June 29, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY, ET AL.	)	Docket No. 50-289-OLA
	)	ASLBP 83-491-04-OLA
(Three Mile Island Nuclear Station, Unit No. 1)	)	(Steam Generator Repair)
	)	

LICENSEE'S TESTIMONY OF RICHARD F. WILSON,
DAVID G. SLEAR AND T. GARY BROUGHTON
ON ISSUE 1.c (CONTENTION 1.a)

To Mr. Wilson:

Q1. Please state your name and address, and describe your involvement with the TMI-1 steam generator tube repair program.

A1. My name is Richard F. Wilson. I am employed by GPU Nuclear Corporation, 100 Interpace Parkway, Parsippany, New Jersey 07054. As the Vice President of Technical Functions, I was responsible for the overall project and technical management of the TMI-1 steam generator tube repair program.

A statement of my professional qualifications is attached.

To Mr. Slear:

Q2. Please state your name and address, and describe your involvement with the TMI-1 steam generator tube repair program.

A2. My name is David G. Slear. I am employed by GPU Nuclear Corporation, 100 Interpace Parkway, Parsippany, New Jersey 07054. As the Manager of Engineering Projects for TMI-1, I was the overall task manager for the TMI-1 steam generator tube repair program reporting directly to the Vice President of Technical Functions. My responsibilities included all activities associated with the evaluation and repair of the steam generators.

A statement of my professional qualifications is attached.

To Mr. Broughton:

Q3. Please state your name and address, and describe your involvement with the TMI-1 steam generator repair program.

A3. My name is T. Gary Broughton. I am employed by GPU Nuclear Corporation, 100 Interpace Parkway, Parsippany, New Jersey 07054. As Director of Systems Engineering, I was responsible for providing support to the steam generator tube repair program primarily in the area of plant performance.

A statement of my professional qualifications is attached.

To all witnesses:

Q4. What is the purpose of your testimony?

A4. The purpose of this testimony is to address Issue 1.c of Contention 1.a as enumerated at page 23 of the Board's Memorandum and Order (Rulings on Motions for Summary Disposition, dated June 1, 1984), in which the Licensing Board stated:

> 1. The rationale underlying certain proposed license conditions should be addressed, with attention to:
>
> * * * *
>
> c. Method of determining power ascension limitations.

Q5. How were the power ascension limitations determined, and how do those limitations relate to the repair of the steam generators?

A5. In addressing the bases for determining those power ascension limitations which relate to the steam generator repair, it is useful to summarize the power ascension/post-critical test program, indicate the reason for including specific tests in the program, and describe the rationale for those limitations.

The proposed license condition concerning power ascension limitations is set forth as condition B.3. in the SER, Supplement 1, at 27:

> GPU Nuclear Corporation shall complete the post-critical test program at each power range (0-5%, 5-50%, 50-100%) in conformance with the program described in Topical Report 008, Rev. 3, and shall have available the results of that test program and a summary of its management review prior to ascension from each power range and prior to normal power operation.

As indicated in the proposed license condition, the post-critical test program (described in TR-008, Rev. 3, Appendix A, Section III) consists of three major phases: 0-5% power, 5-50% power and 50-100% power. Testing related to the steam generator repair will be performed during the three stages as follows:

Low Power Testing

During the first stage, natural circulation testing will be performed to verify the tuning of the integrated control system to maintain preset steam generator levels under loss of main feedwater and natural circulation conditions, and proper response of the emergency feedwater (EFW) system.

Escalation to 50% Power

Testing at this stage will include loss of feedwater tests and a reactor coolant system (RCS) overcooling control test.

Escalation to 100% Power

A variety of tests will be performed during this period, including the 100% turbine-generator trip.

The initial power ascension program was developed, prior to knowledge of the damage to the steam generators, by considering test requirements as a result of core reload, plant modifications made since the plant was last operated, and operator training requirements. These considerations resulted in a testing sequence, power level plateaus and development of special tests for plant modifications and operator training. Primary factors in determining the test sequence and plateaus included verification that core physics parameters are as predicted and that nuclear instruments, the integrated control system and the turbine protective system are calibrated and functioning properly.

