Colby D. Mangini, Ph.D., CHP
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Education

Ph.D., Radiation Health Physics, Oregon State University, 2012. Dissertation: "Beta-Particle Backscatter Factors and Energy-Absorption Scaling Factors for Use with Dose-Point Kernels." D. M. Hamby, Advisor
Masters of Health Physics, Oregon State University, 2008
B.S., Summa Cum Laude, Physics, Allegheny College, 2004

Professional Experience

Pacific Northwest National Laboratory
Health Physicist/Nuclear Engineer (2024-present)

- Lead collaboration with the Nuclear Regulatory Commission (NRC) as PNNL Code Team Lead for the Radiation Protection Computer Code Analysis and Maintenance Program (RAMP), interpreting regulatory guidance and integrating radiation protection models to support licensees compliance requirements.
- Serve as Principal Investigator for development of RASCAL v5.0, supporting the NRC Protective Measures Team in the Operations Center.
- Direct PNNL's Consequence Management (CM) program, aligning technical expertise with the National Nuclear Security Administration (NNSA) NA-84 mission through coordination with program managers.
- Appointed Deputy Technical Team Lead for an upcoming NRC project conducting National Environmental Policy Act (NEPA) environmental reviews for new microreactor designs.
- Managed delivery of the Supplement Analysis and Record of Decision for the NNSA project enhancing TPBAR tritium production capacity at the Tennessee Valley Authority's Watts Bar Nuclear Plant.

Renaissance Code Development, LLC
Lead Health Physicist (2018-2024)

- Specialized in radiological health and safety software development by providing state-of-the-art computational tools for public, worker, and environmental protection in the nuclear power and medical health physics fields.
- Served as subject matter expert on NRC licensed codes, VARSKIN+ and IMBA.
- Provided domestic and international training to NRC licensees and partner organizations, including clinical, academic, and regulatory users, as part of the RAMP program.
- Assisted the NRC with licensee dose verification calculations and provide detailed reports documenting the dose assessment.

Risk Assessment Corporation
Consultant (2017-2024)

- Performed environmental and ecological dose and risk assessments for radiological contamination using fate and transport computer models including RESRAD, AERMOD, XOQDOQ, among others.
- Developed conceptual and mathematical models for low level radioactive waste and TENORM disposal sites using GoldSim software.
- Relied on as the radiation safety expert and served as the consulting team leader on radiation regulations at the state and federal levels.

- Assisted the State of Oregon as a member of the Rulemaking Advisory Committee in rewriting their radioactive waste disposal regulations for TENORM, ensuring protection of the public long term and protecting the operation of key Oregon businesses.
- Managed multiple client projects at time as the project leader, effectively managing the work of other team members while meeting project deliverables and budgets.

St. Jude Children's Research Hospital
Radiation Safety Officer (2014-2017)

- Directed and enhanced a comprehensive medical radiation safety and regulatory compliance program for research laboratories and clinical facilities,:
  - Hitachi 230 MeV proton synchrotron
  - IBA cyclotron with 18 MeV protons and 9 MeV deuterons
  - Tritium labeling facility with a manifold loaded with 100 curies of H-3
  - High Dose Rate (HDR) brachytherapy unit with Iridium-192 sources
  - Biomedical research and clinical laboratories with nearly 100 primary investigators
- Responsible for all radiation safety aspects of the Molecular Imaging Department's IBA cyclotron and associated C-11/F-18 hot-lab.
- Managed a 10 CFR Part 37 compliance program for Category 1 quantities of radioactive material, including routine internal audits and external regulatory inspections.
- Developed, implemented, and maintained an effective training and inspection program for research and clinical users of radioactive materials and radiation-producing equipment, ensuring alignment with institutional and state requirements.
- Managed radiation safety staff of six to meet individual performance levels and divisional operational objectives.
- Advanced the radiation safety program using analytical tools like Tableau and EH&S Assistant to facilitate real time program metrics and overall program compliance.

