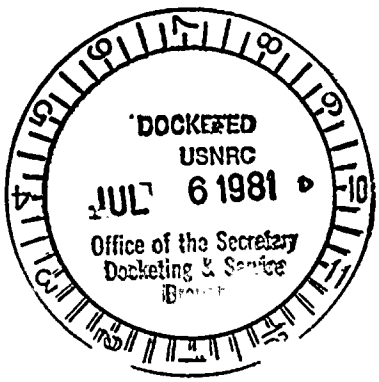
UNITED STATES OF AMERICA

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 JUNIUS WILLIAM MILLARD
IN SUPPORT OF SUMMARY DISPOSITION
OF CONTENTION 19

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

Junius William Millard, being duly sworn according to law, deposes and says:

1. I am Project Manager, Susquehanna Project, General Electric Company ("GE") and give this affidavit in support of Applicants' Motion For Summary Disposition of Contention 19. 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 19 states that the Environmental Report (ER) and the Final Safety Analysis Report (FSAR) "are inadequate in that they do not discuss an accident such as actually occurred at the Three Mile Island Unit 2 facility". While such an accident is not specifically discussed in the ER and the FSAR, that does not render those documents inadequate. The design and operation of the Susquehanna units are such that a TMI-type accident is very unlikely to occur. In addition, should

one or more of the events in the TMI sequence occur during operation of the reactor, its design capability is sufficient to successfully mitigate the consequences and prevent significant radiation releases.

3. The TMI accident was a small break loss of coolant accident ("LOCA") which was not recognized by the plant operators. The accident was complicated by a series of equipment failures and operator errors which combined to produce severe damage to the plant. The major complications encountered at TMI and the features in the Susquehanna design which would prevent or accommodate each complication are discussed below. The discussion demonstrates that there are unique features and characteristics of the boiling water reactors ("BWRs") used in Susquehanna which will provide protection against, and mitigation of, accidents of the type which occurred at TMI.

4. TMI Initiating Event: Loss of Heat Sink. The TMI accident began with a loss of feedwater and unavailability of auxiliary feedwater which combined to deprive the reactor of its heat sink. The Mark-II containment design used in the Susquehanna units has a large suppression pool inside the containment which provides a passive heat sink for primary system energy during a loss of coolant accident. This heat sink capacity is sufficient to accommodate decay heat from the reactor for several hours with the reactor isolated from its normal heat sink. This provides the operator with ample time to establish active containment cooling following a loss of coolant accident. Thus, the occurrence at Susquehanna of the crucial initiating event of the TMI accident is very improbable.

5. Small Break LOCA Through Stuck-Open Relief Valve. The TMI event became a small break LOCA when a power operated primary relief valve stuck open, leading to the overpressurization of its quench tank, discharge of primary system water to the containment, and activation of the emergency core cooling system. Susquehanna has safety relief valves ("SRVs") which are designed to open to relieve pressure increases that occur during expected transients and during certain accident conditions. Each SRV is piped to the large suppression pool. The containment is not pressurized by SRV blowdown and the normal makeup system maintains the reactor water level without initiation of emergency core cooling systems

(ECCS). If an SRV were to stick open, the reactor would begin to depressurize due to the loss of steam out of the reactor vessel. Within a few seconds after the start of such a depressurization transient, the turbine control valve will close, and the reactor vessel pressure will stabilize. Ample time would be available for corrective action to be taken by the operator. In short, there are no TMI-type complications arising from SRV actuation and subsequent failure to close; such an event would be only a minor transient at Susquehanna.

6. Incorrect Reactor Water Level Estimation. The TMI operators were misled into believing that the reactor core was sufficiently covered due to their relying on the pressurizer level to give an indirect (and ambiguous) measure of the water level in the reactor. At Susquehanna, however, the water level in the reactor vessel is measured continuously and directly using differential pressure cells. The reactor water level is also displayed redundantly in the control room at the reactor control console in full view of the operator.

7. Boiling in the Core - The TMI operators did not recognize and therefore did not respond promptly to the existence of boiling in the reactor. Boiling, however, is the normal mode of BWR operation. Water is circulated directly through the reactor core where it boils to produce saturated steam which is separated from recirculation water, dried in the top of the vessel, and directed to the steam turbine generator. Therefore, since boiling is normal in BWRs, there is no problem requiring operator action.

