

RAS 13637

U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of Dominion Nuclear North Anna LLC

Docket No. 52-008-ESP Official Exhibit No. Dominion 12

OFFERED by: Applicant/Licensee Intervenor _____

NRC Staff _____ Other _____

IDENTIFIED on 4/24/07 Witness/Panel ENVL

Action Taken: ADMITTED REJECTED WITHDRAWN

Reporter/Clerk J HC

**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
)	
(Early Site Permit for North Anna ESP Site))	ASLBP No. 04-822-02-ESP

**DOMINION'S PRE-FILED TESTIMONY OF
MARVIN L. SMITH, KAREN K. PATTERSON, AND JON A. CUDWORTH
ON ENVIRONMENTAL MATTERS**

Q1. Please state your name, position, and business address.

A1. (MLS) My name is Marvin L. Smith ("MLS").

(KKP) My name is Karen K. Patterson ("KKP").

(JAC) My name is Jon A. Cudworth ("JAC").

DOCKETED
USNRC

May 16, 2007 (4:05pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Q2. Please state your employer and position.

A2. (MLS) I am a Project Director employed by Dominion Resources Services Inc.

Dominion Resources Services Inc. is a subsidiary of Dominion Resources Inc. ("DRI") and provides technical and management support services to DRI subsidiaries, including Dominion Nuclear North Anna LLC ("Dominion").

(KKP) I am a Project Manager employed by TetraTech NUS, Inc. ("TiNUS").

(JAC) I am an Environmental Scientist employed by TiNUS.

Q3. Please describe your professional qualifications.

A3. (MLS) I hold a Bachelor of Science degree in Physics and a Master of Engineering degree in Nuclear Engineering, both from Virginia Tech. I have over thirty years experience as a

nuclear engineer and manager in the nuclear power industry. A statement of my professional qualifications is attached.

(KKP) I hold Bachelor of Arts degree in Biology from Randolph-Macon Woman's College, a Master of Arts degree in Biology from Wake Forest University, and a Masters in Library and Information Science from the University of South Carolina. I have over 30 years of professional experience as a project manager for multidisciplinary environmental projects and an environmental scientist with expertise in National Environmental Policy Act ("NEPA") analyses. My experience includes involvement in the preparation of twenty environmental reports supporting NRC licensing actions, and six environmental impact statements for the Department of Energy. A statement of my professional qualifications is attached.

(JAC) I hold Bachelor of Science and Master of Science degrees in Resource Development from Michigan State University and a law degree from Cooley Law School. I have 30 years of professional experience in environmental regulatory compliance and environmental reviews under NEPA as a project manager for multidisciplinary environmental projects for utility, industrial, and federal facilities. My experience includes involvement in the preparation of thirty-six environmental reports supporting NRC licensing actions, and fifteen environmental impact statements for the Department of Energy and other federal agencies. A statement of my professional qualifications is attached.

Q4. Please describe your responsibilities with respect to Dominion's application for an early site permit.

A4. (MLS) I am the Project Director responsible for Dominion's application for an early site permit ("ESP"). I have been the responsible Director from the inception of this project and have provided overall supervision and management of the entire project.

(KKP) I am TtNUS's Project Manager for Dominion's ESP Application. Dominion selected Bechtel Power Corporation ("Bechtel") as its primary contractor to assist with the preparation of the ESP Application. Bechtel in turn subcontracted with TtNUS for environmental support personnel, systems, project management, and resources to work on an integrated team with Dominion. I have been the Project Manager for this work from the beginning of the project and have supervised all TtNUS work on it.

(JAC) I am TtNUS's regulatory specialist supporting the integrated team for Dominion's ESP Application. I advise the Project Manager, Bechtel, and Dominion on regulatory interpretation and technical approaches to regulatory compliance. I have been involved in this work from the beginning of the project.

Q5. What is the purpose of your testimony?

A5. (MLS, KKP, JAC) The purpose of our testimony is to describe the Environmental Report ("ER") that Dominion provided in its application for an early site permit and explain how that application meets requirements of the Nuclear Regulatory Commission ("NRC"). In addition, our testimony describes NRC's review of the ER and preparation of NUREG-1811, Final Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site ("FEIS"), and explains how those activities fulfilled NEPA's requirements.

Q6. Are you authorized to provide this testimony on behalf of Dominion?

A6. (MLS) Yes, I am authorized to provide this testimony on behalf of Dominion, and as the Project Director have also authorized Ms. Patterson and Mr. Cudworth to provide this testimony.

Q7. Please describe the ER.

A7. (MLS, KKP, JAC) Dominion prepared its ER in accordance with 10 C.F.R. § 52.17(a)(2) and 10 C.F.R. Part 51, and submitted the ER as Part 3 of the ESP application. In preparing the ER, Dominion followed the applicable NRC guidance in the Environmental Standard Review Plan, NUREG-1555 (“ESRP”), and Regulatory Guide 4.2, and Attachment 3 to RS-002, which provide guidance on how to apply the NRC guidance to an ESP application.

As 10 C.F.R. § 52.17(a)(2) requires, the ER provided the information required by 10 C.F.R. §§ 51.45 and 51.50, focusing on the environmental effects of the construction and operation of reactors which have characteristics within the postulated site parameters. A plant parameter envelope (“PPE”) was provided to bound the postulated parameters of such reactors. Consistent with 10 C.F.R. § 52.17(a)(2), the ER did not assess the benefits of new plant construction and operation but it did provide an evaluation of alternative sites.

Q8. Please describe how the ER complied with 10 C.F.R. §§ 51.45 and 51.50.

A8. (MLS, KKP, JAC) In accordance with 10 C.F.R. § 51.45(b), Section 1.1 of the ER provided a description of the proposed action and a statement of its purposes, and Chapter 2 of the ER provided a description of the affected environment.

In accordance with 10 C.F.R. § 51.45(b)(1), the impacts of the proposed action were described. Chapter 4 of the ER assesses the impact of construction, Chapter 5 assesses the impact of operations, and Chapter 7 assesses the impacts of postulated accidents. The ER discusses impacts in proportion to their significance. Based on guidance provided in Section 4.6 of NUREG-1555, Dominion performed an evaluation to determine the significance level – small, moderate, or large – of the potential environmental impacts that relate to construction and operation activities after any controls or mitigation measures are implemented. This evaluation

considered not only information that supports the proposed action, but also any adverse information, as required by 10 C.F.R. § 51.45(e).

The impacts from construction addressed in Chapter 4 include socio-economic impacts, land use, water-related impacts, ecological impacts, and radiological impacts to construction workers at the North Anna ESP site. As a result of this evaluation, Dominion determined in the ER that all but one impact during construction of new units would be small. The only construction impact that Dominion estimated to be moderate is the impact of the increased traffic associated with construction activities. As the ER discusses, Dominion would use specific measures and controls (*e.g.*, development of a traffic plan, encouraging carpooling of construction workers, coordinating schedules of work force shift changes, scheduling deliveries for off-peak hours) as appropriate to mitigate this impact (ER Section 4.6 and Table 4.6-1).

The operational impacts evaluated in Chapter 5 of the ER include land use, water-related impacts, cooling system impacts, radiological impacts of normal operation, environmental impacts of waste, transmission system impacts, uranium fuel cycle impacts, socioeconomic impacts, and decommissioning impacts. Following the change in the proposed cooling system for Unit 3, which eliminated any significant thermal effect, Dominion determined in its ER that all impacts during operation of the new units would be small.

In accordance with 10 C.F.R. § 51.45(b)(2), Section 10.1 of the ER addresses adverse environmental effects that cannot be avoided if the proposal is implemented. Table 10.1-1 summarizes the potential adverse environmental impacts from the construction of new units. It identifies the adverse environmental impacts that would remain after all reasonable means have been taken to avoid or mitigate them as those associated with the use of land for the units, including loss of vegetation, and habitat; the temporary disturbance of streambeds; and the

construction noise that may disturb wildlife. Table 10.1-2 summarizes potential adverse environmental impacts from the operation of new units. It identifies the adverse environmental impacts that would remain after all practical means to avoid or mitigate them have been applied as the potential reduction in water release rates from the North Anna dam; impacts from the mining, milling and fuel fabrication of uranium; and radioactive waste generation. All these unavoidable operational impacts are projected in the ER to be small.

In accordance with 10 C.F.R. § 51.45(b)(3), Chapter 9 of the ER discusses the alternatives considered. These include alternate sites, alternative heat dissipation systems, alternative circulating water systems, and transmission systems. Chapter 9 of the ER also discusses the no-action alternative (in the context of an ESP). In addition, the ER sections that discuss the impacts of construction and operation consider appropriate mitigation measures.

Section 10.3 of the ER addresses the requirements of 10 C.F.R. § 51.45(b)(4) by discussing the local short-term uses and long-term productivity of the human environment. The economic productivity of the North Anna ESP site is large compared with the productivity from agriculture or other probable uses for the site. Because the site would eventually be restored by decommissioning, there would be no significant impact on long-term productivity.

Section 10.2 of the ER addresses the requirements of 10 C.F.R. § 51.45(b)(5) by discussing irreversible and irretrievable resources committed. The committed resources are identified in the ER as water used for cooling and potable needs, and the non-renewable resources consumed in the construction or operation of the new units, such as building materials and uranium.

As 10 C.F.R. § 52.17(a)(2) and 10 C.F.R. § 51.45(d) require, Section 1.2 of the ER lists the federal, state and local permits, approvals and other entitlements which must be obtained in

connection with the construction and operation of new units. Table 1.2-1 provides a list of the environmental-related authorizations, permits, and certifications potentially required by federal, state, regional, local, and affected Native American tribal agencies for activities related to the construction and operation of any new units at the North Anna ESP site.

In accordance with 10 C.F.R. § 51.50, Section 5.7 of the ER discusses the impacts from the uranium fuel cycle as 10 C.F.R. § 51.51 requires, and Section 3.8 discusses the impacts from the transportation of fuel and waste as 10 C.F.R. § 51.52 requires.

Q9. Please describe the NRC's review of the ER.

A9. (MLS, KKP, JAC) We note that NRC's efforts to ensure that the ER met NRC's requirements began prior to submittal. In an effort coordinated by the Nuclear Energy Institute, industry representatives met with NRC to present information about work being done to prepare ESP applications, including environmental reports. NRC used these opportunities to familiarize itself with issues that applicants were facing and to provide generic input to help ensure compliance.

The NRC's review of Dominion's ER was comprehensive and thorough. NRC began by performing a review to determine the ER's acceptability for docketing -- a review that focused on ensuring that the ER included the components required by regulation. On October 23, 2003, the NRC provided notice in the Federal Register that it had completed its acceptance review and was accepting Dominion's ESP application for docketing. NRC's technical review of the ER was evidenced by numerous questions that NRC posed to Dominion in preparing for and during the NRC site audits, and during its review, and by references to the ER in NRC-prepared documentation. Questions were organized by technical discipline and sought clarification of statements in the ER, verification of information, and copies of supporting documentation

referenced in the ER. During this review, the NRC conducted two site audits of the ESP site and also visited each of the alternative sites that Dominion analyzed. NRC brought a multi-disciplinary team to these visits, a team that included NRC and Pacific Northwest National Laboratory ("PNNL") staff and that provided expertise in disciplines including terrestrial and aquatic biology, water quality, socioeconomics, land use, cultural resources, radiological health, and alternative siting. The team had the opportunity to meet with Dominion and Dominion contractor ER authors and subject matter experts to discuss topics of interest to NRC and to view features that the ER described for the ESP site, the site vicinity, and the alternative sites. During this time, NRC also met with local, state, and other federal regulatory agencies to meet its consultation responsibilities and to ensure that Dominion, in preparing its ER, did not overlook issues of significance.

