

Douglas G. Bowen
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SUMMARY

Nuclear Engineer (MS) with approximately 18 years' experience in Nuclear Criticality Safety (NCS).

EDUCATION

University of New Mexico

Doctor of Philosophy in Engineering, 2015

Dissertation: "Space-time kinetics of the AGN-201M research reactor at the University of New Mexico"

University of New Mexico

Master of Science in Nuclear Engineering, 1997

Thesis: "The coupling of ORIGEN and MCNP for reactor core and spent fuel criticality analyses"

University of New Mexico

Bachelor of Science in Nuclear Engineering, 1995

WORK EXPERIENCE

2012–

Present

Senior R&D Staff

Nuclear Data and Criticality Safety Group; Reactor and Nuclear Systems Division, Oak Ridge National Laboratory, Oak Ridge, TN

Providing general nuclear engineering support and nuclear criticality safety support to the NRC, DOE, ORNL, and other organizations.

Support includes:

- Working as a member of the management team for the DOE Nuclear Criticality Safety Program managing the critical and subcritical experiment program and coordinating the training and education program.
- Assisting with the development of a DOE Non-Destructive Assay (NDA) Program.
- Providing support to NRC for a robust technical basis for the exemption and general license for transporting fissile material packages in addition to examples of using the criteria in 10CFR71.
- Providing support to ORNL with respect to developing a technical justification for a low power critical facility at the High Flux Isotope Reactor at ORNL.
- Coordinator of a training course for analysts and generalists involved with the review and development of Safety Analysis Reports for Packaging documentation.
- Coordinator of the Nuclear Criticality Safety Program DOE Training and Education Project NCS courses.

2010–

2012

Nuclear Criticality Safety Group Leader

NCS Group, Safety Basis Division, Los Alamos National Laboratory (LANL), Los Alamos, NM

- Managed 13 technical staff and contractors with an annual budget of approximately \$6.0M.
- Responsible for maintaining the LANL NCS program on a daily basis consisting of 9 nuclear facilities in Los Alamos, NM and the National Criticality Experiments Research Center (NCERC) at the Nevada Test Site.
- Worked alongside other nuclear facility programs such as NDA and special nuclear material safeguards for NCS evaluation development activities, e.g., fissile material hold-up issues, fissile material control, fissile material accountability, waste acceptance criteria compliance,

- etc. Led an assessment at Area-G regarding the use of LANL or WIPP NDA programs for NCS limit compliance.
- Managed the LANL Program Improvement Plan in order to achieve compliance with DOE Orders and National Consensus Standards related to Nuclear Criticality Safety.
 - Worked closely with other Safety Basis group leaders and Facility Operations Directors on NCS program issues for all nine LANL nuclear facilities, e.g., NCS program implementation, new fissile operations, NDA measurements for NCS limit compliance, DSA updates, infraction response, etc.
 - Served as the lead developer and as the point-of-contact for the NCSP Training and Education Project LANL classroom training.
 - Prepared and presented NCS training for a variety of government agencies and LANL organizations as necessary.
 - Served on the Chemistry and Metallurgy Research Facility Replacement (CMRR) project as the lead NCS advisor for the project design team (2001-2012).
 - Participated in facility assessments, audits, and implementation verification reviews at LANL as necessary as a member of the LANL Nuclear Criticality Safety Committee.
 - Developed and reviewed NCS evaluations for all nine LANL nuclear facilities and the NCERC.

