

February 24, 2006

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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February 24, 2006 (4:12pm)

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

In the Matter of:

Louisiana Energy Services, L.P.

(National Enrichment Facility)

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Docket No. 70-3103-ML

ASLBP No. 04-826-01-ML

**APPLICANT'S PREFILED TESTIMONY IN MANDATORY HEARING  
CONCERNING MITIGATING ACTIONS FOR POSTULATED  
CYLINDER RUPTURE ACCIDENT (ENVIRONMENTAL MATTER NO. 2)**

**I. WITNESS AND PROCEDURAL BACKGROUND**

**Q1.** Please state your name, occupation, and by whom you are employed.

**A1.** My name is Rod M. Krich ("RMK"). I am Vice President of Licensing, Safety, and Nuclear Engineering for Louisiana Energy Services, L.P. ("LES"), the license applicant in this matter. LES is seeking authorization from the U.S. Nuclear Regulatory Commission ("NRC") to construct and operate a gas centrifuge uranium enrichment facility -- designated the National Enrichment Facility ("NEF") -- in Lea County, New Mexico. I am presently "on loan" to LES from Exelon Nuclear, where I am Vice President, Licensing Projects, and lead Exelon Nuclear's licensing activities relative to future generation ventures.

My name is Daniel G. Green ("DGG"). I am a Senior Consulting Engineer with EXCEL Services Corporation, which is headquartered in Rockville, Maryland.

My name is Scott M. Tyler ("SMT"). I am a Manager in the Fire, Safety, & Risk Services group of AREVA (Framatome ANP) in Naperville, Illinois.

**Q2.** Please describe your responsibilities relative to the NEF project.

A2. (RMK) As Vice President of Licensing, Safety, and Nuclear Engineering for LES, I have the overall responsibility for licensing and engineering matters related to the NEF project. In this capacity, I oversaw preparation and submittal of the NEF license application, as well as the engineering design of the facility processes and safety systems. As a result, I am very familiar with the NEF license application, and NRC requirements and guidance related to the contents of such an application. This includes familiarity with Section 7.5 of the NEF Safety Analysis Report ("SAR") and those portions of the NEF Integrated Safety Analysis ("ISA") pertaining to fire protection.

(DGG) As an engineering and regulatory consultant to LES, I supported the development, review, and submittal of the NEF license application. In this capacity, I helped to ensure that the application complied with the applicable guidance set forth in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." Subsequent to the submittal of the NEF application, I have had a lead role in responding to NRC Staff Requests for Additional ("RAIs") on various aspects of the licensing submittal, and in preparing and/or reviewing any necessary revisions to the application. I also am a member of the ISA team, and am therefore familiar with those portions of the ISA and SAR relating to fire protection.

(SMT) My employer, Framatome ANP, has served as a primary contractor on the NEF project. As a member of the NEF project team, I contributed to the preparation and review of key portions of the NEF application. Specifically, I authored the chemical process safety chapter of the SAR (Chapter 6), acted as and continue to serve as a chemical process and fire safety expert on the ISA team, and prepared the baseline fire/emergency response needs

assessment. I am currently conducting International Building Code/International Fire Code analysis for the proposed facility in conjunction with detailed design development.

**Q3.** Please summarize your educational and professional qualifications.

**A3.** (RMK) I hold a B.S. degree in mechanical engineering from the New Jersey Institute of Technology and an M.S. in nuclear engineering from the University of Illinois. I have over 30 years of experience in the nuclear energy industry covering engineering, licensing, and regulatory matters. This experience encompasses the design, licensing, and operation of nuclear facilities. A full statement of my professional qualifications is attached hereto.

(DGG) I hold B.S. and M.S. degrees in nuclear engineering from Kansas State University. I have approximately 25 years of experience in engineering, licensing, and regulatory matters involving the nuclear energy industry. I have been a consulting engineer with EXCEL Services Corporation since 1991, and have provided consulting services to a large number of utilities. Prior to 1991, I was employed principally as a licensing engineer at Florida Power Corporation and Kansas Gas and Electric Company. A full statement of my professional qualifications is attached hereto.

(SMT) I hold a B.S. degree in Fire Protection and Safety Engineering Technology from Oklahoma State University. I have 20 years of design, analysis, and consultation experience in the industrial, institutional, and commercial fields. This includes project/staff management experience and technical expertise in loss prevention, including fire protection design and analysis; occupational and environmental safety; process safety/risk management; and code consultation. A full statement of my professional qualifications is attached hereto.

**Q4.** What is the purpose of your testimony?

A4. (RMK, DGG, SMT) We are providing this testimony on behalf of LES in accordance with the Licensing Board's Memorandum and Order (Memorializing Board Questions/Areas of Concern for Mandatory Hearing) of January 30, 2006 ("January 30th Order"), and Memorandum and Order (Administrative Matters Relative to Mandatory Hearing) of February 8, 2006 ("February 8th Order"). In those issuances, the Board "memorialized" a series of questions or "areas of concern" upon which the Board has required presentations from LES and/or the NRC Staff in the context of the mandatory hearing in this proceeding. This testimony is intended to respond specifically to the environmental impacts question set forth in paragraph B.2 of the Board's January 30th Order. Paragraph B.2 seeks additional information on the potential mitigating actions that may be instituted to reduce the consequences of an accident involving the hydraulic rupture of a depleted uranium hexafluoride ("DUF<sub>6</sub>") cylinder.

Q5. Please briefly describe your understanding of the findings to be made by the Board relative to the Staff's safety review of the license application.

A5. As we understand it, the Board is required to conduct a "sufficiency" review of uncontested issues. According to the Commission, the Board should confirm that the NRC Staff "has performed an adequate review and made findings with reasonable support in logic and fact." In doing so, the Board is to decide whether the overall safety record is sufficient to support license issuance. Accordingly, this testimony is intended to facilitate the Board's review by providing the specific information requested by the Board relative to cylinder-rupture-related mitigating actions.

