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SUMMARY

Nuclear engineer (Ph.D.) with thirty years of work experience; technical expertise includes application of variance reduction methods to complex shielding calculations, containment analyses, source term generation, depletion and criticality code validations for spent nuclear fuel (SNF) burnup credit applications, cross-section sensitivity and uncertainty analyses, material damage evaluations, and gamma heating measurements.

EDUCATION

THE UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX
Doctor of Philosophy in Nuclear Engineering, May 2003
Dissertation title: *Automated Variance Reduction for Monte Carlo Shielding Analyses with MCNP*
Master of Science in Nuclear Engineering, August 1997
Thesis title: *MCNP Criticality Benchmarks for Mixed Oxide Lattices of the Saxton Plutonium Program*
UNIVERSITY OF BUCHAREST, ROMANIA
Master of Science in Engineering Physics, June 1986

WORK EXPERIENCE

08/2005–present
OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TN
Reactor and Nuclear Systems Division – Radiation Transport Group
Senior Research and Development (R&D) Staff

Working on R&D projects of the US Department of Energy, Office of Nuclear Energy, and the Nuclear Regulatory Commission (NRC) related to storage and transportation of commercial SNF; performing shielding analyses for the International Thermonuclear Experimental Reactor (ITER) project and Joint European Torus (JET) NEXT activities

- Radiation Shielding/Source Term Analyses
  - JET shutdown dose rate measurement simulations
  - Conversion of CAD models to MCNP models for the ITER tokamak water cooling system and the ORNL molten salt breeder reactor building
  - Evaluation of material damage (i.e., displacement per atom and gas production rates) in the stainless-steel components of the tokamak water cooling system on level L3 of the tokamak building using Monte Carlo calculations
  - Characterization of dose rates external to as-loaded SNF canisters
  - SCALE/MAVRIC model development and dose rate assessments (10 CFR 72.104) for the proposed WCS consolidated interim storage facility (CISF) to support the NRC review of the license application for the construction and operation of the CISF

- SCALE/MAVRIC shielding analysis model template development for the Used Nuclear Fuel-Storage, Transportation & Disposal Analysis Resource and Data System (UNF-ST&DARDS), an integrated data and analysis tool for cask-specific SNF criticality, thermal, dose rate, and containment analyses
- Analysis of spent nuclear fuel reconfiguration on the external dose rates of SNF transportation packages and storage casks
- Energy deposition by alpha and beta particles in the moist air surrounding UO_2 fuel pellets for use in the determination of the production rates of radiolysis products
- Dose rate assessments to support NRC review of the US EPR reactor design certification features

- Burnup Credit Criticality Safety Analyses
  - SFCOMPO benchmark evaluations
  - Development of the technical basis and recommendations for NRC Interim Staff Guidance concerning the depletion uncertainty associated with burnup credit criticality safety calculations using PWR SNF actinide and fission product nuclides (NRC ISG-8 Rev. 3, *Burnup Credit in the Criticality Safety Analyses of PWR Spent Fuel in Transportation and Storage Casks*)
  - SCALE/TRITON depletion code validations based on comparison of measured and calculated nuclide concentrations in irradiated UO_2 fuel
  - OECD/NEA Expert Group on Burn-up Credit Criticality Safety benchmark phase VII, *UO_2 Fuel Study of Spent Fuel Compositions for Long-term Disposal,* development, calculations, analyses, and documentation
  - Code manager for STARBUCS, the SCALE sequence for automated criticality safety analyses using burnup credit
  - Validation of computational methods used in commercial SNF postclosure criticality calculations
  - Demonstration of the applicability of PWR commercial reactor criticals to criticality code validations for burnup credit criticality safety analyses of commercial SNF casks using cross-section sensitivity and uncertainty analysis techniques

02/2001–08/2005

BECHTEL SAIC COMPANY, LAS VEGAS, NV
DOE Office of Civilian Radioactive Waste Management (OCRWM) Yucca Mountain Project
Senior Engineer

Performed radiation source term, dose rate, and shielding design calculations for the surface and subsurface facilities at the proposed high-level waste geologic repository at Yucca Mountain, Nevada, in support of License Application. Applied project requirements and design criteria to demonstrate compliance with the regulatory requirements of 10 CFR Parts 20, 63, and 72.

