February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF GOUTAM BAGCHI CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, Goutam Bagchi, do hereby state as follows:

1. I am a Senior Level Advisor in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of Site and Environmental Reviews ("DSER"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and in Supplement 1 to NUREG-1835, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned hydrology.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Goutam Bagchi

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF GOUTAM BAGCHI

CURRENT POSITION

Senior Level Advisor for Civil Engineering and Geoscience, Division of Site and Environmental Reviews, Office of New Reactors
United States Nuclear Regulatory Commission

EDUCATION

M.S.	Mechanical Engineering, Northeastern University, Boston, MA, 1974
M.Sc.	Structural Engineering, London University, London, United Kingdom, 1964
B.E.	Civil Engineering, Calcutta University, India, 1959

PROFESSIONAL

American Society of Civil Engineers: Fellow, Member ASCE Nuclear Standards Committee
American Society of Mechanical Engineers: Member
Earthquake Engineering Research Institute: Member
Professional Engineer: Massachusetts, Pennsylvania and New York

QUALIFICATIONS

Mr. Goutam Bagchi has over 47 years of professional work experience of which 39 years is in the design, evaluation, inspection, regulation of nuclear power plant structures, systems and components. He is currently a Senior Level Advisor in the Division of Engineering, NRR. He provides authoritative technical advice and assistance to the Director, Division of Engineering, as the Senior Level Advisor and Lead Coordinator on a broad variety of technical and regulatory issues. He serves as the agency's authority in performing and coordinating the evaluation and resolution of technical and regulatory issues related to structural mechanics involving structures, seismic geosciences and civil engineering areas in nuclear power plants under licensing review related to design certification and early site permit applications, under construction, in operation, under license renewal or in decommissioning.

Mr. Bagchi joined the NRC in 1975 as a technical reviewer. In 1976 he became a senior structural engineer. In 1978 he became the Branch Chief of the Structural Research Branch in the Office of Research. He was instrumental in developing the research program on containment capacity through testing of large scale containment structures to failure. In 1987 he joined the Senior Executive Service and became the Branch Chief for Structural and Civil Engineering Branch, NRR, DE. In 1999 he joined the Senior Level Service and has since served in DE, NRR. He was instrumental in the development of the endorsement of containment inspection requirements in 10 CFR Part 50.55a and maintenance of safety-related structures within the scope of the maintenance rule, 10 CFR 50.65.

In 1987 and 1997, he and his staff conducted the standard plant certification reviews for ABWR, CE System 80^{+}, AP600, and AP 1000 in civil, mechanical and materials engineering areas. As a senior advisor he was involved in the discussions with stake holders on issues related to early site permit applications. He provided input for the ESP template, and the

criteria to be used to determine permit conditions, site characteristics and COL action items. He is involved in the review of three ESP applications in the hydrology area. He participated in a leadership role in all major seismic programs associated with NRR since 1978: Siting rule, 10 CFR Part 100.23, Appendix S to Part 50 and the associated Regulatory Guide 1.165 and corresponding Standard Review Plan Sections, Individual Plant Examination of External Events, Seismic Margins related Unresolved Safety Issues A 40 and A 46, Probabilistic Seismic Hazard Study update of 1993, Diablo Canyon Long Term Seismic Program review and evaluation, including determination of fragility of structures, systems and components. He participated and significantly contributed to the development of risk informed in-service inspection (ISI) of reactor coolant system piping, and was instrumental in the timely review and approval of ISI programs in the Chairman's Tracking List. He has made significant contributions to the development and acceptance of the performance-based seismic design of nuclear power plants.

Mr. Bagchi provided input for the hydrology portion of RS-002, by adapting the Standard Review Plan Section 2.4 for the review of ESP applications. In 2005, Mr. Bagchi represented the NRC, and served as co-chair of two sessions, at the International Workshop on External Flooding, which looked at issues related to tsunami hazards, and was held in Kalpakkam, India. He participated in the development of a tsunami guideline document for the IAEA in Trieste, Italy in 2006 under the joint sponsorship of the International Atomic Energy Agency and the International Center for Theoretical Physics. Currently he is the technical monitor for updating Section 2.4, Hydrologic Engineering, of the SRF.

SELECTED PUBLICATIONS AND PRESENTATIONS

Ashar, H, Bagchi G, NUREG 1522, "Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures." June, 1995.

Bagchi G. et al, "U. S. Regulatory Criteria on Nuclear Plant Protection against External Flooding," presented at the International Workshop in Kalpakkam, India in October, 2005.

Bagchi G. et al, "Containment Design, Performance Criteria and Research Needs for Advanced Reactor Designs," presented at the 12th International Conference on Nuclear Engineering.

Presentation in Trieste on U. S. Tsunami Hazard Protection.

February 8, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF JEAN-CLAUDE DEHMEL CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

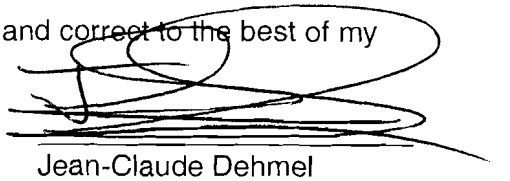
I, Jean-Claude Dehmel, do hereby state as follows:

1. I am a Senior Health Physicist in the Nuclear Regulatory Commission's ("NRC") Office of Nuclear Reactor Regulation ("NRR"), Division of Inspection and Regional Support ("DIRS"). A statement of my professional qualifications is attached.

2. I have reviewed those sections of NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, that relate to radiological impacts of routine operation to members of the public and to the environment, as well as the radioactive waste treatment system. Further, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned radiological impacts of routine operation to members of the public and to the environment, as well as the radioactive waste treatment system, and provided updated information in those areas for Supplement 1 to NUREG-1835, dated November 2006.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.



Jean-Claude Dehmel

STATEMENT OF PROFESSIONAL QUALIFICATIONS
OF
JEAN-CLAUDE DEHMEL

CURRENT POSITION

Senior Heath Physicist
Health Physics Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

EDUCATION

M.S., Health Physics, New York University - Environmental Medicine, New York, NY, 1980
B.S., Radiological Health, Manhattan College, Riverdale, NY, 1977

PROFESSIONAL AFFILIATIONS

Health Physics Society
American Nuclear Society
Institute of Electrical and Electronic Engineers

CERTIFICATIONS

Certified Health Physicist - Comprehensive Certification since 1986

INDUSTRY COMMITTEE ACTIVITIES

Health Physics Society, ANSI/HPS N13.53, Control and Release of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), Chair for the development of the standard
Health Physics Society, ANSI/HPS N13.12, Surface and Volume Radioactivity Standards for Clearance, Working Group member on reaffirmation of standard

QUALIFICATIONS

Mr. Dehmel is experienced in the field of health physics and nuclear licensing, with over 25 years of experience that includes operational radiation protection. This experience, as an employee and consultant, was acquired at various nuclear facilities and project sites, including nuclear power plants (Shoreham, Waterford 3, St. Lucie 2, D.C. Cook 1 & 2, Shearon Harris, James Fitzpatrick, and Philippine NPP-1); a by-product material production facility (Union Carbide/Centichem) with a 5-MW pool reactor and hot-cells; a pharmaceutical research laboratory (Sterling Drug/Sanofi); a fuel conversion facility (Sequoyah Fuels); and various Department of Energy (DOE) national laboratories (Oak Ridge, Paducah, Grand Junction, Los Alamos, Berkeley, Rocky Flats, and the Waste Isolation Pilot Plant); and Department of Defense (DOD) facilities (Lake City Army Ammunition Plant, Lake Ontario Ordnance Works, Aberdeen Proving Grounds, McClellan AFB, and the Mechanicsburg Naval Ships Parts Control Center).

Mr. Dehmel has held the position of radiation safety officer under three licenses: (a) NRC (No. 37-28076-01) and Pennsylvania Bureau of Radiation Protection (No. PA-531) for a pharmaceutical research laboratory, located in Great Valley, PA (Eastman Pharmaceuticals, Sterling Drug, and now Sanofi); (b) S. Cohen & Associates, Inc. Montgomery, AL, for D&D License No. 1270 issued by the Alabama Office of Radiation Control, and (c) with the Department of the U.S. Army under permit No. P-19-0027-APG (Docket No. 0027) issued by the Aberdeen Proving Ground facility, Aberdeen, MD.

Mr. Dehmel joined the NRC in 2000. Prior to joining the NRC, Mr. Dehmel was employed by two consulting companies, a nuclear utility, an architect and engineering firm, and a radiochemical production facility.

NRC Experience

At the NRC since June 2000, Mr. Dehmel is currently responsible for the review of early site permit applications, a design certification, and topical reports. Mr. Dehmel is currently supporting the reviews of the North Anna and Vogtle ESP applications, the review of the GE ESBWR design certification application, and the review of a topical report for the AP1000 reactor on the selection of absorbent media in treating radioactive effluents. These reviews focus on information documenting compliance with radioactive effluents and doses to members of the public under normal operations and anticipated operational occurrences. The technical reviews are conducted against NRC requirements under 10 CFR Part 50.34a, Part 50.36a, Appendix I to Part 50, 10 CFR Parts 20.1301 and 20.1302, and Appendix B (Table 2) to Part 20. The reviews rely on guidance of the Standard Review Plan (NUREG-0800), Sections 11.2 to 11.5, and several Division 1 Regulatory Guides. The regulatory guides present acceptable methods for estimating liquid and gaseous effluent source terms, dispersion of radioactivity in the environment, and methods for calculating doses to members of the public. Mr. Dehmel is also working on the revision of NRC guidance addressing the above topics.