2008–
2010

**Nuclear Criticality Safety Deputy Group Leader
Nuclear Criticality Safety Group, Safety Basis Division, Los Alamos National Laboratory (LANL), Los Alamos, NM**

- Responsible for directing the work and managing technical evaluation issues for the NCS technical staff.
- Worked with LANL nuclear facilities on the use of NDA techniques to support NCS evaluation development and NCS limit compliance.
- Assisted in the revision of LANL waste acceptance criteria for waste disposition activities.
- Manage nuclear facility work priorities, budgets and schedules.
- Work closely with safety basis and facility operations personnel to implement NCS controls into Documented Safety Analyses (DSAs).
- Participate in facility readiness reviews and audits as necessary.
- Work daily with NNSA regulators and DNFSB site representatives on program compliance issues.
- Work with program managers and designers to incorporate NCS engineered controls into a nuclear facility designs and preliminary DSAs.
- Performed and reviewed process evaluations for all LANL nuclear facilities.
- Assisted in the incorporation of NCS requirements into operating procedures and Nuclear Facility safety basis documentation.
- Prepared and presented NCS training for a variety government agencies and LANL staff
- Developed and reviewed NCS evaluations for all nine LANL nuclear facilities and the NCERC.

2001–
2008

**Nuclear Criticality Safety Engineer
NCS Group, Safety Basis/ESH Division, LANL, Los Alamos, NM**

- Developed and reviewed NCS evaluations for fissile material operations with ^{239}Pu and ^{235}U .
- Evaluations developed to support pit production operations and pit disassembly operations for NNSA stockpile surveillance program.
- Performed NCS evaluations for a variety of NDA equipment used for material control and accountability as well as NCS limit compliance at numerous LANL facilities, including Area-G and TA-55. Utilized NDA measurement capability in the generation of NCS evaluations throughout LANL.
- Provided criticality safety design guidance for the proposed Chemical and Metallurgical Research Replacement (CMRR) facility.

- Support the NCS aspects of the subcritical experiment program at LANL and at the Nevada Test Site (Device Assembly Facility and U1A Facility).
- Taught training modules for the LANL nuclear criticality safety courses.
- Provided developmental and ongoing support for the LANL program improvement plan and assist with DOE/NNSA audits and interactions when necessary.

1998–

2001 **Nuclear Criticality Safety Engineer**

NCS Group, United States Enrichment Corporation, Paducah, KY

- Responsible for the development of NCS evaluations for UF₆ enrichment processes in the gaseous diffusion cascade and implementing NCS controls.
- Worked closely with the NDA group in the development of NCS controls for fissile material operations. All cascade maintenance activities relied upon the use of NDA measurements to categorize equipment from an NCS standpoint.
- NCS evaluation work focused on fissile operations with UO₂F₂ solutions and UF₄-oil mixtures with enrichments up to 5.5 wt. % ²³⁵U.
- Conducted inspections and audits of fissile material operations, procedure reviews, and NCS training sessions.
- Performed shielding calculations with MCNP to verify criticality accident alarm coverage.
- Interacted with NRC staff on assessments when necessary.
- Responsible for the technical oversight of six consultants developing NCS evaluations for plant design changes.

1995–

1998 **Nuclear Engineer**

Risk Assessment Group, IT Corporation, Albuquerque, NM

- Developed dose rate models for ecological and human receptors exposed to radionuclides at various DOE and DOD sites.
- Performed dose model verifications using MCNP.
- Performed criticality and shielding analyses for various shipping containers used for WIPP shipments.

PROFESSIONAL AFFILIATIONS

- American Nuclear Society (ANS), member (1994 – Present)
- Convener of Technical Committee (TC) 85, Subcommittee (SC) 5, Working Group (WG) 8 “Nuclear Criticality Safety” (2014-Present)
- Deputy Overall Advisor of TC85/SC5/WG8 for US ANSI/ASTM NTAG (2014-Present)
- Vice Chair of the ANS Subcommittee 8 on Nuclear Criticality Safety (2015-Present)
- ANS Nuclear Criticality Safety Division Chairman (2011-2012)
- Working group co-chair of ANSI/ANS-8.1 standard for fissionable material operations outside of reactors (2005 – Present)
- Working group member for ANSI/ANS-8.28 standard for Administrative Practices for the Use of NDA Measurements for Nuclear Criticality Safety (2014 – Present)
- Working group member for ANSI/ANS-8.10 standard for Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement (2013 – Present)
- Instructor for the University of New Mexico Nuclear Criticality Safety Short Course (2013-Present)

PUBLICATIONS

Bowen, Douglas G. "Status of US DOE Standards and ANSI/ANS-8 Series Standards for Nuclear Criticality Safety." International Standards Organization Technical Committee 85 "Nuclear Energy" Plenary Meeting, Delhi, India, April 04-08, 2016.

