UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PENNSYLVANIA POWER & LIGHT COMPANY	)	
	)	Docket Nos. 50-387
and	)	50-388
	)	
ALLEGHENY ELECTRIC COOPERATIVE, INC.	)	
	)	
(Susquehanna Steam Electric Station, Units 1 and 2)	)	

AFFIDAVIT OF WALTER J. RHOADES
IN SUPPORT OF SUMMARY DISPOSITION OF
CONTENTION 7B

County of Lehigh)
: SS
Commonwealth of Pennsylvania)

Walter J. Rhoades, being duly sworn according to law, deposes and says as follows:

1. I am Nuclear Group Supervisor Mechanical, Nuclear Plant Engineering Department, Pennsylvania Power & Light Company, and give this Affidavit in support of Applicants' Motion for Summary Disposition of Contention 7B regarding Intergranular Stress Corrosion Cracking (IGSCC). I have personal knowledge of the matters set forth herein and believe them to be true and correct. A summary of my professional qualifications and experience is attached as Exhibit "A" hereto.

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2. Contention 7B states that "the nuclear steam supply system of Susquehanna 1 and 2 contains numerous generic design deficiencies, some of which may never be resolvable, and which, when reviewed together, render a picture of an unsafe nuclear installation which may never be safe enough to operate. Specifically: ...[t]he cracking of stainless steel piping in BWR coolant water environments due to stress corrosion has yet to be prevented or avoided".

3. The general problem of IGSCC exhibited in stainless steel boiling water reactor (BWR) piping of the type used in the Susquehanna Steam Electric Station (Susquehanna SES) together with the steps which can be taken to mitigate the effects of IGSCC are discussed in the Affidavit of Joseph C. Lemaire In Support of Summary Disposition of Contention 7B which is filed concurrently herewith. My affidavit discusses the specific mitigation steps which have been taken by Applicants for the Susquehanna SES.

4. Since 1975, when knowledge of IGSCC in BWR piping was brought to their attention, Applicants have undertaken an extensive program to effectively eliminate the possibility of IGSCC-caused down time, and also to conform to the requirements of NUREG-0313, Rev.1 and previous NRC publications.

5. During start-up, hot standby and shutdown, oxygen levels above those experienced during normal operation occur.

Oxygen levels during these conditions will be reduced by the use of a mechanical vaccuum deaerator. This deaerator is expected to maintain an oxygen content of less than .25 ppm during start-up, hot standby and shutdown. Without this deareator, the oxygen levels would increase to about 8 ppm.

6. The recirculation system inlet thermal sleeve/safe-ends were redesigned to eliminate crevices.

7. The recirculation system riser piping shop welds received solution heat treatment.

8. Low carbon, corrosion resistant cladding was applied to that portion of the recirculation system riser piping which was field-welded. The heat affected zones which will come into contact with the reactor coolant also received solution heat treatment.

9. All weld metal and all type 304 and type 316 castings in the reactor coolant pressure boundary of the Susquehanna SES have at least five percent ferrite content. This level of ferrite should effectively provide immunity from the initiation of IGSCC.

10. Applicants have replaced susceptible materials, where practical, with materials that are substantially less susceptible to IGSCC.

a. The recirculation system discharge valve bypass lines were replaced with carbon-limited type 304 stainless

steel. This low carbon stainless steel meets the mechanical properties of regular grade type 304, and has a maximum carbon content of .03%.

b. All piping in the head spray system was replaced with carbon limited type 304 stainless steel.

c. Much of the piping in the core spray system is 304L stainless steel. Almost all piping which is not 304L was replaced with carbon limited type 304 stainless steel.

d. Almost all piping in the reactor water cleanu system was replaced with type 30 L stainless steel.

e. All piping in the instrument piping and bottom drain was replaced with type 304L stainless steel.

11. Welds in all significant piping constituting the reactor coolant pressure boundary not replaced with IGSCC resistant material will receive Induction Heating Stress Improvement (IHSI) and/or augmented in-service inspection.

12. The control rod drive hydraulic return line which was 304 stainless steel was removed and the design modified.

13. The Susquehanna SES has a continuous on-line leak

detection system capable of sensing small leaks and small leak changes. See FSAR, Section 5.2.5.