Regarding operating reactors, Mr. Dehmel evaluated the methodology used by Vermont Yankee to assess doses associated with N-16 radiation exposures at the site boundary. The licensee incorporated three methods in demonstrating compliance, one involving ambient radiation measurements to identify locations with the highest radiation levels along the site boundary, one correlating plant power levels with radiation survey results at the site boundary, and one correlating main steam line radiation monitor readings with radiation survey results at the site boundary. The review assessed the technical merits of the methods, basis of assumptions, validity of the results, and how results are being used in demonstrating compliance with NRC regulations and EPA standards of 40 CFR Part 190. For the Ginna Plant, Mr. Dehmel evaluated an application requesting a partial site release for a portion of the site not used by plant operations.

Regarding decommissioning, Mr. Dehmel was responsible for the review and evaluations of license termination plans and decommissioning plans submitted by licensees. Mr. Dehmel was responsible for six sites, including the Trojan, Maine Yankee, and the Haddam Neck power reactors, and the Mallinckrodt, Kerr-McGee, and Kaiser Aluminum facilities, as Part 40 material sites. The process involves identifying technical deficiencies with respect to the requirements of Appendix E to 10 CFR Part 20, and MARSSIM and SDMP criteria. Other supporting functions included conducting site inspections and planning and participating in the implementation of NRC site confirmatory surveys. Mr. Dehmel participated in other NRC projects, including risk assessment analyses supporting the evaluation of proposed survey methods against site release criteria; providing comments on studies and reports addressing the use of advance instrumentation and analytical methods to determine residual radioactivity levels on solid materials and at sites; providing comments to the NRC Clearance Rulemaking Working Group; providing information in support of the preparation of a RIS on MARSSIM lessons-learned, and presentations before the MARSSIM working group on specific topics.

Private Sector Experience

September 1988 to June 2000 - S. Cohen & Associates, Inc., McLean, VA

Under an NRC-sponsored contract, Mr. Dehmel was assigned as the Project Manager involving the characterization of Class A low-level radioactive waste (NUREG/CR-6147) by category of waste generators, namely academic, government, industrial, medical, and nuclear power plants. The study is based on 1986 to 1990 information contained in the Manifest Information Management System, and supplemented by other studies sponsored by the NRC, DOE, and Low-level Waste Compacts and unaffiliated States. A database program was used to present and aggregate data characterizing the radiological, physical, and chemical properties of wastes listed in shipping manifests. The results of the analyses are summarized in tables, histograms, and cumulative radionuclide

concentration distributions by waste streams, generators, and regions, with data summaries at the container and shipment levels.

Lead investigator for the preparation of the waste characterization and source term development for the EPA's Low-Level Waste Background Information Document and Regulatory Impact Analysis Report for the low-activity mixed waste rule. The work involved updating a prior NRC characterization of mixed waste volumes, generation rates, properties, and radionuclide concentrations (NUREG/CR-5938, National Profile on Commercially Generated Low-Level Radioactive Mixed Waste, Dec. 1992). Agreement State Agencies and industry trade groups were contacted to obtain post-1992 information. The data were reviewed and compared with prior survey compilations for assessing changes in waste generations rates, volumes held in storage, use of new treatment options, and radionuclide distributions and concentrations. The discussion presented a comparison of the regulatory requirements and engineering design differences between low-level waste disposal facilities and RCRA Subtitle C landfills.

Participated in a Chernobyl scientific mission to the Republic of Belarus organized by the World Bank and EPA. The purpose of the mission was to evaluate the technical and cost-effectiveness of the Chernobyl remediation program and collect soil samples for analysis at the U.S. EPA-NAREL Laboratory. Technical discussions addressed the scope of protective measures being implemented to protect the food supply, uses of different blends of fertilizers to retard radionuclide uptake in crops, use of plowing methods to relocate radionuclides in soils beyond the root zone of local crops, and the scope of radioanalytical programs in determining Cs-137, Sr-90, and Pu-239/240 concentrations in meat, dairy products, food crops, and soils.

July 1986 to September 1988 - Roy F. Weston, West Chester, PA

Mr. Dehmel prepared the radiological sections of work plans and health and safety plans to characterize Pu-239 contamination (Pu-239) at the BOMARC Nike missile silo site, located at McGuire AFB, NJ. The contamination was due to the accidental combustion of the Pu warhead. The radiological plans were used to establish personnel and environmental radiation protection requirements for the project. The project, although implemented on DOD facility, was implemented and managed under the NRC requirements of 10 CFR Parts 19 and 20.

Prepared a preliminary decontamination and decommissioning plan to survey the Quehanna Research Facility, located near State College, PA. The former R&D facility was contaminated with Pu-239, Am-241, and Sr-90, and other long-lived mixed fission products. The plan also provided a regulatory analyses of current NRC and PADER requirements and the facility's license conditions. A chronology of past site activities and former licensees was developed for the purpose of identifying radionuclides and residual activity levels by types of AEC/NRC licenses.

Conducted an independent radiological characterization of alpha contamination (Po-210) at a photo-processing laboratory, located in Cleveland, TN. The contamination was due to defective static electricity eliminators that were used as air guns which produced hot particles as microspheres. The surveys were performed for QA/QC purposes at the request of the Division of Radiological Health, State of Tennessee, and a factory recall initiated by 3M. The characterization involved conducting direct alpha scans and smears of building and equipment.

Member of a technical team responsible for upgrading DOE's Rocky Flats capability in monitoring Pu/Am in machining oils and sludge. A gamma spectroscopy system (using a SiLi detector) was procured, set-up and calibrated, based on specifications stipulated by the Rocky Flats Plant. The system was set-up at the site using a standards and sample container provided by plant personnel and a training session was conducted for the staff responsible for its operation. An operation and calibration package was submitted along with the software used to reduce the results to meaningful radiological units.

July 1985 to July 1986 - Long Island Lighting Company, Shoreham NPS, Wading River, NY

As a Section Supervisor, Mr. Dehmel's responsibilities included ALARA support during low power testing, assessing plant radiological effluent emissions, and supporting emergency response functions. In this latter role, Mr.

Dehmel was assigned to the EOF to run computer models to define radioactive source terms, release rates, and plume location predictions under different accident scenarios. Participated in numerous training exercises and participated in the only full scale exercise implemented at Shoreham.

June 1979 to July 1985 - Ebasco Services/Envirosphere Company (a subsidiary), New York, NY

Mr. Dehmel prepared the radiological portions of PSAR and FSAR for nuclear plants under construction and prepared radiological effluent technical specifications and offsite dose calculation manuals for six power reactors (Waterford 3, St. Lucie 2, D.C. Cook 1 & 2, Shearon Harris, James A. Fitzpatrick, and Philippine NPP-1). Conducted evaluations of nuclear power plant system modifications in response to changes in technical specifications, applicability reviews of NRC I&E Bulletins, FSAR updates, Part 50.59 safety analyses, and Part 21 reportability reviews. Report preparations have included writing sections of semi-annual radiological effluent reports and others have included providing technical assistance to nuclear power plants for operational health physics and nuclear licensing support. Assisted in the development of a calibration plan for radiation monitoring systems; development of operational and surveillance requirements for radiation monitoring systems; and preparation of implementing procedures for radiological effluent technical specifications and offsite dose calculation manuals. Conducted a quality assurance audit of the radiological environmental monitoring program of Florida Power Corp's Crystal River Unit 3.

Completed a two-month work assignment under the auspices of the IAEA to the Philippine's first nuclear power plant (PNPP Unit 1). The IAEA mission involved providing technical assistance in health physics, training, and radiation monitoring. The results were published in: Environmental Radioactivity Series: The Philippines - Review of Laboratory Procedures, IAEA-TA-2324, June 6, 1985.

September 1973 to June 1979 - Union Carbide Corporation, Tuxedo, NY

Mr. Dehmel was responsible for routine health physics support during the operation of a 5-MW research pool reactor and a radio-pharmaceutical production facility (formerly Union Carbide Corporation and later decommissioned by Cintichem). The responsibilities included the supervision of three health physics technicians and serving as the technical interface with the staff of the radiochemical laboratory and reactor operations group in coordinating radiological coverage for routine operations and scheduled maintenance tasks. The reactor was used to irradiate highly enriched uranium targets (95% U-235 enrichment) to produce primarily Mo-99, Sr 90, I-131, and Xe-133. Other production activities included the manufacturing of Mo-99/Tc-99m generators, P-32, and Cr-51.

SELECTED PRESENTATIONS AND PROCEEDINGS

Omitted here.