## **II. RESPONSE TO BOARD QUESTIONS**

**Q6.** Please describe the additional information sought by the Board in paragraph B.2, as identified above.

**A6.** As set forth in the Board's January 30th Order, paragraph B.2 states as follows:

2. In Appendix C to the FEIS, specifically in section C.4.2.2, the staff provides a discussion of hydraulic rupture of a DUF<sub>6</sub> cylinder in the blending and liquid sampling area, which it presents as the most severe accident with regard to public health and safety. In that discussion, the staff indicates that LES will provide an emergency plan outlining mitigating actions that could be taken to reduce the consequences of that accident, but presents only the example of securing the heating, ventilation, and air conditioning systems in the area affected by the accident. The staff and LES should provide the Board with information regarding what other mitigating actions are potentially available to reduce the consequences of that type of accident.

**Q7.** Please describe the postulated DUF<sub>6</sub> cylinder rupture accident referred to by the Board in paragraph B.2.

**A7.** The initiating event for this postulated accident is the failure of the Blending Donor Station heater controller, thereby causing the Blending Donor Station heater within the station to remain on. In this postulated accident, the product cylinder in the Blending Donor Station overheats and the cylinder hydraulically ruptures due to the expansion of the liquid UF<sub>6</sub>. Upon cylinder rupture, the product cylinder content of UF<sub>6</sub> is released within the Blending Donor Station. Since the station enclosure is not airtight, the UF<sub>6</sub> is assumed to be released to the Blending and Liquid Sampling Area. The UF<sub>6</sub>, when in contact with air, produces HF gas and UO<sub>2</sub>F<sub>2</sub>. The UF<sub>6</sub> released within the building is then assumed to be released to the outside environment. The HVAC is conservatively assumed to be operating at the maximum ventilation flow rate. HF and UO<sub>2</sub>F<sub>2</sub> are assumed to be transported beyond the site boundary.

**Q8.** Assuming that foregoing accident sequence were to occur, what mitigating actions would be available to reduce the consequences of the accident?

**A8.** (RMK, DGG, SMT) If a cylinder were to rupture, appropriate response actions would be taken in accordance with the NEF Emergency Plan. Specifically, a catastrophic cylinder rupture would generate conditions that could progress to a "Site Area Emergency" classification as identified in Sections 2.1.1 and 3.1.2. of the NEF Emergency Plan. *See* LES Exh. 139-M. For this accident (and for any incident with the potential for a large airborne release), the NEF would -- at a minimum -- take the following actions:

- Activate the Emergency Organization ("EO") and Emergency Operations Center ("EOC"), as described in the Emergency Plan, and initiate the site emergency response team ("ERT") response (*see* LES Exh. 139-M at Section 5.1.1);
- The ERT and/or operations, in turn, upon receipt of a report of a large airborne release, would:
  - notify plant personnel to evacuate the affected area;
  - isolate ventilation to the affected area;
  - initiate other remote process operations as needed (*e.g.*, isolate heater power supplies, close/open valves, etc.);
  - notify plant personnel in adjacent areas to shelter-in-place if inside;
  - notify plant personnel outside to proceed crosswind, then upwind of the affected area and/or proceed to interior shelter-in-place locations as appropriate;
  - initiate personnel accountability procedures;
  - notify immediate off-site response agencies (Eunice Fire and Rescue and/or Hobbs Fire Department and the Lea County Sheriff's office) and request medical response, hazardous material, and law enforcement as needed; and
  - notify NEF Security personnel to secure access to the site at the entrance on NM State Highway 234 and/or coordinate with law enforcement if

wind direction is such that additional sections of Highway 234 need to be secured.

- Notify close proximity neighbors (e.g., WCS, County Landfill personnel) to shelter-in-place and/or evacuate as conditions warrant;
- Notify off-site response agencies to make public announcements/activate emergency broadcasts if broader public shelter-in-place and/or evacuation is believed necessary based on release conditions (evacuation is unlikely – see NEF Emergency Plan Section 5.4.2 (LES Exh. 139-M));
- Perform other notifications as required by the NEF Emergency Plan, including the New Mexico State Police, New Mexico Department of Public Safety (OEM), Andrews County, TX Sheriff's Office, Texas Department of Public Safety – Midland, Texas State Operations Center – Austin, and the Texas Department of Health, Bureau of Radiation Control; and
- Notify the US NRC.
- Once the incident is secured, perform incident investigation, sampling, clean-up, decontamination, and health assessments and related activities.

*See, e.g.,* LES Exh. 139-M at Sections 3.2, 3.3, 5.1 to 5.5.

**Q9.** How will the NEF ensure that the foregoing actions are, in fact, taken by appropriately qualified personnel:

**A9.** Detailed emergency response plans and implementing procedures will be in place to ensure that all of the specified actions occur. Interior shelter-in-place activities will be defined, and could include isolating intake ventilation and/or moving personnel to interior rooms/spaces in non-affected buildings. This guidance on appropriate shelter-in-place actions could also be shared with offsite agencies for dissemination to the community as needed. The NEF EO and plant personnel will receive training in all of these detailed plans and procedures. Drills will be conducted internally and in concert with offsite response agencies on an annual basis, as set forth in the NEF SAR and Emergency Plan. *See* LES Exh. 139-M at Sections 7.1-7.4.

The NEF fire brigade/emergency response team will be outfitted, equipped, and trained to provide hazardous material response and mitigation commensurate with the requirements of 29 C.F.R. § 1910.120, "Hazardous waste operations and emergency response." This includes a technician level qualified entry and backup team with supporting emergency medical function, incident command, and a safety officer. *See* LES Exh. 132-M at 6.4-6. In the event that mitigation activities are required in the area affected by the cylinder rupture, the ERT will be equipped (*e.g.*, with encapsulated suits and appropriate respiratory protection) to take the actions in the affected space.

**Q10.** Notwithstanding the availability of these mitigating actions, do you consider the postulated cylinder rupture accident described above to be a likely event? Please state the basis for your conclusion.