Following NRC publication of the Draft Environmental Impacts Statement ("DEIS"), draft supplemental EIS, and the FEIS, Dominion performed reviews of the documents to ensure that they accurately portrayed and applied information from the ER. This review did not identify any significant errors, which is evidence of the care that NRC had taken in its review of the ER.

Q10. Please describe the process by which the NRC prepared its environmental impact statement.

A10. (MLS, KKP, JAC) After accepting Dominion's ESP application for docketing, the NRC published in the Federal Register, on November 24, 2003, a Notice of Intent ("NOI") to prepare an environmental impact statement and conduct a scoping process as required by 10 C.F.R. §51.26 (ML0329402090). The NOI included the content required by 10 C.F.R. § 51.27 [68 Fed. Reg. 65,961 (2003)] and the NRC conducted a scoping review in compliance with 10 C.F.R. § 51.29. NRC held public meetings in Mineral, Virginia on December 8, 2003, to receive oral comments on the scope and NRC accepted written comments through January 9, 2004. On June

24, 2004, NRC issued a report summarizing this scoping process and the comments received (ML041770579). As part of the scoping process, in November and December 2003, the NRC consulted with and solicited input from Federal and State agencies with expertise on environmental protection, potential fish and wildlife impacts, coastal zone management, natural, archeological and historic resources, and other relevant disciplines. These solicitations, along with the solicitation of comments on the DEIS and the supplement to the DEIS discussed later in this testimony, met the consultation obligations in Section 102(2)(C) of NEPA.

Following the site audits (previously described), the NRC identified additional information that it needed to conduct its review. The NRC Staff asked Dominion to respond to six sets of Requests for Additional Information ("RAI"), containing approximately 70 questions, many of which included numerous subparts. Dominion provided the requested information which NRC then used in its own analyses. The NRC Staff's effort was thorough and probing, and included the preparation of a number of independent analyses in areas where the NRC Staff deemed such analyses to be appropriate.

Upon completion of the scoping process and NRC Staff analyses, the NRC issued its DEIS on December 2, 2004 (ML043370446) in accordance with 10 C.F.R. § 51.70. The DEIS presented the NRC's analyses of the impacts of the construction and operation of Units 3 and 4 at NAPS. The NRC used the analyses in the ER and the Staff's independent analyses, responses to the RAIs that were provided by Dominion, and considered the comments received during the scoping period when preparing the DEIS. The DEIS was prepared by numerous experts in diverse disciplines, including scientists from the PNNL. These experts are listed in Appendix A to the FEIS.

The NRC then solicited comments on the DEIS from other agencies and the public in accordance with 10 C.F.R. § 51.73. NRC published a Federal Register Notice of Availability of the DEIS and Associated Public Meeting in accordance with 10 C.F.R. § 51.74(e) [69 Fed. Reg. 71,854 (2004)]. NRC distributed the DEIS in accordance with 10 C.F.R. § 51.74 (ML043370460). The solicitation of comments included meeting with the County Commissioners of the three counties near the ESP Site, consistent with the requirements of 10 C.F.R. § 51.77, and conducting a public meeting to receive comments in Mineral, Virginia on February 17, 2005. Written comments on the DEIS were accepted through March 1, 2005.

Following Dominion's decision to modify its proposed cooling system for Unit 3 to further mitigate environmental impacts, and preparation of a revised ER that described the impacts of the modified cooling system, the NRC prepared a supplement to its DEIS, using much the same process it used when preparing the DEIS. The NRC published an NOI to prepare a supplement to the DEIS (ML061240025 and ML061240029). [71 Fed. Reg. 28,392 (2006)]. On July 6, 2006, the NRC issued the DEIS supplement in accordance with 10 C.F.R. § 51.72 and distributed it in accordance with 10 C.F.R. § 51.74(c) (ML061660039; ML061800217). A Federal Register Notice of Availability and Associated Public Meeting was published on July 12, 2006, soliciting further public comments during a 45-day comment period. [71 Fed. Reg. 39,372 (2006)]. The NRC then held a public meeting to discuss and receive comments on the DEIS supplement in Mineral, Virginia on August 15, 2006 (ML062440229). Consistent with 10 C.F.R. § 51.70(c), the NRC coordinated the public meeting on the DEIS supplement with a State of Virginia meeting on its Coastal Zone Management Act review. NRC has provided a transcript of the August 15, 2006 meeting (ML062440240).

After receiving and reviewing comments on the DEIS Supplement, the NRC issued the FEIS on December 14, 2006, in accordance with 10 C.F.R. § 51.90 and distributed the FEIS in accordance with 10 C.F.R. § 51.93(a) (ML063480261; ML063480263). A Federal Register Notice of Availability was published in accordance with 10 C.F.R. § 51.93(f) (ML063240022). [71 Fed. Reg. 76,706 (2006)]. The FEIS responds to comments received on both the DEIS and its supplement in accordance with 10 C.F.R. § 51.91(a).

The voluminous comments received are summarized in Appendix E to the FEIS in accordance with 10 C.F.R. § 51.91(b). Chapter 6 of Appendix E of the FEIS describes how copies of the comment letters can be retrieved from the NRC's website. The NRC discusses relevant opposing views in Chapters 3 and 4 of Appendix E of the FEIS as required by 10 C.F.R. § 51.91(b). The alternatives considered and the impacts of decisions based on those alternatives are discussed in Chapters 8 and 9 of the FEIS in accordance with 10 C.F.R. § 51.91(c). Chapter 10 of the FEIS provides a recommendation in accordance with 10 C.F.R. § 51.91(d) to issue the ESP.

In all, the NRC Staff contacted over 60 Federal or State agencies, and regional, tribal, local or other organizations, listed in Appendix B of the FEIS. NRC held several public meetings, solicited comments from agencies and the public, and received and responded to several thousand comments. Appendix C of the FEIS provides a chronology of related correspondence, Appendix D summarizes scoping comments and responses and Appendix E does the same for comments on the DEIS.

Q11. In your opinion, has the NRC Staff complied with the requirements in Section 102(2)(A) of NEPA?

A11. (KKP, JAC) Yes, the relevant NEPA statutory obligations were met. The NRC's environmental review was systematic and interdisciplinary as evidenced by the numerous and diverse topics analyzed in the FEIS, and by the list of preparers, reviewers and the scope of consultations documented in Appendices A, B, and E of the FEIS. The FEIS considers impacts in many disciplines, including ecological, socioeconomics, historic and cultural resources, and environmental justice. This process met the NRC's obligations pursuant to NEPA § 102(2)(A).

Q12. In your opinion, has the NRC Staff complied with the requirements in Section 102(2)(C) of NEPA?

A12. (KKP, JAC) Yes, the FEIS constitutes a detailed statement on the (1) environmental impact, (2) any adverse impacts that cannot be avoided, (3) alternatives, (4) the relationship between short-term uses and long-term productivity, and (5) any irreversible and irretrievable commitment of resources, as required by Section 102(2)(C)(i)-(v). Consideration of design alternatives for mitigating impacts from severe accidents was deferred until the COL stage. The NRC review started from the information presented in the ER, included numerous consultations, independent analyses, and consideration of agency and public comments, culminating in the FEIS providing over 400 pages of analysis of these five issues. This FEIS and the process used by the NRC to develop it meet the requirements of Section 102(2)(C). In our opinion, the NRC has taken the hard look at the environmental impacts required by NEPA.

Section 102(2)(C) of NEPA also requires the NRC to consult with any federal agency with legal jurisdiction or special expertise in the area and provide the views of federal, state, and local agencies on the proposal. As discussed in Answer 10 above, the NRC consulted with

relevant agencies and their views are provided in Appendix F of the FEIS. Therefore, our opinion is that the Staff complied with Section 102(2)(C) of NEPA.

Q13. In your opinion, has the NRC Staff complied with the requirements of Section 102(2)(E) of NEPA?

A13. (KKP, JAC) Yes. As discussed in Chapters 8, 9, and 10 of the FEIS, the NRC studied, developed, and described appropriate alternatives. Section 8.2 of the FEIS concludes that a combination of wet and dry cooling for Unit 3 is the preferred cooling system alternative. Chapter 9 of the FEIS concludes that no alternate site is obviously superior to the proposed North Anna ESP Site. It is our opinion that the NRC has adequately considered a reasonable range of alternative sites (consideration of alternative sources was deferred to the COL stage, as provided for by NRC regulation). Therefore, our opinion is that the Staff complied with its obligations pursuant to NEPA § 102(2)(E).

Q14. In your opinion, has the NRC Staff complied with the requirements of Subpart A to 10 C.F.R. Part 51?

A14. (KKP, JAC) Yes. As discussed in our answer to Question 9, above, the Staff review met the applicable requirements of Subpart A to 10 C.F.R. Part 51. In addition, the FEIS provides the content specified in Appendix A to Subpart A of 10 C.F.R. Part 51 as summarized in this table:

<u>Appendix A to 10 C.F.R. Part 51, Subpart A</u> <u>Standard Format</u>	<u>Conforming FEIS Section</u>
(1) Cover Sheet	FEIS, cover, inside cover, and pp. i to iv.
(2) Summary	FEIS, pp. xxiii to xxvi.
(3) Table of Contents	FEIS, pp. v to xxi.
(4) Purpose and Need for Action	FEIS, pp. 1-8 to 1-9.
(5) Alternatives including the proposed action	FEIS, pp. 1-9 to 1-10; 8-1 to 8-81; 9-1 to 9-9.
(6) Affected Environment	FEIS, pp. 2-1 to 2-80; 3-1 to 3-16.

(7) Environmental Consequences and Mitigating Actions	FEIS, pp. 4-2 to 4-51; 5-1 to 5-94; 6-1 to 6-42; 7-1 to 7-10; 8-1 to 8-81; 9-2 to 9-9; 10-4 to 10-11.
(8) List of Preparers	FEIS, Appendix A.
(9) List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent	FEIS, Appendix B; Appendix E, p. 1-3.
(10) Substantive Comments Received and NRC Staff Responses	FEIS, Appendix E
(11) Index	ADAMS Accession No. ML063480263 and ML063480261 provide a word searchable electronic version of the FEIS.
(12) Appendices	FEIS, Appendices A to L.

Q15. In your opinion, upon consideration of the final balance among conflicting factors, what is the appropriate action to be taken?

A15. (MLS, KKP, JAC) Upon consideration of the balance among conflicting factors at the ESP stage, the ER and FEIS support issuing the ESP as the appropriate action to take. The FEIS finds that most of the impacts of construction and operation would be small, characterizes a few impacts as potentially ranging from small to moderate (transportation and the impact on recreation during construction, demands on housing and schools during construction, operational water use/impact on lake level during drought years, and aesthetics of the cooling tower plume), and finds no large impacts. The FEIS addresses appropriate mitigation measures, provides adequate information to resolve the relevant environmental issues with the North Anna ESP site, and demonstrates that the site is suitable for new nuclear units from an environmental standpoint. The ESP preserves the option to build up to two new units at the North Anna ESP site, thereby fulfilling the purpose of the ESP. The benefits of new units, such as the need-for-power, will be determined at the COL stage, and a final cost-benefit balance will be completed at that time.