Knolls Atomic Power Laboratory (DOE L Clearance)
Principal Scientist (2012-2014)

- Investigated observed abnormalities with Naval Reactors' personnel dosimetry system through the use of Monte Carlo computational models.
- Performed technical reviews for new reactor design concepts in which shipboard dosimeter results could be used to asses and evaluate reactor shielding design objectives.
- Designed and executed laboratory experiments to validate anticipated dosimeter responses.
- Led the Laboratory's Medical Decontamination Facility in support of Emergency Preparedness efforts.

Oregon State University School of Nuclear Engineering and Radiation Health Physics
Graduate Research Assistant (2010-2012)

- Developed an innovative beta-particle physics model for use in NRC licensed skin dosimetry software through extensive programming in scripting, numeric and scientific computing, and radiation particle transport languages.
- Automated the input file writing, simulation execution, output parsing, and data analysis of over 15,000 Monte Carlo simulations.
- Reprogrammed FORTRAN source codes to incorporate novel and complex computational techniques for charged particle dosimetry.
- Selected to teach numerous undergraduate and graduate level courses in the NERHP department, including: Nuclear and Radiation Physics I and II, Nuclear Radiation Detection and Measurement, and Advanced Radiation Detection and Measurement.

Pacific Northwest National Laboratory
National Security Ph.D. Intern (2010)

- Worked independently on atmospheric transport modeling in support of the Comprehensive Nuclear Test-Ban Treaty verification regime and the Automated Radioxenon Sampler and Analyzer (ARSA).
- Automated the modeling tool HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory) to provide real-time daily executions of backwards/forwards tracking simulations for 80 different International Monitoring System radionuclide stations.
- Completed assigned work by collaborating with other National Security interns using iterative and incremental code development techniques, while identifying failure points of the modeling process and providing timely coding solutions.

Puget Sound Naval Shipyard, Bremerton, WA (DOE L Clearance)
Health Physicist (2009-2010)

- Engineered safety procedures for Radiographic Non-Destructive Testing Division and provided oversight to ensure compliance.
- Implemented REM reduction efforts associated with temporary shielding installation and nuclear functional areas.

United States Navy (DoD Secret Clearance)
Lieutenant, Nuclear Power School Instructor (2005-2009)

- Awarded Master Training Specialist designation by the United States Navy, having trained more than 500 enlisted personnel in the following courses: Radiological Controls, Water Chemistry, Materials, and Heat Transfer and Fluid Flow.
- Facilitated Applied Health Physics training to instructors on radiation detection and measurement, radioactive contamination control equipment and methods, airborne radioactivity measurement equipment and methods, and ALARA methods.
- Promoted to Senior Instructor and directed work of 8 junior officer and senior enlisted instructors while coordinating the successful training of over 300 new students every 4 months.

Honors

Outstanding Doctoral Dissertation Award in 2012
Inducted into Alpha Nu Sigma Honor Society in 2011
Selected as Achievement Rewards for College Scientists (ARCS) Fellow in 2010
Awarded Master Training Specialist (U.S. Navy) designation in 2007
Recipient of the Richard L. Brown Physics Prize in 2004
Inducted into Phi Beta Kappa Honor Society in 2003

Affiliations

American Academy of Health Physics since 2014
Health Physics Society since 2007

Select Courses and Presentations

Mangini, C.D.; Integrated Modules for Bioassay Analysis (IMBA) Training. 2023 Spring Users Group Meeting. Nuclear Regulatory Commission. Ghana, West Africa. April 25 – April 28, 2023.

Mangini, C.D.; Integrated Modules for Bioassay Analysis (IMBA) Training. 2022 Fall Users Virtual Meeting. Nuclear Regulatory Commission. Rockville, MD. October 24 – October 27, 2022.

Mangini, C.D.; VARSKIN+ Training: SkinDose, NeutronDose, EyeDose, and WoundDose Modules. 2021 Fall Users Virtual Meeting. Nuclear Regulatory Commission. Rockville, MD. October 25 – November 4, 2021.