**A10.** (RMK, DGG, SMT) No. As reflected in the ISA Summary (Staff Exh. 58-M), the occurrence of the postulated accident sequence described above is highly unlikely. To prevent such an accident, two automatic, hard-wired, fail-safe, independent, diverse (*i.e.*, a temperature sensor trip on high cylinder temperature and a capillary temperature sensor trip on high internal Blending Donor Station air temperature) Blending Donor Station heater trips will be provided. Each of the two trips will be periodically tested (*i.e.*, at least annually) to ensure consistency is maintained with the availability and reliability assumptions of the NEF ISA.

In order for the initiating event (*i.e.*, failure of the Blending Donor Station heater controller that causes the blending donor heater within the station to remain on) to result in a cylinder rupture and the associated consequences, both of the preventive measures Items Relied On For Safety ("IROFS") associated with tripping the Blending Donor Station heater must fail concurrently. In addition, the resulting abnormal high temperature of the Blending Donor

Station and the associated cylinder must go undetected for a long period of time. Due to the capacity of the Blending Donor Station heater, the cylinder heat-up rate is limited such that a significant amount of time (i.e., approximately 15 hours) is required to cause a cylinder rupture and subsequent UF<sub>6</sub> release. Although it is not considered an IROFS, operators will conduct periodic operational monitoring of system pressures/temperature during any blending operations, an action that will further reduce the likelihood that the overheat condition could be sustained for the necessary period of time for this accident sequence to occur.

**Q11.** Does this conclude your testimony?

**A11.** (RMK, DGG, SMT) Yes.

## RESUME

Rod M. Krich  
6395 Twin Oaks Lane  
Lisle, IL 60532  
(H) 630 428 1967  
(W) 630 657-2813

## EDUCATION

MS Nuclear Engineering - University of Illinois - 1973  
BS Mechanical Engineering - New Jersey Institute of Technology - 1972

## EXPERIENCE

1998 to  
Present

### Exelon (formerly Com Ed)

Vice President, Licensing Projects for Exelon Nuclear, with the overall responsibility for leading Exelon Nuclear's licensing activities on future generation ventures, predominantly leading the licensing effort for a U.S. gas centrifuge enrichment plant. In addition, I have been assisting with the Yucca Mountain project licensing effort and served as the lead on strategic licensing issues with the responsibility of working with the Nuclear Regulatory Commission and the Nuclear Energy Institute on the development of a new approach to licensing new reactors.

Vice President-Regulatory Services responsible for interface with the NRC and State regulatory agencies, and regulatory programs. This responsibility covers all 12 ComEd nuclear units and the Nuclear Generation Group headquarters. With respect to regulatory programs, responsibilities include programs such as the change evaluation process (i.e., 10 CFR 50.59, "Changes, tests and experiments), the operability determination process, and the Updated Final Safety Analysis revision process). In this capacity, I was responsible for improving the relationship with the regulatory agencies such that, taken together with improved plant performance, the special scrutiny applied to the ComEd operating plants will be replaced with the normal oversight process. The Regulatory Services organization consists of a group located at the Nuclear Generation Group headquarters and a Regulatory Assurance group at each plant that has a matrix reporting relationship to the Vice President-Regulatory Services.

1994 to  
1998

### Carolina Power & Light Company

As Chief Engineer from November 1996 to April 1998, I was head of the Chief Section of the Nuclear Engineering Department. In this capacity, I was responsible for maintaining the plant design bases and developing, maintaining and enforcing the engineering processes procedures. In addition to the corporate Chief Section, the Design Control groups at each of the nuclear plant sites reported to me starting in February 1997.

As Manager -Regulatory Affairs at the H. B. Robinson Steam Electric Plant, Unit No. 2 (Westinghouse PWR) from February 1994 to November 1996, the managers of Licensing/Regulatory Programs, Emergency Preparedness, and Corrective Action/Operating Experience Program organizations reported to me. As such, I was responsible for all interface and licensing activities involving the NRC headquarters and regional office, environmental regulatory agencies, and the Institute of Nuclear Power Operations. My responsibilities also included implementation of the Emergency Preparedness program, and administration of the Corrective Action and Operating Experience programs. After assuming my position in Carolina Power &

Light Company, I was instrumental in revising and upgrading the IOCFR50.59 safety evaluation program, and was responsible for its implementation at the plant site. My group was also responsible for leading the team that prepared the NRC submittal containing the conversion to the improved Technical Specifications.

1988 to  
1994

Philadelphia Electric Company

As Manager - Limerick Licensing Branch at the Nuclear Group Headquarters, responsible for all licensing activities for the two unit Limerick Generating Station (General Electric BWR) conducted with the NRC headquarters and all enforcement issues involving NRC Region I, including completion of the final tasks leading to issuance of the Unit 2 Operating License. Special projects included assisting in the development of the Design Baseline Document program, obtaining NRC approval for an Emergency Operations Facility common to two sites, preparation of the Technical Specification changes to extend the plant refueling cycle to 24 months and to allow plant operation at uprated power, and obtaining NRC approval of a change to the Limerick Operating Licenses to accept and use the spent fuel from the Shoreham plant. I was also responsible for the development and implementation of the IOCFR50.59 safety evaluation process used throughout the nuclear organization, development of the initial Updated Final Safety Analysis Report for Limerick Generating Station, and served as the Company's Primary Representative to the BWR Owners' Group.

1986 to  
1988

Virginia Power Company

As the Senior Staff Engineer in the Safety Evaluation and Control section, my activities involved responding to both routine and special licensing issues pertaining to North Anna Power Station (Westinghouse PWR). My duties ranged from preparing Technical Specification interpretations and change requests, exemption requests, and coordinating responses to NRC inspection reports, to developing presentations for NRC enforcement conferences and coordinating licensing activities associated with long-term issues such as ATWS and equipment qualification. I was also the Company representative to the utility group formed to address the station blackout issue, and was particularly involved in developing an acceptable method by which utilities can address equipment operability during station blackout conditions.

