UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	
	)	

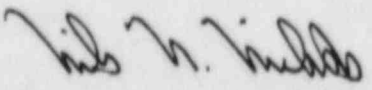
APPLICANT'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW IN THE FORM OF A PARTIAL INITIAL DECISION RELATING TO LEA CONTENTION I-42

Philadelphia Electric Company, Applicant in the captioned proceeding, in accordance with 10 C.F.R. §2.754 and the Atomic Safety and Licensing Board's "Order Scheduling Proposed Findings" (April 27, 1984), hereby submits its Proposed Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision Relating to LEA Contention I-42.

Respectfully submitted,

CONNER & WETTERHAHN, P.C.

Mark J. Wetterhahn



Nils N. Nichols
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June 8, 1984

PARTIAL INITIAL DECISION
(ON LEA CONTENTION I-42)

Preliminary Statement

1. Limerick Ecology Action ("LEA") filed a petition to intervene in the Limerick Generating Station ("Limerick" or "Station") operating license proceeding on September 21, 1981. At a prehearing conference held January 6-8, 1982, this Atomic Safety and Licensing Board ("Board") found that LEA had standing to intervene and admitted, inter alia, its Contention I-42 concerning environmental qualification of safety-related equipment, subject to its further specification.[1/]

2. In our unpublished "Memorandum and Order Confirming Rulings Made at Prehearing Conference," dated October 28, 1983, LEA Contention I-42 was admitted as respecified. Contention I-42 states that:

> The applicant (sic) has not shown compliance with the Commission's rule, Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants, Jan. 21, 1983, 48 FR 2729, 10 CFR §50.49. Particularly, it has neither established a program for qualifying all of the electrical equipment covered by §50.49, nor performed an analysis to ensure that the plant can be safely operated pending completion of

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1/ Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1439, 1497-98 (1982).

> equipment qualification, as required by §50.49(i). Failure to comply will threaten the health and safety of the public.

The City of Philadelphia, which was admitted to the Limerick operating license proceeding as an interested governmental participant, also took part in the litigation of this issue.[2/] Evidentiary hearings were held on April 9-10, 1983 in Philadelphia, Pennsylvania.

Introduction

3. The Applicant presented the testimony of a panel of witnesses relating to Contention I-42. The panel included William J. Boyer, leader of the Environmental Qualification Group of Philadelphia Electric Company's ("PECO") Nuclear Generating Branch; Daniel Thompson, the electrical engineer responsible for the environmental qualification of Nuclear Steam Supply System ("NSSS") equipment at Limerick; Dennis Klein, supervisor of the Bechtel Power Corporation ("Bechtel") licensing group assigned to Limerick; Loren Stanley, President and Principal Consultant of Zytor, Inc., and formerly Quadrex Corporation Group Manager in charge of the Limerick Component Classification Program; Edward Sproat, Electrical Project Engineer, PECO; Thomas Shannon, engineer in charge of the NSSS Branch of the Limerick Power Plant Design Section, PECO; Wesley Bowers, supervising

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2/ Id. at 1456.

engineer in charge of the Nuclear Control Branch of the Control Engineering Section, PECO; and John Doering, Limerick Operations Engineer and Senior Reactor Operator, PECO. These witnesses are qualified in their respective disciplines and the Board has relied heavily upon their testimony.

4. The same is equally true of the witnesses testifying on behalf of the Staff. The Staff presented the testimony of Armando Masciantonio, Environmental Qualification Branch, NRC; and Robert LaGrange, Section Leader, Equipment Qualification Branch, NRC. Both witnesses were highly qualified and their testimony is entitled to great weight. Neither LEA or the City of Philadelphia presented witnesses on this contention.

Summary

5. As applied to the Limerick Generating Station, the scope of equipment required to be considered for environmental qualification was unchanged by the adoption of 10 C.F.R. §50.49 in January 1983. The equipment required to be qualified by §50.49 consists of three subsets of electrical equipment important to safety which is located in a harsh environment. The equipment defined by §50.49(b)(1), safety-related equipment, has been traditionally recognized as requiring environmental qualification and, indeed, the criteria requiring its qualification have been referenced in the Limerick Final Safety Analysis Report ("FSAR") since it was originally submitted to the NRC in March 1981.

6. The new classes of equipment required to be environmentally qualified, which intervenor asserted were not taken into account at Limerick, consist of the subsets of equipment defined in subsections (b)(2) and (b)(3) of §50.49. With respect to the equipment defined in subsection (b)(2), PECO employed a conservative safety classification practice in the design of its systems which resulted in no equipment within the scope of this subsection requiring qualification. Whenever cases were identified during the design process in which the failure of nonsafety-related components could possibly prevent the attainment of safety function objectives, they were eliminated by design modifications or by adding them to the Limerick Q-List and qualifying them as necessary. An equipment safety classification program performed by an independent company verified that Limerick has no equipment falling within subsection (b)(2) requiring qualification.

7. The post-accident monitoring equipment which requires environmental qualification, as set forth in subsection (b)(3), had already been anticipated prior to the adoption of §50.49 and PECO had previously committed to its qualification. The equipment set forth in subsection (b)(3) was defined in December 1980 by Regulatory Guide ("Reg. Guide") 1.97, Rev. 2. PECO committed to meet the requirements set forth in this document in March 1981.

8. Inasmuch as Limerick has no equipment falling within subsection (b)(2) and has committed to meet the

requirements of Reg. Guide 1.97, Rev. 2, regarding subsection (b)(3), plant operators could not be misled by the failure of unqualified equipment falling within the scope of either of these subsections. Moreover, plant procedures assure that only qualified equipment will be utilized if the need arises.

9. Finally, the PECO Environmental Qualification Report ("EQ Report") is not inadequate because no action is identified to correct the alleged deficiency where equipment's qualified life does not equal the plant's 40 year life. A qualified life of less than 40 years is not a deficiency. If the qualified life of any equipment item is less than 40 years, it is scheduled for replacement prior to the end of its qualified life. Otherwise, equipment is routinely scheduled for maintenance on an "as required" basis.