Mangini, C.D.; Electron Dosimetry Training: VARSKIN 6. 2019 Fall Users Group Meeting. Nuclear Regulatory Commission. Rockville, MD. October 28 – November 1, 2019.

Mangini, C.D.; Nasal Cavity Dose Estimates Using VARSKIN and MCNP6. 2019 Fall Users Group Meeting. Nuclear Regulatory Commission. Rockville, MD. October 28 – November 1, 2019.

Mangini, C.D.; Shallow Dose Estimates Using EGS and MCNP. The 4th Annual RAMP User's Meeting. Nuclear Regulatory Commission. Ottawa, Ontario. October 29 - 30, 2018.

Mangini, C.D.; VARSKIN Examples, Training Modules, Dosimetry Theory. The 4th Annual RAMP User's Meeting. Nuclear Regulatory Commission. Ottawa, Ontario. October 29 - 30, 2018.

The 3nd International RAMP VARSKIN Workshop. Nuclear Regulatory Commission and Federal Authority for Nuclear Regulation (of UAE). Abu Dhabi, UAE. March 25-29, 2018

Mangini, C.D.; Shallow Dose Estimates Using EGS and MCNP. The 3rd Annual RAMP User's Meeting. Nuclear Regulatory Commission. Rockville, MD. October 15 - 20, 2017.

Mangini, C.D.; New in VARSKIN 6. The 3rd Annual RAMP User's Meeting. Nuclear Regulatory Commission. Rockville, MD. October 15 - 20, 2017.

Mangini, C.D.; Case Study: 2008 Region IV Eye Dosimetry. The 3rd Annual RAMP User's Meeting. Nuclear Regulatory Commission. Rockville, MD. October 15 - 20, 2017.

Mangini, C.D.; VARSKIN Electron Dosimetry. The 3rd Annual RAMP User's Meeting. Nuclear Regulatory Commission. Rockville, MD. October 15 - 20, 2017.

The 2nd International RAMP VARSKIN Workshop. Nuclear Regulatory Commission and Atomic Energy Council (of Taiwan). Taipei, Taiwan. April 24-28, 2017

Environmental Risk Assessment and Analysis, Training Course H-420. Training Course H-420 prepared and presented by Risk Assessment Corporation for the U.S. Nuclear Regulatory Commission at the NRC Professional Development Center, Three White Flint North, Maryland. May 8–12, 2017. 22 attendees.

The 1st International RAMP VARSKIN Workshop. Nuclear Regulatory Commission and National Nuclear Regulator (of South Africa). Pretoria, South Africa. May 16-20, 2016

Select Publications

C. Mangini, E.A. Caffrey, Rood, A.S., H.J. Mohler, Grogan, H.J., J.E. Till. "Dose Assessment for Outdoor Workers at Coal Combustion Product Management Sites." *Health Physics*, submitted January, 2023.

E.A. Caffrey, **C. Mangini**, Rood, A.S., Grogan, H.J., J.E. Till. "Radon Flux Measurement System." *Health Physics*, submitted January, 2023.

E.A. Caffrey, Rood, A.S., Grogan, H.J., **C. Mangini**, J.E. Till. "Comparison of Doses from Disposals of Technologically Enhanced Naturally Occurring Radioactive Materials in Kentucky and Oregon." *Health Physics*, submitted September, 2022. Accepted December, 2022.

Rood, A.S., **C. Mangini**, E.A. Caffrey, Mohler, H.J., Grogan, H.J., J.E. Till. "Potential Airborne Releases and Deposition of Radionuclides from the Santa Susana Field Laboratory during the Woolsey Fire." *Health Physics*, submitted May, 2022. Accepted October, 2022.

O'Doherty, J., **Mangini, C.**, Hamby, D., Boozer, D., Singh, N., Hippelainen, E. Radiation dosimetry of nasally administered PET agents using Monte Carlo simulations. submitted to *Medical Physics*. October 2020.