1981 to  
1986

Consumers Power Company

During my employment with Consumers Power Company, I worked at the General Office in the Nuclear Licensing Department and the Company's Palisades Plant (Combustion Engineering PWR). While in the Nuclear Licensing Department, I held the position of Plant Licensing Engineer for the Big Rock Point Plant (General Electric BWR), Section I-lead - Special Projects Section, and Section Head - Licensing Projects and Generic Issues Section. My responsibilities while in these positions included managing the initial and continuing Palisades Plant FSAR update effort, developing and operating a computerized commitment tracking system, managing the licensing activities supporting the expansion of the Palisades Plant spent fuel storage capacity, and coordinating activities associated with various generic issues such as fire protection and seismic qualification of equipment. As the administrative point of contact for INPO, I coordinated the Company's efforts in responding to plant and corporate INPO evaluations. At the Palisades Plant, I was head of the Plant Licensing Department. My responsibilities primarily entailed managing the on-site licensing activities, including preparation of Licensee Event Reports and responses to

inspection reports, interfacing with NRC resident and regional inspectors, and serving as chairman of the on-site safety review committee. I also administered the on-site corrective action system and managed the on-site program for the review and implementation of industry operating experience.

1974 to  
1981

General Atomic Company

My positions while at the General Atomic Company were principally concerned with fuel performance development efforts for the High Temperature Gas-Cooled Reactor (HTGR). Specific responsibilities included two assignments to the French Atomic Energy Commission laboratories at Saclay and Grenoble (France) for the purpose of coordinating a cooperative test program. I was also assigned as a consultant to the Bechtel Corporation, Los Angeles Power Division, and worked in the Nuclear Group of the Alvin M. Vogtle Nuclear Project for Georgia Power.

RELATED EXPERIENCE

University of Illinois

As a graduate research assistant, I assisted in both the experimental and analytical phases of a NASA-funded program in the study and modeling of far-field noise generated by near-field turbulence in jets.

PUBLICATIONS

General Atomic Company

"CPL-2 Analysis: Fission Product Release, Plateout and Liftoff."

University of Illinois

"Prediction of Far-Field Sound Power Level for Jet Flows from Flow Field Pressure Model," paper 75-440 in the AIAA Journal, co-authored by Jones, Weber, Hammersley, Planchon, Krich, McDowell, and Northranandan.

MEMBERSHIPS

American Nuclear Society  
Pi Tau Sigma -Mechanical Engineers 1-Honorary Fraternity  
American Association for the Advancement of Science

REFERENCES

Furnished upon request

DANIEL G. GREEN  
2726 Edgewood Drive  
Cedar Falls, Iowa 50613  
(319) 277-3182

**EDUCATION:**

Master of Science in Nuclear Engineering, Kansas State University, August 1981.

Bachelor of Science in Nuclear Engineering, Kansas State University, May 1980.

**RELATED EXPERIENCE:**

EXCEL Services Corporation, Louisiana Energy Services (01/04-Present)

Senior Consulting Engineer: Supported the licensing effort for the construction and operation of the National Enrichment Facility, a gaseous centrifuge enrichment plant proposed to be located in Lea County, New Mexico. This involved supporting NRC review meetings and teleconferences, developing responses to NRC Requests for Additional Information regarding the licensing submittal, and revising the licensing submittal, as necessary. Responsibilities during this time also included serving as a member of the Integrated Safety Analysis team and supporting the development and implementation of the Configuration Management program.

EXCEL Services Corporation, Louisiana Energy Services (08/03-12/03)

Senior Consulting Engineer: Supported development and submittal of the Louisiana Energy Services License Application for the construction and operation of the National Enrichment Facility, a gaseous centrifuge enrichment plant proposed to be located in Lea County, New Mexico. This included ensuring applicable regulatory requirements were addressed.

EXCEL Services Corporation, International Access Corporation (IAC) (7/03)

Senior Consulting Engineer: Performed an evaluation of the impact of the new Reactor Oversight Process (ROP) on regulatory burden for the US nuclear industry. The evaluation examined the impact on the US nuclear industry as a whole, as well as the impact on individual US nuclear industry licensees using case studies that show the decreasing or increasing regulatory burden when plant performance trends show improvement or decline, using the new ROP. Research for the evaluation was conducted using NRC public domain resources, Nuclear Energy Institute and US nuclear industry input, and insights from US nuclear plant licensees. Interviews of US nuclear plant licensees were also conducted.

**EXCEL Services Corporation, Entergy - Indian Point 2 (6/03)**

Senior Consulting Engineer: Performed an independent assessment of the submitted Indian Point 2 (IP2) Improved Technical Specifications (ITS) to ensure that the final product was ready for implementation. The focus of the assessment was to perform both a limited "horizontal" review (i.e., looking at the IP2 ITS and Bases in an integrated fashion to ensure overall consistency), and a limited "vertical" review (i.e., looking in some detail at specific IP2 Technical Specifications and Bases, including the associated ITS Conversion Package, which are known in the industry to be especially complex and/or important to safety to ensure that the requisite unity of design/licensing bases are preserved). The results of the assessment were documented in a report provided to Entergy.

**EXCEL Services Corporation, American Electric Power (AEP) - DC Cook (5/03)**

Senior Consulting Engineer: Assisted in the development of the DC Cook Units 1 and 2 Improved Technical Specifications/24 Month Operating Cycle initial draft submittal of the Instrumentation section. The submittal utilized NUREG-1431, Revision 2, as the standard. This involved development of plant specific Technical Specifications, Bases, technical justifications, 10CFR50.92 evaluations, and comparison documents.

**EXCEL Services Corporation, Omaha Public Power District (OPPD) - Fort Calhoun Station (4/03)**

Senior Consulting Engineer: Developed a root cause analysis evaluation associated with the Fort Calhoun Station practice of establishing Allowed Outage Times for systems not included in the Technical Specifications that support the operability of systems in Technical Specifications.