Q16. In your opinion, after considering reasonable alternatives, should the ESP be issued?

A16. (MLS, KKP, JAC) Yes. The NRC Staff proposes four conditions for the ESP as listed in Table J-4 of Appendix J to the FEIS. With these conditions, it is our opinion that the discussions found in the ER and the FEIS, including the analysis of alternatives, support the issuance of the ESP.

Q17. Does this complete your testimony?

A17. (MLS, KKP, JAC) Yes.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
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DOMINION NUCLEAR NORTH ANNA, LLC) Docket No. 52-008
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(Early Site Permit for North Anna ESP Site)) ASLBP No. 04-822-02-ESP

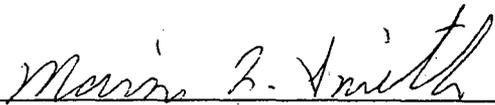
DECLARATION OF MARVIN L. SMITH IN SUPPORT OF DOMINION'S
PRE-FILED TESTIMONY ON ENVIRONMENTAL MATTERS

I, Marvin L. Smith, do hereby state the following:

I am the Project Director for Dominion Resources, Inc., parent corporation of Dominion Nuclear North Anna, LLC ("Dominion"). My business address is 5000 Dominion Boulevard, Glen Allen, VA 23060. I am the director responsible for Dominion's application for an Early Site Permit, and performed work related to this project involving overall project management. A statement of my professional qualifications is attached.

I am providing this declaration in support of Dominion's pre-filed testimony on environmental matters filed pursuant to the Atomic Safety and Licensing Board Order of March 20, 2007.

I attest to the accuracy of those statements attributed to me (that material marked by my initials in Dominion's pre-filed testimony), 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 declaration, are true and correct to the best of my knowledge, information and belief.



Marvin L. Smith

Marvin L. Smith, P.E.

**Project Director
Dominion**

S U M M A R Y O F Q U A L I F I C A T I O N S

**Project Manager
Early Site Permitting**

2000 -2007

SPECIFIC DUTIES/RESPONSIBILITIES: PROJECT MANAGER FOR EARLY SITE PERMITTING PROJECT. RESPONSIBLE FOR LICENSING THE NORTH ANNA SITE FOR POTENTIAL NEW NUCLEAR REACTOR DEPLOYMENT AND FOR FINANCIAL AND TECHNICAL EVALUATIONS OF NEW NUCLEAR TECHNOLOGIES.

- PROJECT DIRECTOR FOR COOPERATIVE AGREEMENT PROJECT BETWEEN DOMINION, BECHTEL AND DOE FOR AN EARLY SITE PERMIT LICENSING DEMONSTRATION PROJECT FOR DOMINION'S NORTH ANNA SITE.
- PROJECT MANAGER FOR COOPERATIVE AGREEMENT WITH DOE, TVA, ENTERGY, TLG AND BECHTEL TO EVALUATE OPERATIONS AND MAINTENANCE STAFFING AND COST, CONSTRUCTION SCHEDULES AND DECOMMISSIONING COSTS AND FUNDING REQUIREMENTS FOR NEW NUCLEAR TECHNOLOGIES.
- PROJECT MANAGER FOR COOPERATIVE AGREEMENT PROJECT BETWEEN DOMINION, BECHTEL AND DOE TO STUDY POTENTIAL SITES FOR THE DEPLOYMENT OF NEW NUCLEAR PLANTS IN THE UNITED STATES [STUDY PUBLISHED SEPTEMBER 27, 2002]
- DEVELOPED AND OBTAINED APPROVAL OF STRATEGIC PLAN FOR EARLY SITE PERMITTING PROJECT. THIS STRATEGIC PLAN INCLUDES DEVELOPMENT OF A PROCESS TO SCREEN POTENTIAL SITES FOR NEW NUCLEAR PLANTS AGAINST INDUSTRY, NRC AND ENVIRONMENTAL CRITERIA; REVIEW OF ADVANCED NUCLEAR POWER PLANT TECHNOLOGIES; DEVELOP THE BUSINESS CASE FOR NEW NUCLEAR GENERATION; AND PREPARE EARLY SITE PERMIT AND COMBINED CONSTRUCTION AND OPERATING LICENSE APPLICATIONS TO NRC.
- PARTICIPATED IN NEI AND INDUSTRY GROUPS TO DEVELOP PLANS FOR IMPLEMENTING NEW NUCLEAR POWER PLANTS INCLUDING THE NEI EARLY SITE PERMIT WORKING GROUP.

**Principal Engineer
Nuclear Analysis and Fuels**

1999 - 2000

SPECIFIC DUTIES/RESPONSIBILITIES: PROVIDED SPENT NUCLEAR FUEL CONSULTING SERVICES TO THE DOE AND THE COMMERCIAL NUCLEAR INDUSTRY INCLUDING VIRGINIA POWER'S FOUR NUCLEAR PLANTS, TWO DRY INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS (ISFSIS) AND TWO WET POOL FACILITIES. CONSULTED ON SNF FACILITY AND CASK SYSTEM DESIGN, LICENSING, AND OPERATIONAL ISSUES. MANAGED CORPORATE EXTERNAL RELATIONS ON SPENT NUCLEAR FUEL WITH INDUSTRY, DOE, EPRI, ASTM, IAEA AND STATE GOVERNMENT.

- DEVELOPED LONG TERM PROCUREMENT AND LICENSING STRATEGY FOR SPENT NUCLEAR FUEL STORAGE AND TRANSPORT SYSTEMS.
- MEMBER, SENIOR OVERSIGHT COMMITTEE FOR COMMONWEALTH EDISON'S DRESDEN ISFSI PROJECT.
- CONSULTANT ON YUCCA MOUNTAIN OPERATIONAL EXPERIENCE REVIEW THAT LED TO RECOMMENDATIONS FOR IMPROVED FUEL HANDLING, DRY TRANSFER, AND HVAC SYSTEMS.
- REVIEWED DESIGN AND LICENSING BASIS FOR FUEL HANDLING OPERATIONS FOR THE PEACH BOTTOM ATOMIC POWER PLANT ISFSI.

- PROVIDED ISFSI ADVISORY SERVICES TO SACRAMENTO MUNICIPAL POWER DISTRICT FOR RANCHO SECO NUCLEAR STATION.
- PERFORMED BASELINE STUDY FOR THE PRIVATELY OWNED OWL CREEK DRY SPENT FUEL STORAGE SYSTEM PLANNED FOR WYOMING BY NAC. RECOMMENDED USE OF THE DOE-DEVELOPED CENTRAL INTERIM SPENT FUEL STORAGE DESIGN TO REDUCE OVERALL DESIGN AND LICENSING COSTS BY \$10 MILLION.
- CONSULTED ON THE DESIGN, CONSTRUCTION, AND LICENSING OF THE NORTH ANNA ISFSI THAT RECEIVED ITS OPERATING LICENSE AND BECAME OPERATIONAL IN JULY 1998.
- PUBLISHED STUDY ON ABOVE AND BELOW BOILING THERMAL LOADING STRATEGIES FOR DISPOSAL OF WASTE PACKAGES AT YUCCA MOUNTAIN REPOSITORY.

**System Engineer
Nuclear Analysis and Fuels**

1990 - 1998

SPECIFIC DUTIES/RESPONSIBILITIES: OVERSAW DEVELOPMENT OF LONG-TERM PLANS AND OPTIONS FOR SNF STORAGE AND DISPOSAL, WITH EMPHASIS ON DESIGN AND LICENSING OF THE NORTH ANNA ISFSI AND CONTINUED OPERATION OF THE SURRY ISFSI. SERVED AS COMPANY REPRESENTATIVE IN DOE INTERFACES ON SNF DISPOSAL. KEY PARTICIPANT IN DOE, INDUSTRY, IAEA AND EPRI STUDIES INVOLVING SPENT FUEL STORAGE, TRANSPORT AND DISPOSAL SYSTEMS. ALSO DEVELOPED METHODS AND PERFORMED SAFETY EVALUATIONS OF POTENTIAL OFF-SITE DOSES FROM REACTOR ACCIDENTS. SUPPORTED PROJECT TO RERACK VIRGINIA POWER SNF POOLS TO INCREASE STORAGE CAPACITY.

- CONCEIVED CONCEPT OF MULTI-PURPOSE CANISTER (MPC) TO PROVIDE FOR STORAGE, TRANSPORT AND DISPOSAL OF SPENT FUEL. PERFORMED STUDIES TO SHOW THAT WASTE PACKAGES COULD BE DISPOSED IN DRIFT RATHER THAN BOREHOLES. OBTAINED ENDORSEMENT OF UTILITY USERS GROUP FOR CONCEPT AND FUNDING BY DOE FOR PROCUREMENT OF MPC DESIGNS.
- RECEIVED EPRI TECHNOLOGY TRANSFER AWARD FOR ADVANCING NEW TECHNOLOGY IN DRY SPENT FUEL STORAGE.
- PROVIDED CONSULTING SERVICES TO NAC ON DESIGN AND LICENSING OF THE NAC UNIVERSAL MULTI-PURPOSE CANISTER SYSTEM.

**Project Manager
Spent Fuel Storage**

1984 - 1990

SPECIFIC DUTIES/RESPONSIBILITIES: MANAGED A 10-PERSON OFFICE AND \$50 MILLION ISFSI DESIGN/CONSTRUCT BUDGET. PROJECT MANAGER FOR DEVELOPMENT OF DRY STORAGE AT SURRY POWER STATION, WHICH WAS THE FIRST DRY STORAGE SYSTEM LICENSED IN THE UNITED STATES, AND PROGRAM MANAGER FOR VIRGINIA POWER/EPRI/DOE COOPERATIVE AGREEMENT PROGRAM ON DRY STORAGE. MANAGED FACILITY LICENSING AS WELL AS LICENSING OF THE DRY STORAGE CASKS USED AT SURRY INCLUDING THE CASTOR V/21, NAC 1-28, AND WESTINGHOUSE MC-10. THIS PROGRAM INCLUDED DRY CONTAINER STORAGE THERMAL TESTING BY THE DEPARTMENT OF ENERGY AT THE IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY (INEEL) WITH CONTAINERS AND USED FUEL PROVIDED BY VIRGINIA POWER. PLANNED AND COORDINATED 23 SHIPMENTS OF SPENT FUEL FROM SURRY TO INEEL.

- CHAIRMAN OF TECHNICAL MANAGEMENT COMMITTEE (INCLUDING REPRESENTATIVES FROM DOE, EPRI) FOR OVERSIGHT OF THE \$33 MILLION COOPERATIVE DEMONSTRATION PROJECT TO LICENSE AT REACTOR DRY STORAGE. IN THIS DEMONSTRATION PROJECT, PARTICIPANTS USED AN INTEGRATED APPROACH TO COORDINATE RESEARCH AT INEEL FUNDED BY DOE AND EPRI WITH AN NRC LICENSED DEMONSTRATION PROJECT AT VIRGINIA POWER'S SURRY ISFSI.