Compliance with 10 C.F.R. §50.49(b)(1)

10. The equipment defined by 10 C.F.R. §50.49(b)(1), safety-related electric equipment, has been traditionally recognized as requiring environmental qualification. This requirement was originally embodied in various General Design Criteria ("GDC") set forth in Appendix A of 10 C.F.R. Part 50. These criteria have been referenced in the FSAR since it was originally submitted to the NRC in March 1981 and the structures, systems and components required to be reviewed for environmental qualification are set forth in the Limerick Q-List.

11. The Limerick Q-List was established in accordance with 10 C.F.R. Part 50, Appendix B, as the controlling document identifying the safety-related structures, systems and components required to assure the: (1) integrity of the reactor coolant pressure boundary; (2) capability to achieve and maintain safe shutdown; and (3) capability to prevent or mitigate the consequences of an accident which could result in potential offsite exposures comparable to the guidelines of 10 C.F.R. Part 100. Bechtel Power Corporation, the Limerick architect-engineer, and the Applicant's engineering staff evaluated all structures, systems and components using the GDC set forth in 10 C.F.R. Part 50, Appendix A, to determine those which are required to achieve the above safety functions and which must, therefore, be included on the Q-List. Information from other boiling water reactor plants was also used in this evaluation since many of them contain systems and components identical or similar to ones used in Limerick. The Q-List has been updated as necessary to reflect design changes. These revisions have been reviewed by both Bechtel and PECO to ensure the correct classification of all structures, systems and components. W. Boyer, et al., ff. Tr. 9529, at 4-5.

12. Under the requirements of §50.49, all equipment must be qualified on the basis of actual tests. The PECO EQ group reviewed the specifications for the tests, the test plans, follow-up reports, and in some cases actually participated in the tests. Tr. 9546-49 (W. Boyer).

Compliance With 10 C.F.R. §50.49(b)(2)

13. Intervenor contended that the adoption of 10 C.F.R. §50.49(b)(2) expanded the scope of equipment required to be environmentally qualified and that the Applicant had not complied with this provision. 10 C.F.R. §50.49(b)(2) provides, in essence, that all nonsafety-related equipment whose failure under postulated environmental conditions could prevent the accomplishment of specified safety functions shall be qualified. Contrary to the intervenor's assertion, the evidence indicated that Limerick's conformance with various regulatory requirements and guidelines, and conservative design practices has resulted in system designs involving no equipment within the scope of subsection (b)(2) requiring qualification. W. Boyer, et al., ff. Tr. 9529, at 7; Tr. 9553, 9575, 9595 (W. Boyer).

14. As part of this process, the interfaces between safety-related electrical components were evaluated during the plant design process and whenever cases were identified in which the failure of nonsafety-related components could prevent attainment of safety function objectives, they were eliminated by implementing design modifications or by adding them to the Q-List and qualifying them as necessary. W. Boyer, et al., ff. Tr. 9529, at 7; Tr. 9554-57 (W. Boyer, Klein, Shannon). The design modifications were reviewed and approved by the Staff. Tr. 9561-62 (Sproat).

Independent Verification Program

15. In addition to the design process described above, PECO retained Quadrex Corporation ("Quadrex") to conduct an independent verification program to ensure that all electrical equipment required to perform a safety function was properly identified. This program was initiated by Quadrex in February 1982. W. Boyer, et al., ff. Tr. 9529, at 9; Tr. 9550-51 (Stanley); Tr. 9562 (W. Boyer); 9616-17, 9619 (Thompson). Quadrex was fully qualified to conduct such a program, having previously conducted similar programs at a number of other nuclear plants. Tr. 9550-51 (Stanley).

16. Using a recognized program, designated Q*5, Quadrex established a Component Classification Program ("CCP") to evaluate electrical components at Limerick. The CCP rules were adopted from previous classification experience gained with both boiling water reactors ("BWR's") and pressurized water reactors ("PWR's"). A wide range of reference documents were also used to develop the classification rules including, inter alia,: the Limerick Final Safety Analysis Report ("FSAR"); NUREG-0737, Classification of TMI Action Plan Requirements; Reg. Guide 1.26, Quality Group Classification Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants; Reg. Guide 1.29, Seismic Design Classification; Reg. Guide 1.97, Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident; ANSI/ANS 4.5-1980, Accident

Monitoring Functions in LWR's; and ANSI/IEEE Std. 279-1971, Criteria for Protection Systems for Nuclear Power Generating Stations. W. Boyer, et al., ff. Tr. 9529, at 9-10.

17. The Q*5 CCP was then initiated by defining specific tasks. Within the first task, the scope of the work and program rules were determined. The work scope was to review Limerick plant systems and their components and to assign a five-character code to each component classifying it in accordance with its relative safety ranking. The standard Q*5 Program Rules were modified as necessary in accordance with PECO's specifications. These modifications included identifying: (1) the equipment's specific safety function in response to a high energy line break ("HELB") or loss of coolant accident ("LOCA"); (2) the safety function for which the equipment is relied upon; (3) the equipment's location; (4) the duration for which it is required to perform its safety function objectives in response to a HELB or LOCA; and (5) the electrical state of the equipment in performing its safety function, i.e., energized, de-energized or alternatively energized and de-energized. W. Boyer, et al., ff. Tr. 9529, at 10-11.

18. The second task was initiated by Quadrex and reviewed by PECO. Under this task, Quadrex prepared a matrix of required systems versus events as defined in Chapter 15 of the FSAR and independently proposed a number of other systems for review. W. Boyer, et al., ff. Tr. 9529, at 11-12.

19. Intervenor cited the emergency lighting system, in-plant communications system, the plant process computer system, and the computer software as examples of systems which were improperly excluded from the classification program. The evidence indicated that these systems and the computer software were properly excluded from the CCP because they are not safety-related as defined by 10 C.F.R. §50.49; they are not relied upon to provide lighting, communications or information, respectively, during a design basis accident in areas which could produce a harsh environment; and their individual or collective failures could not prevent achie ment of the safety function objectives defined in subparagraphs (i) through (iii) of 10 C.F.R. §50.49, paragraph (1). W. Boyer, et al., ff. Tr. 9529, at 11-15.