**EXCEL Services Corporation, Omaha Public Power District (OPPD) - Fort Calhoun Station (3/03)**

Senior Consulting Engineer: Performed an assessment of the benefits of options and disadvantages and advantages of upgrading the Fort Calhoun Station (FCS) current Technical Specifications (CTS). The resulting report discussed the options for upgrading FCS CTS, including the option of full conversion to Revision 2 of the Improved Standard Technical Specifications for Combustion Engineering Plants. For each of the options examined, the report provided the estimated cost, advantages, disadvantages, plant impacts, and interface requirements with other planned FCS major projects.

**EXCEL Services Corporation, Australian Nuclear Science and Technology Organisation (ANSTO) (2/03)**

Senior Consulting Engineer: Developed update for ANSTO Replacement Research Reactor (RRR) Safety Analysis Report Chapter 13, "Conduct of Operations. This included providing updates to address the proposed RRR Organizational Structure, Training Program, Review and Audit Functions, Operating Procedures and Instructions, and Maintenance, Testing and Inspection.

**EXCEL Services Corporation, Exelon (1/03)**

Senior Consulting Engineer: Performed an independent review of the Louisiana Energy Services License Application for the construction and operation of a gaseous centrifuge enrichment plant. The review included ensuring compliance with the guidance of NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility."

EXCEL Services Corporation, Australian Nuclear Science and Technology Organisation (ANSTO) (12/02)

Senior Consulting Engineer: Developed a Maintenance and Testing Program Bases Document for the currently under construction ANSTO Replacement Research Reactor (RRR). The program is based on the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance of Nuclear Power Plants," and the associated implementation guidance.

EXCEL Services Corporation, First Energy Nuclear Operating Company - Davis Besse (11/02)

Senior Consulting Engineer: Supported reconstitution of the Davis Besse Licensing Basis to support restart. This involved research and review of both generic and plant-specific licensing correspondence and documentation of the current licensing basis for the plant.

EXCEL Services Corporation, Wolf Creek Nuclear Operating Company (10/02)

Senior Consulting Engineer: Supported development of on-line training courses for the License Amendment Requests, the Introduction to Technical Specifications and the Use and Application of Technical Specifications courses of the United Services Alliance Regulatory Affairs and Qualification Initiative.

EXCEL Services Corporation, First Energy Nuclear Operating Company - Perry (9/02)

Senior Consulting Engineer: Supported development of training materials for the Licensing Basis Introduction and Miscellaneous Licensing Basis Change Processes courses of the United Services Alliance Regulatory Affairs and Qualification Initiative.

EXCEL Services Corporation, Australian Nuclear Science and Technology Organisation (ANSTO) (11/01-8/02)

Senior Consulting Engineer: Developed Operating Limits and Conditions (OLCs) and Bases for the currently under construction ANSTO Replacement Research Reactor (RRR). The OLCs and Bases were developed using the format and concepts from the U.S. Improved Standard Technical Specifications. This required review of RRR Preliminary Safety Analysis Report and plant specific application of the U.S. Technical Specification criteria to the RRR design and safety analysis. Supported resolution of discrepancies identified during development of the Bases. Supported resolution of comments generated during ANSTO internal reviews.

EXCEL Services Corporation, Vermont Yankee Nuclear Power Corporation (11/01-7/02)

Senior Consulting Engineer: Provided an independent assessment of the Vermont Yankee Nuclear Power Station Technical Specifications and Bases. Identified inconsistent requirements, non-conservative requirements and recommended enhancements. Working with the Operations Department, prioritized recommendations from the assessment and began development and processing of License Amendment requests to adopt the changes from the recommendations.

**EXCEL Services Corporation, Nebraska Public Power District (NPPD) (10/00-9/01)**

**Senior Consulting Engineer:** Assisted in day-to-day licensing activities for Cooper Nuclear Station (CNS). This involved performing reviews for License Amendment Requests, 10 CFR 50.59 Safety Evaluations, Operability Evaluations, and other changes to licensing basis documents. Supported the development of the presentations for the following NRC/NPPD meetings: a Cooper Nuclear Station Performance Status Meeting and a Regulatory Conference concerning Equipment Qualification Non-conformances. Participated in the development of training materials for the United Services Alliance Regulatory Affairs Training and Qualification Initiative. Also participated on the CNS Condition Review Team for the Significant Condition Report related to weaknesses in the Determination and Documentation of Equipment Operability.

**EXCEL Services Corporation, Commonwealth Edison Company (8/99-9/00)**

**Senior Consulting Engineer:** Served as project lead licensing engineer responsible for technical oversight and review of the Improved Technical Specifications/24 Month Operating Cycle submittal for the Commonwealth Edison Company Boiling Water Reactors (BWRs). The submittal utilized NUREG-1433, Revision 1, and NUREG-1434, Revision 1, as the standards. This involved review of plant specific application of the Technical Specification criteria, Technical Specifications, Bases, technical justifications, 10CFR50.92 evaluations, and comparison documents. Supported resolution of discrepancies between current Technical Specifications and safety analyses identified during development of the Bases. Supported resolution of comments generated during Commonwealth Edison Company internal reviews. Also, served as the project lead licensing engineer responsible for licensing of the Improved Technical Specifications/24 Month Operating Cycle submittal for Commonwealth Edison Company BWRs. This involved supporting NRC review meetings, developing responses to NRC comments and questions regarding the submittal, and revising the submittal, as necessary. Responsibilities during this time also included developing the Technical Requirements Manuals for the BWRs.

**EXCEL Services Corporation, Commonwealth Edison Company (7/98-7/99)**

**Acting Director, Licensing and Compliance - Byron/Braidwood Stations:** Provided governance in developing strategies, positions, and responses for federal regulatory programs and issues. Responsible for development and maintenance of policies that support Byron/Braidwood and Corporate Nuclear Generation Group needs while complying with regulations. Planned, directed and provided oversight of the corporate staff. Served as the primary contact with NRR and was responsible for ensuring that NRR requests are satisfied in a timely and quality manner. Other responsibilities included ensuring that the NRR Project Managers were kept informed of significant regulatory issues at Byron/Braidwood and that issues with NRR were addressed in a professional and business-like manner. Also served as the primary contact between Regulatory Services and the Byron and Braidwood Regulatory Assurance Managers.