- RECEIVED EPRI FIRST USE AWARD FOR DEVELOPING DRY SPENT FUEL STORAGE, WHICH SAVED OVER \$90 MILLION (NPV) COMPARED WITH CONSTRUCTION AND OPERATION OF A NEW SPENT FUEL POOL.
- LED ANALYSIS EFFORT TO DEVELOP SNF BURNUP CREDIT FOR SPENT FUEL STORAGE AND TRANSPORT PACKAGES, INCLUDING INTERACTION WITH ORNL TO USE REACTOR CRITICAL DATA FOR BENCHMARKING.
- SERVED AS U.S. REPRESENTATIVE AT MEETINGS OF INTERNATIONAL ATOMIC ENERGY AGENCY AND FOR EXCHANGE PROGRAMS WITH KOREA.

**Project Manager
Nuclear Plant Capital Improvements**

1979 - 1983

SPECIFIC DUTIES/RESPONSIBILITIES: PROJECT MANAGER FOR 10-PERSON OFFICE RESPONSIBLE FOR ANNUAL BUDGET OF \$25 MILLION FOR ALL CAPITAL IMPROVEMENT PROJECTS AT THE NORTH ANNA POWER STATION INCLUDING THE PROJECTS REQUIRED TO RESPOND TO NEW NRC REQUIREMENTS DEVELOPED AS A RESULT OF THE TMI ACCIDENT.

**Engineer to Supervisor
Nuclear Fuel Design and Safety
Analysis**

1973 - 1978

SPECIFIC DUTIES/RESPONSIBILITIES: RESPONSIBLE FOR DEVELOPMENT OF RELOAD CORE DESIGN AND SAFETY ANALYSIS METHODS. DURING THIS PERIOD, PROMOTED FROM ENTRY-LEVEL ENGINEER TO SUPERVISOR. DEVELOPED RELOAD CORE PHYSICS AND THERMAL HYDRAULIC ANALYSIS METHODS AND OBTAINED NRC APPROVAL OF THESE METHODS. DEVELOPED THE FIRST 18 MONTH RELOAD CORE DESIGN USED BY A US PWR REACTOR AND IMPLEMENTED LOW LEAKAGE LOADING PATTERNS AT VIRGINIA POWER'S REACTORS.

- DESIGNED AND LICENSED NEW RELOAD CORE CONFIGURATION THAT EXTENDED THE REACTOR OPERATING CYCLE FROM 12 TO 18 MONTHS. THIS DESIGN, NOW ADOPTED AS AN INDUSTRY STANDARD, REDUCES REFUELING AND REPLACEMENT POWER COSTS RESULTING IN SAVINGS OF OVER \$20 PER YEAR FOR EACH NUCLEAR UNIT.
- IMPLEMENTED FIRST-OF-A-KIND LOW NEUTRON LEAKAGE CORE LOADING PATTERNS AT VIRGINIA POWER'S REACTORS. THIS LOADING TECHNIQUE IS NOW AN INDUSTRY STANDARD AND REDUCES URANIUM AND ENRICHMENT REQUIREMENTS FOR EACH RELOAD CORE.

EDUCATION

Virginia Tech

1967 - 1973

BS IN PHYSICS (1972)

M.E. IN NUCLEAR ENGINEERING (1973)

SPECIAL TRAINING: COURSES/SEMINARS/WORKSHOPS INCLUDING FUEL UTILIZATION AND PERFORMANCE ANALYSIS COMPUTER CODE SYSTEM; REACTOR PHYSICS ANALYSIS; RETRAN-REACTOR SYSTEM SAFETY ANALYSIS CODE; BASIC PWR CORE PHYSICS AND THERMAL/HYDRAULIC ANALYSIS; NON-LOCA SAFETY ANALYSIS; PWR INFORMATION; NUCLEAR DESIGN CONTROL MANUAL TRAINING; CRITICALITY ANALYSIS USING SCALE SYSTEM; 10CRF50.59 TRAINING; CORRECTIVE ACTION PROGRAM TRAINING; SELF ASSESSMENT PROGRAM TRAINING; FOREIGN MATERIAL EXCLUSION TRAINING; PROJECT MANAGEMENT; DEALING WITH THE MEDIA.

PROFESSIONAL ACTIVITIES

REGISTERED PROFESSIONAL ENGINEER (VIRGINIA)

MEMBER OF AMERICAN NUCLEAR SOCIETY

US REPRESENTATIVE ON INTERNATIONAL ATOMIC ENERGY AGENCY COMMITTEE TO DEVELOP STANDARDS FOR OPERATION OF DRY SPENT FUEL STORAGE INSTALLATIONS

AWARDS RECEIVED

EPRI FIRST USE AWARD FOR DRY STORAGE OF SPENT FUEL IN METAL CASKS

EPRI TECHNOLOGY TRANSFER AWARD FOR DRY SPENT FUEL STORAGE

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
)
(Early Site Permit for North Anna ESP Site)) ASLBP No. 04-822-02-ESP

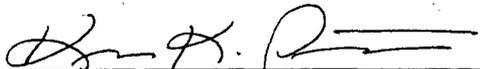
DECLARATION OF KAREN K. PATTERSON IN SUPPORT OF DOMINION'S
PRE-FILED TESTIMONY ON ENVIRONMENTAL MATTERS

I, Karen K. Patterson, do hereby state the following:

I am an environmental scientist for Tetra Tech NUS, subcontractor to Bechtel Power Corporation for preparation of the Early Site Permit application Environmental Report for Dominion Nuclear North Anna, LLC ("Dominion"). My business address is 900 Trail Ridge Road, Aiken, SC 29803. I am the Tetra Tech NUS project manager responsible for the portion of Dominion's application that Tetra Tech NUS prepared, and performed work related to this project on technical analyses. A statement of my professional qualifications is attached.

I am providing this declaration in support of Dominion's pre-filed testimony on environmental matters filed pursuant to the Board Order of March 20, 2007.

I attest to the accuracy of those statements attributed to me (that material marked by my initials in Dominion's pre-filed testimony), 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 declaration, are true and correct to the best of my knowledge, information and belief.



Karen K. Patterson

KAREN K. PATTERSON
PROJECT MANAGER
AIKEN, SOUTH CAROLINA

EDUCATION: M.A.; Biology; Wake Forest University; 1977
B.A.; Biology; Randolph-Macon Woman's College; 1973
MLIS; Library and Information Science; University of South Carolina;
1999

**CERTIFICATIONS/
REGISTRATIONS:** None

TRAINING: Hazardous Waste Management Under RCRA, Sumter Area Technical
College Environmental Training Center, 1990
Management Development Program, School of Business Administration,
Daniel Management Center, University of SC, 1990
Leadership South Carolina, University of SC, 2002

EXPERIENCE SUMMARY:

Ms. Patterson has 34 years of professional experience as a project manager for multidisciplinary environmental projects and an environmental scientist with expertise in National Environmental Policy Act (NEPA) analyses. She also serves as Technical Editor for the Aiken office.

Ms. Patterson manages the preparation of environmental reports for nuclear utilities' license renewal applications and applications to construct and operate new nuclear facilities. She also serves as a technical lead or senior reviewer of the environmental reports for nuclear utility license renewals and the construction and operation of new nuclear plants. She has conducted and managed studies of environmental impacts of cooling waters on water quality, fisheries, wildlife, vegetation, and macroinvertebrate and periphyton communities. She has managed and participated in wetland delineations for utility, transportation, and development projects throughout the Southeast; endangered species and critical habitat surveys; Clean Water Act (CWA) Section 316(a) Demonstrations; environmental impact statements for NEPA; and environmental assessments and research projects.

She has designed and implemented monitoring programs required for regulatory compliance. She is familiar with the requirements of NEPA, CWA, CERCLA, the Endangered Species Act and the Coastal Zone Management Act. She has extensive public participation experience. She has written and edited technical documents, peer-reviewed articles, symposia publications, and articles for the popular press.

PROJECT EXPERIENCE:

Project Manager; Environmental Report in support of an Early Site Permit Application for Vogtle Electric Generating Plant; Southern Nuclear Company; 2005 – present. Ms. Patterson is the project manager for the preparation of the environmental report in support of

an early site permit (ESP) application being prepared by Southern Nuclear Company (SNC) for submittal to the Nuclear Regulatory Commission. A significant component of the project is to assimilate NRC comments on the previous applications and incorporate lessons learned into this application. She performs normal project management function such as working with procurement to select, hire and manage subcontractors; monitoring staff workload, expenditures, and work products; and providing technical and financial reports to the client on a regular basis. She also has significant technical responsibilities. Ms. Patterson developed an extensive annotated outline of the report which identified section author, information to be included in the section, including tables and figures; identified predecessor and successor activities, and applicable regulatory requirements or guidance for each section; wrote the project plan; offered project training; coordinated scheduling and information exchange with the contractor developing the Site Safety Analysis Report, and with SNC; authored several technical sections; and edited the entire document. She meets regularly with the client and other contractor to develop strategy. She directs the technical analysts who do the analyses and prepare the documents. She oversees document production. She participates in regulatory audits and responds to questions posed by regulatory agencies, and prepares input to responses to intervention contentions.

Project Manager; Environmental Report in support of License Renewal for Vogtle Electric Generating Plant; Southern Nuclear Company; 2005 – present. In concert with the Early Site Permit application for Vogtle Electric Generating Plant, TtNUS is preparing an environmental report supporting the license renewal application for the existing units. Ms. Patterson is serving as the project manager, performing the same functions as for the Early Site Permit Application Environmental Report.

Project Manager; Ecological Sections of the Environmental Report in support of an Early Site Permit for North Anna Power Station; Bechtel Power for Dominion Energy; 2002 – 2005. Ms. Patterson was the project manager for the preparation of the ecological sections of an environmental report in support of an Early Site Permit (ESP) application being prepared by Bechtel Power for Dominion Energy. An ESP is the first step to constructing and operating a new nuclear facility. As a Bechtel subcontractor, TtNUS is responsible for preparing all sections on site description, construction and operational impacts of the new facility. The task is challenging in that a new reactor type has not yet been identified for that particular site, so the analysis has to be broad enough to incorporate several reactor designs and specific enough to ensure that impacts are appropriately addressed. An ESP application has never been prepared. TtNUS participates with Dominion and Bechtel in strategy development for the document. Ms. Patterson managed the contract and performed all administrative and quality assurance functions. In additions, she spent two weeks performing an extensive technical and editorial review of the entire document to ensure clarity and consistency. Because the document had been prepared by multiple authors at multiple locations, the draft was not yet cohesive or consistent. Ms. Patterson's technical and editorial experience enabled her to read the entire document, identify and correct numerous inconsistencies. In addition, because some of the authors had less experience developing environmental reports than Ms. Patterson, she also rewrote sections to strengthened some arguments and pointed out analyses that were insufficient. Ms. Patterson then spent a week at the North Anna site with the client, other contractors, and the U. S. Nuclear Regulatory Commission, participating in a site audit. Ms.

Patterson was available to answer technical questions posed by the NRC. She participated in strategy meetings regarding how best to approach regulatory issues.