20. The objective of the third task was tc assure understanding and familiarity with each plant system to be analyzed prior to starting the component classification coding process. The primary source documents discussed in Proposed Finding 16 were used to describe the particular plant system; the safety functions required of that system were identified from the FSAR and System Descriptions. This information was then correlated with results obtained from previously completed Q*5 programs for other BWR plants to further ensure its reliability. W. Boyer, et al., ff. Tr. 9529, at 15.

21. Once this task was accomplished, individual components were identified and classified by their safety functions. For each component, the coding of each identified function was accomplished using the component classification rules. Other components with a functional relationship to the particular component under analysis were also identified on the coding form along with their classification results. An internal consistency check was then provided by comparing the final coding of particular components with the coding of functionally related components. W. Boyer, et al., ff. Tr. 9529, at 16.

22. This check assured that each component was evaluated in the context of its functional relationship to other components. It also provided a means of interrelating each component to other components within a particular system. Furthermore, at each system boundary with other plant systems, this comparison assured that the overall system was evaluated relative to its external interfaces. Finally, the highest overall coding for the particular component was determined for each of the Q*5 positions. W. Boyer, et al., ff. Tr. 9529, at 16-17.

23. There were also two additional levels of review and approval by different individuals within Quadrex of the tasks described above. W. Boyer, et al., ff. Tr. 9529, at 17; Tr. 9624 (Stanley). Moreover, once Quadrex approved and submitted its report to the Applicant, it underwent yet another level of review and approval. Tr. 9624 (Thompson).

24. In addition to the tasks described above, the results of the Quadrex CCP codes were compared against the Bechtel Quality Assurance Drawings ("QAD's") to determine any difference between the codes and the Limerick Q-List. Of the approximately 30,000 components coded, there were 16 electrical equipment classification differences such that equipment was not classified as safety-related by Bechtel, but should have been considered for inclusion in the Limerick EQ program. Of these items, nine were located in a mild environment and another four did not require environmental qualification. The remaining three items were included in the Limerick EQ program. W. Boyer, et al., ff. Tr. 9529, at 22-23.

25. Inasmuch as the Quadrex CCP rules were prepared and implemented prior to the publication of 10 C.F.R. §50.49 in January 1983, they were compared against that rule and it was determined that the CCP rules fully comply with §50.49. This conclusion was also based on a comparison of the Q*5 rules against the guidance provided by draft Reg. Guide 1.89, Rev. 1. Draft Reg. Guide 1.89, Rev. 1, Appendix A, lists each of the typical equipment items or systems important to safety. With the exception of the Auxiliary Feedwater System, which is used only on PWR's, each item of equipment or system important to safety listed in Appendix A was included in the Limerick Q*5 CCP. All applicable examples contained in Appendix B of draft Reg. Guide 1.89, Rev. 1, were also included in the Limerick Q*5 program

except for the turbine generator control system. Its exclusion was based on BWR plant design in that that system is isolated and is also protected by automatic operation of safety-related equipment and instrumentation, such as the main steam line isolation valve closure on low pressure and the reactor protection system trip signals from turbine control valve fast closure and turbine stop valve closure. W. Boyer, et al., ff. Tr. 9529, at 23-25; Tr. 9566, 9594 (W. Boyer).

Compliance with 10 C.F.R. §50.49(b)(3)

26. Intervenor also contended that Station operators could be misled by the failure of equipment that was not qualified in accordance with §50.49(b)(3). The post-accident monitoring equipment defined by subsection (b)(3) is also set forth in Reg. Guide 1.97, Rev. 2, which is referenced in the regulation. As described in FSAR Section 7.5.2.5.1.1.2., the Applicant has committed to the NRC to meet the requirements set forth in Reg. Guide 1.97, Rev. 2, by the time fuel is loaded. W. Boyer, et al., ff. Tr. 9529, at 6; Tr. 9622 (Bowers).

Squib Valves and Keylock Switch

27. Intervenor also asserted that the Standby Liquid Control System squib valves and the related Keylock switch in the control room were improperly excluded from the EQ program. The evidence indicated, however, that the Standby Liquid Control System keylock switch is not located in an area subject to harsh environments and, therefore, is not

within the scope of 10 C.F.R. §50.49 and that the squib valves have been added to Appendix B, "List of Equipment Important to Safety," of the Applicant's EQ Report. W. Boyer, et al., ff. Tr. 9529, at 3, 21.

Correlation of Systems Important to Safety

28. As part of its review, the Applicant also correlated the list of systems important to safety contained in Appendix A of its EQ Report, with the list of such systems contained in FSAR Table 3.2-1 and justified the omission of those systems not included in its Report. Tr. 9576-77 (W. Boyer). Justification for omission from Appendix A is based on the fact that a system is located in a mild environment or is not used to mitigate the effects of an accident. The results of this review were provided to the Staff on January 16, 1984. Tr. 9657-59 (Masciantonio).

29. To ensure the validity of the Applicant's conclusions regarding its omissions from Appendix A, the Staff generated its own list of systems important to safety. Essentially, the six branches of the NRC's Division of Systems Integration developed lists of such systems which were then supplied to the Environmental Qualifications Branch. The list of systems generated by the Staff is generic in some respects and specific to Limerick in other respects. Tr. 9659-60, 9693-96 (Masciantonio). Based on this list, the Staff determined that all omissions from Appendix A of the Applicant's EQ Report were fully justified. Masciantonio, ff. Tr. 9640, at 5-6.