8. Noncondensible Gases - The noncondensible gases trapped in the TMI reactor vessel could not be vented and inhibited natural circulation cooling. The Susquehanna vessel can be vented either through the SRVs or through a vessel dome vent line. Any noncondensibles formed in the BWR rise to the top of the vessel by virtue of the same phenomena and by the same route as the steam that is generated in the core. During reactor shutdown conditions, noncondensibles are swept with the steam either to the condenser (via the turbine bypass valve) or to the suppression pool (via the SRVs). The reactor vessel head can also be vented to the drywell remotely from the control room. Whether or not noncondensibles are vented from the top of the vessel, the formation of

noncondensibles will not hinder natural circulation during an abnormal event, nor will it result in a blockage condition that could hamper eventual recovery of the core.

9. Natural Circulation - Natural circulation at TMI was interrupted by voids resulting from boiling and noncondensible gases trapped in the primary system. As noted above, neither boiling nor non-condensible gases are obstacles to natural circulation at Susquehanna. Moreover, strong natural circulation internal to the reactor vessel is a significant inherent feature of the Susquehanna reactors, which are capable of operating at significant power under natural circulation conditions while retaining core cooling margins.

10. The primary natural circulation loop at Susquehanna is between the downcomer and the core. This natural circulation flow is established by boiling in the core region which causes a large difference in coolant density. This density difference becomes the driving force for natural circulation flow from the downcomer through the jet pumps and into the shroud region.

11. A second natural circulation loop also exists (see Figure 1), as an internal loop between the fluid in the bypass region and in the boiling region within the active fuel. Again driven by the density difference between these two regions, this natural circulation causes water to flow downward through the bypass and into the bottom of the active fuel bundles through the normal bypass leakage paths. Unevaporated water is recirculated to the bypass region at the top and the difference is made up from the water inventory in the upper plenum. Thus a second natural water circulation through the active core is maintained as long as water inventory in the upper plenum is not depleted.

12. With the reactor shut down, these natural circulation mechanisms provide adequate core cooling as long as the core is covered. For an accident of the type experienced at TMI, maintenance of natural circulation at the Susquehanna units would occur automatically and would not require operator action.

13. Depressurization - The TMI reactor was maintained partially pressurized following the accident because of concern over boiling in the reactor and possible core uncovery due to expansion of the noncondensible gas bubble. Since the Susquehanna units are designed for

boiling and have provision for venting of noncondensible gases, they can be safely depressurized during an emergency. Rapid depressurization through the SRVs to the suppression pool can be initiated either automatically or manually.

14. Cooling of the Uncovered Core - Partial uncovering of the core at TMI led to inadequate core cooling and resulted in core damage. The Susquehanna reactors are designed with a multiplicity of water sources and injection delivery systems to maintain adequate core cooling. The diverse and redundant water supply capability to the Susquehanna reactor vessels is partly due to the direct cycle BWR design in which normal pumping systems, (feedwater, control rod drive cooling, and reactor core isolation cooling (RCIC)), provide makeup water to the reactor vessel. In addition, the emergency core cooling system (ECCS) assures adequate cooling during an emergency via high pressure core injection (HPCI), low pressure coolant injection (LPCI), or low pressure core spray (LPCS). These systems include the capability to spray the core from above and refill it from below at both high and low pressure.

15. RCIC is initiated automatically when the water level in the reactor vessel drops below a preselected level. RCIC supplies makeup water from the condensate storage tank (primary source), from the suppression pool, or, following manual operator action, from the steam condensed in the residual heat removal system (RHR) heat exchangers. Through these sources, RCIC maintains sufficient makeup water in the vessel to cool the core. It then maintains the reactor in safe standby condition or allows for complete plant shutdown.