Project Manager; Environmental Report in support of License Renewal for Oyster Creek Generating Station; Exelon; Philadelphia PA; 2004-present. Ms. Patterson is the project manager for the environmental report submitted as part of the license renewal application for Exelon's Oyster Creek Generating Station in New Jersey. She led the site visit, developed the methodology for the environmental report, interviewed Dominion personnel, did the new and significant investigation, wrote several chapters of the report and was senior reviewer for the other chapters. In addition she met several times with New Jersey state regulators to discuss the impacts of Oyster Creek on the environment. She prepared an exhaustive Coastal Zone Management Act certification in anticipation of the certification being denied by the State and appealed to NOAA. She met regularly with Exelon staff and management to review the progress of the document. Internally, she was responsible for training TtNUS staff, technical review and approval of all sections, maintaining the project within budget, and preparing all administrative reports.

Project Manager; Environmental Report in support of License Renewal for Millstone Power Station; Dominion; Waterford CT; 2002-2005. Ms. Patterson is the project manager for the environmental report submitted as part of the license renewal application for Dominion's Millstone Power Station in southern Connecticut. She led the site visit, developed the methodology for the environmental report, interviewed Dominion personnel, did the new and significant investigation, wrote several chapters of the report and was senior reviewer for the other chapters. She met regularly with Dominion staff and management to review the progress of the document. Internally, she was responsible for training TtNUS staff, maintaining the project within budget, and preparing all administrative reports.

Project Manager; Environmental Report in support of License Renewal for Peach Bottom Atomic Power Station; Philadelphia PA; 2002-2003. Ms. Patterson was the project manager for the environmental report submitted as part of the license renewal application for Exelon's Peach Bottom Atomic Power Station in southeastern Pennsylvania. She led the site visit, developed the methodology for the environmental report, interviewed Exelon plant and corporate personnel, did the new and significant investigation, wrote several chapters of the report and was senior reviewer for the other chapters. She met regularly with Exelon staff and management to review the progress of the document. She made a presentation to Exelon management, environmental, legal, and public relations staff early in the project to explain NEPA, the purpose of the environmental report, and the process to develop it. She supported Exelon personnel during the NRC site visit by attending the audit and answering questions posed by the NRC. Internally, she was responsible for training TtNUS staff, maintaining the project within budget, and preparing all administrative reports.

Project Manager; Environmental Report in support of License Renewal for Pilgrim Nuclear Power Station, Plymouth, MA; 2001-current. Ms. Patterson is the project manager for the environmental report submitted as part of the license renewal application for Entergy's Pilgrim Nuclear Power Station in Plymouth, MA. She provided training for Entergy staff on how to prepare an environmental report, was the site visit lead, directed the development of the

methodology for the environmental report, interviewed Entergy personnel, directed the new and significant investigation, wrote several chapters of the report and was senior reviewer for the other chapters. She met regularly with Entergy staff and management to resolve issues concerning the information presented in the report. Internally, she was responsible for training TtNUS staff, maintaining the project within budget, and preparing all administrative reports.

Deputy Project Manager/Document Lead; environmental report in support of License Renewal for Turkey Point Nuclear Plant; Florida Power and Light; Miami, FL; 2001-2003.

Ms. Patterson was the deputy manager and document lead for the environmental report submitted as part of the license renewal application for Florida Power and Light's Turkey Point Nuclear Units 3 and 4. Her responsibilities included the identification of new and significant information; preparation of methodology papers and chapters in the environmental report. She interviewed environmental, legal, corporate and plant staff regarding the issues that had to be addressed in the environmental report. She was responsible for describing the plant and its environment, the discussion of actions to mitigate impacts, and the discussion of the process to identify new and significant information. She participated in site visits, identified FPL documents that would support the environmental report, interviewed FPL employees, and wrote many of the issue papers and much of the report.

Project Manager; Environmental Report in support of License Renewal for Power Station; Dominion; Richmond, VA 2001-2002. Ms. Patterson was the project manager, document manager, and the technical lead for the environmental report prepared by Virginia Power in support of its Surry License Renewal application. She identified new and significant information, wrote Chapters 1, 5, 6, and 8 and part of chapters 2, 3, and 4. She made site visits, interviewed Virginia Power personnel, met with regulators, provided support to Tetra Tech NUS technical staff and acted as the liaison between Virginia Power and Tetra Tech NUS staffs. She supported Dominion personnel during the NRC site visit and preparation of the draft Supplemental Environmental Impact Statement.

Project Manager; Environmental Report for License Renewal for Surry Independent Spent Fuel Storage Installation; Dominion; Richmond, VA 2002-2003. Ms. Patterson was the project manager for the preparation of the environmental report in support of the license renewal application for the ISFSI, the dry storage facility for used reactor fuel. In addition to project management administrative responsibilities, including ensuring proper quality assurance, Ms. Patterson wrote all the non-rad, non-accident sections of the report. She participated in the NRC's site audit and was available to answer questions posed by the NRC.

Project Manager; Environmental Report for License Renewal for H. B. Robinson Independent Spent Fuel Storage Installation; Progress Energy; Raleigh, NC 2003-2005.

Ms. Patterson was the project manager for the preparation of the environmental report in support of the license renewal application for the ISFSI, the dry storage facility for used reactor fuel. In addition to project management administrative responsibilities, including ensuring proper quality assurance, Ms. Patterson wrote all the non-rad, non-accident sections of the report.

Technical Editor; *Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*; U.S. Department of Energy, Office of Civilian Radioactive Waste Management; Las Vegas, NV; 1998-1999. Ms. Patterson was the technical editor for Chapter 7 and the associated appendixes of the *Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*. Chapter 7 described the no-action alternative which was to leave the radioactive materials in place at 77 sites throughout the country. The analyses described the impacts to populations projected 10,000 years into the future. As technical editor, it was Ms. Patterson's responsibility to accurately describe the assumptions, the complex analyses, and the impacts so that non-technical readers would understand what had been done, and why. She also performed quality reviews of several other chapters and appendixes. This involved recalculating or otherwise determining that the values in the text and tables were correct.

Technical editor for the following Environmental Impact Statements: *Construction and Operation of a Tritium Extraction Facility at the Savannah River Site, Savannah River Site Spent Nuclear Fuel Management, High-Level Waste Salt Processing Alternatives at the Savannah River Site, and Savannah River Site Waste Management*; U.S. Department of Energy, Savannah River Operations Office; Aiken SC; 1991-2000. For each of these EISs, Ms. Patterson's responsibilities include ensuring that the technical information was accurate, that the data presented were correct, and that the document was written to be understood by the non-technical reader. This required understanding the technical issues well enough to rework complex technical discussions into non-technical language that accurately conveyed the salient issues. She worked with authors to ensure their technical assessments were presented accurately using non-technical language. She ensured that text and tables/figures were consistent, that text among sections was consistent, that all references were correct, all callouts were correct, and that graphics were clear and accurate. She oversaw the document production.

CHRONOLOGICAL WORK HISTORY:

Project Manager; Tetra Tech NUS; Aiken, SC 1998 to Present.

Editor; Dunaway & Fletcher; North Augusta, SC; 1996 to 1998. Ms. Patterson revised the Savannah River Site (SRS) Environmental Information Document that summarizes 40 years of ecological research. She identified, reviewed and abstracted research papers, revised or updated information, wrote new sections and chapters, edited the entire 800-page document and oversaw its production in Pagemaker format. She edited a series of technical reports on the biological and chemical components of two large cooling reservoirs. Her responsibilities included ensuring that data were accurate and complete, and working with the scientist-authors to ensure clarity of presentations and understanding by a non-technical audience. Topics included water chemistry, radiological contamination, biological risk assessments, endangered

species, and floral and faunal community dynamics. She edited the SRS Geology Information Document that describes the geology and hydrology of the SRS. 1996-1998. Client: Savannah River Technology Center.

Environmental Scientist; B&RE; Aiken, SC; 1991 to 1996. Ms. Patterson was Project Manager for a task order under a contract with the Naval Facilities and Engineering Command (NAVFAC), Northern Division, for Comprehensive Long-Term Environmental Action Navy (CLEAN in which she prepared an ecological assessment of a tidal stream that runs through a defense facility in the Chesapeake Bay watershed. A screening assessment identified potential contamination and degradation of the stream. Additional studies determined the extent of any contamination and the condition of the stream and supported recommendations for stream cleanup. This project marked the first use under this contract of state-of-the-art analytical procedures on several tasks. B&RE used ultra clean procedures to measure mercury contamination because very low levels of mercury seem to affect aquatic organisms. Techniques used in the past were not sensitive enough to provide data useful in making informed decisions about mercury contamination. A newly developed (still in the agency approval process) toxicity test was used to measure the toxicity of the sediments to estuarine organisms. Because these procedures were non-standard, they required more than the usual negotiations with the client, regulators, and subcontractors providing the work. The goal was to evaluate the added value of the new techniques to making informed decisions and to use them in future projects, if they proved successful. The Navy gave this task an above-average performance review. 1995-1996. Client: U.S. Department of Defense (DOD), US Navy; Ryan Mayer, (202) 685-3282.

Ms. Patterson was the Lead Editor for the SRS Waste Management Environmental Impact Statement (EIS). This 2-volume document analyzed the storage of radioactive and hazardous wastes under 10 different scenarios. She was responsible for the clarity and veracity of the technical content as well as the editorial quality. This required a working knowledge of the waste types and the issues addressed in the document, coordination of many authors, and coordination of the production staff. This large EIS was one of the first in which changes made by reviewers were incorporated into the document as it was being reviewed. Although a difficult task for the reviewers, authors, editors, and production staff, the process saved the client time and money. 1994-1995. Client: DOE-SR; Howard Pope, (803) 725-5544.

Ms. Patterson was Senior Project Manager for small wetland delineation projects addressing Section 404 of the CWA. She developed study plans including QA/QC procedures; initiated training and audits; oversaw data collection and analysis and QA/QC procedures; supervised preparation of the deliverable; and, most significantly, trained staff scientists to serve as project managers responsible for scheduling, resource allocation, client interaction, and deliverables. 1992-1996. Client: Various clients.

Ms. Patterson was the line manager for the B&RE Natural Resources Department. She provided technical and management direction to scientists and support personnel. Her experience included responsibility for planning, organization, program implementation, budget, and personnel. She was responsible for the quality of technical products and client satisfaction. She consistently met annual business goals. She trained scientists to be successful project

managers, with significant client contact and budget control. She gained progressive experience in problem solving at all levels of technical work, project management, and personnel management. Staff regularly received letters of commendation from satisfied clients for meeting or exceeding their requirements. 1991-1994. Client: Various clients.

Ms. Patterson was the Project Manager for a CWA Section 316(a) Demonstration for a coal-fired steam electric plant on the Cooper River, SC. The demonstration was praised by the regulators and resulted in granting a thermal variance to the utility company. 1991-1993. Client: South Carolina Electric & Gas (SCE&G); Jack Shuman, (803) 748-3676.

Ms. Patterson reviewed and provided comments on technical proposals, publications, and position papers dealing with education, outreach, and natural resources. She prepared or assisted in the preparation of administrative documents and prepared management summary issue documents. She interacted with DOE-SR and DOE-SR contractors to facilitate the contractors obligations to DOE-SR. She participated in assessments and reviews of environmental or education programs on the SRS administered by contractors. 1991-1996. Client: DOE-SR.