Misleading of Plant Operators

30. Intervenor also contended that plant operators could be misled by the failure of equipment that has not been properly qualified, but which falls within the subsets of equipment defined by subsection (b)(2) and (b)(3) of 10 C.F.R. §50.49. Inasmuch as Limerick has no equipment falling within the scope of §50.49(b)(2) and has committed to environmentally qualify the equipment identified by subsection (b)(3) prior to fuel load, there is no potential for Limerick operators to be misled by the failure of such equipment. Moreover, the Limerick Transient Response Implementation Plan ("TRIP") Procedures assure that plant operators will rely on Reg. Guide 1.97, Rev. 2, equipment when harsh environmental conditions exist in the plant. W. Boyer, et al., ff. Tr. 9529, at 25.

31. The TRIP procedures, which are specific to Limerick, provide direction to control room personnel during design basis and degraded accident scenarios. These procedures are entered when symptoms known as entry conditions are indicated and are designed to specifically remedy such symptoms. W. Boyer, et al., ff. Tr. 9529, at 25-27.

32. Whenever an adverse symptom develops, the operator will immediately enter the applicable procedure and take the corrective action directed by that procedure. That procedure will be followed until its exit conditions are satisfied. If the particular transient continues to degrade,

the operator will enter contingency procedures to handle the more degraded conditions until he can return to the main procedures. W. Boyer, et al., ff. Tr. 9529, at 27.

33. All entry conditions into the TRIP procedures are monitored by environmentally qualified instrumentation. Once in the TRIP procedures, which are set forth in flow chart form, the operator is directed down various action paths. At the beginning of each path, if there is a possibility that the operator might use other than qualified instrumentation in the execution of that procedure, he is conditionally instructed, by cautions contained in the procedure, to utilize specific instrumentation. When an operator encounters a caution, he looks it up on a table contained in the procedure and executes it. The impact of cautions on the actual execution of the TRIP procedures is minimal since the instrumentation that must be used is either the instrumentation the operator would normally choose under those conditions or the only qualified instrumentation available to monitor that parameter. W. Boyer, et al., ff. Tr. 9529, at 28-29; Tr. 9601-11 (Doering).

34. While many TRIP procedures use only instrumentation that has been environmentally qualified, they are not limited solely to the use of such instrumentation. In fact, there are only three paths under which an operator is directed, under adverse conditions, to use only qualified instrumentation. The evidence indicated that to limit an

operator to the use of qualified instrumentation without any indication of actual adverse environmental conditions in the reactor building could unduly restrict execution of the procedure. This is because environmentally qualified instrumentation may cover a broader range than non-qualified instrumentation and thus, in some circumstances, be less suitable for use because it is less precise. By contrast, the instrumentation an operator normally relies upon is restricted generally to a narrow band around the operating range and is therefore more exact. Tr. 9607-09 (Doering).

35. Limerick has a great deal of environmental monitoring instrumentation in the secondary containment that can be used to determine adverse environmental conditions. These diverse systems include the use of thermocouples, fire protection instrumentation, ventilation monitoring, and temperature instrumentation. Any of these systems can independently indicate the development of adverse environmental conditions and thus alert the operator to utilize the specific instrumentation qualified under Reg. Guide 1.97. W. Boyer, et al., ff. Tr. 9529, at 28; Tr. 9585-86 (Doering).

36. A number of important-to-safety items located in the secondary containment have been exempted from the requirements of Reg. Guide 1.97 because it has been determined that they would not be subjected to a harsh environment under any circumstances. These exemptions are based on a detailed evaluation of safety function

requirements and the time during which the equipment would need to perform its safety function. Specifically, this analysis considered the requirements for each specific equipment item, the accidents the equipment would be used to mitigate, the point at which the equipment would be utilized, and the environmental conditions that would exist at that time. The Staff has reviewed the criteria used in the exemption analysis and found them to be appropriate. Tr. 9587-89 (W. Boyer).

Maintenance Requirements

37. Intervenor also contended that PECO's EQ program is inadequate because in those cases in which equipment's qualified life does not equal the 40 year plant life, no action is identified to correct the deficiency. To the contrary, the evidence indicated that the environmental qualification of instrumentation and other electrical equipment is contingent upon the performance of required maintenance and replacement at the end of its designated life. The designated life of equipment is the period of normal plant operation during which the equipment is expected to operate satisfactorily and still perform its safety function. In some cases, the designated life of certain equipment is 40 years, the length of the Station's license. In other instances, the designated life is less than 40 years. W. Boyer, et al., ff. Tr. 9529, at 32-33; Tr. 9581 (W. Boyer).

38. As part of the environmental qualification documentation review process, maintenance requirements related to the environmental qualification of electrical equipment are documented on individual equipment environmental qualification review records ("EQRR's"). The maintenance requirements for that item are identified on the EQRR by reference to applicable sections of the test reports and other documentation. W. Boyer, et al., ff. Tr. 9529, at 33.

39. Each EQRR is reviewed by the Limerick Plant Staff Maintenance Group to determine if it contains information concerning required replacement intervals or maintenance activities that are necessary to maintain qualification of the equipment during its designated life. If the EQRR indicates that the designated life of an item is greater than 40 years and that no maintenance is required to maintain its environmental qualification, no further review is necessary. When maintenance activities are required to sustain environmental qualification, the documents listed in the Maintenance Requirements section of the EQRR are reviewed and the required activity, including its frequency, is listed on a Maintenance Group form. This information is then incorporated within plant procedures and into a computer program to ensure that the desired activity is carried out on the proper schedule. When the EQRR indicates that equipment has a designated life of less than 40 years, its replacement schedule is listed on a Maintenance Group form. After determining the required maintenance or

equipment replacement activities, a list of procedures necessary to implement those activities is then established. W. Boyer, et al., ff. Tr. 9529, at 34; Tr. 9581-82 (W. Boyer).

Staff Review of Limerick EQ Program

40. The Staff has reviewed the Applicant's EQ program for completeness, accuracy and conformance to the established requirements. This review included determining the proper definition of the scope of the program as defined by 10 C.F.R. §50.49, proper definition of postulated environments and demonstration of qualification in accordance with NRC rules and regulations. Masciantonio, ff. Tr. 9640, at 4-5; Tr. 9649-50 (Masciantonio).