16. HPCI is a high pressure system designed to provide makeup water in the event of loss of reactor coolant inventory. The system permits the plant to shut down while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. Operation of the system is automatically initiated from signals indicating low reactor water level or high drywell pressure. The HPCI pump initially draws water from the condensate storage tank and automatically switches to the suppression pool with condensate tank low water level indication or when the high suppression pool water level is reached. For Susquehanna, the HPCI injection valve will close on a high reactor water level signal and will reopen if another low water level signal is received.

17. LPCI is a low pressure system designed to restore and maintain the water level in the reactor vessel after a LOCA so that the core is sufficiently cooled to prevent fuel cladding heat up. The LPCI pumps are initiated by either 1) high drywell pressure when reactor pressure is low or 2) low reactor water level. This reduction in reactor pressure may be caused by the break itself, or by the initiation of the automatic depressurization system or a combination of both. Water is supplied to the vessel from the suppression pool.

18. LPCS is a second low pressure system designed to prevent fuel cladding heat up in the event the core is uncovered by a loss-of-coolant accident. The cooling is accomplished by directing jets of water over the fuel assemblies from spray nozzles mounted on a ring above the reactor core. The LPCS is initiated on low reactor water level, or high drywell pressure when the reactor pressure is low. Water is supplied to the vessel from the suppression pool. The system continues to operate until it is manually stopped by the operator.

19. These systems (HPCI, RCIC, LPCI, LPCS) together with the inherent natural circulation, provide adequate decay heat removal capability.

20. Radiation Release - TMI released radiation to the environment because there were incomplete containment isolation and containment bypass leakage. The Susquehanna units are designed so that primary containment isolates at the same time the emergency core cooling systems are initiated. All systems which are not required for accident mitigation are provided with two isolation valves in series on each line penetrating the primary containment. Both valves are actuated upon an isolation signal. Containment isolation is accomplished by safety grade instrumentation, actuators and valves. Reopening any isolation valve requires specific operator action.

21. Moreover, the Susquehanna units have been designed with a pressure suppression system within containment to absorb the energy and radioactivity released during an accident. The primary containment itself is conservatively designed to withstand applied loads which may result from an accident. The drywell, which is the upper portion of the primary containment, is connected to the pressure suppression pool and channels the air-steam mixture released during an accident to the suppression pool.

22. The suppression pool serves as an effective second barrier to radioactive releases. A process of decontamination takes place at the pool by "scrubbing" steam or fluid releases from the primary coolant system and reducing their content of radioactive materials. For postulated events which lead to radioactivity releases, the decontamination factor is in the range of 100 to 1000. Any radioactive matter that passes through the suppression pool or remains in the drywell is contained by the primary containment.

23. Within primary and secondary containment are those systems which process primary coolant and containment radioactive materials and are required to operate in the event of a LOCA. All leakage from the primary containment or through containment penetrations, or from emergency core cooling systems, goes into the secondary containment, which encloses the primary containment. Radioactive materials are prevented from direct release to the outside environment since the secondary containment volume is maintained at a negative pressure during accident conditions by the Standby Gas Treatment System ("SGTS"). The SGTS is safety grade and includes high efficiency filters, so that gaseous discharges from the secondary containment to the outside environment would be filtered and the radioactive material concentration substantially reduced. The secondary containment provides, therefore, a third barrier against, and further reduction factors and dilution of, all radioactive releases. The Susquehanna containment design thus provides a multiple barrier approach for retention and control of radioactive material releases in the event of an accident.

James William McDonald
[Name]