Ms. Patterson was Deputy Principal Investigator for DOE Savannah River Site Task Assignment 001, working to ensure that client requirements were met on time and as specified. She allocated resources, prepared administrative reports, developed and implemented the project task plan, performed cost planning, reviewed technical documents prepared for the client, maintained an understanding of client needs, and assisted in the interactions between the client and the Task Order Leader. 1991-1996. Client: DOE-SR.

Division Manager; Normandeau Associates; Aiken, SC; 1985-1991. Ms. Patterson was the line manager for the Ecological Services Division. She had 5 years of experience providing technical and management direction to scientists and support personnel. This experience included responsibility for planning, organization, program implementation, budget, and personnel. She was responsible for the quality of technical products and client satisfaction. She consistently met annual business goals. She trained scientists to be successful project managers, with significant client contact and budget control. She gained progressive experience in problem solving at all levels of technical work, project management, and personnel management. Staff regularly received letters of commendation from satisfied clients for meeting or exceeding their requirements. 1988-1991. Client: Various clients.

Ms. Patterson was the Senior Project Manager for a large, 7-year, \$7-million, multidisciplinary environmental assessment project addressing CWA Section 316(a) compliance requirements in a newly created nuclear production facility cooling reservoir and receiving stream. Execution of the project required a staff of more than 40 people. The project entailed investigating seven disciplines (water quality, primary productivity, vegetation, zooplankton, macroinvertebrates, fish, wildlife and endangered species) in both a lotic and a lentic system, with weekly or monthly sampling schedules, monthly progress reports, and 14 annual reports that collated and interpreted the data in the context of the behavior of similar aquatic systems. She was responsible for budgeting, resource allocation, procedures and training, client reviews, management reviews, and the quality of the final product. She was the lead manager involved

with the preparation of a rebid proposal, including labor-hour estimates and costing. The client representative considered the proposal to be a standard for excellence. The rebid was successful. 1985-1988. Client: E.I. du Pont de Nemours & Co.; John Gladden, (803) 725-1425.

Ms. Patterson was the Senior Project Manager for an 18-month multidisciplinary project that addressed CWA Section 316(a) compliance requirements. The project had a budget of more than \$200,000 and a staff of eight scientists and various support personnel. It involved sampling fish, water quality, and macroinvertebrates in a blackwater stream receiving increased flow, deviated temperatures, and flyash from a coal-fired powerplant. She was responsible for budgeting, resource allocation, procedures and training, client reviews, management reviews, and the quality of the final product. In addition, she trained a technical person in project management. The project was completed on time, and the project manager and task leaders received letters of commendation from the client. 1988-1990. Client: Westinghouse Savannah River Co.; Winona Specht, (803) 725-5214.

Ms. Patterson was Senior Project Manager for many small (less than \$100,000) projects addressing various CWA compliance requirements. She developed study plans including quality assurance/quality control (QA/QC) procedures; initiated training and procedures; oversaw data collection and analysis and QA/QC procedures; and, most significantly, trained staff scientists to serve as project managers responsible for scheduling, resource allocation, client interaction, and deliverables. Clients included Union Camp, South Carolina Electric and Gas (SCE&G), International Paper, Western Carolina Regional Sewer Authority, Martin-Marietta, Owens Corning Fiberglas, Hoersch Celanese, and others. 1988-1991. Client: Various clients.

Ms. Patterson was Senior Project Manager for small (less than \$100,000) wetland delineation projects addressing Section 404 of the CWA. She developed study plans including QA/QC procedures; initiated training and audits; oversaw data collection and analysis and QA/QC procedures; supervised preparation of the deliverable; and, most significantly, trained staff scientists to serve as project managers responsible for scheduling, resource allocation, client interaction, and deliverables. Clients included Rust International, Martin-Marietta, and many local and regional developers. 1988-1991. Client: Various clients.

Ms. Patterson was Senior Project Manager for the wetland delineation of 47 potential highway projects in the State of Georgia. The sites occurred from the Coastal Plain to the mountains and ranged in size from an acre to several hundred acres. Normandeau successfully won the contract and completed the project on time and under budget. 1990. Client: Georgia Department of Transportation (DOT).

Ms. Patterson was Senior Project Manager for a \$90,000 project addressing CWA compliance requirements for a new kraft paper mill on the Pee Dee River. She developed study plans including QA/QC procedures; prepared proposals; initiated training and procedures; oversaw data collection and analysis, and QA/QC procedures; and, most significantly, trained a staff scientist to serve as Project Manager responsible for scheduling, resource allocation, client interaction, and deliverables. During the project Hurricane Hugo, unseasonably severe flooding

devastated the river and severely impacted the study plan. She worked with the client to revise the plan to enable submittal of the permit application on time, with the necessary information, and without a substantial increase in cost. 1989-1991. Client: Willamette Industries.

Ms. Patterson was Senior Project Manager for a \$300,000 FERC relicensing project for a textile mill on the Savannah River. She developed study plans including QA/QC procedures; prepared proposals; initiated training and procedures; oversaw data collection and analysis, and QA/QC procedures; and, most significantly, trained a staff scientist to serve as Project Manager responsible for scheduling, resource allocation, client interaction and deliverables. Initially Normandeau Associates worked with fisheries agencies from 2 states and the plant environmental manager to develop a study plan that was considered fair and equitable to all parties. During the project, previously unknown underwater obstructions necessitated the design and construction of a special net and delicate and time-consuming placement and retrieval of the net to ensure that the data met stringent QA/QC requirements. 1991. Client: Spartan Mills.

Ms. Patterson was Senior Project Manager for 3 in-stream flow monitoring studies for small hydropower stations in the mountains of GA and SC. She developed study plans including QA/QC procedures; prepared proposals; initiated training and procedures; oversaw data collection and analysis, and QA/QC procedures; and, most significantly, trained a staff scientist to serve as Project Manager responsible for scheduling, resource allocation, client interaction and deliverables. The client representative was so pleased with the quality of work and responsiveness to his needs that, on his own initiative, he recommended Normandeau to other hydropower companies. 1990. Client: Consolidated Hydropower.

Ms. Patterson was Project Manager for the collection of waterfowl, reptile and amphibian, and endangered species data from a large reservoir and receiving stream and swamp on a 4-year project. She designed the reptile and amphibian sampling program, wrote the proposal, trained personnel in sample collection techniques; analyzed the data, prepared monthly and annual reports, and trained less experienced scientists in report writing. 1986-1988. Client: Westinghouse Savannah River Co.; J. A. Bowers, (803) 725-5213.

Ms. Patterson was Project Manager for a project to collect baseline data for an assessment of mining operations on the surrounding landscape. She collected and analyzed fishery, water quality, macroinvertebrate, vertebrate, and plant community data by standard sampling and analysis procedures. She wrote some sections of the final report and edited all sections. The client used the report for more than 5 years as a benchmark for reports done by other firms on other projects. The state agency to which the report was submitted commended the client on the quality of the technical work and on the caliber of the presentation in the report. 1985. Client: Nicor Mineral Ventures.

Ms. Patterson was Senior Editor for many technical reports. She prepared outlines for authors to work from; acted as ghost writer; performed QA checks on the data in the report; served as scientific editor; and supervised the production staff of graphic artist, assistant editor, and word processors. She conceived and implemented review procedures to ensure product dependability. For 2 years, she produce 14 annual reports, all due on the same day, 4 months

after the final sample collection period. Together the reports each year included more than 1,500 pages. 1983-1988.

Research Technician; Savannah River Ecology Laboratory; 1973 to 1985. Ms. Patterson was an Ecologist/Biologist on aquatic systems and wetland (reservoirs, streams and swamps receiving thermal impacts, Carolina bays, southeastern barrier islands) research projects for more than 12 years. As a Field Technician, she collected and analyzed fishery, reptile and amphibian, macroinvertebrate, and plant data. She participated in project scoping and sampling design. With progressive experience, she assumed more responsibility for the successful execution of entire projects. She developed projects, designed and oversaw sample collection and analysis, analyzed and interpreted data, and wrote or co-wrote articles that were published in peer-reviewed scientific literature and symposia volumes. She served as editor for senior scientists. During this time, she studied paedogenic salamanders (salamanders that breed as larvae and then metamorphose) and forwarded the first explanation for paedogenesis in the Southeast. The theory has led to significant additional research by vertebrate ecologists in the Southeast, Far West, and Europe. 1973-1982.

Ms. Patterson was the coordinator of committee chairman for technical meetings and presentations including general chairman of a 3-day toxicology workshop, chairman of various aspects of 3 international symposia, coordinator for many workshops designed for scientists from different areas of the country to congregate and discuss research topics, and coordinator and leader of tours and presentations for the general public. Her duties included administrative details associated with feeding, housing, and entertaining participants; registering participants; organizing meeting sessions; editing pre- and post-event publications; and acting as resource person and troubleshooter during the event. 1973.

Savannah River Site Citizens Advisory Board, 1996 to 2001; 2004 to present. Ms. Patterson was elected to the SRS Citizens Advisory Board in 1996 for a six year term, and again in 2004. She served as the Education Chairperson and as Chairperson of the Board. She chaired a public education forum on Spent Nuclear Fuel in 1997, and, at the invitation of DOE-HQ, participated in a round-table discussion of site-specific advisory boards in Brookhaven, NY in 1997. She has made presentations at DOE National Site Specific Advisory Board (SSAB) meetings about SRS Low-Level Waste, High-Level Waste, waste transportation and SRS activities, and has participated in complex-wide forums on low level waste, and nuclear waste transportation issues. She was asked by DOE to provide citizen input to a National Academy of Sciences panel on the value of public participation. She served as Board Chairperson from 2000-2001. She regularly participated with other DOE SSAB Chairs and DOE-HQ personnel in national meetings.

PROFESSIONAL AFFILIATIONS:

North American Lake Mgmt Society/Lake and Watershed Association of SC, 1994-1999; Board of Directors, 1995-1999; Secretary, 1996-1998; Steering Committee for the Annual NALMS Conference 1998; Chair of Annual Meeting 1998.

Savannah River Site Citizens Advisory Board, 1996-2001; Chair, 2000-present; Executive Committee, 1998-present; Education Committee Chair, 1998-2000; Spent Nuclear Fuel Public Education Forum, Chair, 1997

H.W. Wilson scholarship, 1996-1997

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
)
(Early Site Permit for North Anna ESP Site)) ASLBP No. 04-822-02-ESP

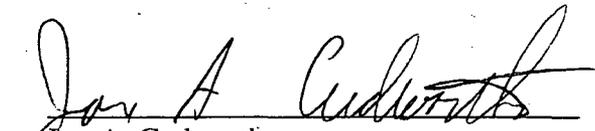
DECLARATION OF JON A. CUDWORTH IN SUPPORT OF DOMINION'S
PRE-FILED TESTIMONY ON ENVIRONMENTAL MATTERS

I, Jon A. Cudworth, do hereby state the following:

I am a regulatory analyst for Tetra Tech NUS, subcontractor to Bechtel Power Corporation for preparation of the Early Site Permit application Environmental Report for Dominion Nuclear North Anna, LLC ("Dominion"). My business address is 900 Trail Ridge Road, Aiken, SC 29803. I am the regulatory analyst responsible for the portion of Dominion's application that Tetra Tech NUS prepared, and performed work related to this project on regulatory analyses. A statement of my professional qualifications is attached.