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF R. BRAD HARVEY CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, R. Brad Harvey, do hereby state as follows:

1. I am a Senior Physical Scientist in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of Site and Environmental Reviews ("DSER"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and in Supplement 1 to NUREG-1835, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned meteorology.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

R. Brad Harvey

R. Brad Harvey

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF R. BRAD HARVEY

CURRENT POSITION

Senior 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 UF_6 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.

February 8, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF CHARLES S. HINSON CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, Charles S. Hinson, do hereby state as follows:

1. I am a Senior Health Physicist in the Nuclear Regulatory Commission's ("NRC"), Office of Nuclear Reactor Regulation ("NRR"), Division of Inspection and Regional Support ("DIRS"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and in Supplement 1 to NUREG-1835, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned radiological impacts of routine operation to plant workers and members of the public.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Charles S. Hinson

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF CHARLES S. HINSON

CURRENT POSITION

Senior Health Physicist
Health Physics Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

EDUCATION

B.S.	University of Virginia, Nuclear Engineering	1974
M.E.	University of Virginia, Nuclear Engineering/Health Physics	1976

QUALIFICATIONS

Mr. Hinson has worked for over 31 years in the areas of radiation protection and project management.

Mr. Hinson joined the NRC in 1974 as a technical reviewer. Between 1974 and 1986, Mr. Hinson performed a large number of radiation protection evaluations of construction permit and operating license applications for commercial nuclear power plants. He participated in evaluation of the accident at Three Mile Island and in the cleanup operations and lessons learned development. He was instrumental in the development of Regulatory Guide 8.8 on ALARA as well as several other radiation protection related Regulatory Guides. In addition, he served as contract manager or Technical Reviewer for several contracts relating to ALARA and dose assessment.

In 1986, Mr. Hinson served as Project Manager for the nation's only high temperature gas-cooled reactor and, as such, dealt with several problems which were unique to this type of plant. In 1987, he served as the Project Manager for the Big Rock Nuclear Plant. In this capacity as Project Manager, Mr. Hinson managed and coordinated all aspects of the safety and environmental evaluations for these plants.

Between 1987 and 2004, Mr. Hinson served as the NRC expert in the ALARA field and made ALARA presentations at several ALARA Symposiums, REM ALARA Seminars, and BNL ALARA Workshops. During this period, he performed ALARA evaluations of several complex licensing applications including steam generator replacements, reactor vessel annealing, and recirculation piping replacements. He participated in several ALARA team inspections conducted at plants determined to have weak ALARA programs. In the area of reactor oversight, Mr. Hinson was instrumental in the formulation and implementation of the Reactor Oversight Process in the Occupational Radiation Protection area. In the area of new reactors, he developed the Review Standards for Early Site Permit and Extended Power Uprate reviews in the radiation protection area. Mr. Hinson performed evaluations of the following advanced LWR applications submitted to the NRC; General Electric SBWR, Combustion Engineering System 80+, and the Westinghouse AP600 and AP1000.

Since 2004, as Senior Health Physicist, a majority of Mr. Hinson's duties have been associated with the NRC's preparation for new reactor reviews. He served as the lead reviewer in the occupational radiation protection area for the North Anna, Clinton, Grand Gulf, and Vogtle Early Site Permit application reviews. He was instrumental in updating the radiation protection section of DG-1145, "Combined License Applications for Nuclear Power Plants". Mr. Hinson has also been involved in the updates of the Standard Review Plan (NUREG-0800) and various Regulatory Guides in preparation for the upcoming COL applications.

Over the past 30 years, Mr. Hinson has been active in the compilation and analysis of collective doses for US commercial nuclear power plants. Mr. Hinson is the NRR Technical Reviewer for the annual NUREG-0713 report entitled " Occupational Exposure at Commercial Nuclear Power Reactors and Other Facilities" and issues an annual findings report on dose trends at US nuclear power plants.

SELECTED PUBLICATIONS AND PRESENTATIONS

- Murphy, T.D. and C. S. Hinson (1976), Occupational Radiation Exposures at LWRs, 1969-1974, Nuclear Safety, Vol.17, No. 5, pp. 622-625.

- Presentation at the 1989 Brookhaven National Laboratory International Workshop, "Health Physics Aspects of the NRC's Maintenance Inspection Program," Hauppauge, Long Island, NY, September, 1989.

- Presentation at the 1991 Health Physics Society Meeting,, "Exposure Control During High Maintenance Jobs," Raleigh, NC, January 1991.

- Hinson, C. S. (1991), Exposure Control During High Maintenance Jobs, Nuclear Plant Journal, Vol. 9, No. 2, pp. 80-95.

- Presentation at the 1991 American Nuclear Society Meeting, "Health Physics Aspects of the NRC's Maintenance Program," Salt Lake City, UT, April, 1991.

- Presentation at the 1994 Brookhaven National Laboratory International Workshop, "Health Physics Aspects of Advanced Reactor Licensing Reviews," Hauppauge, Long Island, NY, May, 1994.

- Presentation at the 1997 AIT/TECRO Meeting, "Method Adopted in the US to Evaluate Dose Levels at NPPs, Strategy and Practices Employed to Reduce Personnel Dose at NPPs," Washington, D.C., December, 1996.

- Presentation at 2001 ISOE International ALARA Symposium/Midyear Health Physics Society Meeting, "Recent Experience in ALARA Performance Assessment in the USA," Anaheim, CA, February, 2001.

- Presentation at the EPRI Radiation Protection Conference/ 2006 ISOE North American ALARA Symposium, "US NRC Comparative Analysis of 2002-2004 US Occupational Dose Trends," Orlando, FL, January, 2006.

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF JAY Y. LEE CONCERNING NRC STAFF RESPONSE
TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

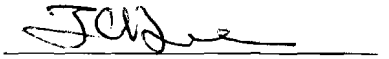
I, Jay Y. Lee, do hereby state as follows:

1. I am a Senior Health Physicist in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of Site and Environmental Reviews ("DSER"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and in Supplement 1 to NUREG-1835, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned geography and demography, and radiological consequences of design basis accidents.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.



Jay Y. Lee

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF JAY Y. LEE

CURRENT POSITION

Senior Health Physicist
Division of Site and Environmental Reviews
Office of New Reactors
U.S. Nuclear Regulatory Commission

EDUCATION

B.S.	University of Minnesota, Chemical Engineering	1962
M.S.	Catholic University of America, Radiation Protection	1978

PROFESSIONAL AFFILIATIONS

American Nuclear Society
American Health Physics Society

INDUSTRY COMMITTEE ACTIVITIES

ANS-18.1 Working Group, "Radioactive Source Term for Normal Operation of Light Water Reactors."
ANS-55.6, Working Group, "Liquid Radioactive Waste Processing System for Light Water Reactor Plants."
ANS-55.4, Working Group, "Gaseous Radioactive Waste Processing System for Light Water Reactor Plants."

QUALIFICATIONS

Mr. Lee joined the NRC in 1974 and has over 40 years of experience in design, construction, operation, and licensing of nuclear power reactors.

Prior to joining the NRC in 1974, Mr. Lee worked at Pathfinder Atomic Power Plant (decommissioned) of (then) Northern States Power Company in Sioux Falls, SD as a nuclear chemist (1962 to 1966) and at Rancho Seco Nuclear Generating Station (decommissioned) of the Sacramento Municipal Utility District in Sacramento, CA as a chemical engineer and a health physicist (1969 to 1974). From 1966 to 1969, Mr. Lee worked at Bechtel Corporation in San Francisco, CA as a nuclear engineer and worked on design and construction of the Radioactive Waste Management Systems and the Reactor Water Treatment Systems for nuclear power plants (Palisades and Peach Bottom Nuclear Stations).

Current NRC Work

Site Characteristics and Radiological Consequence of Design Basis Accident Reviews for Early Site Permits. Mr. Lee reviewed the Site Safety Analysis Report (SSAR) submittals supporting the Clinton, Grand Gulf, and North Anna Early Site Permit (ESP) applications, including the preparation of the associated Safety Evaluation Report (SER) sections related to site characteristics and radiological consequences of design basis accidents. He reviewed draft and final Environmental Impact Statements prepared by an NRC contractor for the Clinton, Grand Gulf, and North Anna Early Site Permit (ESP) applications.

Standard Reactor Design Certification Review. He is reviewing General Electric ESBWR standard reactor design certification application Chapter 6, "Containment systems," and Chapter 15, "Safety Analysis."

License Amendment Reviews for Alternative Source Term (AST) Implementation. He is reviewing the radiological consequence analyses in support of licensing amendment requests related to implementation of the AST pursuant to 10 CFR 50.67.

He is participating in the NRC's new rulemaking of 10 CFR 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

He is preparing Regulatory Guide and Standard Review Plan Development for COL Applications.

He is developing reactor accident source terms for high burnup fuel and MOX fuel.

Recent Selected NRC Experience

Review Standard (RS)-002, "Processing Applications for Early Site Permits." He prepared selected sections of Chapter 2 and Chapter 15, "Radiological Consequences of Design Basis Accidents,"of RS-002.