**EXCEL Services Corporation, Nebraska Public Power District, Cooper Nuclear Station (11/97-7/98)**

**Senior Consulting Engineer:** Assisted in the licensing of the Improved Technical Specifications submittal for Cooper Nuclear Station. This involved supporting NRC review meetings, developing responses to NRC comments and questions regarding the submittal, and revising the submittal, as necessary.

EXCEL Services Corporation, Baltimore Gas & Electric Company, Calvert Cliffs Nuclear Plant Units 1 and 2 (6/97-7/97)

Senior Consulting Engineer: Assisted in the licensing of the Improved Technical Specifications submittal for Calvert Cliffs Nuclear Plant Units 1 and 2. This involved developing responses to NRC comments and questions regarding the submittal and revising the submittal, as necessary.

EXCEL Services Corporation, Carolina Power and Light Company, Robinson Steam Electric Plant Unit 2 (3/97-8/97)

Senior Consulting Engineer: Assisted in the licensing of the Improved Technical Specifications submittal for Robinson Steam Electric Plant Unit 2. This involved developing responses to NRC comments and questions regarding the submittal and revising the submittal, as necessary. Responsibilities during this time also included developing the Technical Requirements Manual and the associated 10CFR50.59 safety evaluations.

EXCEL Services Corporation, Nebraska Public Power District, Cooper Nuclear Station (2/97-3/97)

Senior Consulting Engineer: Performed an integrated review of the complete Cooper Nuclear Station Improved Technical Specifications submittal to ensure that the final product was ready for submittal to the NRC. The review included ensuring that all changes were appropriately addressed, that the submittal met the NEI guidance for Improved Technical Specifications submittals, and that lessons learned from other Improved Technical Specifications projects were incorporated.

EXCEL Services Corporation, Commonwealth Edison Company, Byron Station Units 1 and 2 and Braidwood Station Units 1 and 2 (11/96-12/96)

Senior Consulting Engineer: Performed an integrated review of the complete Byron/Braidwood Improved Technical Specifications submittal to ensure that the final product was ready for submittal to the NRC. The review included ensuring that all changes were appropriately addressed, that the submittal met the NEI guidance for Improved Technical Specifications submittals, and that lessons learned from other Improved Technical Specifications projects were incorporated.

EXCEL Services Corporation, Carolina Power and Light Company, Robinson Steam Electric Plant Unit 2 (8/96)

Senior Consulting Engineer: Performed an integrated review of the complete Robinson Steam Electric Plant Unit 2 Improved Technical Specifications submittal to ensure that the final product was ready for submittal to the NRC. The review included ensuring that all changes were appropriately addressed, that the submittal met the NEI guidance for Improved Technical Specifications submittals, and that lessons learned from other Improved Technical Specifications projects were incorporated.

EXCEL Services Corporation, Carolina Power and Light Company, Brunswick Nuclear Plant Units 1 and 2 (11/95-7/98)

Senior Consulting Engineer: Served as project lead engineer responsible for development and aiding in the coordination of the Improved Technical Specifications/24 Month Operating Cycle submittal for Brunswick Nuclear Plant Units 1 and 2. The plant specific submittal utilized NUREG-1433, Revision 1, as the BWR/4 Standard. This involved development of plant specific application of the Technical Specification criteria, Technical Specifications, Bases, technical justifications, 10CFR50.92 evaluations, and comparison documents. Supported resolution of discrepancies between current Technical Specifications and safety analyses identified during development of the Bases. Supported resolution of comments generated during Carolina Power and Light Company internal reviews. Also, served as the project lead engineer responsible for licensing of the Improved Technical Specifications/24 Month Operating Cycle submittal for Brunswick Nuclear Plant Units 1 and 2. This involved supporting NRC review meetings, developing responses to NRC comments and questions regarding the submittal, and revising the submittal, as necessary. Responsibilities during this time also included developing the Technical Requirements Manual, revising to Offsite Dose Calculation Manual, and developing the associated 10CFR50.59 safety evaluations.

EXCEL Services Corporation, PECO Energy Company, Peach Bottom Atomic Power Station Units 2 and 3 (10/95-10/96)

Senior Consulting Engineer: Served as project manager responsible for licensing of the Improved Technical Specifications submittal for Peach Bottom Atomic Power Station Units 2 and 3. This involved supporting NRC review meetings and developing responses to NRC comments and questions regarding the submittal. Also, served as project manager responsible for the development of the programs necessary to implement the Peach Bottom Atomic Power Station Units 2 and 3 Improved Technical Specifications. This involved revising and updating the Technical Requirements Manual, Offsite Dose Calculation Manual, UFSAR, Design Basis Documents, and the QA Program and also included development of 10CFR50.59 evaluations and 10CFR50.54(a) evaluations, as applicable. This effort also included development of matrices to implement the Safety Function Development Program.

EXCEL Services Corporation, Philadelphia Electric Company, Peach Bottom Atomic Power Station Units 2 and 3 (5/93-9/95)

Senior Consulting Engineer: Served as lead engineer responsible for development and aiding the coordination of the Improved Technical Specifications submittal for Peach Bottom Atomic Power Station Units 2 and 3. The plant specific submittal utilized NUREG-1433 as the BWR/4 Standard. This involved development of plant specific application of the Technical Specification criteria, Technical Specifications, Bases, technical justifications, 10CFR50.92 evaluations, 10CFR50.59 evaluations, and comparison documents. Supported resolution of discrepancies between current Technical Specifications and safety analyses identified during development of the Bases. Supported resolution of comments generated during Philadelphia Electric Company internal reviews.