07/1998–02/2001

FRAMATOME COGEMA FUELS, LAS VEGAS, NV
DOE OCRWM Yucca Mountain Project
Engineer

Performed detailed dose rate evaluations for commercial SNF waste packages and codisposal high-level waste and DOE-owned SNF (e.g., FFTF, TRIGA, Fermi, FSV, and Shippingport fuels) waste packages.

09/1995–06/1998
THE UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX
Department of Mechanical Engineering
Graduate Research/Teaching Assistant

Performed criticality benchmark evaluations for the Saxton Plutonium Critical Experiments in support of the joint US/Russia project *Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel*.

08/1986–08/1995
INSTITUTE FOR NUCLEAR RESEARCH, PITESTI, ROMANIA
TRIGA Research Reactor Division
Research Scientist

- Designed and performed gamma heating measurements of material testing reactor
- Performed radiation source term and shielding design calculations for SNF transportation casks

COMPUTER SKILLS

- Computer codes
  SCALE (CSAS5, CSAS6, ORIGAMI, ORIGEN, MAVRIC, STARBUCS, TSUNAMI)
  MCNP, MCNPX
- Geometry visualization and conversion tools
  VisIt, Cubit, McCad

PROFESSIONAL SOCIETIES

- Member of the American Nuclear Society
- Chair of the Working Group for the ANS-19.3.4 standard, *The Determination of Thermal Energy Deposition Rate in Nuclear Reactors*

PUBLICATIONS

B.J. Marshall, B. Ade, I. Gauld, G. Ilas, U. Mertyurek, J. Clarity, **G. Radulescu**, B. Betzler, S. Bowman, and J. Martinez-Gonzalez, "Overview of the Recent BWR Burnup Credit Project at Oak Ridge National Laboratory," Proc. of the 11th International Conference on Nuclear Criticality Safety, Paris, France, September 15-20, 2019.

D. G. Bowen, J. Risner, **G. Radulescu**, and E. Saylor, "Safety Analysis Report for Packaging Shielding & Nuclear Criticality Safety Courses Developed and Conducted by Oak Ridge National Laboratories," Proc. of the 11th International Conference on Nuclear Criticality Safety, Paris, France, September 15-20, 2019.

G. Radulescu, K. E. Royston, S. C. Wilson, W. Van Hove, D. E. Williamson, and S. H. Kim, "MCNP Models for Tokamak Cooling Water System Equipment Evaluations," *Fusion Sci. Technol.* 75(6) 425-457 (2019). https://doi.org/10.1080/15361055.2019.1606519

K. E. Royston, **G. Radulescu,** W. Van Hove, S. C. Wilson, and S. H. Kim, "Assessment of Activation on Level L3 of the Tokamak Building Due to the ITER Tokamak Cooling Water System," *Fusion Sci. Technol.* 75(6) 458-465 (2019). https://doi.org/10.1080/15361055.2019.1606519

G. Radulescu and K. Banerjee, "Dose to Cementitious Material for Moderator Exclusion in a Spent Fuel Canister During a Repository Timeframe," Proc. of the International High Level Radioactive Waste Management, Knoxville, TN, April 14-18, 2019.

G. Radulescu and K. Banerjee, "Detailed Radiation Dose Rate Evaluations of Commercial Spent Nuclear Fuel Canisters," Proc. of the International High Level Radioactive Waste Management, Knoxville, TN, April 14-18, 2019.