Standard Reactor Design Certification Reviews. He reviewed the standard reactor design certification of GE/ABWR, CE System 80+, Westinghouse AP600, and ACR 700 reactors and prepared safety evaluation reports for the radiological consequence analyses of the postulated reactor design basis accidents. Mr. Lee also completed the review of EPRI Advanced Light-Water Reactor Requirement Documents for Evolutionary and Passive Designs.

He helped refine the NRC Severe Accident Computer Code (MELCOR) and Consequence Computer Code (MACCS)

SELECTED PUBLICATIONS AND PRESENTATIONS

- NUREG-0016, Revision 1, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Boiling Water Reactors (BWR-Gale Code)." 1979.
- NUREG-0017, Revision 1, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-Gale Code)." 1985.
- ANSI/ANS Standard 18.1 (as a working member), "Radioactive Source Term for Normal Operation of Light Water Reactors." Revision 0 (1976), Revision 1(1984), and Revision 2 (1999).
- SECY-94-302, "Source Term Related Technical and Licensing Issues Pertaining to Evolutionary and Passive Light-Water Reactor Designs" (1994).
- Presentation to 2004 ANS Winter Meeting, "Reactor Accident Source Term Program at U.S. Nuclear Regulatory Commission," Washington, D.C. November 2004.
- Presentation to 2006 ANS Annual Meeting, "Alternative Source Term Implementation at U.S. Reactors," Reno, NV, 2006.
- Presentation to 14th Pacific Basin Nuclear Conference, "Implementation of Alternative Source Term at U.S. Power Reactors," Honolulu, Hawaii, March 2004.
- Presentation to 2006 Cooperative Severe Accident Research and MELCOR code Assessment Technical Review Meeting, "Alternative Source Term Implementation at U.S. Power Reactors," Albuquerque, NM, September 2006.

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF CLIFFORD G. MUNSON CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

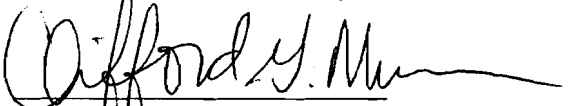
I, Clifford G. Munson, do hereby state as follows:

1. I am a Senior Geophysicist in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of Siting and Environmental Review ("DSER"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and in Supplement 1 to NUREG-1835, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned geology and seismology.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.



Clifford G. Munson

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF CLIFFORD G. MUNSON

CURRENT POSITION

Senior Geophysicist
Office of New Reactors
U.S. Nuclear Regulatory Commission

Since joining the NRC in 1995, Dr. Munson has been involved in projects covering a diverse set of seismic related issues. His professional experience includes basic and applied research, and regulatory compliance assessments. His areas of expertise cover a broad spectrum of areas related to the geosciences.

PROFESSIONAL INTERESTS

Seismic Source Characterization
Seismic Ground Motion Modeling
Probabilistic Seismic Hazard Analysis
Site Response Analysis

EDUCATION

B.S.	Brigham Young University, statistics	1987
M.S.	University of Wisconsin - Madison, geophysics	1991
Ph.D.	University of Wisconsin - Madison, geophysics	1995
M.C.E.	Johns Hopkins University, civil engineering	2001

PROFESSIONAL AFFILIATIONS

American Geophysical Union
Seismological Society of America

CURRENT PROJECTS

Seismic and Geologic Site Safety Reviews for Early Site Permits. Lead reviewer for geology, seismology, and geotechnical engineering sections. Three applications for an Early Site Permit (ESP) have been submitted to the Nuclear Regulatory Commission.

Standard Review Plan Update. Lead for update of NUREG-0800, "Standard Review Plan For The Review of Safety Analysis Reports For Nuclear Power Plants," in the areas of geology, seismology, and geotechnical engineering.

Regulatory Guide Development. Key participant for development of new regulatory guide for determining performance-based site-specific earthquake ground motion.

KEY PUBLICATIONS

Munson, C.G. and C.H. Thurber (1997). Analysis of the attenuation of strong ground motion on the island of Hawaii, Bull. Seismol. Soc. Of Am., 87, 945-960.

Munson, C.G., C.H. Thurber, Y. Li, and P.G. Okubo (1995). Crustal shear-wave anisotropy in southern Hawaii: Spatial and temporal variations, J. Geophys. Res., 100, 20367-20377.

Munson, C.G., C.H. Thurber, and Y. Li (1993). Observations of shear-wave splitting on the southeast flank of Mauna Loa Volcano, Hawaii, Geophys. Res. Lett., 20, 1139-1142.

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF BRUCE J. MUSICO CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

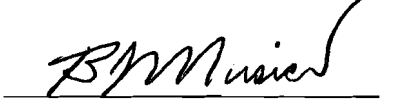
I, Bruce J. Musico, do hereby state as follows:

1. I am a Senior Emergency Preparedness Specialist in the Nuclear Regulatory Commission's ("NRC") Office of Nuclear Security and Incident Response ("NSIR"), Division of Preparedness and Response ("DPR"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's health and safety review of the North Anna ESP application, documented in NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned emergency planning.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.



Bruce J. Musico

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF BRUCE J. MUSICO

Current Position

Sr. Emergency Preparedness Specialist
Division of Preparedness and Response
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission

Education

J.D., Franklin Pierce Law Center, Concord, NH 1992
B.S., Nuclear Engineering, University of Michigan, Ann Arbor, MI 1976

Professional Affiliations

American Nuclear Society
Bar Admission – Pennsylvania & Washington, D.C.

Qualifications

Mr. Musico is a nuclear engineer with over 25 years experience in the commercial nuclear power and related industry, including approximately 19 years relating to nuclear reactor emergency planning (EP). This EP experience included work in virtually all facets of reactor emergency preparedness and response; including substantial experience performing a variety of EP work for nuclear utilities, local, State and Federal governments, and Canadian nuclear licensing work. Prior to joining the NRC in 2002, Mr. Musico had a private consulting and law practice providing counsel to governmental agencies and legislators in the area of nuclear power operation, regulation, and decommissioning.

NRC Experience

Early Site Permits (ESPs) – Principal staff reviewer for the emergency planning section of the North Anna ESP application, and author of Safety Evaluation Report (SER) section 13.3, "Emergency Planning." Principal EP staff reviewer for the Vogtle ESP application.

Standard Review Plan (SRP) – Author of section 13.3, "Emergency Planning," of the update to the Standard Review Plan (NUREG-0800). Creator of the emergency planning Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).

DG-1145 – Author of section 13.3, "Emergency Planning," of the draft regulatory guide DG-1145, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

ESP Review Standard (RS)-002 – Author of section 13.3, "Emergency Planning," of NRC RS-002, "Processing Applications for Early Site Permits."

New Reactor Licensing Final Rule – Principal author of EP-related changes to the Final Rule: Licenses, Certifications, and Approvals for Nuclear Power Plants (10 CFR Part 52, etc.)

NRC Incident Response Organization – Member of the Protective Measures Team, for NRC response in support of nuclear reactor emergencies.

Non-NRC Experience

Counsel – New Hampshire Nuclear Decommissioning Financing Committee

Reactor Licensing Engineer – Ontario Power Generation, Pickering Nuclear Station

Reactor Licensing Engineer – Commonwealth Edison Co., Zion Nuclear Station

Counsel – Maryland NRC Agreement State Nuclear Materials Licensee

Emergency Planning Consultant – Impell Corporation

Emergency Planning Manager – Illinois Department of Nuclear Safety

Radwaste System Designer – Sargent & Lundy Engineers

Reactor Startup and Operations Engineer – VEPCO, North Anna Unit 1

Publications

"Getting It Right–New Hampshire's State-of-the-Art Nuclear Decommissioning Law," (principal author) *Radwaste Solutions*, Nov/Dec 2001.

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF WILLIAM SANDUSKY CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, William Sandusky, do hereby state as follows:

1. I am employed as a Program Manager at the Battelle Pacific Northwest Division, Pacific Northwest National Laboratory. I am providing responses to the Licensing Board's questions under a technical assistance contract with the staff of the U.S. Nuclear Regulatory Commission ("NRC"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's environmental review of the North Anna ESP application, documented in NUREG-1811, the "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site," November 2006 ("FEIS"), I assisted the NRC staff as a member of the technical team that provided input to the FEIS. I provided assistance in the analysis of the applicant's Environmental Report that concerned meteorology and air quality.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

William Sandusky 2/7/07

WILLIAM F. SANDUSKY, Manager II
Energy & Engineering Division, Energy Sciences and Technology Directorate

Education

B.S. Space Technology, Florida Institute of Technology, 1969
M.S. Meteorology, Florida State University, 1971

Additional Graduate Studies:

Meteorology, Florida State University, 1972
Numerical Analysis and Economics, University of Washington
Joint Center Campus - Richland, Washington 1975-1976

Professional Experience

Mr. Sandusky has been with Battelle since March of 1972. He has worked as a technical contributor, a member of intra- and interdisciplinary research teams, project manager, line manager, manger of research operations, and program manager. Mr. Sandusky's area of technical expertise include computational fluid dynamics as applied to the transport and diffusion of materials released to the atmosphere, indoor air quality, data acquisition and processing, analysis of real-time data, deployment and maintenance of meteorological instrumentation, formation of regulatory review criteria, probabilistic modeling of risk associated with reduced indoor air quality, and energy engineering. Mr. Sandusky is noted for his research project management skills and has a keen interest developing in training programs in this area. He has made significant contributions to the following areas and programs:

- *Energy Management* - Since November 1993, Mr. Sandusky has been responsible for overall direction of Laboratory activities associated with the DOE Federal Energy Management Program (FEMP). The primary elements of this program are New Technology Demonstrations, Technical Transfer Initiative, Design and Technical Assistance, Training, Energy Savings Performance Contracting, Utility Service Program, and Strategic Planning and Analysis. He also serves as the overall FEMP coordinator for the Utility Service Program. In addition to these activities, he serves on several subcommittees of the Interagency Energy Task Force, Federal Energy Management Advisory Committee, as well as the planning committee for the annual energy workshop that is co-sponsored by DOE, GSA, DOD and VA.

