UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

Affidavit of FELIX B. LITTON
In Support of Applicants' Motion For
Summary Disposition Of
Contention 7B

Felix B. Litton, being duly sworn according to law, deposes and says:

1. I am employed by the Nuclear Regulatory Commission as a Senior Materials Engineer in the Materials Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation. A copy of my professional qualifications is attached.

2. My responsibility entails the review and evaluation of those sections of the Applicants' Final Safety Analysis Report (FSAR) for which the Materials Application Section of the Materials Engineering Branch has primary review responsibility. This responsibility includes the review of the materials used for the construction of reactor coolant pressure boundary and the inspection procedures used to assure component integrity.

3. The scope of review and the acceptance criteria are described in Standard Review Plan (SRP) 5.2.3, "Reactor Coolant Pressure Boundary Materials", 6.1.1, "Engineered Safety Features Metallic Materials," 5.3.1, "Reactor Vessel Materials", 5.2.4, "Reactor Coolant Pressure Boundary Inservice Inspection and Testing", and 6.6, "Inservice Inspection of Class 2 and 3 Components". The scope includes a review and evaluation of the Applicants' compliance with NUREG-0313, Revision 1, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping" and NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking".

4. The purpose of my affidavit is to address Contention 7B which states:

The Nuclear Steam Supply Systems of Susquehanna 1 and 2 contain 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:

The cracking of stainless steel piping in BWR coolant water environments due to stress corrosion has yet to be prevented or avoided.

5. I have read the "Applicants' Motion For Summary Disposition of Contention 7B," "Applicants' Statement of Material Facts as to Which There is No Genuine Issue to be Heard (Contention 7B)." the "Affidavit of Joseph C. Lemaire in support of Summary Disposition of Contention 7B" and the "Affidavit of Walter J. Rhoades in support of Summary Disposition of Contention 7B".

6. Leaks and cracks in the heat-affected zone (HAZ) of welds that join austenitic stainless steel piping and associated components in BWR systems have been observed since the early nineteen sixties. A pipe crack study group was formed by the NRC to study and evaluate the problem. During the same general time period, the General Electric Company (GE) conducted an independent evaluation and submitted their recommendations to the staff in NEDO-21000, "Investigation of Cause of Cracking in Austenitic Stainless Steel Pipe".

7. The NRC and GE Pipe Crack Study Groups concluded that three conditions must be present for intergranular stress corrosion cracking to occur. The conditions are: 1) tensil-type stress, including residual stress from fabrication, 2) corrodent, on environment in which an electrochemical reaction can occur, and 3) susceptible material. The degree to which one of these conditions must be present for intergranular stress corrosion cracking to occur is variable and depends on the degree to which the other conditions are present.

8. An implementation document was issued following the staff's review of the NRC and GE Pipe Crack Study Groups' recommendations. This document, NUREG-0313, Revision 1, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," sets forth methods acceptable to the NRC staff to reduce the incidents of intergranular stress corrosion cracking in ASME Code Class 1, 2 and 3 boiling water reactor pressure boundary piping and safe ends.

9. The Applicants have undertaken an extensive program at the Susquehanna Steam Electric Station, Units 1 and 2, to evaluate incidents of intergranular stress corrosion cracking in austenitic stainless steel piping systems. The Applicant conforms to the recommendations of NUREG-0313, Revision 1. Regular grade Type 304 stainless steel piping has been replaced with low carbon grade stainless steel piping in the Recirculation System Discharge Valve Bypass Line, Core Spray and Head Spray System, Reactor Water Cleanup System, and Instrument Piping and Bottom Drain Lines. Further replacement of nonconforming material would result in undue hardship because it would involve replacement of already installed large diameter pipe (≥ 20-inch diameter) or flued heads imbedded in concrete. On the pipe that it is inpractical to replace, the augumented inservice inspection recommended by NUREG-0313, Revision 1, will be conducted to ensure that developing cracks will be detected and repaired before the integrity of the system is violated. In addition, the leak detection system at the Susquehanna Steam Electric Station has been reviewed and conforms to the recommendations of Section III.B.1.a of NUREG-0313, Revision 1.

10. The program undertaken by the Applicants is based on an accurate and full understanding of the cause and prevention of intergranular stress corrosion cracking in BWR stainless steel piping systems. Each of the major contributing factors to cause intergranular stress corrosion is minimized by the implementation of the program. We conclude that the Applicants' program is acceptable because the materials susceptible to intergranular stress corrosion cracking have been replaced to the extent practical with nonsusceptible materials, and the program conforms to the augumented inservice inspection and leak detection requirements and recommendations of NUREG-0313, Revision 1.

Felix B. Litton

Linda M. Eyler
LINDA M. EYLER
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires July 1, 1982

Subscribed and sworn to before me
this 21st day of September, 1981.

PROFESSIONAL QUALIFICATIONS

FELIX B. LITTON

I am a Senior Materials Engineer in the Materials Engineering Branch of the Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission. I am attached to the Materials Integrity Section and am responsible for the review and evaluation of materials and processes used in the construction and operation of components in the nuclear power industry.

My education consists of a B. S. (1936) and M. S. (1937) degree in Physical Chemistry from Virginia Polytechnic Institute, Blacksburg, Va. I have completed additional study in Material Science (1967) at the University of New Mexico and have taken special courses in Fracture Mechanics (1977) at George Washington University.

Prior to joining the Nuclear Regulatory Commission, my experience consists of metallurgical research related to the preparation, fabrication and alloy formation of new structural materials for nuclear, advanced aircraft and high temperature application. I have published in technical journals on the environmental behavior, thermodynamic stability and mechanical properties of uranium, plutonium, vanadium, zirconium, titanium, hafnium and silicon and their alloys. My experience in ferrous metallurgy relates to the cause of failure in service.