41. As noted previously, to assure that all equipment required to be qualified was included in the Applicant's EQ program, the Staff compared the "List of Systems Important to Safety" submitted by PECO as Appendix A of its EQ Report with a Staff generated list of systems, their required safety functions and operability times. Also, as noted previously, on December 19, 1983, the Staff requested PECO to correlate the systems listed in Appendix A of its Report with the systems listed in FSAR Table 3.2-1, which constitutes a list of all plant systems and subsystems, and to justify any omissions. PECO responded to this request on January 16, 1984. Based on this information, the Staff determined that the Applicant had adequately justified all

omissions from Appendix A. Masciantonio, ff. Tr. 9640, at 5-6; Tr. 9645-46, 9668, 9673 (Masciantonio).

42. Additionally, the Staff compared the total number of components and equipment types set forth in the Limerick EQ program with other plants of similar design and reviewed the process used to select the components that were included in the program. Masciantonio, ff. Tr. 9640, at 6; Tr. 9646, 9674 (Masciantonio). Finally, the Staff reviewed the methodology used by the Applicant to arrive at its list of components to ensure that it was appropriate. Tr. 9646 (Masciantonio).

43. The Staff then reviewed conformance of PECO's EQ program with §50.49(b)(2) for nonsafety-related equipment whose failure under postulated accident conditions could affect safety functions. Conformance with §50.49(b)(2) is determined by reviewing the issues set forth in IE Information Notice 79-22 and Reg. Guide 1.75. Masciantonio, ff. Tr. 9640, at 6; Tr. 9665-66, 9668, 9678, 9686 (Masciantonio); Tr. 9684-88, 9708-09 (LaGrange).

44. IE Information Notice 79-22, "Qualification of Control Systems," deals with the performance of nonsafety-grade equipment subjected to an adverse environment which could impact the protective functions performed by safety-grade equipment. Masciantonio, ff. Tr. 9640, at 6; Tr. 9666, 9681 (Masciantonio). Although the Staff's review under Information Notice 79-22 is not yet complete, Section 7.7.2.1 of the Staff's Safety Evaluation Report ("SER") has

identified what the Applicant's response to this request must include and what the Staff must be able to conclude in order to resolve this matter. Tr. 9670-61, 9708-11 (LaGrange, Masciantonio). In short, the items remaining open for review have well defined criteria that can readily be applied to determine their acceptability. Tr. 9707-09 (LaGrange, Masciantonio).

45. Reg. Guide 1.75, "Physical Independence of Electric Systems," provides another review criterion assuring that there is no adverse interaction between safety-related and nonsafety-related equipment. Specifically, this document provides guidance for complying with the requirements for physical independence of those circuits and electric equipment associated with the Class 1E power system, the protection system and other related systems. The Staff's review of the Limerick EQ program's conformance to Reg. Guide 1.75 is complete and has been found acceptable, as set forth in Chapter 8 of the SER. Masciantonio, ff. Tr. 9640, at 7; Tr. 9665-66 (Masciantonio); 9709 (LaGrange, Masciantonio).

46. To verify that the necessary equipment is indeed qualified for the conditions under which it is required to operate, the Staff reviewed the EQRR summary sheets that were provided as Appendix E of the Applicant's EQ Report. The Staff also audited PECO's equipment qualification files to verify the bases of the submitted information and to establish that the Applicant properly understood those

factors necessary to the proper qualification of equipment. Masciantonio, ff. Tr. 9647, at 8-9, 11; Tr. 9642, 9697 (Masciantonio). Essentially, the Staff selected 12 equipment qualification files representing approximately 10% of the items in the EQ program for a detailed review. These files were examined for completeness and to determine if qualification were actually demonstrated. Masciontonio, ff. Tr. 9460, at 11; Tr. 9642 (Masciantonio). The Staff primarily relied upon past experience to determine the items it selected to be audited. For example, equipment that has surfaced in past reviews on other plants as being unqualified, that has historically failed under LOCA conditions and that has never been previously audited constitute items that would likely be examined. Tr. 9650-51, 9695-98 (Masciantonio). In all cases, it was determined that adequate proof of qualification was established. Masciontonio, ff. Tr. 9460, at 11; Tr. 9643 (Masciantonio). On this basis, the Staff concluded that the Applicant's EQ program is acceptable. Tr. 9695-98 (Masciantonio).

47. Also as part of its audit, the Staff conducted a plant walkdown to inspect the equipment as it was actually installed and to verify manufacturer and model number and proper installation of the equipment in a manner consistent with the qualification documents. No violations were discovered during this exercise, thus further indicating the validity of PECO's EQ program. Masciontonio, ff. Tr. 9640, at 11; Tr. 9642-43 (Masciantonio).

Human Interaction Review

48. Contrary to the intervenor's assertions, a human interaction review is not a requirement of the Applicant's EQ program pursuant to 10 C.F.R. §50.49. Masciantonio, ff. Tr. 9640, at 8. 10 C.F.R. §50.49 fully defines the requirements for environmental qualification and there is no requirement in that rule that a human interaction review be conducted. Tr. 9661 (Masciantonio).

Status of Staff's Review

49. As of this time, the Staff has determined that a program for qualifying electrical equipment within the scope of §50.49 has been established for Limerick. The Staff has not yet completed its review, however, and no approval of that program has been issued. Masciantonio, ff. Tr. 9640, at 11. Yet to be reviewed are the remaining EQRR's (approximately 20% of the total), the information requested under Information Notice 79-22 and the subsection (b)(3) post-accident monitoring equipment committed to be installed pursuant to Reg. Guide 1.97. Before an operating license will be issued, all equipment items in the Limerick EQ program must be demonstrated to have been qualified or a justification for interim operation, as provided for by §50.49, must have been submitted and approved by the Staff for each item that is not fully qualified. Masciantonio, ff. Tr. 9640, at 14.