Bowen, Douglas G. "Status of the Development and Deployment of the NCSP Training and Education Courses for FY15." 2016.

Bowen, Douglas G., Eric M. Moore and Jeff S. Castor. *Oak Ridge National Laboratory Nuclear Criticality Safety Triennial Review*, ORNL/LTR-2015/677, Oak Ridge, TN: Oak Ridge National Laboratory.2015.

Bowen, Douglas G., et al. "International Organization for Standardization on the Topic of Nuclear Criticality Safety (ISO TC85/SC5/WG8)." *International Conference on Nuclear Criticality 2015*, Charlotte, North Carolina, USA, September 14, 2015.

Barto, Andrew, Douglas G. Bowen and Cecil V. Parks. "Review of Fissile Material Exemptions and General Licenses in 10 CFR Part 71." *International Conference on Nuclear Criticality 2015*, Charlotte, North Carolina, USA, September 14, 2015.

Parks, Cecil V., Douglas G. Bowen and Andrew Barto. "Review of Fissile Material Exemptions and General Licenses in 10 CFR Part 71." In *International Conference on Nuclear Criticality 2015*, 2015.

Bowen, Douglas G., Lori Scott and Jerry N. McKamy. "The Conduct of the US DOE Nuclear Criticality Safety Program Hands-on Training and Education Courses." *International Conference of Nuclear Criticality Safety 2015*, Charlotte, North Carolina, USA, September 14, 2015.

Bowen, Douglas G., Lester M. Petrie Jr and Elizabeth L. Jones. *SCALE Sensitivity and Uncertainty Calculations for the High Flux Isotope Reactor Core Loaded with LEU Fuel*. ORNL/TM-2015/489. Oak Ridge, TN: Oak Ridge National Laboratory, 2015.

Bowen, Douglas G., Larry Wetzel and Robert D. Busch. "Benchmark Models and Experimental Data for a U(20)-Polyethylene-Moderated Critical System." International Conference of Nuclear Criticality Safety, Charlotte, North Carolina, USA, September 14, 2015.

Bowen, Douglas G. and Nicholas Brown. "An Overview of the 2014 Revision of ANSI/ANS-8.1–2014, “Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors” International Conference of Nuclear Criticality Safety, Charlotte, North Carolina, USA, September 14, 2015.

Mueller, Don, William BJ J. Marshall and Douglas G. Bowen. "Addressing Fission Product Validation in MCNP Burnup Credit Criticality Calculations." 2015 ICNC, Charlotte, North Carolina, USA, September 13-17, 2015.

Wetzel, Larry, Robert D. Busch and Douglas G. Bowen, "Benchmark Models and Experimental Data for a U(20) Polyethylene-Moderated Critical System," *International Conference on Nuclear Criticality 2015*, 2015.

McKamy, Jerry N., Lori Scott and Douglas G. Bowen, "The Conduct of the United States Department of Energy Nuclear Criticality Safety Program Hands-On Training and Education Courses," *International Conference on Nuclear Criticality 2015*, 2015.

Bowen, Douglas G. and Nicholas Brown. "An Overview of the 2014 Revision of ANSI/ANS-8.1-2014 "Nuclear Criticality Safety Outside of Reactors." *International Conference on Nuclear Criticality 2015*, 2015.

Mueller, Don, Douglas G. Bowen and William BJ J. Marshall. "Addressing Fission Product Validation in MCNP Burnup Credit Criticality Calculations." *ICNC 2015*, 2015.

Bowen, Douglas G., Robert D. Busch and Larry Wetzel. "Benchmark Models and Experimental Data for a U(20)-Polyethylene Moderated Critical System." *International Conference on Nuclear Criticality 2015*, Charlotte, North Carolina, USA, September 13, 2015.