J. Yang, S. C. Wilson, S. W. Mosher, and **G. Radulescu**, "Integration of the Full Tokamak Reference Model with the Complex Model for ITER Neutronic Analysis," *Fusion Sci. Technol.* 74(4) 277-287 (2018). https://doi.org/10.1080/15361055.2018.1493325

G. Radulescu, T. M. Miller, K. Banerjee, and D. E. Peplow, "Detailed SCALE Dose Rate Evaluations for a Consolidated Interim Spent Nuclear Fuel Storage Facility," *Trans. Am. Nucl. Soc*., 118, 765-768 (2018).

G. Radulescu, K. Banerjee, R.A. Lefebvre, L. P. Miller, and J. M. Scaglione, "Shielding Analysis Capability of UNF-ST&DARDS," *Nucl. Technol*., 199(3), 276-288 (2017).

G. Radulescu, K. Banerjee, R.A. Lefebvre, L. P. Miller, and J. M. Scaglione, "Containment Analysis Capability of UNF-ST&DARDS," *Nucl. Technol*., 199(3), 299-309 (2017).

R.A. Lefebvre, L. P. Miller, J. M. Scaglione, K. Banerjee, J. L. Peterson, **G Radulescu**, K. R. Robb, A. B. Thompson, H. Liljenfeldt, J. P. Lefebvre, "Development of Streamlined Nuclear Safety Analysis Tool for Spent Nuclear Fuel Applications," *Nucl. Technol*., 199(3), 227-244 (2017).

F. Michel-Sandis et al., "An OECD NEA database of spent nuclear fuel isotopic assay, reactor design specifications, and operating data," *Annals of Nuclear Energy* 110, 779-788 (2017).

K. Banerjee, H. Liljenfeldt, L. P. Miller, J. L. Peterson, R. A. Joseph III, J. B. Clarity, **G. Radulescu**, R. A. LeFebvre, and J. M. Scaglione, "Consolidating Data on Spent Nuclear Fuel into a Unified Database," *Trans. Am. Nucl. Soc.* 115(1), 279-282 (2016).

K. Banerjee, K. R. Robb, **G. Radulescu**, L. P. Miller, J. M. Scaglione, J. M. Cuta, and H. Liljenfeldt, "UNF-ST&DARDS: A Unique Tool for Automated Characterization of Spent Nuclear Fuel and Related Systems," *PATRAM 2016*, Japan Society of Mechanical Engineers and Atomic Energy Society of Japan, Kobe, Japan, Sept. 2016.

K. Banerjee, K. R. Robb, **G. Radulescu**, J. M. Scaglione, J. C. Wagner, J. B. Clarity, R. A. Lefebvre, J. L. Peterson, "Estimation of Inherent Safety Margins in Loaded Commercial Spent Nuclear Fuel Casks," *Nucl. Technol*., 195(2), 124-142 (2016).

G. Radulescu and K. J. Connolly, "A Parametric Analysis of Factors Affecting Calculations of Estimated Dose Rates from Spent Nuclear Fuel Shipments," Proc. of the WM2016 Conference, Phoenix, Arizona, March 6-10, 2016.

G. Radulescu, R. A. Lefebvre, K. Banerjee, P. Miller, and J. M. Scaglione, "Shielding Analysis Capability of UNF-ST&DARDS," *Trans. Am. Nucl. Soc*., 113 (2015).

G. Radulescu, R. A. Lefebvre, P. Miller, A. B. Thompson, K. Banerjee, and J. M. Scaglione, "Containment Analysis Capability of UNF-ST&DARDS," *Trans. Am. Nucl. Soc*., 113 (2015).

K. J. Connolly and **G. Radulescu**, "Long Range Dose Rate Models for Spent Nuclear Fuel Transportation Casks," *Trans. Am. Nucl. Soc*., 113 (2015).

W. J. Marshall, B. J. Ade, S. M. Bowman, I. C. Gauld, G. Ilas, U. Mertyurek, and **G. Radulescu**, "Technical Basis for Peak Reactivity Burnup Credit for BWR Spent Nuclear Fuel in Storage and Transportation Systems," *Proc. of the ICNC 2015*, Charlotte, North Carolina, Sept. 13-17, 2015.