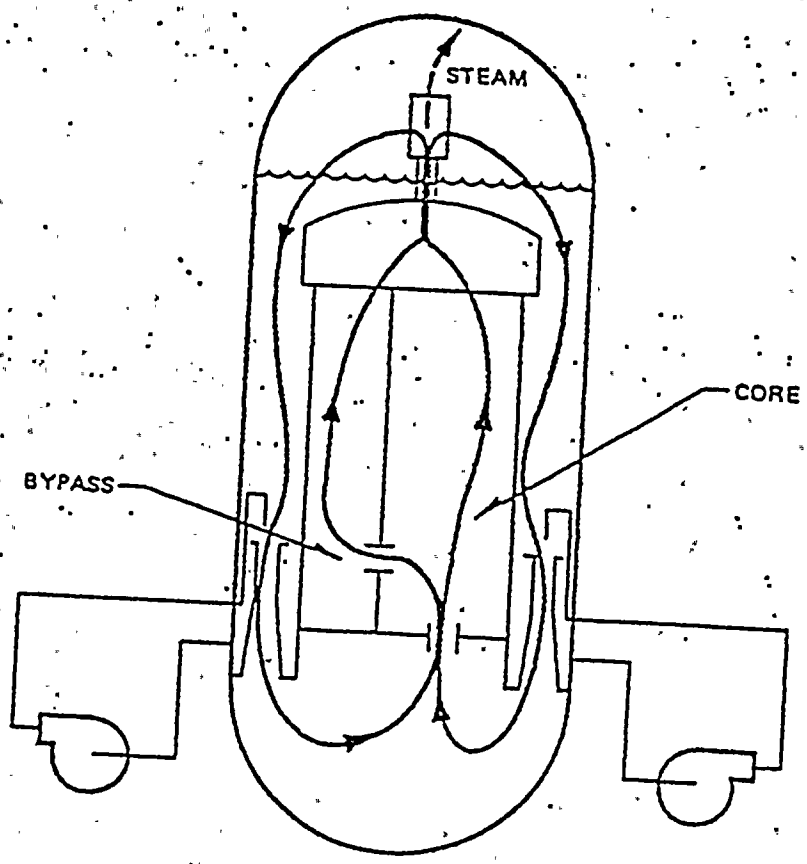
Sworn to and subscribed before me
this 19th day of June, 1981

Ruthe M. Kinnamon
Notary Public

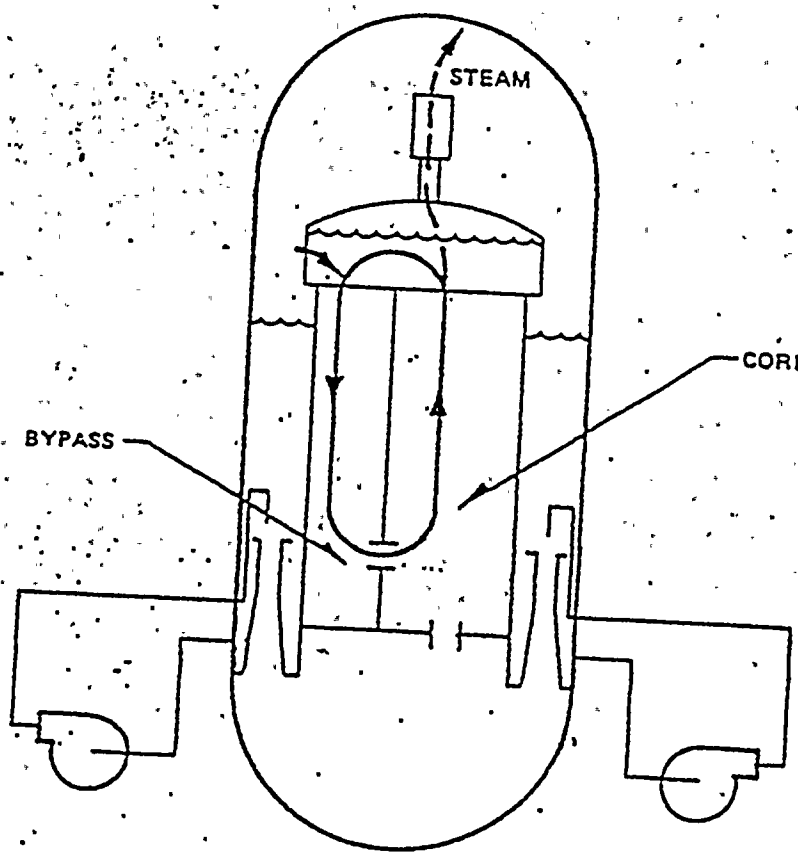
OFFICIAL SEAL
RUTHE M KINNAMON
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My comm. expires APR 26, 1985

LS:csc/182L

175 Curtner Avenue, San Jose, CA 95125



A. NORMAL NATURAL CIRCULATION



B. INTERNAL LOOP CIRCULATION

Figure 1 -- BWR Natural Circulation

JUNIUS WILLIAM MILLARD

Education

BS, Mechanical Engineering (with distinction), Stanford University, 1952.