In conjunction with the steam generator tube repair program, special pre-critical tests were developed to demonstrate steam generator operability, including drip tests, bubble

tests, normal and accelerated cooldowns (with their transient loads) and long periods of steady state leakage monitoring. These tests have now been performed and evaluated. The results confirmed the adequacy of the repair process and the operability of the steam generators.

Additionally, the power ascension/post-critical testing program described above was reviewed for its effect on the steam generators. Because the pre-critical testing verified the adequacy of the repair and the operability of the steam generators, no additional tests were needed in the post-critical test program because of the repair. It was determined, however, that two 30-day hold periods should be added to the power ascension program. This slow progression from power level to power level has several purposes:

1. To facilitate monitoring leak rate changes, especially after load-inducing transients, which will provide information on the condition of the kinetically expanded joints.

2. To detect abnormal trends as early in the program as possible.

3. To slowly increase plant power and operating history to aid in mitigation of unplanned events.

4. To gain additional experience in operating the plant with systems in normal line-ups.

The first hold period will occur at 48% power following the RCS overcooling test. This point was chosen because it immediately follows tests which load the steam generator tubes (loss of feedwater and RCS overcooling) and because it allows

operation with two main feed pumps which is the normal plant configuration. The second hold point follows testing at the 75% power plateau. Leak rate monitoring, surveillance testing and operator familiarity will occur during this hold period. Experience from the steam generator pre-critical tests corroborated that 30-day hold periods would provide adequate time for stabilizing the plant and collecting statistically valid data.

Management reviews are scheduled prior to power increases following the 48% power hold period and the 100% turbine trip test. The purpose of these reviews is to assure management that the people, plant, facilities and procedures are in a state of readiness such that the plant can be safely operated at the next power plateau. These reviews also provide management the opportunity to review all open items at that time that may have potential impact on power operations.

Q6. Are Licensee's power ascension limitations in accordance with the recommendations of the Third Party Review (TPR) Group?

A6. Yes. In its February 18, 1983 report, the TPR recommended that:

> GPU Nuclear should consider substantially extended operation at low power during a slow and deliberate power escalation the first time the plant goes critical. Although we do not have an analytical basis for a specific duration, a hold period of perhaps a month or more at 40 percent power should be considered before the Loss of Feedwater/Turbine Trip test is performed. This might be followed by another month or more at 70 percent power before final escalation to 100 percent power.

Att. 6 to the Staff's SER, TPR February 1983 Report at 11-12, Recommendation 2.

In accordance with the TPR's recommendations and its own evaluation of the power ascension program in light of the repair, Licensee determined to modify the power ascension program to add two 30-day hold periods, one at 48% power and one at 75% power. In its May 16, 1983 report, the TPR stated that "[t]he GPU Nuclear response is satisfactory." Att. 6 to the Staff's SER, TPR May 1983 Report at 7.

The TPR also recommended that Licensee "consider the possibility of deliberately running one steam generator at a higher power than the other during the first escalation hold periods." Att. 6 to the Staff's SER, TPR February 1983 Report at 12, Recommendation 3. The TPR recognized, however, that this recommendation "may involve other operating considerations which would have to be weighed before a decision could be made." Ibid.

Licensee explained to the TPR that significant operating considerations rendered this suggested approach infeasible and imprudent. In particular, the mismatch can only be implemented by operation of a single reactor coolant pump in one loop which would cause mismatched reactor coolant system flow, imbalanced feed flows and different coolant levels in each generator. This could mask changes in the plant conditions, including any abnormalities in the plant response to transients. This abnormal plant configuration would conflict with the intent of

conducting the startup in a slow, deliberate manner under normal operating conditions.

In response to Licensee's explanation, the TPR stated that "[t]he GPU Nuclear response is satisfactory." Att. 6 to the Staff's SER, TPR May 16, 1983 Report at 7.