J. M. Scaglione, R. L. Lefebvre, K. Banerjee, **G. Radulescu**, and K.R. Robb, "A Unified Spent Nuclear Fuel Database and Analysis System," *Proc. of the IAEA International Conference on Management of Spent Fuel from Nuclear Power Reactors – An Integrated Approach to the Back-End of the Fuel Cycle*, Vienna, Austria, June 15-19, 2015.

J. M. Scaglione, **G. Radulescu**, W. J. Marshall, and K. R. Robb, A Quantitative Impact Assessment of Hypothetical Spent Fuel Reconfiguration in Spent Fuel Storage Casks and Transportation Packages, NUREG/CR-7203 (ORNL/TM-2013/92), US Nuclear Regulatory Commission, Oak Ridge National Laboratory (2015).

W. J. Marshall, B. J. Ade, S.M. Bowman, I. C. Gauld, G. Ilas, U. Mertyurek, and **G. Radulescu**, *Technical Basis for Peak Reactivity Burnup Credit for BWR Spent Nuclear Fuel in Storage and Transportation Systems*, NUREG/CR-7194 (ORNL/TM-2014/240), US Nuclear Regulatory Commission, Oak Ridge National Laboratory (2015).

K. Banerjee, J. M. Scaglione, R. L. Lefebvre, **G. Radulescu**, and K. R. Robb, "Streamlining Analysis Capabilities for SNF Management," *Proc. of the WM2015 Conference*, Phoenix, AZ, March 15-19, 2015.

J. M. Scaglione, **G. Radulescu**, K. R. Robb, and W. J. Marshall, "Consequence Assessment of Fuel Reconfiguration for Dry Storage and Transportation Packages," *Trans. Am. Nucl. Soc*., 111, 330-333 (2014).

G. Radulescu, I. C. Gauld, G. Ilas, and J. C. Wagner, "Approach for Validating Actinide and Fission Product Compositions for Burnup Credit Criticality Safety Analyses," *Nucl. Technol*., 188(2), 154–171 (2014).

G. Radulescu, D. E. Peplow, M. L. Williams, and J. M. Scaglione, "Dose Rate Analysis of As-Loaded Spent Nuclear Fuel Casks," *Proc. of the 18th Topical Meeting of the Radiation Protection & Shielding Division of ANS*, Knoxville, TN, Sept. 14 – 18, 2014.

D. E. Peplow, **G. Radulescu**, M. L. Williams, and R. L. Lefebvre,, "SCALE Enhancements for Detailed Cask Dose Rate Analysis," *Proc. of the 18th Topical Meeting of the Radiation Protection & Shielding Division of ANS*, Knoxville, TN, Sept. 14 – 18, 2014.

G. Radulescu, R. L. Lefebvre, D. E. Peplow, M. L. Williams, and J. M. Scaglione, "Dose Rate Analysis Capability for Actual Spent Fuel Transportation Cask Contents," *Proc. of the 55th Institute of Nuclear Materials Management (INMM) Annual Meeting*, Atlanta, GA, July 20-24, 2014.

J. M. Scaglione, **G. Radulescu**, K. R. Robb, W. J. Marshall, J. C. Wagner, M. Flanagan, M. Aissa, and Z. Li, "Consequence Analysis of Spent Nuclear Fuel Reconfiguration Scenarios," *Proc. of PATRAM 2013*, San Francisco, CA, August 18-23, 2013.

J. M. Scaglione, R. L. Lefebvre, **G. Radulescu**, H. J. Smith, D. Ilas, K. R. Robb, J. C. Wagner, H. E. Adkins, T. E. Michener, and D. Vinson, "Integrating Data and Analysis Capabilities for Cask-Specific Safety Evaluations," *Proc. of the 14th International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, April 28 – May 2, 2013.

J. M. Scaglione, A. Caswell, J. B. Clarity, and **G. Radulescu**, "Considerations for an Integrated Storage, Transportation, and Disposal Canister," *Proc. of the 14th International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, April 28 – May 2, 2013.