Bowen, Douglas G., John M. Scaglione and Justin B. Clarity, *Assessment of the Transportability of Storage-Only Used Nuclear Fuel Canisters*, ORNL/LTR-2014/383, Oak Ridge, TN: Oak Ridge National Laboratory, 2014.

Bowen, Douglas G. and Nicholas Brown. "A Revision to ANS-8.1 "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors," American Nuclear Society, Washington DC, District of Columbia, USA, November 10, 2013.

Bowen, Douglas G. and Nicholas Brown. "Revision to ANS-8.1 "Nuclear Criticality Safety in Operations with Fissionable Material Outside of Reactors," 2013 ANS Winter Meeting and Nuclear Technology Expo, Washington, District of Columbia, USA, November 10-14, 2013.

Bowen, Douglas G. and Cecil V. Parks. "Bases and Guidance on Fissile Material Exemption and General Licenses in 10 CFR Part 71." *PATRAM 2013*, San Francisco, California, USA, August 18-23, 2013.

Bowen, Douglas G. and Lester M. Petrie Jr. *Technical Justification for a Low-Power Critical Facility at the High Flux Isotope Reactor Site*, ORNL/LTR-2012/552, Oak Ridge, TN: Oak Ridge National Laboratory, 2012.

Mueller, Don, Douglas G. Bowen, et al. *Bias Estimates Used in Lieu of Validation of Fission Products and Minor Actinides in MCNP keff Calculations for PWR Burnup Credit Casks*, ORNL/TM-2012/544, Oak Ridge, TN: Oak Ridge National Laboratory, 2012.

Bowen, Douglas G. and D. E. Kornreich, "Examination of Uranium and Plutonium Solution Criticality in High-Concentration Solutions," *Progress in Nuclear Energy*, Vol. 52, pp. 830-836, 2010.

Bowen, Douglas G., "The Role of Criticality Safety Officers at Los Alamos National Laboratory," Los Alamos National Laboratory, LA-UR-09-0606, 2009.

Bowen, Douglas G., "Integration of NCS in the Chemistry and Metallurgy Research Replacement Facility at Los Alamos National Laboratory," Los Alamos National Laboratory, LA-UR-09-0607, 2009.

Bowen, Douglas G. and N. W. Brown, "ANSI/ANS-8.1 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," Los Alamos National Laboratory, LA-UR-08-7219, 2008.

Bowen, Douglas G. and R. D. Busch, "Hand Calculation Methods for Criticality Safety—A Primer," LA-14244-M, Los Alamos National Laboratory, 2006.

Bowen, Douglas G., "ENDF/B Cross-Section Evolution for Criticality Safety Burnup Credit Applications," *Transactions of the American Nuclear Society*, **93**, 267, 2005.

Bowen, Douglas G. and R. D. Busch, "Hand Calculational Methods for Criticality Safety—A Primer," 2005 Nuclear Criticality Safety Division Topical Meeting, Knoxville, TN, 2005.

Bowen, Douglas G., "Preliminary Subcritical Mass and Volume Calculations for Various Plutonium Compounds to Support a Revision to ANSI/ANS-8.1," Los Alamos National Laboratory, LA-UR-04-7989, 2004.

Bowen, Douglas G. and R. D. Busch, "Using ORIGEN and MCNP to Calculate Reactor Criticals and Burnup Effects," *Transactions of the American Nuclear Society*, **77**, 233, 1997.

Bowen, Douglas G., "The Coupling of ORIGEN and MCNP for Reactor Core and Spent Fuel Criticality Analyses," Master's Thesis, University of New Mexico, 1997.

AWARDS

Yucca Mountain Project Achievement Award (2003)

Defense Programs Award of Excellence (2005-2006)

Los Alamos Award of Excellence (2007)

Los Alamos Achievement Award (2004-2008)

Los Alamos National Laboratory Distinguished Performance Award (2009, 2010)

Security Clearance Level

Active – DOE "Q" (Secret) clearance

Inactive – Human reliability program