- *Nuclear Power Plant License Renewal and Early Site Permits* – Since 2001, Mr. Sandusky has been a member of laboratory teams that have prepared draft Supplemental Environmental Impact Statements in support of the Nuclear

Regulatory Commission response to requests from utilities to renew the existing commercial nuclear plant operating license at four sites (North Anna, Catawba, H.B. Robinson, and Browns Ferry). His area of focus for this activity was air quality, the impact of electromagnetic fields from transmission lines, and for one site noise. He also is a member of a team that is preparing parts of an environmental impacts statement for an early site permit for two nuclear units at the existing North Anna Power Station. His area of focus for this effort is meteorology and air quality, meteorological and air quality impacts resulting from construction and operation of the proposed plants, nonradiological health impacts from electromagnetic fields associate with transmission lines, and air quality impacts associated with alternative sites to the proposed action.

- *End-Use Metering* - From December 1991 through 1993, Mr. Sandusky was the Technical Group Leader responsible for both electrical and fossil fuel end-use metering projects completed within the Energy Sciences Department. He was responsible for technical oversight of all tasks, budget development, tracking, and monthly reporting to the client. From January 1977 through December 1990, he directed the End-Use Load and Consumer Assessment Program (ELCAP) that was conducted for the Bonneville Power Administration. The goal of this program was to collect end-use data from a variety of both residential and commercial buildings throughout the Pacific Northwest region to assist Bonneville in evaluating conservation acquisition programs and improve long-range forecast of energy demand in the region. Prior to 1977, he first served as task leader for installation of metering equipment and then oversight for all activities related to residential sector. In this capacity he developed the metering protocols for the residential sites and was instrumental in the initial development of protocols for commercial buildings. Other activities included preparing request for proposals for installation contractors, supervising the review of measurement plans for installations, and interfacing with state electrical inspection personnel.

  From January 1991 through May 1992, he was the project manager for the Bonneville sponsored Regional End-Use Metering Project (REMP), which is the follow-on to ELCAP using a portion of the original ELCAP sites as the measurement sample. In November 1990, he assumed project management responsibility for both the Tacoma Multifamily Energy-Monitoring and the Energy Edge Projects at PNL. In July 1989, he assumed the project management responsibility for the Commercial End-Use (CEU) Metering Project that is being funded by Pacific Gas & Electric Company to acquire electrical load data from 47 commercial sites within three of their service areas.

- *Indoor Air Quality*. Mr. Sandusky served as project manager of an interdisciplinary research team that prepared an Environmental Impact Statement (EIS) for a residential retrofit weatherization program and new energy-efficient homes programs that was sponsored by the Bonneville Power Administration. These documents are unique because they evaluate environmental impacts for the Pacific Northwest region as a result of installing of house-tightening

measures, or homes built to model conservation standards. Mr. Sandusky also assisted in preparing an environmental assessment for providing conservation measures to commercial and industrial buildings.

- *Document Audit Codes*. Mr. Sandusky was the project manager for a Nuclear Regulatory Commission (NRC) project to upgrade, expand and document various computer programs used in meteorology reviews of licensee applications. Under his guidance, two NUREG documents and two Laboratory reports documenting the computer programs were prepared.

- *Wind Energy*. From October 1978 to September 1982, Mr. Sandusky was task leader for the DOE Meteorological Validation Program. His responsibilities included serving as technical administrator for several major subcontracts involving meteorological data acquisition at potential wind turbine sites and managing the entire data collection program. Mr. Sandusky directed a subcontractor to acquire meteorological data for as many as 35 sites, ranging from Alaska to Puerto Rico, to perform calibration and maintenance activities to prepare engineering units data. Mr. Sandusky was responsible for developing computer software for the analysis of the data into a form required by NASA and DOE researchers in order for wind characteristics evaluations to be made. This work required publishing monthly and annual data reports of the site data. Mr. Sandusky also formulated and implemented a formal quality assurance program for data acquisition and processing activities.

- *Regional Studies*. PNNL, along with other national laboratories, was previously engaged in environmental assessments of national energy programs projected through the year 2000. Mr. Sandusky directed Battelle's responsibility to analyze the impact of the long-range transport of pollutants resulting from various energy technologies in the western United States. Results of this work were integrated into a summary document to be used in future policy analysis. He has also directed air quality impact studies involving coal development in Alaska. Other aspects of the regional studies program include employing the long-range transport technologies and developing a technique to estimate the impact of emissions from an air quality control region (AQCR) on all other AQCRs.

- *Commercial Wastes Management EIS*. Mr. Sandusky was a member of an interdisciplinary team evaluating the resulting atmospheric impact of locating commercial waste management facilities at various geographical locations. He examined the short-range atmospheric transport of various radiological and non-radiological pollutants and related predicted concentrations to existing regulatory standards. These results were used in the preparation of an Environmental Impact Statement for Commercial Waste Management.

- *Regulatory Data Acquisition*. Mr. Sandusky was a project manager of a regulatory data acquisition program in eastern Tennessee for an industrial client. In this capacity he directed the selection and installation of the meteorological

sensor and coordinated maintenance and calibration programs with a subcontractor. He also analyzed the data and prepared written portions of both Safety Analysis and Environmental Reports. He represented the sponsor in all communication with Regulatory personnel regarding meteorological data acquisition and reporting.

- *Environmental Impact Statements*. Mr. Sandusky was a member of various Laboratory teams that reviewed environmental and safety analysis reports submitted to the Nuclear Regulatory Commission (NRC) and then prepared of Environmental Impact Statements in support of a construction permit for a nuclear plant. He always was a member of an interdisciplinary team preparing environmental standard review plans for the NRC. His task was to prepare review plans regarding the atmospheric effects of various cooling systems and to contribute to other plans regarding dispersion calculations and the accuracy and representativeness of onsite meteorological data acquisition programs.

- *Atmospheric Diffusion and Transport*. Soon after joining the Battelle staff, Mr. Sandusky was involved in various programs involving pollutant transport and diffusion on space scales from local to mesoscale. In particular, Mr. Sandusky contributed to computer simulation models and development of computer graphical display packages. He also participated in numerous field programs.

- *Prior Experience*. Before joining Battelle, Mr. Sandusky worked in the field of orbital mechanics and as a reliability and quality assurance inspector for spacecraft parts at the Kennedy Space Center, Florida.

Professional Affiliations/Registrations

American Meteorological Society
Association of Energy Engineers
Engineer-in-Training Certificate (Washington, No. 12823)

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF MICHAEL J. SCOTT CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

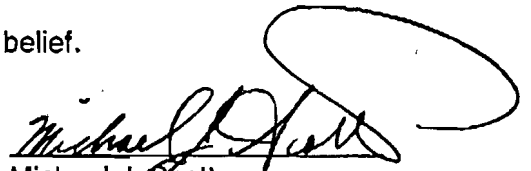
I, Michael J. Scott, do hereby state as follows:

1. I am employed as a Staff Scientist at Pacific Northwest National Laboratory operated by Battelle Memorial Institute. I am providing responses to the Licensing Board's questions under a technical assistance contract with the staff of the U.S. Nuclear Regulatory Commission ("NRC"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's environmental review of the North Anna ESP application, documented in NUREG-1811, the "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site," November 2006 ("FEIS"), I assisted the NRC staff as a member of the technical team that provided input to the FEIS. I provided assistance in the analysis of the applicant's Environmental Report that concerned socioeconomics.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.



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Expertise: Natural resource and environmental economics; regional economics; socioeconomic impact; environmental justice

EDUCATION

B.A.	Economics, Washington State University	1970
M.A.	Economics, University of Washington	1971
Ph.D.	Economics, University of Washington	1975

EXPERIENCE

Dr. Scott's training and experience in natural resource economics, regional economics, public finance, and applied economic analysis has been utilized in a variety of projects. He has directed and participated in dozens of benefit-cost studies and evaluations of the regional impacts of economic development. He has worked on numerous projects involving practical problems of state and local governments.

Natural Resource Economics.