MS, Mechanical Engineering, Stanford University, 1956.

Experience:

I am a Nuclear Power Plant Project Manager employed by the Nuclear Energy Projects Division of the General Electric Company in San Jose, California. Since 1976, I have been assigned as Project Manager on the Nuclear Steam Supply System supplied to Pennsylvania Power & Light Company for use at the Susquehanna Steam Electric Station. As such, I have overall responsibility for the General Electric effort on this project. My duties consist of directing and coordinating the design, fabrication and supply of the plant nuclear systems and components, together with the necessary supporting analysis. I am also responsible for providing technical direction to the utility and his agents for construction, testing and startup of the reactor and its associated systems. Finally, I serve as the principal contact between General Electric and the many outside agencies involved in the Susquehanna Project.

Prior to my current assisgnment, I spent three years as Project Manager on the Bailly Generating Station Nuclear-1 provided to the Northern Indiana Public Service Company. My duties were similar to those in my current assignment.

In 1973 I was assigned as Senior Project Engineer on the Perry Nuclear Steam Supply Project being provided by General Electric to Cleveland Electric Illuminating Company. In this capacity, I provided technical support and guidance to the utility customer and his agents. My further responsibilities were to review and approve engineering documents, to define project requirements to the engineering department, to ensure contract commitments were met and to coordinate any changes in these commitments.

Prior to coming to San Jose, I directed the General Electric effort to develop specific products for the off-shore oil industry market with responsibility for all phases of the effort including selection of approach, product development, manufacture, marketing, sales, distribution and service. Products included an oil water separator and a special underwater manipulator.

From 1963 to 1968, I was a Program Manager on many nuclear thermo-electric power supply programs conducted for the AEC, DOD and NASA. This involved responsibility for customer interface, technical performance, cost and schedule control, and contract satisfaction.

While employed at KAPL between 1956 and 1963, I worked in the following Naval Nuclear Power Plant Projects:

EXHIBIT A

S5G, I was responsible for system performance studies of the reactor/power plant combination including the effects of natural circulation and ship motion.

D1G/D2G, I was a safeguards engineer responsible for all aspects of the reactor and plant safety.

S3G/S4G, I was responsible for thermal and hydraulic analysis of the reactor core. I prepared, monitored and evaluated several special reactor test programs.

My career began in 1952 with the U. S. Navy where I was qualified in submarine and was a destroyer engineering officer.

In addition to my educational background and experience, I am a certified Professional Engineer in the State of California in Nuclear Engineering.

JWM:pes/444-5

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

CERTIFICATE OF SERVICE

This is to certify that copies of the foregoing "Applicants' Motion for Summary Disposition of Contention 19", "Applicants' Statement of Material Facts As To Which there Is No Genuine Issue To Be Heard (Contention 19)", "Applicants' Brief in Support of Motion for Summary Disposition of Contention 19" and "Affidavit of Junius William Millard in Support of Summary Disposition of Contention 19", were served by deposit in the United States Mail, First Class, postage prepaid, this 1st day of July, 1981, to all those on the attached Service List.

Jay E. Silberg

Dated: July 1, 1981

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NUCLEAR REGULATORY COMMISSION

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	)	
(Susquehanna Steam Electric Station, Units 1 and 2)	)	

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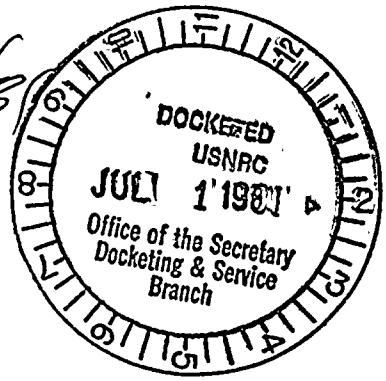
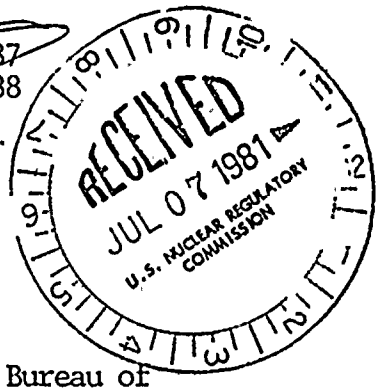


UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

PENNSYLVANIA POWER & LIGHT CO. and ALLEGHENY ELECIRIC COOPERATIVE, INC. (Susquehanna Steam Electric Station, Units 1 and 2)	:	Docket Nos 50-387 50-388



COMMONWEALTH OF PENNSYLVANIA'S ANSWER TO CAND MOTION TO DISMISS, AND MOTION TO AMEND INTERVENTION STATUS

On June 18, 1981, CAND moved to dismiss the Pennsylvania Bureau of Radiation Protection from these proceedings, "but only on the condition that the Radiation Bureau be replaced on an order of the ASLB by the several other agencies of the Pennsylvania Department of Environmental Resources, and by the Susquehanna River Basin Commission." Citizens Against Nuclear Dangers Status Report on Discovery Proceedings and Motions Concerning Intervention (June 18, 1981), at 4. The Bureau of Radiation Protection opposes this motion.

The Bureau of Radiation Protection was admitted as an interested state agency pursuant to 10 C.F.R. §2.715(c). Special Prehearing Conference Order, LBP-79-6 (March 6, 1979), at 3. As such, the Bureau has the right, at its discretion, to "participate and to introduce evidence, interrogate witnesses, and advise the Commission without requiring the representative to take a position with respect to the issue." 10 C.F.R. §2.715(c). An interested state participant has no legal duty to take any given action or to adopt any given position in an NRC proceeding. The only limitation on the participation of an

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interested state is that the "presiding officer may require such representative to indicate with reasonable specificity, in advance of the hearing, the subject matters on which he desires to participate." Id. The Board and the parties will receive a report, prior to the commencement of the hearing, on the subject matters on which Pennsylvania desires to participate.

CAND is correct, however, on its observation that the intervention on behalf of the Pennsylvania Department of Environmental Resources, Bureau of Radiation Protection, is unduly narrow in light of the Commonwealth of Pennsylvania's potential interest in all issues in the proceeding. Particularly in the area of emergency planning, the interest of the Commonwealth in this proceeding encompasses other state agencies, such as the Pennsylvania Emergency Management Agency. Consequently, it is hereby moved that the Commonwealth's intervention status in this proceeding be amended to the "Commonwealth of Pennsylvania." The Commonwealth is not empowered to represent the interests of the Susquehanna River Basin Commission, which is an interstate Commission and not an agency or department of the Commonwealth.

As a final note, the Commonwealth takes exception to CAND's allegations regarding the extent of Pennsylvania's participation in this proceeding. The Commonwealth has cooperated freely with all parties who have submitted discovery requests to the Commonwealth. Although the Commonwealth, as an interested state participant, does not recognize any legal obligation to comply with discovery requests, it believes that it is in the interest of its citizens to cooperate as fully as possible with the Board and the parties in order to develop a full and fair record in the proceeding. See, e.g., Responses of Commonwealth of Pennsylvania to First Round

Discovery Requests of Citizens Against Nuclear Danger (June 29, 1979). The Commonwealth will continue to contribute to the record of this proceeding through additional discovery requests, if warranted, through cross-examination, and if necessary through the introduction of direct testimony.

Respectfully submitted,

Robert W. Adler

ROBERT W. ADLER
Assistant Counsel
Commonwealth of Pennsylvania

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

PENNSYLVANIA POWER & LIGHT CO.	:	
and	:	
ALLEGHENY ELECTRIC COOPERATIVE,	:	Docket Nos. 50-387
INC. (Susquehanna Steam Electric	:	50-388
Station, Units 1 and 2)	:	

CERTIFICATE OF SERVICE

I hereby certify that copies of the attached "Commonwealth of Pennsylvania's Answer to CAND Motion to Dismiss, and Motion to Amend Intervention Status" were served on the parties on the attached service list, this 26th day of June, 1981, by deposit in the U.S. mail, first class, postage prepaid.

Robert W. Adler

ROBERT W. ADLER

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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