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 WILLIAM L. FIOCK
IN SUPPORT OF SUMMARY DISPOSITION
OF CONTENTION 7D

County of Santa Clara)
: ss.
State of California)

William L. Fiock, being duly sworn according to law, deposes and says:

1. I am Manager, ATWS Program, General Electric Company ("GE") and give this affidavit in support of Applicants' Motion For Summary Disposition of Contention 7D. 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.

2. Contention 7D 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 ability of Susquehanna to survive Anticipated Transients Without Scram (ATWS) remains to be demonstrated. In this regard, reliance on probabilistic numbers, as 10^{-7} per year, is unwise and unsafe."

3. An "anticipated transient" is a deviation from normal operating conditions which is expected to occur during the life of the nuclear power reactor and which triggers the automatic mechanism for rapidly inserting the control rods into the reactor core. Such rapid insertion shuts down the reactor and is called a scram. An ATWS would occur if the scram mechanism failed following an anticipated transient.

4. In 1969, the Advisory Committee for Reactor Safeguards (ACRS) first raised the concern of ATWS events. Since that time the nuclear industry and NRC have performed a great deal of work in this area, and there has been a continuing dialogue regarding the likelihood of such events, and the prospective systems that would ease the severity of such postulated events.

5. The NRC staff position, as stated in NUREG-0460[1], is that while probability estimates of the risk of severe consequences arising from an ATWS event may provide useful information for supplementing engineering judgment in regulatory decision making, such estimates

should not be used as the sole basis for determining design requirements for nuclear power plants. Over the years, studies of ATWS events have shifted bases from sole reliance on probabilistic analysis to a combination of probabilistic analysis and engineering judgment.

6. Recent analyses by NRC of the risk from ATWS events involved a complete review and evaluation of the extensive information, including the lessons of TMI, which have been developed over the past 12 years on ATWS events and the manner in which they should be considered in the design and safety evaluation of nuclear power plants. Based upon their analyses, NRC plans to publish for comment proposed rules which will require modification in the design and operation of reactors to reduce the likelihood of failure of the automatic protection system to rapidly shut down the reactor in the event an anticipated transient occurs and to mitigate the consequences of ATWS events. Implementation of the rule will be consistent with the defense-in-depth concept in that it will provide the capability to mitigate consequences of ATWS events as well as incorporate additional design features which will enhance the reliability of the shutdown system.

7. The NRC believes that the likelihood of severe consequences arising from an ATWS event during the implementation of this rule is acceptably small. This judgment is based on (a) the favorable experience with the operating reactors, (b) the limited number of operating nuclear power reactors, (c) the capability of reactors to partially or fully mitigate the consequences of ATWS events, (d) partial ATWS mitigative

capability of the recirculation pump trip feature which has been implemented on General Electric BWRs and (e) the interim steps taken to develop procedures and train operators to further reduce the risk from some ATWS events. On the basis of these considerations, the NRC believes that further ATWS modification need not be implemented pending the outcome of the rulemaking proceeding.[2]

8. General Electric Company has performed a comprehensive study of the reliability of the BWR scram system.[3] This study considered scram system design such as that in the Susquehanna reactor which utilizes relay type electrical systems and the control rod drive mechanical systems. The study consumed eight man-years of effort, analyzed all the related scram systems; reactor protection relay logic, mechanical components, hydraulic control units, scram air headers and scram discharge volume.* A large number of failure modes and effects analyses were developed through this study. A number of potential common cause failures were examined and a number of reported individual component abnormalities were factored into the study. The study concludes that the existing scram system is highly reliable.

9. With respect to Susquehanna, PP&L is implementing the following steps to further improve the prevention and mitigation of ATWS events. For improved mitigation, PP&L is installing the Recirculation Pump Trip (RPT) and is establishing operator procedures and training addressed specifically to ATWS events. For improved prevention, PP&L is improving the Scram Discharge Volume System (SDV) instrumentation.

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* The scram discharge volume issues described in NUREG-0785 are not related to ATWS, and are the subject of a separate contention in this proceeding, Contention 21.

10. Recirculation pump trip (RPT) is initiated automatically through system signals (either high reactor vessel pressure or low reactor vessel water level), indicating a possible ATWS. This action is initiated through logic completely independent of the scram system. Trip of the recirculation pump has two beneficial effects. First, it minimizes the pressure rise in the vessel in the first few seconds of the event so that the reactor coolant system pressure is maintained within acceptable limits by the relief valves. Second, RPT reduces the reactor thermal power. For ATWS events in which the main condenser is unavailable, the reduced thermal power reduces the steam flow to the suppression pool, which in turn minimizes the peak suppression pool temperature and containment pressure. Core cooling capability is provided by automatic initiation of the high pressure coolant injection system. For certain ATWS events, recirculation pump trip provides the operator time to initiate action which can bring the reactor to cold shutdown either by insertion of the control rods or actuation of the Standby Liquid Control System (SLCS). SLCS injects sodium pentaborate solution into the primary coolant inserting sufficient negative reactivity to bring the plant subcritical even where no control rod insertion has occurred.