EXCEL Services Corporation, Commonwealth Edison Company, Zion Nuclear Power Station Units 1 and 2 (3/91-4/93)

Consulting Engineer: Responsible for development of license amendment requests needed for Unit 1 and 2 refueling outages. This included supporting licensing of the microprocessor based Westinghouse Eagle 21 Process Protection System replacement, safety analyses upgrade for Westinghouse Vantage 5 fuel, and Setpoint Methodology upgrades. Supported resolution of discrepancies between current plant design and procedures and the safety analyses identified during the development of these license amendment requests. Also, supported daily licensing activities including development and submittal of Temporary Waivers of Compliance, UFSAR updates, and numerous short-term Technical Specification improvement license amendment requests. Served as lead engineer responsible for development of the Zion Station Units 1 and 2 Improved Technical Specifications initial draft submittal. This involved development of plant specific application of the Technical Specification criteria, Technical Specifications, Bases, technical justifications, 10CFR50.92 evaluations, and comparison documents.

EXCEL Services Corporation, Washington Public Power Supply System, WNP-2 (3/90-3/91)

Consulting Engineer: Responsible for development and aiding the coordination of the draft Improved Technical Specifications submittal for WNP-2. The plant specific submittal utilized the NUMARC/NRC negotiated BWR Standards. This involved development of plant specific application of the Technical Specification criteria, Technical Specifications, Bases, technical justifications, 10 CFR 50.92 evaluation, and comparison documents. Supported resolution of discrepancies between WNP-2 current Technical Specifications and safety analyses identified during development of the Bases.

Impell Corporation, Systems Engineering Department (11/89-2/90)

Lead Senior Engineer: Served as lead engineer on projects which involved preparation of FSAR change requests and 10CFR50.59 safety evaluations for the North Anna and Surry plants, the Turkey Point plant, and the Calvert Cliffs Nuclear Power Plant. The purpose of these projects was to correct FSAR discrepancies and inaccuracies discovered during FSAR verification and design basis documentation efforts.

Florida Power Corporation, Nuclear Department (8/84-11/89)

Licensing Engineer: Responsible for activities related to maintenance of the operating license for Crystal River Unit 3. The activities included the development and coordination of Technical Specification change requests, and implementation of a Technical Specification Interpretation program. Also participated in the Atomic Industrial Forum Subcommittee on Technical Specification Improvements and was Vice Chairman of the Babcock & Wilcox Owners Group Technical Specification Committee. Responsible for the development and coordination of the Technical Specification Improvement Program for Crystal River Unit 3 (lead plant for the Babcock & Wilcox Owners Group) from initiation through submittal to the NRC. Coordinated licensing resolution of design problems including the Emergency Diesel Generator overload concerns. Responsible for the initiation and development of the nuclear industry Snubber Utility Group.

Kansas Gas & Electric Company, Nuclear Department (5/81-8/84)

Licensing Engineer: Responsible for facilitating activities related to obtaining the Wolf Creek Generating Station operating license in addition to interfacing with the NRC. These activities included the development and coordination of technical reports and documents as well as responses to NRC concerns. Also responsible for licensing issues related to seismology and plant Technical Specifications. Coordinated licensing resolution of design and construction deficiencies.

Kansas State University, Nuclear Engineering Department (5/80-5/81)

Thesis Research: Involved in designing an iodine collection system. Research procedure included the use of neutron activation analysis to determine amount of iodine in a resin bed.

Kansas State University, Nuclear Engineering Department (6/79-9/79)

Research Assistant: Assisted with radiation shielding project. Responsible for collecting and reducing data on the effects of shielding, source-strength, wall thickness, and angle, in order to determine penetration through ducts.

## **SCOTT M. TYLER, P.E.**

### **SUMMARY**

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Twenty years design, analysis, and consultation experience in the industrial, institutional, and commercial fields. Project/staff management and technical expertise in loss prevention including fire protection design and analysis, occupational and environmental safety, process safety/risk management, and code consultation.

### **PROFESSIONAL EXPERIENCE**

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#### **AREVA (Framatome ANP)**

*Naperville, IL*

*Oct. 95 - Present*

Mr. Tyler is a Manager in the Fire, Safety, & Risk Services group. He has broad technical and PM responsibilities in fire protection engineering; hazards and consequence analysis; occupational/environmental health & safety; process safety/risk management; and code/regulatory consultation and permitting in these technical areas.

#### **AcuTech Consulting, Inc.**

*San Francisco, CA*

*Feb. 94 - Oct. 95*

Mr. Tyler was a Senior Engineer with AcuTech specializing in engineering services for process safety and hazardous material control programs. This included preparation of chemical accident prevention programs in accordance with federal and state statutes. Provided OSHA and model building/fire code consultation for hazardous materials compliance.

#### **ABB Impell Corporation**

*San Ramon, CA*

*Jun. 85 - Feb. 94*

Mr. Tyler held various engineering positions culminating in supervisor responsible for technical oversight and management of five junior engineers. Mr. Tyler was involved in over 50 design and analysis projects in a host of industrial and institutional occupancies serving in both managerial and technical roles for fire protection, hazardous materials, process and occupational safety, and related areas.

## EDUCATION

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B.S., *Fire Protection and Safety Engineering Technology*, 1986  
Oklahoma State University

## PROFESSIONAL AFFILIATIONS/REGISTRATION

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Registered Professional Fire Protection Engineer, State of California # FP1390  
Member, American Institute of Chemical Engineers  
Member, Society of Fire Protection Engineers  
Member, NFPA 30 - Flammable and Combustible Liquids Code Committee  
National Fire Protection Association, Industrial Section  
Certified Fire Service Instructor and Firefighter

## PRESENTATIONS/MISCELLANEOUS

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Primary Contributing Author – *"Emergency Management Guidelines for the Water Industry"*,  
American Water Works Association Research Foundation, to be published in 2006

Authored Chapter 3 – Methods of Reducing Fire Flow Requirements, *"Impacts of Fire Flow on  
Distribution System Water Quality, Design, and Operations"*, American Water Works  
Association Research Foundation, 2002

*"Strategies for RMP Development and Implementation"*, RMP Rule Workshop cosponsored by  
Metropolitan Washington Council of Governments and The Chlorine Institute,  
Washington, DC, 2/99

Peer Reviewer for USEPA Publication *"Risk Management Program Guidance for Ammonia  
Refrigeration"*, 8/98

*"Fire PRA for Fossil Utilities"*, Edison Electric Institute - Fire Protection Task Force, Rochester,  
NY, 10/97

*"OSHA PSM/EPA RMP - A Management Primer"*, Oregon Assn. of Clean Water Agencies,  
Portland, OR, 10/95

*"Case Study: PHA/PRA Techniques applied to a Chemical Distribution Facility"*, H.S. McGee and  
S.M. Tyler - AIChE Summer National Meeting, 8/93

## KEY PROJECTS

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This is a synopsis of key representative projects; a comprehensive list of projects is available upon request.

