

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF R. BRAD HARVEY

CURRENT POSITION

Physical Scientist
Division of Risk Assessment
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

EDUCATION

M.S. Atmospheric Science, University of Michigan, Ann Arbor, MI, 1976
B.S. Physics, Rensselaer Polytechnic Institute, Troy, NY, 1975

PROFESSIONAL AFFILIATIONS

American Meteorological Society
American Nuclear Society
Nuclear Utility Meteorological Data Users Group

CERTIFICATIONS

Certified Consulting Meteorologist, American Meteorological Society, 1992

INDUSTRY COMMITTEE ACTIVITIES

ANS-3.11 Working Group. One of the primary authors for ANSI/ANS-3.11-2005, "Determining Meteorological Information at Nuclear Facilities"

NEI Control Room Habitability Task Force. Participated as an industry member coordinating and authoring Appendix D, "Atmospheric Dispersion," and Appendix G, "Toxic Gas Assessments," to the original (June 2001) version of NEI 99-03, "Control Room Habitability Assessment Guidance"

QUALIFICATIONS

Mr. Harvey is a Certified Consulting Meteorologist with over 29 years of experience in performing and reviewing meteorological monitoring, atmospheric dispersion modeling, climatic evaluations, and air quality licensing analyses for the nuclear power industry. Mr. Harvey's experience includes performing atmospheric dispersion analyses and dose assessments for nuclear plant routine release and design basis accident applications. Mr. Harvey has also participated in developing emergency response dose assessment models and in performing toxic gas analyses for control room habitability evaluations. In addition, he has assisted nuclear plants in completing air emission inventories and air quality licensing documents. Mr. Harvey has been active on industry committees concerned with control room habitability and meteorological monitoring.

Mr. Harvey joined the NRC in 2003. Prior to joining the NRC, Mr. Harvey was employed by an NRC licensee (Yankee Atomic Electric Company) and several consultants (Sargent & Lundy, Duke Engineering and Services, and Framatome-ANP).

NRC Experience

Meteorological Site Safety Reviews for Early Site Permits. Mr. Harvey reviewed the Site Safety Analysis Report (SSAR) submittals supporting the Clinton, Grand Gulf, and North Anna Early Site Permit (ESP) applications, including preparing the associated Safety Evaluation Report (SER) sections related to climatology, meteorological monitoring, and design-basis accident and routine release atmospheric dispersion modeling. These reviews established that (1) site climatic characteristics to ensure potential threats from severe weather will pose no undue

risk to the type of facility proposed to be located at the site, and (2) site atmospheric dispersion characteristics to ensure radiological effluent release limits associated with normal operation and radiological dose consequences associated with postulated accidents can meet regulatory criteria.

Meteorological License Amendment Reviews for Alternative Source Term Implementation. Mr. Harvey reviewed onsite meteorological data sets and control room and offsite atmospheric dispersion analyses submitted in support of nine license amendment requests related to implementation of the Alternative Source Term (AST) pursuant to 10 C.F.R. 50.67.

Revision to Regulatory Guide 1.23, "Onsite Meteorological Programs." Mr. Harvey served as technical lead in the development of DG-1164 (Third Proposed Revision 1 of Regulatory Guide 1.23), "Meteorological Monitoring Programs for Nuclear Power Plants." This regulatory guide describes a suitable onsite meteorological monitoring program for collecting the basic meteorological data needed to support new reactor licensing and operating plant needs. The draft regulatory guide revision updates the discussion of applicable regulations and references to associated regulatory guides, provides new guidance to reflect current meteorological monitoring equipment and practices, and clarifies monitoring criteria for supporting emergency planning requirements.

Revision to Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants." Mr. Harvey served as project manager coordinating the development of DG-1143 (Proposed Revision 1 of Regulatory Guide 1.76), "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants." DG-1143 provides new guidance for use in selecting the design-basis tornado and design-basis tornado-generated missiles that a nuclear plant should be designed to withstand. The new guidance is based on a more extensive set of historical tornado data and improved methods for estimating the frequency of exceedance of tornado wind speeds. Mr. Harvey's associated activities included (1) co-authoring SECY-04-0200, "A Risk-Informed Approach to Defining the Design Basis Tornado for New Reactor Licensing," and (2) serving as co-program monitor for Revision 1 to NUREG/CR-4461, "Tornado Climatology of the Contiguous United States."

Member of NRC's Incident Response Organization. Mr. Harvey was assigned as a weather and dispersion analyst on the protective measures team (PMT) for responding to reactor, fuel cycle, and material transportation incidents.

Private Sector Experience

Supervisor, Radiological Engineering. Mr. Harvey directed the technical, administrative, and business development activities of more than 20 radiological engineering professionals. He managed many functions including radiological design engineering (activation analysis, shielding, equipment qualification, accident analysis, source term), effluent and environmental monitoring (RETS/REMP, waste management, pathway dose), and meteorological services (database management, dispersion analyses). Clients included operational commercial power reactors, facilities undergoing decommissioning, and other firms requiring radiological support (e.g., biotech).

Onsite Meteorological Monitoring Support. Mr. Harvey developed nuclear plant meteorological monitoring system design basis documents, instrumentation specifications, and data collection algorithms. He wrote procedures for the review and validation of onsite meteorological data and supervised meteorological data reduction and validation activities for the Yankee Rowe, Vermont Yankee, Maine Yankee, and Seabrook nuclear plants. He developed a Program Manual for the Millstone Station meteorological monitoring program that identified and coordinated the resolution of over 200 regulatory and guidance document criteria that were applicable to the monitoring program.