I am providing this declaration in support of Dominion's pre-filed testimony on environmental matters filed pursuant to the Board Order of March 20, 2007.

I attest to the accuracy of those statements attributed to me (that material marked by my initials in Dominion's pre-filed testimony), 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 declaration, are true and correct to the best of my knowledge, information and belief.


Jon A. Cudworth

JON A. CUDWORTH
ENVIRONMENTAL SCIENTIST
AIKEN, SOUTH CAROLINA

EDUCATION: J.D.; Law; Cooley Law School; 1982
M.S.; Resource Development; Michigan State University; 1978
B.S.; Resource Development; Michigan State University; 1973

**CERTIFICATIONS/
REGISTRATIONS:** Admitted to Michigan Bar, Reg. No. P35057; 1982

TRAINING: Editing Workshop, TtNUS; 1993
Guide to Project Control, TtNUS; 1993
Root-Cause Analysis Overview, TtNUS; 1991
Basic Radiation Safety, EG&G-Rocky Flats/Computer-Based Training;
1990
Beryllium Operations, EG&G-Rocky Flats/Computer-Based Training;
1990
Computer Security, EG&G-Rocky Flats/Computer-Based Training; 1990
General Waste Handling, EG&G-Rocky Flats/Computer-Based Training;
1990
Industrial Safety, EG&G-Rocky Flats/Computer-Based Training; 1990
Nuclear Materials Safeguards, EG&G-Rocky Flats/Computer-Based
Training; 1990
Occurrence Management, EG&G-Rocky Flats; 1990
Unclassified Controlled Nuclear Information (UCNI) Education Briefing,
DOE-SR; 1990
Industrial Security Briefing, Safeguards and Security, DOE-SR; 1989
Personal Protective Equipment (PPE) Orientation, TtNUS; 1989
Radiation Safety Training, TtNUS; 1989
Technical Review: Your Rights and Responsibilities, TtNUS; 1989
Getting Things Done Seminar, Career Track/TtNUS; 1988
Hazardous Waste Operations (HAZWOPER) Safety Training, TtNUS;
1987
Improving Managerial Skills of the New or Prospective Manager,
American Management Assoc.; 1987
The State of Environmental Quality In SC, SCDHEC; 1987
Hazardous Waste Regulation and Legislation, American Bar Assoc.;
1987
The State of Environmental Quality In SC, SCDHEC; 1986
Hazardous Waste Delisting, EPA; 1985
Hazardous Waste Disposal, SC Chamber of Commerce; 1985
Practical Environmental Law for the General Practitioner, SC Bar Assoc.;
1985
Project Management Training, EMZEE Associates; 1985
Problem Solving and Decision Making, Action Management Associates
Inc.; 1984
Management 18; A Short Course For Managers, Wiley Professional
Development Programs; 1984

EXPERIENCE SUMMARY:

Mr. Cudworth has over 25 of professional experience in environmental regulatory compliance for public utility, industrial, and Federal facilities. Mr. Cudworth is the TtNUS Program Manager for environmental support services for commercial nuclear plant license renewal. He oversees multi-project management, resource loading, client relations, and business development. His combination of technical and legal expertise gives him a unique perspective on compliance with environmental laws and regulations, a perspective that covers the gamut of Federal, State, and local programs. He is an experienced strategist and advocate for Tetra Tech NUS, Inc. (TtNUS) clients. He is active in Nuclear Energy Institute and American Nuclear Society activities and is nationally recognized as an expert in environmental impacts of commercial nuclear plant license renewal.

PROJECT EXPERIENCE:

Project Manager; Strategic Planning, Clean Water Act Section 316(b) Phase II Compliance; Progress Energy; 2004 to present. This task entails reviewing information on intake design and construction, plant operation, source waters, and related regulatory issues for 7 plants in both North and South Carolina. The primary focus of the first segment of this task was the development of a Compliance Strategy Implementation Plan (CSIP) for each plant. Development of this first of a kind document required interviewing plant and corporate personnel, visiting selected sites, and preparing plant-specific and fleet-wide strategies for ensuring compliance with the rule. Mr. Cudworth was responsible for the overall strategic planning activities and interactions with the utility Program Manager. Mr. Cudworth developed a comprehensive annotated outline for the preparation of the first CSIP, and used that template for directing preparation of other CSIPs for plants with different or unique modes of operation, water intake systems, flow rates, and impingement data, etc. Mr. Cudworth was responsible for conducting plant specific interviews with utility personnel, identifying data needs, collating data received, developing draft schedules for compliance, and discussing regulatory strategy with the utility Program Manager.

Program Manager, License Renewal Services, Tetra Tech NUS, South Carolina, 1998 – Present. Mr. Cudworth is Program Manager for TtNUS license renewal environmental support services for commercial nuclear plants. TtNUS is one of only two vendors offering these services and TtNUS holds 90 percent of the market. Mr. Cudworth has overall responsibility for technical quality of services rendered, budget, and schedule, for ensuring application to each project lessons learned on other projects, and for maintaining cognizance of industry activities. The TtNUS license renewal team includes 6 project managers and approximately 36 staff. Mr. Cudworth is also the corporate representative to the Nuclear Energy Institute license renewal environmental working group.

Project Manager, Nuclear Management Company (NMC), Tetra Tech NUS, Aiken, South Carolina, 2001 – Present. Mr. Cudworth is Project Manager of environmental services for license renewal for the Point Beach Nuclear Plant. TtNUS will prepare an environmental report for completion April 2002 and will support NMC during the U. S. Nuclear Regulatory Commission review process.

Project Manager, Exelon Corporation, Tetra Tech NUS, Aiken, South Carolina, 2000 – Present. Mr. Cudworth is Project Manager of environmental services for license renewal for the Dresden and Quad Cities Nuclear Stations. Mr. Cudworth supervises technical leads who have

technical and administrative responsibility for preparing environmental reports for each station. Environmental Report completion is scheduled for December 2001. TtNUS will continue supporting Exelon through the U. S. Nuclear Regulatory Commission review process.

Project Manager, Progress Energy, Tetra Tech NUS, Aiken, South Carolina, 2000 – Present. Mr. Cudworth is Project Manager for providing environmental support services for license renewal for the Robinson Nuclear Plant. Environmental Report preparation is underway with a scheduled November 2001 completion date for 2003 submittal to the U. S. Nuclear Regulatory Commission (NRC). TtNUS will also support Progress Energy during the NRC review process.

Project Manager, Dominion Generation, Tetra Tech NUS, Aiken, South Carolina, 2000 – Present. Mr. Cudworth is Project Manager for providing environmental support services for license renewal for the Surry and North Anna Power Stations. In this precedent-setting effort to produce 2 environmental reports simultaneously, Mr. Cudworth supervised the work of a technical lead for each plant and project administrative staff. TtNUS has completed the reports for Dominion Summer 2001 submittal to the U. S. Nuclear Regulatory Commission (NRC) and will continue to support Dominion during the NRC application review process.

Project Manager, Florida Power and Light Company (FPL), Tetra Tech NUS, Aiken, South Carolina, 1999 - Present. Mr. Cudworth is Project Manager for providing environmental support services for the Turkey Point Nuclear Plant license renewal. TtNUS prepared an environmental report that FPL submitted to the U. S. Nuclear regulatory Commission (NRC) with the Turkey Point license renewal application. TtNUS also delivered a supplemental report, for client internal use, that documents preparation methodology and review for new and significant information, and includes calculation packages and a copy of every reference cited in the environmental report. TtNUS continues to support FPL in responding to NRC questions

Senior Executive Permitting Specialist/Technical Advisor/Project Manager; Tetra Tech NUS; Aiken, South Carolina; 1984 - Present. Project Manager 1999 – Present. Florida Power & Light, Inc.; Virginia Power; PECO Energy Company (Philadelphia Electric). Mr. Cudworth currently serves as Project Manager for preparation of an environmental report for the license renewal of Florida Power and Light Turkey Point Units 3 and 4 nuclear power plants, as well as author and Technical Reviewer. He is also Project Manager for preparation of environmental reports for the license renewal of Virginia Power's Surry and North Anna Nuclear Power Stations, in addition to Technical Reviewer and author. He also serves as Program Manager for the preparation of an environmental report for the license renewal of PECO Energy Company's Peach Bottom Units 2 and 3 nuclear power plants.

Deputy Project Manager; Jason and Associates, Inc., 1998 - Present. Tetra Tech NUS is part of a team, lead by Jason and Associates, Inc., that is preparing an environmental impact statement for U.S. Department of Energy construction of a geologic repository for disposal of spent nuclear fuel and high-level waste at Yucca Mountain, Nevada. Mr. Cudworth is Deputy Project Manager for Tetra Tech NUS services under this contract. In this capacity, he manages a multi-disciplinary team of scientists, engineers, health physicists, and environmental planners that is evaluating the land use, aesthetic, socioeconomic, environmental justice, waste generation, and health and safety impacts of the repository, as well as the impacts of taking no

action (i.e., not constructing the repository). Mr. Cudworth schedules work efforts, guides technical work and reviews technical work products for quality, and ensures schedule compliance.

Deputy Project Manager; Southern Nuclear Company, Inc., 1998 - Present. Mr. Cudworth is Deputy Project Manager for preparation of an environmental report for the Edwin I. Hatch Nuclear Plant license renewal. In the Project Manager's absence, Mr. Cudworth approves project deliverables, financial reports, and invoices. Mr. Cudworth is also authoring discussion of plant transmission line corridors and induced shock hazards.

Project Manager; Entergy Operations, Inc., 1997 - Present. Mr. Cudworth is Project Manager for environmental support services for a proposed steam generator replacement project at Arkansas Nuclear One Unit 2. Mr. Cudworth and a team of environmental analysis professionals have prepared an environmental report on potential impacts of the proposed project together with summary testimony for presentation to the Arkansas Public Service Commission.

Project Manager; BGE; 1996-Present. Mr. Cudworth serves as the Project Manager for license renewal environmental support services for Baltimore Gas and Electric Company (BGE) Calvert Cliffs Nuclear Power Plant. Project activities have included strategic planning, site environmental compliance program evaluation, establishment of an environmental compliance management program, and preparation of an environmental report for submittal to the U.S. Nuclear Regulatory Commission. In recognition of the trend-setting nature of this work, the Electric Power Research Institute published two project reports for use by other nuclear utilities planning license renewal and asked Mr. Cudworth to conduct a workshop on license renewal.

Project Manager; AEP; 1996-1997. Mr. Cudworth was Project Manager for environmental compliance planning for Cook Nuclear Plant license renewal. Authored two project reports, for publication by Electric Power Research Institute, that describe American Electric Power Company (AEP) planning and data-gathering efforts preparatory to drafting an environmental report for submittal to the U.S. Nuclear Regulatory Commission.

Project Manager; Alaska Aerospace Development Corp.; 1996-Present. Project Manager for preparation of environmental assessment for Alaska Aerospace Development Corporation Kodiak Launch Complex. Established database of reference materials on ecology, launch vehicle design and effects, and other space industry environmental analyses. Performed site reconnaissance, spoke before public, and met with regulatory agencies regarding analytical approach and results. Authored description of proposed action, and directed team of specialists who analyzed environment and potential impacts. Met project schedule and budget with document that supported finding of no significant impact to the environment. On November 5, 1998, the client successfully completed the first launch from the new facility.