### Fire Protection Design/Program Development

*Meriden Gas Turbines, LLC* – Led fire protection design team for dual fuel combustion turbine combined-cycle power plant. Project included water storage tank, electric/diesel fire pumps, sprinkler and water spray systems, and fire alarm.

*New United Motor Manufacturing Inc.* - Led fire protection design team for addition of truck assembly line (\$350M). Design included water storage tank, diesel fire pump, 14 ton low pressure CO<sub>2</sub> system, foam suppression, extra hazard sprinkler and water spray systems, proprietary and special hazard alarm systems, underground main and hydrant system. Served as construction liaison for engineering (mech., elec., HVAC, and fire prot.) during 18-month construction phase.

*DOW Chemical* - Design of process plant water spray and sprinkler systems protecting structures, vessels, loading racks, and buildings including Chlorinated Pyridines (5 systems), Generon Process Bldg. (2 systems), Styrene Facility, MEI Process Structure (5 systems), Propane Storage Tanks (2 systems). Designed fire main replacement project and conceptual design for fire pump repair/replacement.

*Sacramento Municipal Utility District, Rancho Seco Nuclear Generating Station* - PM/Design Engineer for numerous projects including plant proprietary fire alarm system replacement, EDP facility pre-action sprinkler system and sub-floor Halon system, Fire Pump controller replacement, and other FP system modifications. Prepared fire alarm/annunciator response procedures, fire protection system surveillance and maintenance procedures, combustible materials and ignition source control program, and pre-fire planning.

### Analysis/Compliance

*Uranium Disposition Services* – Led fire hazards analysis for two uranium hexafluoride deconversion sites per DOE criteria. Suggested and led hydraulic analysis of alternate water supply for fire water resulting in >\$2M project savings.

*Louisiana Energy Services* – Authored chemical process safety chapter of license application (USNRC) for proposed uranium hexafluoride centrifuge enrichment facility. Acted as chemical process and fire safety expert on integrated safety analysis team. Prepared baseline fire/emergency response needs assessment and IBC/IFC analysis for facility.

*Duke/Fluor Daniel* – Managed project to develop Occupational Safety program template for rollout to four fossil power plants. Work included building a safety management system and technical procedures for 39 individual safety topics.

*Metropolitan Water District of Southern California* - Prepared alternate materials and methods recommendations for bulk chlorine operations for conformance with UBC/UFC hazardous material control requirements.

*Dow Chemical* - Prepared UBC/UFC code reports as acting AHJ for facility and hazardous material projects including MEI process, chlorine system relocation (90 ton railcars), HCl manufacturing, and Generon Bldg. second story addition.

### Process Safety Management/Risk Management Plans

*Duke Energy North America* - Prepared federal (PSM/RMP) and state chemical accident prevention programs (CalARP) for aqueous ammonia systems supporting Selective Catalytic Reduction at gas-fired power plants.

*ConAgra/Armour Swift-Eckrich* - Prepared PSM programs including P&IDs, PSI validation/update, PHAs, SOPs, PM procedures, and others program elements for ammonia refrigeration systems at nine meat processing plants.

*International Rectifier* - Prepared CalARP for semiconductor manufacturer including PHA, dispersion modeling and consequence assessment. Systems included chlorine, ammonia, silane/phosphine; nitric, sulfuric, and hydrofluoric acids.

*Sacramento Area Water Works Association* - Prepared state chemical accident prevention program (RMPP) for seven water utilities covering chlorine systems at over 200 facilities including water/sewer treatment plants and well sites.

*Hill Brothers Chemical* – PSM/state program development for four facilities (L.A., San Diego, San Jose, Phoenix). Processes included NH<sub>3</sub> and Cl<sub>2</sub> repackaging/distribution, NH<sub>4</sub>OH mfg., NaOCl mfg. and several bulk acid systems.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	Docket No. 70-3103-ML
	)	
Louisiana Energy Services, L.P.	)	ASLBP No. 04-826-01-ML
	)	
(National Enrichment Facility)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the "APPLICANT'S PREFILED TESTIMONY IN MANDATORY HEARING CONCERNING MITIGATING ACTIONS FOR POSTULATED CYLINDER RUPTURE ACCIDENT (ENVIRONMENTAL MATTER NO. 2)" in the captioned proceeding has been served on the following by hand-delivery on February 24, 2006 as shown below.

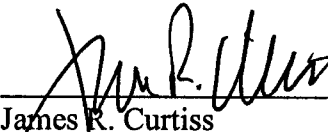
Administrative Judge  
G. Paul Bollwerk, III, Chair  
Atomic Safety and Licensing Board Panel  
Mail Stop T-3F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
e-mail: gpb@nrc.gov

Administrative Judge  
Paul B. Abramson  
Atomic Safety and Licensing Board Panel  
Mail Stop T-3F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
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Administrative Judge  
Charles N. Kelber  
Atomic Safety and Licensing Board Panel  
Mail Stop T-3F23  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
e-mail: cnkelber@aol.com

Office of the Secretary  
Attn: Rulemakings and Adjudications Staff  
U.S. Nuclear Regulatory Commission  
Mail Stop O-16C1  
Washington, DC 20555-0001  
(original + two copies)

Lisa B. Clark, Esq.  
Office of the General Counsel  
Mail Stop O-15D21  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001



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James R. Curtiss  
Counsel for Louisiana Energy Services, L.P.