Global Change Dr. Scott is a Senior Staff Scientist with Pacific Northwest National Laboratory in Richland, Washington with a Ph.D. in economics and over 30 years of experience in microeconomic and macroeconomic modeling. Over the last ten years, Dr. Scott has specialized in studying the effects of global environmental change on natural resources and the economy, particularly impacts on human systems and uncertainty. Highlights include his management of a current project designing Monte Carlo analysis into an integrated assessment model of global change. He managed the Department of Energy's $1M-plus Resources Analysis Research Project (MINK Study) to estimate the comprehensive regional economic consequences of global warming and CO_2 fertilization, in which he also contributed to the uncertainty analysis of outcomes, This was followed by a more limited effort for the Department of Energy to analyze similar questions in the Pacific Northwest, focused on water supply and utilization of the Columbia River by hydropower, irrigation, and fisheries interests. He was one of the co-

authors of the multi-laboratory, DOE study for the Congress to estimate the feasibility and cost to the U.S. economy of achieving major reductions in CO_2 and other greenhouse gas emissions over the next 10 to 20 years, and is following up this activity with analysis the consequences of climate change for energy consumption and a second report to the Congress comparing policy instruments for limiting greenhouse gas emissions. Dr. Scott is also contributed to the agricultural sections of an international, computable, general-equilibrium economic model to be used by DOE to estimate the effects of economic development and policy on global warming (the SGM). He was a convening lead author for the IPCC 1995 Assessment Climate Change 1995: Impacts, Adaptation, and Mitigation of Climatic Change in the topic area of Human Settlements, a coordinating lead author for human settlements impacts in the IPCC Third Assessment Report Climate Change 2001: Impacts Adaptation and Vulnerability, a contributing author to the IPCC Special Report The Regional Impacts of Climate Change, and a lead author for the North American chapter of the IPCC Fourth Assessment Report. His current research is in the areas of impacts of climate change on energy consumption in buildings and irrigated agriculture, and the impacts of uncertainty and non-CO_2 gases in integrated assessment models.

Natural Resources Dr. Scott's doctoral dissertation concerns the economics of the organization of oil fields. It advances the thesis that state regulations, historically designed to allocate oil production within and among oil fields, can be explained as an effort by the oil industry itself to minimize bargaining costs. He has also analyzed the oil supply costs in foreign oil fields, analyzed oil bid leasing models utilized by the State of Alaska. Dr. Scott is a widely-published author on the practical problems and solutions of evaluating environmental benefits, especially when natural systems' benefits are not well-specified. He has published several journal articles and monographs on the relationships of the economic value of Pacific salmon and their environment, including the potential effects of hydroelectric dams on the Columbia River, global climate change and tributary conditions in the Pacific Northwest, and petroleum transportation on Puget Sound. He has also published on the economic benefits of "non-glamorous" resources, in which he provided estimates of the economic value of undeveloped shrub-steppe habitat, and an analysis of the linkages between unvalued habitat and economically valued functions.

Regional Economics. Over the last 30 years, Dr. Scott's training and experience in natural resource economics, regional economics, public finance, and applied economic analysis has been utilized in a wide variety of projects. He has directed and participated in numerous benefit-cost studies and evaluations of the regional impacts of large-scale energy development and other types of federal actions. He also has worked on several projects involving practical problems of state and local governments.

Dr. Scott developed a number of small-region economic models and conducted

numerous regional analyses using a variety of regional models and methods to estimate the local economic and demographic effects of monitored retrievable nuclear waste storage systems in Tennessee; closure of aluminum mills in the Pacific Northwest, coal mines in Appalachia, and nuclear power plants in the Pacific Northwest and the U.S. Southeast; radioisotope production in New Mexico, Tennessee, and Idaho; and expansion or contraction of economic activity in a variety of sectors and locations.

Dr. Scott has prepared environmental justice sections for environmental impact statements for the K-Basin reactors at the Hanford Site, for four separate sites for Molybdenum-99 production, and for the Watts Bar nuclear power plant site. He has prepared environmental review guidance for the Nuclear Regulatory Commission on socioeconomics and environmental justice (NUREG-1555 and NUREG-1555, Supplement 1). He prepared socioeconomics and environmental justice sections of environmental impact statements for Department of Energy on management of solid wastes at the Hanford site and for NRC on the Calvert Cliffs, Oconee, Arkansas No.1, Edwin Hatch, and Peach Bottom nuclear power plants and an environmental justice analysis for the NRC at the PFS independent spent fuel storage facility at Skull Valley, Utah and the National Enrichment Facility at Eunice, New Mexico. He is currently working on the socioeconomic impacts of early site permits for nuclear reactors in several locations across the country.

Applied Economic Analysis. Dr. Scott has conducted several studies to resolve practical program problems of governments at all levels. At Pacific Northwest National Laboratory he has directed the development of an econometric/end-use electric load forecasting model estimate the demand for electric generating capacity in Alaska and has forecasted the demand for electric power in the European republics of the Former Soviet Union. Before coming to PNNL, he developed a low-cost price index to allocate public school foundation program funds to school districts and devised a method of administratively determining child support payments for divorced couples in accordance with federal guidelines. He helped develop a strategy for allocating minimum water flows among competing users for the State of Washington. He has conducted studies estimating the economic benefit of basic and applied science funded by the Department of Energy, options for supplying local jail services and privatized waste management, and market studies to analyze purchasing patterns of consumers, industry, and government. He prepares periodic reports on the economic diversification and growth in the Tri-Cities area of Washington State.

PROFESSIONAL AFFILIATIONS

- American Economic Association
- Western Economic Association

- American Agricultural Economics Association
- American Geophysical Union
- American Water Resources Association
- Board of Directors, Pacific Northwest Regional Economic Conference

PUBLICATIONS AND PRESENTATIONS

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MICHAEL J. SCOTT

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February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF GREGORY ALAN STOETZEL CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, Gregory Alan Stoetzel, do hereby state as follows:

1. I am employed as an Environmental Safety and Health Principal Engineer with the Safety and Health Department at the Battelle Pacific Northwest Division, Pacific Northwest National Laboratory. I am providing responses to the Licensing Board's questions under a technical assistance contract with the staff of the U.S. Nuclear Regulatory Commission ("NRC"). A statement of my professional qualifications is attached.

2. As part of the NRC staff's environmental review of the North Anna ESP application, documented in NUREG-1811, the "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site," November 2006 ("FEIS"), I assisted the NRC staff as a member of the technical team that provided input to the FEIS. I provided assistance in the analysis of the applicant's Environmental Report that concerned the radiological environment, nonradiological and radiological health impacts of construction and normal operation, and uranium fuel cycle impacts.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their

introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Gregory Alan Stoetzel

GREGORY A. STOETZEL, Environmental, Safety and Health Principal Engineer
Safety and Health Department
Battelle, Pacific Northwest National Laboratory

Education

B.S.	Science, Penn State University	1973
M.S.	Bionucleonics, Purdue University	1976

Experience

Mr. Stoetzel joined Battelle in 1976, and has over thirty years of work experience in the operational health physics, emergency preparedness, and environmental assessment areas. Details of his work experience are presented below:

- Operational Health Physics. Mr. Stoetzel has extensive experience in writing technical basis guidance documents to support Federal health physics regulations. He was the primary technical contributor to the Department of Energy (DOE) Implementation Guides on workplace air monitoring and on sealed radioactive source accountability and control. He was a technical contributor to the DOE Radiological Control Manual, the Hanford Site Radiological Control Manual, and to several DOE Good Practices Manuals covering topics such as ALARA and operation of uranium and plutonium facilities. He was also a contributor to the workplace air monitoring guidance developed by Nuclear Regulatory Commission (NRC) to support implementation of 10 CFR Part 20.

  Mr. Stoetzel has provided health physics support to DOE contractors and programs in the following areas: writing radiation protection manuals and radiological protection portions of safety analysis reports; evaluating facility conceptual design reports for adequacy of shielding, radiation detection instrumentation, and ALARA considerations; and performing occupational dose assessments for inclusion in environmental assessments and environmental impact statements.

  Mr. Stoetzel has performed qualitative air flow studies (i.e., smoke testing) at over 12 nuclear facilities as a means of evaluating the adequacy of workplace air sampler and monitor locations.

  Mr. Stoetzel has provided health physics support to several Department of Army projects. Specific work has included determination of the best survey methods and instrumentation for performing release surveys on depleted uranium contaminated components, and the evaluation of component decontamination methods to ensure worker safety.

  Currently, Mr. Stoetzel is assigned to Battelle's Safety and Health Department. Responsibilities include 1) conducting compliance inspections of nuclear facilities

against requirements in 10 CFR Part 835 and the DOE Radiological Control Manual (RCM), 2) writing health physics procedures to support implementation of 10 CFR Part 835 and the RCM, 3) providing technical support to Battelle's air sampling/monitoring program and area dosimeter program, and 4) developing technical methods for uncontrolled release of work areas and materials and equipment from radiological control.