50. Contention I-42, as litigated by LEA and the City of Philadelphia, concerns the scope of the Applicant's EQ

program and particularly whether the equipment classified under subsections (b)(2) and (b)(3) was properly considered. Inasmuch as the Staff's review of the Applicant's conformance to Reg. Guide 1.75 is complete and the necessary requirements to establish conformance with Information Notice 71-22 are set forth in the SER; and inasmuch as the Applicant has committed to install any post-accident monitoring equipment required under subsection (b)(3) prior to fuel load, the Board finds that completion of the Staff's review is not a condition prerequisite to its issuance of a partial initial decision.

51. The Staff has indicated the criteria by which the outstanding items in the Applicant's EQ program are to be evaluated, including the criteria set forth in §50.49 and NUREG's 0800 and 0588, and that the Applicant is aware of these requirements. The Staff's SER will not be closed out until compliance with these criteria have been demonstrated. Accordingly, the Board may properly issue its decision on LEA Contention I-42 at this time.

Conclusions of Law

52. Based upon the foregoing Findings of Fact, which are supported by reliable, probative and substantial evidence as required by the Administrative Procedure Act and the Commission's Rules of Practice, and upon consideration of the entire evidentiary record in this proceeding, the Board reaches the following conclusions pursuant to 10 C.F.R. §2.760a:

(1) The Applicant has fully complied with the requirements set forth in 10 C.F.R. §50.49. Specifically, it has established a program for qualifying all electrical equipment at Limerick encompassed within §50.49. It was not necessary to analyze the ability of the plant to be safely operated pending completion of the equipment qualification program inasmuch as all relevant equipment will be qualified prior to fuel load.

(2) Limerick has no equipment falling within the category designated by 10 C.F.R. §50.49(b)(2). Consequently, the postulated post-accident failure of nonsafety-related equipment could not degrade any safety function or mislead plant operators.

(3) The feedwater control system, emergency lighting system, the communications system, the plant process computer system, and the computer software were reviewed for inclusion in the Applicant's Environmental Qualification program and it was determined that they do not fall within the purview of 10 C.F.R. §50.49.

(4) Those systems required to mitigate the consequences of a loss of coolant accident or a high energy line break were fully considered and included within the list of systems and equipment to be qualified where necessary.

(5) A human interaction review is not required by 10 C.F.R. §50.49.

(6) The Applicant has an effective program to maintain and replace equipment as necessary in those cases in which

the qualified life of equipment is not equal to the 40 year licensed life of the plant.

(7) The Keylock switch and the Standby Liquid Control System do not fall within the scope of 10 C.F.R. §50.49 and were therefore properly excluded from the Applicant's Environmental Qualification program. The squib valves have been added to the Environmental Qualification Report "List of Equipment Important to Safety".

APPENDIX A

WITNESS LIST

APPENDIX B

Exhibit List

Applicant

Exhibit Description	Transcript Page	Identified at Transcript Page	Admitted at Transcript Page
PECO Ex. 7	Limerick Generating Station Site Plan, AB-207392-5, August 31, 1970.	5357	5357
PECO Ex. 8	Color Photograph of Cooling Tower Plumes Coming from the John Amos Plant.	6236	6236
PECO Ex. 9	Cooling Towers and the Environment, Major Contributors: Maynard Smith, Mark Kramer and David Seymour, October 1974.	6413	6413
PECO Ex. 10	Amos Cooling Tower Flight Program, Test No. 48A, March 11, 1975.	6649	6649
PECO Ex. 11	Douglas Point Power Plant Site Evaluation Final Report, Vol. 1, Part 2, L.C. Kohlenstein, Project Engineer, Published by the Johns Hopkins University Applied Physics Laboratory, January 1976.	6650	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
PECO Ex. 12	John E. Amos Cooling Tower Flight Program Data, Conducted for the American Electric Power Service Corporation by Smith-Singer Meteorologists, Inc., December 1975-March 1976.	6765	
PECO Ex. 13	Environmental Measurements of Power Plant Cooling Tower and Stack Plumes, Final Report for AEC, ERDA and DOE, Conducted by the Department of Meteorology, Pennsylvania State University, Edited by D.W. Thomson, R.G. de Pena, J.A. Pena, Updated.	6868	
PECO Ex. 14	Table 2.2-3 of the Limerick Generating Station Final Safety Analysis Report, "Airports Within Ten Miles of the Site," Rev. 4, 05/82.	6972	
PECO Ex. 15	Figure 1, One page document, Free Air-Burst Blast Environment	8214	8214
PECO Ex. 16	Figure 1, One page document entitled "Air-Burst Blast Environment"	8214	8214
PECO Ex. 17	Figure 2, One page document entitled "Surface-Burst Blast	8214	8214

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	Environment."		
PECO Ex. 18	Figure 3, One pag document entitled "Site Plan" AB-207392-5 indicating the postulated line of centroids of detonation (parallel to Columbia Pipe Line)	8214	8214
PECO Ex. 19	Figure 4, one page document entitled "Cooling Tower General Arrangement"	8214	8214
PECO Ex. 20	Figure 5, One page document entitled "Cooling Tower Section Looking North"	8214	8214
PECO Ex. 21	Figure 6, One page document entitled "Cooling Tower Looking West"	8214	8214
PECO Ex. 22	Figure 7, Single page, large scale drawing entitled "Seismic Category I Underground Facilities"	8214	8214
PECO Ex. 23	Figure 8, single page, large scale sheet entitled "Profiles of RHR & ESQ Pipes Showing Ground Cover"	8214	8214
PECO Ex. 24	Figure 9, single page, large scale sheet entitled "Profiles of Cat. 1 Electrical Duct Banks Showing	8214	8214