A. M. Bevill, **G. Radulescu**, J. M. Scaglione, and R. L. Howard, "ADVANTG Shielding Analysis for Closure Operations in an Open-Mode Repository," *Proc. of the 14th International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, April 28 – May 2, 2013.

G. Radulescu, I. C. Gauld, G. Ilas, and J. C. Wagner, *An Approach for Validating Actinide and Fission Product Burnup Credit Criticality Safety Analyses—Isotopic Composition Predictions*, NUREG/CR-7108 (ORNL/TM-2011/509), US Nuclear Regulatory Commission, Oak Ridge National Laboratory (2012).

G. Radulescu and J. C. Wagner, *Burn-up Credit Criticality Safety Benchmark Phase VII, UO_2 Fuel: Study of Spent Fuel Compositions for Long-term Disposal*, A Report by the Expert Group on Burn-up Credit Criticality NEA Nuclear Science Committee, Working Party on Nuclear Criticality Safety, ISBN

978-92-64-99172-9, NEA No. 6998, Nuclear Energy Agency, Organisation for Economic Co-operation and Development, February 2012.

G. Ilas, I. C. Gauld, and **G. Radulescu**, "Validation of new depletion capabilities and ENDF/B–VII data libraries in SCALE," *Annals of Nuclear Energy*, 46, 43–55 (2012).

I. C. Gauld, G. Ilas, and **G. Radulescu**, *Uncertainties in Predicted Isotopic Compositions for High Burnup PWR Spent Nuclear Fuel*, NUREG/CR-7012 (ORNL/TM-2010/41), US Nuclear Regulatory Commission, Oak Ridge National Laboratory (2011).

G. Radulescu, I. C. Gauld, G. Ilas, and J. C. Wagner, "An Approach for Validating Actinide and Fission Product Burnup Credit Criticality Safety Analyses--Isotopic Composition Predictions," *Proc. of the 9th International Conference on Nuclear Criticality Safety (ICNC 2011)*, Edinburgh, United Kingdom, Sept. 19–22, 2011.

I. C. Gauld, **G. Radulescu**, G. Ilas, B. D. Murphy, M. L. Williams, and D. Wiarda, "Isotopic Depletion and Decay Methods and Analysis Capabilities in SCALE," *Nucl. Technol*., 174, 169–195 (2011).

G. Radulescu and J. C. Wagner, "Review of Results for the OECD/NEA Phase VII Benchmark: Study of Spent Fuel Compositions for Long-Term Disposal," *Proc. of the International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, April 10–14, 2011.

G. Radulescu, *Propagation of Isotopic Bias and Uncertainty to Criticality Safety Analyses of PWR Waste Packages*, ORNL/TM-2010/116, Oak Ridge National Laboratory (2010).

G. Radulescu and E. D. Blakeman, "Iodine-125 Brachytherapy Seed Benchmark," *Proc. American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting*, Las Vegas, NV, April 18–23, 2010.

G. Radulescu, I. C. Gauld, and G. Ilas, *SCALE 5.1 Predictions of PWR Spent Nuclear Fuel Isotopic Compositions*, ORNL/TM-2010/44, Oak Ridge National Laboratory (2010).

G. Radulescu, I. C. Gauld, and G. Ilas "Evaluation of PWR Isotopic Composition Data," *Trans. Am. Nucl. Soc*., 101, 688 (2009).

I. C. Gauld, **G. Radulescu**, and G. Ilas, "SCALE Validation Experience Using an Expanded Isotopic Assay Database for Spent Nuclear Fuel," *Proc. of the IAEA/CSN International Workshop on Advances in Applications of Burnup Credit for Spent Fuel Storage, Transport, Reprocessing, and Disposition*, Cordoba, Spain, Oct. 27–30, 2009.