Meteorological Sections of Safety Analysis Reports and Environmental Reports. Mr. Harvey prepared the meteorological sections of the Safety Analysis Reports and Environmental Reports supporting the operating license applications for the Byron, Braidwood, and Seabrook nuclear plants, addressing such topics as climatology, onsite meteorological monitoring, and atmospheric dispersion modeling.

Atmospheric Dispersion Analyses for Nuclear Power Plant Applications. Mr. Harvey managed the development of a software code, AEOLUS-2, for calculating atmospheric dispersion factors for routine gaseous releases from nuclear plants, and he generated atmospheric dispersion factors for use in nuclear plant offsite dose calculation manuals (ODCMs). He calculated offsite dose estimates resulting from routine liquid and gaseous effluent releases for the Annual Radioactive Effluent Release Reports for the Yankee Rowe and Seabrook nuclear stations. He generated atmospheric dispersion analyses to evaluate control room habitability for potential accident radiological and toxic gas releases for several nuclear plants.

Emergency Response Dose Assessment Support. Mr. Harvey developed near real-time atmospheric dispersion modeling tools for use during radiological emergencies at several nuclear plants, including a variable-trajectory plume-segment atmospheric dispersion model called METPAC, which handled the site-specific topographic features of flat terrain (e.g., Maine Yankee), river valley (e.g., Yankee Rowe, Vermont Yankee), and coastal (e.g., Seabrook) sites. He trained nuclear plant emergency response personnel in atmospheric dispersion modeling techniques and provided meteorological support during nuclear plant radiological emergency response drills and exercises for the Yankee Rowe, Vermont Yankee, Maine Yankee, and Seabrook nuclear plants.

Consequence Analysis for Domestic Licensing of Special Nuclear Material. Mr. Harvey developed and implemented the consequence analysis methodology (e.g., estimating and classifying worker and public exposures to potential accident UF₆ releases) in support of the Louisiana Energy Services (LES) Gas Centrifuge Facility Integrated Safety Analysis (ISA) in accordance with Subpart H of 10 CFR 70 and NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility."

SELECTED PRESENTATIONS AND PROCEEDINGS

"ANSI/ANS-3.11-2005: American National Standard for Determining Meteorological Information at Nuclear Facilities," presented at the 16th Annual RETS/REMP Workshop, Mashantucket, CT, June 2006.

"Climatic Site Characteristics for Early Site Permits," presented at the 2005 ANS Annual Meeting, San Diego, CA, June 2005.

"The ARCON96 Atmospheric Dispersion Model," presented at the 2004 ANS Winter Meeting, Embedded Topical Meeting: 2004 Operating Nuclear Facility Safety (2004 ONFS), Washington, DC, November 2004.

"Using ARCON96 for Control Room Radiological Habitability Assessments," co-authors Steve LaVie and Leta Brown, presented at the Ninth Nuclear Utility Meteorological Data Users Group Meeting, Chattanooga, TN, October 2003.

"Atmospheric Dispersion Factors: What Are They and Why Do We Use Them," co-author Ted A Messier, presented at the 2002 RETS/REMP workshop, Atlantic City, NJ, June 2002.

"Meteorological Data Processing for Commercial Nuclear Power Plants," co-author Ted A Messier, presented at the 2002 RETS/REMP workshop, Atlantic City, NJ, June 2002.

"NEI 99-03 Appendix D, Atmospheric Dispersion, and Appendix G, Toxic Gas Assessments," presented at the NEI Control Room Habitability Workshop, Clearwater Beach, FL, August 2001.

"Ongoing Developments in Atmospheric Dispersion Analyses for Control Room Habitability Evaluations," presented at the 2001 ANS Annual Meeting, Milwaukee, WI, June 2001.

"NEI 99-03: Control Room Habitability Assessment Guidance," presented at the Seventh Nuclear Utility Meteorological Data Users Group Meeting, Las Vegas, NV, October 2000.

“Millstone Station Meteorological Monitoring Program Manual,” co-authors Gary W Johnson and John Leavitt, presented at the Seventh Nuclear Utility Meteorological Data Users Group Meeting, Las Vegas, NV, October 2000.

“Time-Dependent Atmospheric Dispersion Factors for Use in Offsite Dose Calculation Manuals,” co-author M. S. Strum, presented at the 2000 RETS/REMP Workshop, Falmouth, Mass., June 2000.

“A Methodology for Calculating Meteorological Channel Accuracies,” presented at the Sixth Nuclear Utility Meteorological Data Users Group Meeting, Syracuse, N.Y., May 1999.

“A Review of the NRC Emergency Response Code RASCAL Version 2.1,” presented at the Fourth Nuclear Utility Meteorological Data Users Group Meeting, San Francisco, Calif., April 1996.

“Atmospheric Dispersion Modeling Applications in the Nuclear Power Industry,” presented at the ASTM 1995 Johnson Conference on Performance Evaluation of Atmospheric Dispersion Models, Johnson, Vt., July 1995.

“Meteorological Aspects of Emergency Action Level Schemes: NUREG-0654 Versus NUMARC-007,” presented at the Third Nuclear Utility Meteorological Data Users Group Meeting, Charlotte, N.C., October 1994.

“Experience in Implementing a 10m Backup Meteorological Tower,” co-author T. A. Messier, presented at the Second Nuclear Utility Meteorological Data Users Group Meeting, Boston, Mass., April 1993.

“Regional Weekly Background Variations in REMP-Reported Airborne Gross-Beta Activity: Influence of Meteorological Factors,” co-author S. Farber, presented at the 1992 RETS/REMP Workshop, Concord, Mass., June 1992.

“Technical Specification and Off-Site Dose Calculation Manual Meteorological Requirements,” presented at the First Nuclear Utility Meteorological Data Users Group Meeting, Chattanooga, Tenn., November 1991.