PROFESSIONAL QUALIFICATIONS

Richard F. Wilson
Vice President, Technical Functions
GPU Nuclear Corporation

GPU Experience:

Technical responsibility for the Engineering, Design, Licensing and Technical Support of all nuclear generating stations for the GPU System. The position manages the technical resources of GPU Nuclear including day-to-day support for plant operations.

Previously was Acting Director for TMI-2 from September, 1979, to about March, 1980, and before that was Director of the Engineering and Quality Assurance Departments within the GPU Service Corporation. Between 1975 and 1977, was Manager of Quality Assurance for the GPU Service Corporation with responsibilities for design and construction Quality Assurance.

Other Experience:

Prior work experience included two years (1973-1975) as Manager of Manufacturing Engineering for Offshore Power Systems, Jacksonville, Florida. Responsibilities included activities associated with manufacturing planning, tooling, industrial engineering, manufacturing engineering, and technical support to the planned manufacturing facility. Prior to joining Offshore Power Systems, held a number of positions at the Atomic International Division of Rockwell International, 1954 to 1973. Some of these positions included Engineering Supervisor, Department Manager, Chief Project Engineer, Program Manager, and Chief Program Engineer on a wide variety of Atomic International programs. The last position was Program Manager for the Atomic International work on the fast breeder program. Performed and supervised work in almost every facet of reactor engineering, physics, facility design, safety, reactor operations, etc.

Committee affiliations have included the EEI QA Task Force, the AIF Committee on Power Plant Design, Construction and Operation, B&W Plant Owners and BWR Owners Groups, EPRI Nuclear Divisional Committee, etc. Outside the utility industry has served on a number of company and company/government advisory groups as related to specific programs.

Education and training includes a B.S. degree in Mechanical Engineering, University of California at Berkeley, 1951; an M.S. degree in Mechanical Engineering, University of Michigan, 1953; and one year attendance at the former Oak Ridge School of Reactor Technology in 1954. Has attended a large number of management and other courses, including the University of Michigan Public Utility Executive Program.

PROFESSIONAL QUALIFICATIONS

DAVID G. SLEAR

WORK EXPERIENCE

Company:	GPU Nuclear Corporation
Title:	TMI-1 Manager Engineering Projects
Responsibilities:	Management of TMI-1 modification, which entails: Management of the $25 million annual budget allocated for plant modification; prioritization of the various phases of plant modification; oversight of the technical adequacy of plant modification and of the components involved in plant modification; consultation regarding problem resolution with respect to matters concerning plant modification; and direct supervision of 16 GPU employees. This position demands constant attention to long term and daily plant modification concerns and an extremely firm grasp of both the technical aspects of TMI-Unit 1 and of the various modes and components of modification available for implementation at TMI-Unit 1.
Dates:	1983 - Present
Company:	GPU Nuclear Corporation
Title:	OTSG Repair Project Manager
Responsibilities:	Management (in conjunction with individual task managers) of all aspects of the OTSG Recovery program at TMI-1 including failure analysis, eddy current testing, corrosion testing, RCS examination, RCS sulfer cleanups, and plant performance analysis. This position involved direct management of the OTSG repair process and personal involvement in the decision making process with respect to the repair program. This position also entailed the definition and implementation of the overall project, and required a broad overview and analysis of the OTSG Recovery program. In his capacity as OTSG Repair Project Manager, Mr. Slear was also called

upon to deliver numerous presentations concerning project details before the NRC, ACRS, TPR, and the GPU Nuclear Corp. management.

Dates: December 1981 - November 1983

Company: GPU Service Corporation

Title: TMI-1 Manager Engineering Projects

Responsibilities: Similar to those listed for Mr. Slear's present position including management of a $20 million budget and of project engineering for modifications.

Dates: 1979 - 1981

Company: GPU Service Corporation

Title: Preliminary Engineering Manager

Responsibilities: This position entailed: the analysis and preliminary design of 400 Megawatt combustion turbines and of a 600 Megawatt coal fired power plant; extensive analysis of the reliability and availability of the components to be installed in the prospective power plant; and the establishment of a baseline criteria document for the designated plants including the technical documentation and presentation of the plant design for management review.

