing on the groundwater pathway analysis for the two Naval Reactor Component Disposal Areas (NRCDA), 643-7E and 643-26E.

## William C. Jolin

Ph.D., *Environmental Engineering, University of Connecticut*, 2016  
B.S., *Environmental Engineering, University of Connecticut*, 2012

Dr. Jolin is a Senior Engineer at Savannah River National Laboratory where he serves as a contaminant fate and transport subject matter expert. His work focuses on the application of environmental modeling for regulatory decisions and the characterization of nuclear facilities prior to decommissioning. Prior to joining SRNL, Dr. Jolin performed his post-doctoral work at Argonne National Laboratory where he developed numerical solutions for the fate and transport of radionuclides during widescale urban decontamination activities.

For this study, Dr. Jolin performed the air pathways and radon flux analyses and contributed to the groundwater pathway analysis performed for slit and engineered trenches.

**Walter P. Kubilius**

*Ph.D., Geology, Johns Hopkins University, 1991*  
*M.S., Geochemistry and Mineralogy, Pennsylvania State University, 1983*  
*B.S., Geology, New Mexico Institute of Mining & Technology, 1978*

Dr. Kubilius was a Fellow Scientist at SRNL with over 30 years of experience nationally and internationally in waste management, with emphasis on performance assessment, decommissioning, design, monitoring, reviews, and remediation of radiological waste sites. He has recently participated in PA development and review, served as monitoring technical lead at E-Area Low-Level Waste Facility, wrote annual summary reports for the LFRG, conducted research in chemical leaching behavior of cementitious materials, planned chemical and radiochemical analyses of high-level waste, estimated radionuclide inventory of groundwater contaminant plumes, and conducted training classes in radioactivity and analytical methods. He led the modeling task for the decommissioning of P and R reactors at SRS. Dr. Kubilius currently works for IEI Consulting, Inc.

In the current PA, Dr. Kubilius conducted the inadvertent human intruder analyses and contributed to the radionuclide screening methodologies for groundwater, air, and radon.

**Frank G. Smith III**

*Sc.D., Chemical Engineering, Massachusetts Institute of Technology, 1981*  
*M.S., Chemical Engineering, California Institute of Technology, 1971*  
*B.S., Chemical Engineering, University of Louisville, 1969*

Dr. Smith is a Senior Fellow Engineer at SRNL with over 35 years of experience in computer modeling including 11 years of experience in groundwater transport. He was lead modeler for the 2010 SRS Composite Analysis which used the GoldSim<sup>®</sup> software. He developed the current Radionuclide and Element Data Package and was principal author of the 2015 report describing the dose calculation methodology to be used for solid waste Performance Assessment and Composite Analysis.

In this PA, Dr. Smith was one of the principal investigators contributing to the development and documentation of the PORFLOW vadose zone models used for the ILV and LAWV, performing all groundwater pathway calculations for the ILV, and design checking the LAWV calculations. Dr. Smith also developed and applied the method used to assess uncertainty in the PORFLOW calculations.

## Stephanie B. Taylor

M.P.S., *Data Analytics, The Pennsylvania State University, 2019*

B.S., *Mathematics, Tarleton State University, 2006*

Mrs. Taylor is a Senior Scientist at Savannah River National Laboratory with 8 years of experience in statistical applications and data analytics. She has conducted uncertainty analyses for numerous safety significant applications at Savannah River Site.

For this study, Mrs. Taylor contributed to the investigation and quantification of bias and uncertainty in radionuclide inventory estimates provided by waste generators and recorded electronically in the waste inventory tracking software used for tracking waste inventories at the Savannah River Site.

## Tad S. Whiteside

Ph.D., *Physical Chemistry, The University of Georgia, 2004*

B.S., *Chemistry, Erskine College, 2000*

B.A., *Physics, Erskine College, 2000*

Dr. Whiteside is a Principal Scientist at Savannah River National Laboratory with 17 years of experience in physicochemical modeling, environmental modeling, and nuclear measurements. His experience spans from using big-data to teach physical-organic chemistry to artificial intelligence systems, running engineering applications that describe how metals and rads move through the environment, and developing user-interface software to control various nuclear instruments.

In this work, Dr. Whiteside developed the software to interface with the WITS database, extract the inventory of each isotope in each container in each disposal unit, and determine the uncertainty and bias of each isotope in each disposal unit. This involved making some assumptions and then refining those assumptions through analysis of the highest activity containers and waste-streams.

## Jennifer L. Wohlwend

Ph.D., *Materials Science and Engineering, University of Florida, 2009*

M.S., *Materials Science and Engineering, University of Florida, 2008*

B.S., *Ceramic and Materials Engineering, Clemson University, 2004*

Dr. Wohlwend is a Principal Engineer at Savannah River National Laboratory with 11 years of experience related to computational simulation. In the last five years, she has focused on flow and transport simulation using GoldSim<sup>®</sup>, deactivation and decommissioning, and performance assessment and composite analysis for low-level radioactive waste disposal at the Savannah River Site.

For this study, Dr. Wohlwend has been one of the principal investigators, focusing on the uncertainty quantification and sensitivity analysis for slit and engineered trenches as well as the air pathways and radon flux modeling.

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