G. Radulescu and I. C. Gauld, "Enhancements to the Burnup Credit Criticality Safety Analysis Sequence in SCALE", *Proc. of the 2009 Nuclear Criticality Safety Division Topical Meeting on Realism, Robustness and the Nuclear Renaissance*, Richland, WA, Sept. 13–17, 2009.

G. Radulescu, D. E. Mueller, and J. C. Wagner, "Sensitivity and Uncertainty Analysis of Commercial Reactor Criticals for Burnup Credit," *Nucl. Technol.*, 167(2), 268–287 (2009).

G. Radulescu, D. E. Mueller, and J. C. Wagner, *Sensitivity and Uncertainty Analysis of Commercial Reactor Criticals for Burnup Credit*, NUREG/CR-6951 (ORNL/TM-2006/87), US Nuclear Regulatory Commission, Oak Ridge National Laboratory, (2007).

G. Radulescu, D. E. Mueller, S. Goluoglu, D. F. Hollenbach, and P. B. Fox, *Range of Applicability and Bias Determination for Postclosure Criticality of Commercial Spent Nuclear Fuel*, ORNL/TM-2007/127, Oak Ridge National Laboratory, (2007).

G. Radulescu, D. E. Mueller, and J. C. Wagner**,** "Evaluation of Applicability of CRC Models for Burnup Credit Validation," *Trans. Am. Nucl. Soc*. 97, 151-153 (2007).

G. Radulescu and S. Su, "Dose Rate Evaluation for Spent Fuel Aging Areas at Yucca Mountain," *Trans. Am. Nucl. Soc.*, 92, 29 (2005).

G. Radulescu and J. S. Tang, "Shielding Evaluations of Waste Package Designs," *Proc. of the 12th Biennial RPSD Topical Meeting*, Santa Fe, NM, April 14–18, 2002.

J. S. Tang and **G. Radulescu**, "Radiolytic Production of Nitric Acid Outside a 21-PWR Waste Package," *Proc. of the 12th Biennial RPSD Topical Meeting*, Santa Fe, NM, April 14–18, 2002.

G. Radulescu, *Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel: Evaluation of the Relative Power Experiments for the Saxton Partial Plutonium Core*, ORNL/SUB/99-XSZ175V-4, Oak Ridge National Laboratory (2001).

N. M. Abdurrahman, I. Carron, and **G. Radulescu**, *Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel: Saxton Critical Experiments*, ORNL/SUB/00-XSZ175V-2, Oak Ridge National Laboratory, (2000).

G. Radulescu, J. S. Tang, and T. W. Doering, "Evaluation of the Effect of Source Geometry Models on Dose Rates of Waste Packages." *J. Nucl. Sci. Tech.*, Supplement 1, 320–323 (2000) (9th International Conference on Radiation Shielding, Tsukuba, Japan, 17–22 Oct. 1999).

N. M. Abdurrahman, **G. Radulescu**, and I. Carron, "Benchmark Calculations for Critical Experiments of the Saxton Plutonium Program," *Nucl. Technol.*, 127, 315–331 (1999).

G. Radulescu and N. M. Abdurrahman, "Benchmark Calculations for Relative Power Experiments of the Saxton Plutonium Critical Experiments," *Trans. Am. Nucl. Soc.*, 78, 250 (1998).

N. M. Abdurrahman, M. Yavuz, and **G. Radulescu**, "MCNP Analysis of PNL Split-Table Critical Experiments Containing Mixed-Oxide Fuels," *Trans. Am. Nucl. Soc.*, 77, 213 (1997).

G. Radulescu and N. M. Abdurrahman, "MCNP Criticality Calculations of the Saxton Plutonium Program Experiments," *Trans. Am. Nucl. Soc.*, 76, 231 (1997).

G. Radulescu, I. Pop, and C. Toma, "Measurement of Absorbed Dose in the 14-MW TRIGA Reactor," *Proc. of the Twelfth European TRIGA Users Conference*, Pitesti, Romania, Sept. 28 – Oct. 1, 1992.