- Emergency Preparedness. Mr. Stoetzel was a contributor for approximately fourteen years to a Battelle program that provided technical assistance to the Nuclear Regulatory Commission (NRC) in the area of emergency preparedness at commercial nuclear power plants. He was a team member on about 20 onsite appraisals and inspections of reactor emergency preparedness programs and an observer on over 50 exercises. Other activities related to this project included performing technical reviews of exercise scenarios, emergency plans, and emergency procedures. Mr. Stoetzel was also a technical contributor and coordinator on two special studies for the NRC, one that reviewed emergency offsite dose projection methods at commercial nuclear power plants and one that developed emergency environmental sampling and analysis guidance for radioactive material facilities.

  Mr. Stoetzel has provided emergency preparedness support to Department of Energy (DOE) Headquarters and DOE Richland Operations Office (DOE RL). This support has included 1) development of radiological and nonradiological field data for emergency preparedness exercises, 2) conduct of emergency preparedness appraisals of individual DOE facilities, 3) an evaluation of the applicability of the revised protective action guidelines developed by the Environmental Protection Agency to DOE sites, and 4) upgrading emergency environmental monitoring activities on the Hanford site. Mr. Stoetzel is currently part of the DOE-RL emergency response team filling the position of radiological field team coordinator.

- Environmental Assessments. For the past five years, Mr. Stoetzel has been a contributor to the environmental impact statements developed by the NRC for license renewal of nuclear plants and for early site permits. He has supported development of the radiological health impact and fuel cycle impact sections. He has worked on environmental impact statements for three license renewal applications and two early site permit applications.

Professional Certifications

Certified Health Physicist (November 1996 by American Board of Health Physics)

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF SESHAGIRI TAMMARA CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, Seshagiri Tammara, do hereby state as follows:

1. I am a Physical Scientist in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of Siting and Environmental Review ("DSER"), Siting and Accidents Branch. A statement of my professional qualifications is attached.

2. I have reviewed those sections of NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005, and of Supplement 1 to NUREG-1835, that relate to site characteristics, specifically, geography and demographics; and external site hazards. Further, I am familiar with those aspects of the Applicant's Site Safety Analysis Report that concern site characteristics, specifically, geography and demographics; and external site hazards.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Seshagiri Rao Tammara

Seshagiri Tammara

SESHAGIRIRAO TAMMARA

EDUCATION

M.S., Environmental Engineering (Pollution Control), University of Maryland, 1976
M.S., Chemical/Nuclear Engineering, University of Maryland, 1970
M. Tech (M.S.), Chemical Engineering, Plant Design, Osmania University, India, 1968
B. Tech (B.S.), Chemical Engineering, Osmania University, India, 1966
B. Sci (B.S.), Mathematics, Physics and Chemistry, Osmania University, India, 1961

SPECIAL TRAINING

Tetra Tech NUS Project Management Training, 1985
Health Physics Society, Basic Radiological Health Course, 1989
Tetra Tech NUS, Quality Improvement Training refresher course, 1992

CERTIFICATIONS/REGISTRATIONS

None

SECURITY CLEARANCE(S)

DOE Q-Cleared
DOD SECRET- Cleared
NRC L-Cleared

EXPERIENCE

US Nuclear Regulatory Commission (NRC) May 2006-Present
Tetra Tech NUS, Inc. (formerly Brown & Root Environmental), Gaithersburg, Maryland, 1974-2006
University of Maryland, College Park, Maryland, 1969-1974
Osmania University, Hyderabad, India, 1968-1969

QUALIFICATIONS

Serves as Environmental/Physical Scientist in conducting reviews and evaluations pertaining to site criteria and site suitability, potential external hazards, and meteorological data and usage as a part of Safety Evaluation Reports (SERs) for new nuclear reactors, meteorological data review and evaluation for Alternate Source Term (AST) applications, performing environmental radiological impact analyses of nuclear power plants and other nuclear facilities. Has more than 35 years of professional experience in multidisciplinary environmental impact assessments and evaluations of air pollutants and chemicals from power plants and other facilities; and also radiological impact analyses of nuclear power plants and other nuclear facilities. Activities include radiological dose assessments and health effects due to normal operations and facility accidents, concentration impacts and health risk assessments due to chemical accidents, traffic and radioactive material transportation impacts, chemical and air quality impact assessments, thermal performance evaluations, cooling tower analyses, emergency cooling pond analyses, health risk assessments due to hazardous and carcinogenic substances, and remedial actions to control waste releases for corrective actions and mitigative measures.

Involved in risk assessment and retrieval methodologies of radioactive thermoelectric generators used in space systems. Worked on generating radionuclide inventories for plutonium fuel used in Radioisotope Thermoelectric Generators (RTGs) using ORIGEN2 computer model. Has experience in evaluating risks due to potential accidents of space missions carrying on board RTGs, using TtNUS developed EMERGE computer model. Has processed and prepared meteorological data sets required in analyzing environmental and potential health risk impacts due to space missions. Has experience in preparing sections required for Environmental Reports and Safety Analysis Reports. Also has experience in NEPA process and in preparing sections for EISs. Involved in calculating facility accident impacts using MACCS computer code, and has computer modeling experience utilizing various industry-wide computer models such as GASPAR, LADTAP, GENII, AIRDOS, RADTRAN IV, MACCS, ORIGEN2, CAP88PC2, ALOHA, MEPAS, SLAB, DEGADIS, CHEMSPLUS, PATHRAE, MESOPUFF, SACTI Cooling Tower Plume Dispersion model, and other pertinent meteorological models like XOQDOQ, PAVAN and ARCON96 for determining atmospheric dispersion parameters(X/Q values).

RELEVANT EXPERIENCE

Environmental/Physical Scientist: NRC May 2006 – Present. Participated in updating Standard Review Plan (SRP) sections pertaining to site characteristics and external hazards. Participated in reviewing and updating site characteristics sections of Draft Guide DG-1145 for COL applications. Conducted meteorological review and evaluation as a part of SER for AST applications. Currently performing site suitability and external hazards review and evaluation towards SER of the proposed new units 3 and 4 at Vogtle Electric Generating Plant(VEGP) ESP application. Involved in answering ASLB questions pertaining to SER of respective Clinton and North Anna Plant ESP applications. Also involved in making independent checks, calculations and analyses as applicable and appropriate in performing these reviews and evaluations.

Environmental/Physical Scientist: DOE-Space Programs; Department of Energy/Johns Hopkins University/APL, Germantown Environmental/Physical, Columbia, Maryland. 1995 -- 2006. Preparation of meteorological data and modeling risk analyses as a part of impact evaluations for EISs and other evaluations. Performed documentation of models used for risk analyses. Used ORIGEN2 computer model in generating radionuclide inventories of Radioisotope Thermoelectric Generators (RTGs). Performed risk analyses using TtNUS developed EMERGE computer model. Provided transportation impact analyses for Environmental Assessments and Environmental Impact Statements for plutonium and enriched uranium movements.

Environmental/Physical Scientist: Cooling Tower Analyses; 2004-2006. Performed preliminary cooling tower impact analyses for the cooling towers considered for the SNC proposed nuclear units at the Vogtle, GA site.

Environmental/Physical Scientist; LLNL-SWEIS, June 2002- December 2003. Evaluate impacts due to chemical accidents that are being addressed in LLNL-SWEIS using ALOHA computer model. QA/QC of radiological accident and normal radiological impact analyses performed.

Environmental/Physical Scientist; MPF-EIS, October 2002 – September /2003. Evaluated impacts due to chemical accidents at five sites that being considered for Modern Pit Facility EIS.

Environmental/Physical Scientist; Sandia National Laboratories; Department of Energy, Albuquerque, NM; June 1997 -- June 1999. Performed radiological impact analysis and RADTRAN transportation impact analysis and traffic analysis and prepared pertinent sections for the Sandia National Laboratory Site-wide Environmental Impact Statement. Also involved in generating information and data for facility accident analyses.

Environmental/Physical Scientist; Oak Ridge Reservation, Y-12 Plant; Department of Energy, Oak Ridge, TN; June 1999 -- 2001. Performed radiological impact analysis and traffic and transportation impact analysis for Y-12 site-wide Environmental Impact Statement.

Environmental/Physical Scientist; New Production Reactor Environmental Impact Statement; Department of Energy, Washington, DC, December 1990 -- June 1991. Performed radiological impact analysis and cooling tower performance analysis.

Environmental/Physical Scientist; Department of Energy, Washington, DC; October 1991 -- 1996. Prepared radiological impact analyses and transportation impact analyses for various DOE Environmental Impact Statements applicable to the Weapons Complex Reconfiguration Program that included the Tritium Supply and Recycling Programmatic EIS; Disposition of Highly Enriched Uranium EIS; Stockpile Stewardship and Management Programmatic EIS and Storage and Material Disposition EIS. Also involved in modeling health risk analyses due to potential facility accidents and reviewed pertinent PEIS and EIS sections generated.

Environmental/Physical Scientist; Spent Nuclear Fuel Management Environmental Impact Statement, Department of Energy, Idaho; October, 1993 -- December 1995. Performed radiological impact analyses and transportation impact analyses and participated in public comment response effort in support of the EIS effort.