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	Ground Cover"		
PECO Ex. 25	Figure 10, one page document entitled "Intense Storm Site Runoff Pattern: General Plan," Figure 2.4-4, LGS FSAR.	8214	8214
PECO Ex. 26	Figure 11, one page document entitled "Intense Storm Site Runoff Pattern: Spary Pond and Cooling Tower Areas," Figure 2.4-5, LGS FSAR.	8214	8214
PECO Ex. 27	Figure 12, one page document entitled "Duct Bank Sections"	8214	8214
PECO Ex. 28	Figure 13, one page document entitled "Buried Pipe Bedding"	8214	8214
PECO Ex. 29	Environmental Qualification Report for Limerick Generating Station, Units 1 and 2. October 1983.	9531	9532
PECO Ex. 30	Letter dated January 16, 1984 transmitting document entitled "Additional Information Required for Limerick Environmental Qualification Program."	9534	9534
PECO Ex. 31	Letter dated February 16, 1984 from J.S.	9537	9537

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	Kemper to A.S. Schwencer conveying Figure 4, "Calculated Reactor Enclosure LOCA Temperature Profile" and Enclosures 1 and 2		
PECO Ex. 32	Emergency Plan, Limerick Generating Station, Units 1 and 2 (through Rev. 8), Section 3, Section 4, Section 5.2.2, Section 5.3.2, Section 5.3.3 (Table 5-5), Section 6, Section 7.1, Section 7.3, Section 7.4, Section 7.5 (Table 7-3, Table 7-4, Table 7-5, Figure 7-2), Section 8.1.1, Section 8.3 (Table 8-1), Appendices A, B, E, I, Answers to NRC Questions 810.5b, 810.13, 810.18, 810.24, 810.30, 810.32, 810.33, 810.35, 810.37, 810.40, 810.41, 810.45, 810.46, 810.47, 810.48, 810.49, 810.53, 810.54, 810.55, 810.57 and 810.59	9772	9773, 9996
PECO Ex. 33	Emergency Plan Implementing Procedures, Limerick Generating Station, EP-101 (Classification of Emergencies), EP-102 (Unusual Event Response), EP-103 (Alert Response), EP-104 (Site Emergency Response),	9772	9773, 9996

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	EP-105 (General Emergency Response), EP-110 (Personnel Assembly and Accountability), EP-201 (Technical Support Center (TSC) Activation), EP-202 (Operations Support Center (OSC) Activation), EP-203 (Emergency Operations Facility (EOF) Activation), EP-208 (Security Team Activation), EP-210 (Dose Assessment Team), EP-220 (Radiation Protection Team Activation), EP-221 (Personnel Dosimetry, Bioassay, and Respiratory Protection Group), EP-222 (Field Survey Group), EP-230 (Chemistry Sampling and Analysis Team Activation), EP-250 (Personnel Safety Team Activation), EP-251 (Plant Survey Group), EP-252 (Search and Rescue/First Aid), EP-254 (Vehicle and Evacuee Control Group), EP-255 (Vehicle Decontamination), EP-260 (Activation of the Firefighting Group), EP-291 (Staffing Augmentation 60 Minute Call Procedure), EP-305 (Site Evacuation), EP-307 (Reception and Orientation of Support Personnel),		

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	EP-313 (Distribution of Thyroid Blocking Tablets), EP-316 (Cumulative Population Dose Calculations for Airborne Releases - Manual Method), EP-317 (Determination of Protective Action Recommendations), EP-325 (Use of Containment Radiation Monitors to Estimate Release Source Term), EP-401 (Entry for Emergency Repair and Operations), EP-500 (Review and Revision of Emergency Plan)		
PECO Ex. 34	Revised Table 4-2 Emergency Plan	9772	9773
PECO Ex. 35	Emergency Procedure Corporate, EP-C-326	9772	9773
PECO Ex. 36	Emergency Procedure Corporate, EP-C-315	9772	9773
PECO Ex. 37	Surveillance Test Procedure ST-7-EPP-351-0, Limerick Generating Station	9772	9773
PECO Ex. 38	Final Safety Analysis Report, Limerick Generating Station, Sections 1.3 (page 1.13-18b), 2.1.2.3, 2.3.3, 2.3.3.2, 3.7.4, 7 5.1.4.2.1.5, 7.5.2.5.1.1.2, 7.6.1.1.6, 11.5, 11.5.2.2.1, 11.5.2.2.11, 11.5.2.3.1, 11.5.4, 11.5.5, 12.3.4,	9772	9773

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	12.5.2.2.4, 12.5.2.2.6, 12.5.3, 12.5.3.2, 12.5.3.4.2, 12.5.3.5, 12.5.3.5.1		
	Section 2.2.3.1.3 and Tables 2.2-1, 2.2-5, 2.2-6	10284	10285
PECO Ex. 39	Environmental Report - Operating License Stage, Limerick Generating Station, Section 6.1.5	9772	9773
PECO Ex. 40	Letter of Agreement dated August 16, 1983 between Hospital of the University of Pennsylvania and Radiation Management Corporation (including attached Radiation Plan entitled "Decontamination and Treatment of Radioactively Contaminated Patient at Hospital of the University of Pennsylvania")	9772	9773
PECO Ex. 41	Letter of Agreement dated June 25, 1982 between Keystone Helicopter Corporation and Radiation Management Corporation	9772	9773
PECO Ex. 42	Letter of Agreement dated January 1, 1984 between Radiation Management Corporation and Applicant	9772	9773
PECO Ex. 43	Letter of Agreement dated April 5, 1984	9772	9773

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	between Pottstown Memorial Medical Center and Applicant		
PECO Ex. 44	Letter of Agreement dated April 2, 1984 between Linfield Fire Company and Applicant	9772	9773
PECO Ex. 45	Letter of Agreement dated April 2, 1984 between Limerick Fire Company and Applicant	9772	9773
PECO Ex. 46	Applicant's Analysis of Minimum Staffing Requirements for NRC Licensees for Nuclear Power Plant Emergencies as required under NUREG-0654, Table B-1	10173	10220
	Limerick Ecology Action		
LEA Ex. 1	Compilation of Attachment P's from Draft #5 of Municipal RERP's regarding service by Goodwill Ambulance	10283	
	Staff		
Staff Ex. 6	NUREG-0911 "Safety Evaluation Report Related to the Operation of Limerick Generating Station," Section 2.2.2, August 1983.	6137	6138 (Bound in ff. 6138)
Staff Ex. 7	Regulatory Guide 1.91 (Revision	6150	6153