Senior Executive Permitting Specialist; DOE-SR; 1993-1995. As a Senior Executive Permitting Specialist, Mr. Cudworth provided environmental planning and transition, decontamination, and decommissioning (TDD) programmatic development support at the Savannah River Site. In this capacity, he identified and documented interrelationships between

more than 100 environment-related planning documents. He also prepared recommendations for integrating planning efforts. Additionally, he drafted a surplus facilities program plan and advised TDD staff on program development.

Deputy Project Manager; DOE-SR; 1995-1996. Mr. Cudworth served as Deputy Project Manager for concurrent U.S. Department of Energy (DOE) EISs on stabilizing nuclear materials at the SRS. Two of these EISs were the F-Canyon Plutonium Solutions EIS and the Interim Management of Nuclear Materials EIS. In this capacity, Mr. Cudworth drafted descriptions of proposed actions and served as Senior Technical Reviewer of both documents. For his efforts, he received letters of commendation received from DOE Savannah River Operations Office (SR) and from DOE Headquarters (HQ).

Deputy Project Manager; U.S. Department of Defense, USAF; 1992-1996. Mr. Cudworth created and supervised National Environmental Policy Act documentation for four U. S. Air Force (USAF) projects: (1) the National Launch System, (2) two modifications of the Buckley Air National Guard Base Aerospace Data Facility in Colorado, and (3) construction of the Hardware Storage Facility at Vandenberg Air Force Base in California. He provided input to proposals and technical input and review for products. For Buckley, he also performed a compliance survey patterned after the USAF environmental compliance assessment and management program assessment protocols.

Deputy Project Manager; U.S. DOD, USAF; 1992-1996. Mr. Cudworth created and supervised NEPA documentation for several USAF projects: (1) the National Launch System (NLS), (2) two modifications of the Buckley ANGB Aerospace Data Facility in CO, and (3) construction of the Hardware Storage Facility at Vandenberg AFB in CA. He provided input to proposals and technical input and review for products.

Senior Executive Permitting Specialist/Senior Technical Reviewer; Northern States Power; 1991. Mr. Cudworth served as Senior Executive Permitting Specialist, as well as Senior Technical Reviewer and author of technical sections in the preparation of Northern States Power's Monticello Nuclear Generating Plant Draft Environmental Report Supplement in support of relicensing.

Senior Technical Advisor, EG&G Rocky Flats. Mr. Cudworth worked on an assignment in the offices of EG&G Rocky Flats for 3 months providing independent verification of operability of plutonium testing and processing operations, Buildings 509 and 707. He reviewed records, performed physical inspections, and wrote reports on findings.

Senior Technical Advisor; Adolph Coors Co.; 1991. Mr. Cudworth worked on an assignment in Adolph Coors' corporate office for 3 months providing regulatory compliance support services regarding wastewater discharge effluent quality and biological impacts. He provided technical expertise in negotiations with regulatory agencies for fish kill, audited water quality laboratory, and appraised ambient water quality sampling program.

Senior Technical Advisor; EG&G Rocky Flats; 1990. Mr. Cudworth worked on assignment with minimal supervision in the offices of EG&G Rocky Flats for 4 months to appraise environmental compliance plans and develop an independent review system patterned after the NRC 10 CFR 50.59 program concerning domestic licensing of production and utilization facilities.

Assistant Program Manager; DOE-SR; 1989-1991. As an Assistant Program Manager for the Aiken's TtNUS Office of Environment Services, Mr. Cudworth provided management review, technical quality assurance (QA), and senior technical expertise. As measure of success and at DOE-SR's request, he provided similar support service to the DOE-SR Environmental Division management.

Project Manager; DOE-SR; 1988-1990. Mr. Cudworth established client monthly environmental compliance report ("SEN-7") to DOE-HQ. He organized reporting responsibilities, document flow, client reviews, and production on a very tight schedule. The report was distributed throughout the DOE-SR organization as a practice to be followed.

Department Manager; DOE-SR. As Department Manager for Aiken's TtNUS Environmental Planning and Assessment Department, Mr. Cudworth organized the department, hired and trained staff, managed innovative improvements to the appraisal program, and was responsible for DOE-SR's programmatic documentation which was praised by DOE-HQ.

Permitting Specialist; DOE-SR; 1987. Mr. Cudworth analyzed the Superfund Amendments and Reauthorization Act (SARA) of 1987 to identify potential impacts to DOE-SR. He also conducted formal training on compliance requirements.

Project Manager; DOE-SR; 1986 - 1987. As Project Manager for response to environmental lawsuits, Mr. Cudworth directed the creation of a records database, responded to discovery requests, and provided subject-matter expertise to DOE-SR's legal staff. For his efforts, he received a letter of commendation from DOE-SR manager.

Mr. Cudworth prepared Palo Verde Nuclear Plant environmental monitoring data for Arizona Public Service Company submittal to NRC. Submittal included analysis of affects of cooling tower salt drift on area cotton crops.

Project Manager; DOE-SR; 1984 - 1988. As Project Manager for environmental compliance services, Mr. Cudworth organized tasks, hired and trained staff, and was responsible for technical product accuracy. Areas of responsibility included RCRA, CERCLA, CAA, CWA, Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, and environmental radiological. He managed and provided technical support to approximately 1,000 deliverables and received 3 letters of commendation from DOE-SR.

CHRONOLOGICAL WORK HISTORY:

Senior Executive Permitting Specialist/Technical Advisor/Project Manager; Tetra Tech NUS; Aiken, South Carolina; 1984 - Present.

Permitting Specialist; Consumers Power Co.; City, State, 1984. As a Permitting Specialist for engineering projects, primarily nuclear and fossil powerplants, Mr. Cudworth prepared environmental reports; safety analysis reports (SARs); air emissions, National Pollutant Discharge Elimination System (NPDES), and wastewater management permit applications; and tax exemption applications. He consistently received high performance ratings for his performance.

Licensing Engineer; Gilbert/Commonwealth Assoc.; City, State; 1977-1983. For gas line construction under a major river, Mr. Cudworth assessed the environmental impacts and identified the required permits. The assessment involved interfacing with U.S. and Canadian agencies. 1983. Client: Major Oil Company (confidential).

Licensing Engineer; Consumers Power Co.; City, State; 1980-1982. Mr. Cudworth was Licensing Engineer for the power block construction and substation modification for an 850 MW fossil-fired unit. He established a permitting schedule, secured engineering input, and obtained permits. He also conducted EAs for intake and discharge structures.

Title; Ohio Edison Company; City, Ohio; 1980-1982. Mr. Cudworth prepared permit applications and provided input for environmental report updates for a proposed nuclear power plant.

Title; Detroit Edison Company; City, Detroit; 1980-1982. Mr. Cudworth prepared permit applications for Detroit Edison's Fermi Nuclear Plant.

Title; Northern States Power Co.; City, State; 1979. Mr. Cudworth identified permits and environmental impacts the transportation of equipment to a proposed nuclear power plant by rail, barge, and road. The project involved interfacing with engineers and Federal and state regulatory officials for construction in wetlands, for transmission line rerouting, and for substation construction.

Title; Northern States Power Co.; City, State; 1978. Mr. Cudworth was responsible for regulatory agency approvals of transmission lines crossing over the Mississippi River. An issue of concern was the potential for mortalities among migrating raptors. An EA included alternatives such as rerouting and burial and mitigative measures such as making lines more visible.

Title; Company, City, State; 1977 - 1983. Mr. Cudworth identified EAs and permits needed for corporate transmission line proposal efforts in AK, CO, MN, ND, and WY, including the Western U.S.

Permitting Specialist; Consumers Power Co.; City, State; 1976. As a Permitting Specialist for engineering projects, primarily nuclear and fossil powerplants, Mr. Cudworth prepared

environmental reports; SARs; air emissions, NPDES, and water management permit applications; and tax exemption applications. He consistently received high performance ratings for his performance, 1976.

PROFESSIONAL AFFILIATIONS:

TtNUS Quality Award, 1989

PUBLICATIONS:

"Supplement to Applicant's Environmental Report - Operating License Renewal Stage; Calvert Cliffs Nuclear Power Plant Units 1 and 2; Baltimore Gas and Electric Company," December 1995. Project Manager and Contributor.

"Nuclear Power Plant License Renewal Environmental Compliance Program Plan Manual," Electric Power Research Institute, publisher. December 1995. Author.

"Draft Programmatic Environmental Assessment of the Kodiak Launch Complex; Alaska Aerospace Development Corporation," December 1995. Deputy Project Manager and Contributor.

"Interim Management of Nuclear Materials Environmental Impact Statement," U.S. Department of Energy. October 1995. Deputy Project Manager and Contributor.

"Calvert Cliffs Nuclear Power Plant Environmental Life Cycle Management Plan," Baltimore Gas and Electric Company. March 1995. Project Manager and Primary Author.

"F-Canyon Plutonium Solutions Environmental Impact Statement," U.S. Department of Energy. December 1994. Deputy Project Manager and Contributor.

"Nuclear Power Plant License Renewal Environmental Compliance Program Plan Manual," Electric Power Research Institute, publisher. September 1994. Author.

"Calvert Cliffs Nuclear Power Plant License Renewal Environmental Compliance Program Plan," Baltimore Gas and Electric Company. February 1994. Author.

"Savannah River Site Environmental Planning Status Report; U.S. Department of Energy," January 1994. Author.

"Savannah River Site Surplus Facilities Program Description, U.S. Department of Energy," January 1994. Author.

"Environmental Assessment; Data Processing, Research, and Training Facility and Dormitory; Aerospace Data Facility; Buckley Air National Guard Base, Colorado; Department of the Air Force," December 1993. Deputy Project Manager and Contributor.

"Environmental Assessment; Hardware Storage Facility, Vandenberg Air Force Base, California, Department of the Air Force," August 1993. Deputy Project Manager and Contributor.

"Environmental Report Supplement; Northern States Power Company; Monticello Nuclear Generating Plant; Monticello, Minnesota," December 1992. Technical Reviewer.

"Environmental Assessment; Additions to and Operations of Aerospace Data Facility; Buckley Air National Guard Base, Colorado; Department of the Air Force," November 1992. Deputy Project Manager and Contributor.

"National Launch System, Environmental Evaluation and Alternatives," National Aeronautics and Space Administration, June 1992. Deputy Project Manager and Contributor.

"Early Site Permit Demonstration Program; Regulatory Criteria Evaluation Report; Technical Review of Documentation Related to Site Permitting for Advanced Light Water Reactors," Electric Power Research Institute. March 1992. Contributor.

"EPA and State Authority over DOE Groundwater Radionuclides," Proceedings of the U.S. Department of Energy (DOE) Model Conference, U.S. Department of Energy, Oak Ridge, TN, 1988.

PRESENTATIONS:

Invited Speaker, 1994 & 1996 LIS and TRENDS conferences on commercial nuclear license renewal: "Environmental Considerations for License Renewal" May 26, 1994. "License Renewal Efforts at Calvert Cliffs" March 7, 1996.