Environmental/Physical Scientist; Arizona Public Service Company; Tetra Tech NUS; 1974-1978; 1983-1993. Analyzed environmental impacts, including fogging, icing, visible plumes, and salt deposition, due to operation of primary and alternative cooling towers for Palo Verde Nuclear Generating station and prepared sections for Environmental Report for construction permit and operating license. As part of annual salt monitoring program, drift deposition from cooling towers operation is being analyzed.

Environmental/Physical Scientist performing analyses of environmental impacts, such as fogging, icing, visible plumes, and salt deposition, due to cooling tower operation for various nuclear power plants such as Cleveland Electric Illuminating Company, Perry; DECo, Greenwood, Massachusetts Municipal Wholesale Electric Company, Davis-Besse, NSP-Tyrone, Skagit-Hanford, HLP-STP, and Beaver Valley. Tetra Tech NUS; 1974-1980.

Environmental/Physical Scientist analyzing thermal performance of cooling lakes for Commonwealth Edison Company's nuclear power generating stations--Quad Cities, Byron, Braidwood and La Salle. Commonwealth Edison Company. Tetra Tech NUS. 1978-1979.

Air Quality Analyst performing air quality impact analyses for PSD Permit applications for celanese fibers plant in Maryland. Celanese Fibers Company. Tetra Tech NUS. 1978.

Environmental/Physical Scientist analyzing emergency cooling pond analysis for South Texas plant. Houston Lighting & Power Company. Tetra Tech NUS. 1981.

Environmental/Physical Scientist performing radiological impacts and health effects analyses and participating in preparing sections for Defense Waste Processing Facility EIS at Savannah River Site. DOE, Savannah River Operations Office. Tetra Tech NUS. 1982.

Environmental/Physical Scientist performing radiological impacts and health effects analyses and preparing sections for EIS for L-Reactor Operation at Savannah River Site. DOE, Savannah River Operations Office. Tetra Tech NUS. 1984.

Environmental/Physical Scientist performing radiological impacts and air quality impacts from potential sites for characterization and selection for the nuclear waste disposal for the Office of Nuclear Waste Isolation (ONWI). Battelle Memorial Institute. Tetra Tech NUS. 1978-1983.

Environmental /Physical Scientist performing radiological impacts and health effects analyses and cooling tower impact analyses including fogging, icing, visible plumes, and salt deposition; prepared sections for EIS for alternative cooling water systems at Savannah River Site. DOE, Savannah River Operations Office. Tetra Tech NUS. 1986-1987.

Environmental/Physical Scientist performing radiological and chemical impacts and health effects analyses and preparing sections for EIS for waste management activities for groundwater protection at Savannah River Site. DOE, Savannah River Operations Office. Tetra Tech NUS. 1987.

Environmental/Physical Scientist performing radiological impacts and health effects analyses and preparing sections for EIS for continued operation of K-, L-, and P- Reactors at Savannah River Site. DOE, Savannah River Operations Office. Tetra Tech NUS. 1990-1991.

Environmental/Physical Scientist reviewing Safety Analysis Reports for specific facilities such as SRL Seepage Basin and some support facilities.

Environmental/Physical Scientist involved in risk assessments and retrieval methodologies of radioactive thermoelectric generators used in space systems such as Galileo and Ulysses missions SP-100 space reactors. DOE. Tetra Tech NUS. 1981-1988; 1993-2006.

Environmental/Physical Scientist performing health risk assessments for waste sites using DOE's Multimedia Environmental Pollutant Assessment System (MEPAS) in determining Hazard Potential Index values as part of DOE's Environmental Surveys and Audits of their 36 sites. DOE.

Tetra Tech NUS. 1988-1990.

Environmental/Physical Scientist performing radiological dose assessments using EPA-PATHRAE model for the proposed low-level radioactive disposal sites at Oak Ridge Reservation. Martin Marietta. Tetra Tech NUS. 1990-1993.

Environmental/Physical Scientist performing cooling tower performance analyses and radiological dose assessments for siting, construction, and operation of the New Production Reactor Capacity EIS. Argonne National Laboratory. Tetra Tech NUS. 1990-1991.

Environmental/Physical Scientist participating in responding to public comments on New Production Reactor Capacity EIS serving as a team member for comment/response project. Argonne National Laboratory. Tetra Tech NUS. 1991.

Environmental/Physical Scientist performing radiological impacts and health effects analyses for normal operations and facility accidents, and also evaluating the intersite transportation impacts for Tritium Supply and Recycling Programmatic Environmental Impact Statement. DOE/Tetra Tech. Tetra Tech NUS 1991-1995.

Environmental/Physical Scientist performing radiological impacts and health effects analyses for normal operations and facility accidents, and also evaluating the intersite transportation impacts for Disposition of Surplus Highly Enriched Uranium Environmental Impact Statement. DOE/Tetra Tech. Tetra Tech NUS 1993-1995.

Environmental/Physical Scientist performing radiological impacts and health effects analyses for normal operations and facility accidents, and also evaluating the intersite transportation impacts for all the potential alternatives at various sites for the Plutonium Storage and Disposition Programmatic Environmental Impact Statement. DOE/Tetra Tech. Tetra Tech NUS 1991.

Environmental/Physical Scientist performing radiological impacts and health effects analyses for normal operations and facility accidents, and also evaluating the intersite transportation impacts of special nuclear materials such as Highly Enriched Uranium (HEU) and plutonium for all the potential alternatives at various sites for Stockpile Stewardship and Management Programmatic Environmental Impact Statement under Nuclear Weapons Complex Reconfiguration. DOE/Tetra Tech. Tetra Tech NUS. 1991.

Environmental/Physical Scientist performing air quality PSD analysis for a Class-I area for a proposed thermal power plant in Cumberland, Maryland, as part of a plant licensing effort. AES Corporation. Tetra Tech NUS 1992-1995.

Environmental/Physical Scientist involved in processing and preparation of meteorological data sets for space mission Cassini launch window. DOE-Space. Tetra Tech NUS. 1992.

Research Assistant working with Goddard Space Flight Center, Maryland helping on various tasks on data reduction, compilation, and analysis of rocket and satellite data. University of Maryland. 1969-1974.

Lecturer teaching chemical engineering and was in charge of laboratory, India. 1968-1969.

PROFESSIONAL AFFILIATION AND HONORS

American Institute of Chemical Engineers, Associate Member

February 7, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DOMINION NUCLEAR NORTH ANNA, LLC	)	Docket No. 52-008-ESP
	)	
(Early Site Permit for North Anna ESP Site)	)	

AFFIDAVIT OF GEORGE F. WUNDER CONCERNING NRC STAFF RESPONSE TO THE LICENSING BOARD'S SAFETY-RELATED QUESTIONS

I, George F. Wunder, do hereby state as follows:

1. I am a Senior Project Manager in the Nuclear Regulatory Commission's ("NRC"), Office of New Reactors ("NRO"), Division of New Reactor Licensing ("DNRL"). I am the NRC Project Manager for the health and safety review of the Dominion Nuclear North Anna, LLC application for an early site permit ("ESP") at the North Anna ESP site near Mineral, Virginia. A statement of my professional qualifications is attached.

2. I took over project management responsibilities in December 2006, following issuance of NUREG-1835, the "Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site," September 2005 ("SER"), and Supplement 1 to NUREG-1835, November 2006 ("SSER"). I have been responsible for project management activities with respect to the SER since that time.

3. I am responsible for those responses to Board questions (or portions of questions) in Attachment A to the "NRC Staff Legal Brief in Response to the Licensing Board's Safety-Related Questions" for which I am listed as the author.

4. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

George F. Wunder

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF GEORGE F. WUNDER

Current Position
Senior Project Manager,
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission

Education
M.A., Applied Economics, Johns Hopkins University, Baltimore, Maryland, 2004
Master of Environmental Engineering, Johns Hopkins University, Baltimore, Maryland, 1997
B.S., Industrial Engineering, Northwestern University, Evanston, Illinois, 1981

Qualifications

In 1989, Mr. Wunder joined the Nuclear Regulatory Commission (NRC) headquarters office as a project engineer in the Division of Reactor Projects. After serving as backup project manager for Crystal River Unit 3 and completing several training assignments, Mr. Wunder was appointed NRC project manager of the Virgil C. Summer Station in Jenkinsville, S.C. in 1990.

Mr. Wunder continued in the division of reactor projects serving as project manager for Indian Point Unit 3, Seabrook Unit 1, Hope Creek, Peach Bottom Units 2 and 3, and Limerick Units 1 and 2. In January 2006 Mr. Wunder accepted a position in the Division of New Reactor Licensing where he became project manager for both the Grand Gulf Early Site Permit and the South Texas Project future Combined License.

Before joining the Agency, Mr. Wunder was a commissioned officer in the U.S. Navy. He attended Naval Nuclear Power School in Orlando Florida and Naval Prototype Training Unit in West Milton, New York. Mr. Wunder has four years of power reactor operating experience. He was qualified by the Director, Navy Nuclear Power Program, as ships nuclear engineering officer for Trident Class submarines.

Awards

Mr. Wunder has received numerous awards during his time at the Agency. He also holds the Navy Achievement medal.