11. Operators are trained to recognize an ATWS condition and to take appropriate correction and mitigating actions. Emergency Procedure EO-00-014 provides specific guidance to the operators. The procedure identifies the symptoms of an ATWS event and contains step by step instructions so that the operator will (1) quickly recognize the condition,

(2) verify that the automatic actions have occurred, (3) take positive actions to shut down the reactor and maintain it in shut down condition, (4) limit RPV pressures, (5) maintain core water levels, (6) limit suppression pool temperatures, and (7) establish long term cool down.

12. SDV system instrumentation modifications will improve the reliability of the level sensing and scram functions. Additional diverse and redundant sensors will be added to each scram discharge instrument volume (SDIV) to initiate a scram through the logic system upon high SDIV level. The instrument pipe routing will also be modified to minimize transient hydrodynamic effects on the level instruments. Water level alarm and control rod withdraw block level instruments currently only on the north SDIV will be added to the south SDIV.

13. The high reliability of current scram systems combined with the ATWS mitigation and prevention measures described above enhance the capability of the Susquehanna units to withstand ATWS events with acceptably low risk to the public.

William L. Fiock

William L. Fiock

Sworn to and subscribed before me
this 14. day of July 1981.

Karen S. Vogelhuber
NOTARY PUBLIC

OFFICIAL SEAL
KAREN S. VOGELHUBER
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires Dec. 21, 1984

LS:ggt:csc/213G
7/14/81

REFERENCES

1. NUREG-0460, Volume 4, "Anticipated Transient Without Scram For Light Water Reactors." p. 3, March 1980.

2. November 7, 1980, NRC Memo from Robert B. Minogue, Director, Office of Standard Development, to NRC Commissioners. Subject: Proposed Rulemaking to Amend 10CFR50 Concerning Anticipated Transients Without Scram (ATWS) Events. (SECY 80-409)

3. NEDE-21514-2, "BWR Scram System Reliability Analysis - Part 2." (December 1976)

4. August 15, 1980, Letter from Robert L. Tedesco, NRC, to Norman Curtis, Pennsylvania Power & Light Company. Subject: Interim Actions Needed for Plant Operation Pending Final Resolution of ATWS.

WILLIAM L. FIOCK
MANAGER - ATWS PROGRAM
UPDATE OPERATIONS

NUCLEAR POWER SYSTEMS DIVISION

EDUCATION:

BS Mechanical Engineering, 1947, Texas A & M College
MS Mechanical Engineering, 1950, Johns Hopkins University

PROFESSIONAL ENGINEERING LICENSES:

Mechanical Engineer - New York State
Nuclear Engineer - California State

SUMMARY:

Twenty-five years in the Nuclear field including development, system design and project management. Responsibilities include pressure suppression system tests, reactor test programs, project management and management of special technical programs for General Electric nuclear steam supply systems. Six years in large steam turbine design and development.

EXPERIENCE:

I am Program Manager for the Anticipated Transient Without Scram (ATWS) program in the Nuclear Power System Division of the General Electric Company in San Jose, California. As Program Manager, I have responsibility for this program within General Electric for plants in the design and construction phase. I was assigned the ATWS program in 1978. My duties consist of directing and coordinating the design and application activities for the implementation of ATWS modifications on several Nuclear Projects.

For nine years prior to my current position, I served as Manager in several groups within GE, including: Manager - Generic BWR 4/5 Programs; Manager - BWR 4 Projects; Manager - Project Engineering; Manager - Nuclear Projects; Project Manager - LaSalle County Station; Manager - Domestic Turnkey Requisition Engineering; Manager - Test Programs, Vallecitos BWR.

My early career with GE began in 1949 at the GE test program and continued with Engineering positions of increasing responsibility, which included research,design and development engineering.

"EXHIBIT A"

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CERTIFICATE OF SERVICE

This is to certify that copies of the foregoing Applicants' Motion for Summary Disposition of Contention 7D, Statement of Material Facts As To Which There Is No Genuine Issue To Be Heard (Contention 7D), and Affidavit of William L. Fiock in Support of Summary Disposition of Contention 7D, were served by deposit in the U. S. Mail, First Class, postage prepaid, this 17th day of July, 1981, to all those on the attached Service List.

Matias F. Travieso-Diaz

Matias F. Travieso-Diaz

Dated: July 17, 1981

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