Rood, A.S., H.A. Grogan, H.J. Mohler, J.R. Rocco, E.A. Caffrey, **C. Mangini**, J. Cartwright, T. Mathews, C. Shaw, M.E. Packard, and J.E. Till, 2020. "Use of Routine Environmental Monitoring

Data to Establish A Dose-Based Compliance System for a Low-Level Radioactive Waste Disposal Site." *Health Physics*, DOI: 10.1097/HP.0000000000001116.

Caffrey, E.A., **Mangini, C.D.**, Rood, A.S., Grogan, H.A., Mohler, J.H., Rocco, J.R., Till, J.E., Cartwright, J., Shaw, C., and Matthews, T. 2019. Implementation of a Dose-based Compliance System for WCS. *Waste Management Symposia 2019*. Phoenix, AZ. 3–7 March.

Mangini, C.D.; Hamby, D.M. Scaling Parameters for Beta Dosimetry. *Rad. Prot. Dosimetry*. January 7, 2016.

Mohaupt, T.H.; Thuo, K.; **Mangini, C.D**.; Farr, J. Air, Coolant, Beam Bock, and Concrete Shield Activation in a Proton Therapy Center. *Proceedings of the 60th Annual Meeting of the Health Physics Society*. Indianapolis, IN. Health Physics. July 12-16, 2015.

Mangini, C.D., Beta-Particle Backscatter Factors and Energy-Absorption Scaling Factors for Use with Dose-Point Kernels. *Oregon State University Doctoral Dissertation*. Oregon State University. Available at: https://ir.library.oregonstate.edu/xmlui/handle/1957/35364.

Mangini, C.D.; Caffrey, J.A.; Hamby, D.M. Beta-Particle Backscatter Factors and Energy-Absorption Scaling Factors for Use with Dose-Point Kernel Models. *Proceedings of the 58th Annual Meeting of the Health Physics Society*. Madison, WI. Health Physics. July 7-11, 2013.

Mangini, C.D.; Caffrey, J.A.; Hamby, D.M. Determination of Beta Dose-Point-Kernels for High-Z Sources in Non-homogeneous Geometries. *Proceedings of the 57th Annual Meeting of the Health Physics Society*. Sacramento, CA. Health Physics. July 22-26, 2012.

Mangini, C.D.; Hamby, D.M. Determination of Beta-Particle Dose-Point-Kernels for High-Z Sources Typical in Hot Particle Skin Dosimetry. *Spring Meeting of the Cascade Chapter of the Health Physics Society*. Corvallis, OR. May 4, 2012.

Mangini, C.D.; Caffrey, J.A.; Farsoni, A.T.; Hamby, D.M. A Signal Pulse Processor for Multi Component Signals. *The 44th Annual Midyear Meeting of the Health Physics Society*. Charleston, SC. February 6-9, 2011.

Caffrey, J.A.; **Mangini, C.D.**; Farsoni, A.T.; Hamby, D.M. A Phoswich Detector for Simultaneous Beta and Gamma Spectroscopy. *The 44th Annual Midyear Meeting of the Health Physics Society*. Charleston, SC. February 6-9, 2011.

Technical Reports

Hamby, D.M.; **Mangini, C.D**.; Luitjens, J.M.; Boozer, D.L.; Tucker, Z.G.; Rose, C.T.; Flora, R.S. VARSKIN+ 1.0: A computer code for skin contamination and dosimetry assessments. Office of Nuclear Regulatory Research. Nuclear Regulatory Commission. Washington, DC: Report No. *NUREG/CR-6918*, Rev. 4. July 2021.

Hamby, D.M.; **Mangini, C.D**. VARSKIN 6: A computer code for skin contamination dosimetry. Office of Nuclear Regulatory Research. Nuclear Regulatory Commission. Washington, DC: Report No. NUREG/CR-6918, Rev. 3; final printing. April 2018.

Hamby, D.M.; **Mangini, C.D**.; Caffrey, J.A.; Tang, M. VARSKIN 5: A computer code for skin contamination dosimetry. Nuclear Regulatory Commission. Office of Nuclear Regulatory Research. Rockville, MD: Report No. *NUREG/CR-6918, Rev. 2*; July 2014.