Dates: 1978 - 1979

Company: GPU Service Corporation

Title: Component Engineer

Responsibilities: This position entailed: the review of design specifications and technical details of products going into TMI-2, including the steam generators, pressurizer, main

condensors, cooling towers, reactor vessel, and internals; technical consultation and analysis of problems; and review of the contractor's design work on new components going into a plant.

UNITED STATES NAVY NUCLEAR SUBMARINE FORCE OFFICER

Title: Engineer Officer

Responsibilities: This position entailed: essentially primary responsibility and control of the onboard nuclear power plant; control of all engineering sections, command of 4 divisions; and supervision of approximately 55 crewmen.

Dates: 1972 - 1974

Title: Machinery Division Officer

Responsibilities: As Machinery Division Officer, Mr. Slear was responsible for: all mechanical components of the primary and secondary systems of the power plant including the steam generator, reactor, and drive controls; chemistry control of the primary and secondary systems; and the supervision of 15 crewmen. Mr. Slear also served as an Auxiliary Division Officer in charge of non-nuclear life support systems, and as a Communications Division Officer.

Dates: 1968 - 1972

Mr. Slear also attended the Nuclear Power Submarine School from 1966 - 1968, during which time he obtained one year of nuclear power plant training (6 months classroom, 6 months actual plant training) in addition to the submarine qualification program.

EDUCATION

College: University of Oklahoma

Degree: B.S. Mechanical Engineering

Dates: 1961 - 1966

College: Stevens Institute of Technology

Degree: M.S. Mechanical Engineering

Dates: 1974 - 1978

PROFESSIONAL QUALIFICATIONS

T. GARY BROUGHTON

Business Address: GPU Service Corporation
100 Interpace Parkway
Parsippany, New Jersey 07054

Education: B.A., Mathematics, Dartmouth College, 1966.

Experience:

Director Systems Engineering, GPU Nuclear Corporation, November 1982 to Present. Responsible for Systems Engineering Department activities including: operating experience assessment, operating plant shift technical advisors, nuclear fuels, integrated plant analysis, risk and reliability assessment, human engineering and process computers.

Systems Analysis Director, GPU Nuclear Corporation, 1981-1982.
Responsible for human engineering, control and safety analysis, operating experience review and operating plant shift technical advisors.

Control and Safety Analysis Manager, GPU Service Corporation, 1978 to 1981.
Responsible for nuclear safety analysis and integrated thermal, hydraulic and control system analysis of nuclear and fossil plants. Supervised on-site technical support groups at Three Mile Island, Unit 2 during the post-accident period.

Safety and Licensing Engineer, Safety and Licensing Manager, GPU Service Corporation, 1976-1978. Performed and supervised nuclear licensing, environmental licensing and safety analysis for Oyster Creek, Three Mile Island and Forked River plants. Served as Technical Secretary to Oyster Creek and Three Mile Island General Office Review Boards.

Officer, U.S. Navy, 1966 to 1976.
Trained at Naval Nuclear Power School, Prototype and Submarine School. Positions held include Nuclear Propulsion Plant Watch Supervisor, Instructor at D1G prototype plant and Engineering Officer aboard a fast-attack nuclear submarine.

Publications:

EPRI CCM-5, RETRAN - A Program for One-Dimensional Transient Thermal-Hydraulic Analyses of Complex Fluid Flow Systems, Volume 4: Applications, December 1978, Section 6.1, "Analysis of Rapid Cooldown Transient - Three Mile Island Unit 2", With N.G. Trikouros and J. F. Harrison.

"The Use of RETRAN to Evaluate Alternate Accident Scenarios at TMI-2", with N. G. Trikouros. Proceeding of the ANS/ENS Topical Meeting on Thermal Reactor Safety, April 1980, CONF-800403.

"A Real-Time Method for Analyzing Nuclear Power Plant Transients", with P. S. Walsh. ANS Transactions, Volume 34 TANSAD 34 1-899 (1980).