14. Based upon the above-described mitigation actions taken by Applicants and the Affidavit of Joseph C. Lemaire in support of Applicants' Motion for Summary Disposition of Contention 7B, it is my opinion that the incidence of stainless steel cracking at Susquehanna SES should be effectively eliminated.

Walter J. Rhoades
Walter J. Rhoades

Sworn to and subscribed
before me this 25th day
of August, 1981.

JOHN P. MILLER, JR., Notary Public
Allentown, Lehigh County, Pa.
My Commission Expires May 25, 1985

WALTER J. RHOADES

Nuclear Group Supervisor - Mechanical
Nuclear Plant Engineering
Pennsylvania Power & Light Company

Education

Formal

Drexel University, B.S.M.E. (1970)
Graduate Course in Nuclear Engineering - Lehigh University (1979)

Continuing Education

Boiling Water Reactor Technology
Light Water Reactor Safety Course
Probability and Risk Assessment
Single and Multiphase Transients in Reactors and Nuclear Piping Systems
Quality Assurance and In-Service Inspection
ASME Code Design Course
ASME Radwaste Systems Design

Registration

Professional Engineer, Commonwealth of Pennsylvania (PE-22519-E)(1974).

Work Experience

June, 1974 - Present — Nuclear Group Supervisor-Mechanical, Susquehanna Project. Assigned to manage and provide techical supervision of the mechanical/nuclear group. Responsible for directing technical reviews of the design work being done for PP&L by General Electric Company and Bechtel Corp. in the area of mechanical/nuclear systems. The mechanical/nuclear group presently consists of twenty (20) engineers. Its responsibilities include reviewing system drawings and equipment specifications for over eighty plant systems. This review includes an evaluation of materials used, design specifications, interface requirements, and conformity with applicable industry standards and NRC requirements.

Current position includes responsibility for the substantive work of the engineers of the mechanical/nuclear group and is the highest position in PP&L with technical responsibility for the design and safety of these eighty systems. Among these systems

Exhibit "A"

are the Service Water and Circulating Water Systems which are the only two systems connected to the cooling towers.

Generated a Service Water System Computer Analysis covering steady state operation of the service water system. The analysis verified pressure in the system to ensure that the correct pressure differences were maintained.

December, 1971 - June, 1974

Engineer & Project Engineer - Responsible for design reviews and equipment specifications for Circulating Water, Feedwater, Condensate, Extraction, Air Removal and Sealing, Compressed Air, Reactor Feedback Pump Turbine, High Pressure Coolant Injection and Reactor Core Isolation Cooling systems. Provided reviews of codes and standards information for both PSAR and FSAR review to ensure that the proper codes were included. This work required a working knowledge of both the applicable codes and the systems involved.

Performed initial work for in-service and pre-service inspection programs. Responsible for reviewing and approving specifications for the main condenser and other heat exchangers in the plant. Responsible for reviewing analysis of circulating water hydraulic transients in the plant

Other work Experience

BALDWIN-LIMA-HAMILTON CORPORATION, Eddystone, Pa.

Engineer: Responsible for the design and installation of large steam surface condensers. Work consisted of processing design from conceptual to final stages. Responsible for substantive technical discussions with customer, procurement of materials and supervision of the work through completion of the system. Also responsible for condenser design at Duke Power Company's Oconee Station and the engineering of supports for the vertical feedwater heaters.

Assistant Engineer: Duties included structual design calculations of large steam surface condensers, land based desalting plants and feedwater heaters. Design of these pressure vessels involved use of ASME Section VIII, HEI and TEMA standards. Duties also included the preparation of technical literature, maintenance manuals, proposals and computer applications.

February, 1967 to September, 1967 — NATIONAL LICORICE COMPANY, 13th and Washington Avenue, Philadelphia, PA.

Plant Engineer: Supervisor of maintenance. Responsible for the installation of new equipment and purchasing of maintenance supplies. Maintenance Department consisted of five (5) mechanics, two (2) helpers and a foreman. Work with outside vendors included installation of a new office and facilities for freight manager, extensive in-plant revisions of facilities such as cafeteria and machinery which included [illegible]r feed system, packing machines and process [illegible]ment.

January, 1964 to February, 1967 — GENERAL ELECTRIC COMPANY, 69th and Elmwood Avenue, Philadelphia, PA.

Tool and Die Trainee: Received training consisting of 4,000 shop hours and 2,000 hours in various assignments including tool design and manufacturing engineering.