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	1), "Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants," February 1978.		
Staff Ex. 8	VFR Terminal Area Chart for the Philadelphia Area, 18th Edition, September 2, 1983.	7104	
Staff Ex. 9	National Transportation Safety Board Pipelines Accident Report. No. NTSB-PAR-76-8, Los Angeles, California, cover pg. and fig. 3, June 16, 1976.	7145	
Staff Ex. 10	NUREG-0570, "Toxic Vapor Concentrations Control Room Following a Postulated Accidental Release," June 1979.	7145	
Staff Ex. 11	Army Technical Manual, TM 5-1300, "Structures to Resist the Effects of Accidental Explosions," TM 5-1300, cover pg., fig.4-4 and 4-12, June 1969.	7146	
Staff Ex. 12	National Transportation Safety Board Pipeline Accident Report No. NTSB-DAR-80-6. Bayamon, Puerto. Rico, cover pg., summary pg. and pgs. 5,12, January 30, 1980.	7147	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
Staff Ex. 13	U.S. Atomic Energy Commission, "Meteorology and Atomic Energy 1968," July 1968.	7147	
Staff Ex. 14	NUREG/CR-1748, "Hazards to Nuclear Power Plants from Nearby Accidents Including Hazardous Materials - Preliminary Assessment," Chemical Engineering, cover page and pgs. F-2, F-4, F-8 and F-11, Undated.	7148	
Staff Ex. 15	"Unconfined-Vapor Cloud Explosions," V.C. Marshall, June 14, 1982.	7148	
Staff Ex. 16	"Conditions of External Loading of Nuclear Power Plant Structures by Vapor Cloud Explosions and Design Requirements," W. Geiger, Undated.	7149	
Staff Ex. 17	"Transactions of the 4th International Conference on Structural Mechanics in Reactor Technology," August 19, 1977.	7151	
Staff Ex. 18	Department of Transportation, "Explosions Hazards Associated with Spills of Large Quantities of Hazardous Materials Phase II," Report No. CG-D-85-77, C.D. Lind and J.C. Whitson, November 1977.	7151	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
Staff Ex. 19	NRC Testimony of Jacques B.J. Read Relating to Safety Implications of the Natural Gas Pipelines which Passes by the Hartsville Site, In the Matter of Tennessee Valley Authority (Hartsville Nuclear Plants Units 1A, 2A, 1B, and 2B), Undated.	7152	
Staff Ex. 20	Army Technical Manual, TM 5-1300, "Structures to Resist the Effects of Accidental Explosions," dover page and figures 4-3, 4-4, 4-5, 4-6, 4-7 and 4-12, June 1969.	9050 (Bound in ff. 9055)	
Staff Ex. 21	One page graph, "Limerick Peak Positive Reflected Overpressure and Positive Phase Pulse Time Due to 56 Tons of TNT," Undated.	9051	9054 (Bound in ff. 9055)
Staff Ex. 22	U.S. Atomic Energy Commission, "The Effects of Nuclear Weapons," Samuel Gladstone, Editor,cover page and pgs. 147 and 151, April 1962.	9051 (Bound in ff. 9055)	
Staff Ex. 23	Table I, "Summary of Accidental Explosion Pressures," Undated.	9051	9055 (Bound in ff. 9055)
Sfaff Ex. 24	Figure 1 "Selection of Critical Element for Purpose of	9052 (Bound in ff. 9055)	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
	Analysis and Design," February 8, 1984.		
Staff Ex. 25	Figure 2, "Typical Load Deformation Curve Idealized Elastic-Plastic System," February 13, 1984.	9052	
Staff Ex. 26	1979 Supplement "Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-76) and Commentary on Code Requirements for Nuclear Safety Concrete Structures (ACI 349-76), Appendix C, Undated.	9053 (Bound in ff. 9055)	
Staff Ex. 27	Memorandum from Norman D. Romney, Structural Engineer, NRC, to George Lear, Chief, Structural and Geotechnical Engineer Branch, NRC, "Limerick Conference Call Between NRC Staff, Bechtel Corporation and Philadelphia Electric Company," March 13, 1984.	9071	9073 (Bound in ff. 9073)
Staff Ex. 28	Regulatory Guide 1.142 (Revision 1) "Safety-Related Concrete Structures for Nuclear Power Plants (Other Than Reactor Vessels and Containments)," October 1981.	9211	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
		FOE	
FOE Ex. 1	Nuclear Power, Armory Lovins, pg. 161, Undated.	5542 (Rejected)	
FOE Ex. 2	National Transportation Safety Board Pipeline Accident Report No. NTSB-PAR-73-2, Hearne, Texas. August 1, 1973.	5257	5258
FOE Ex. 3	National Transportation Safety Board Pipeline Accident Report No. NTSB-PAR-75-3, Farmington, New Mexico, March 15, 1974.	5758	5759
FOE Ex. 4	Transactions of the ASME "Decompression of Gas Pipelines During Longitudinal Ductile Fractures," G.G. King, March 1979.	5768 (Rejected)	
FOE Ex. 10	Journal of the Soil Mechanics and Foundation Division, "Depth Prediction for Earth-Penetrating Projectiles" C. Wayne Young, May 1969.	8881	
FOE Ex. 5	Figure 6-2, "Structures to Resist the Effects of Accidental Explosions," Undated.	8979	
FOE Ex. 11	"Nuclear Safety-Related Concrete Structures, ACI-349-80," pg 349-83, Undated.	9007	

Exhibit Number	Description	Identified at Transcript Page	Admitted at Transcript Page
FOE Ex. 9	LGS FSAR Table 3.5-5, "Railroad-Accident-Generated Missile Parameters," Undated.	9009	
FOE Ex. 6	Post Card Depicting Limerick Generating Station.	9253	
	AWPP		
AWPP Ex. 1	The New Private Pilot, Published by Pan American Navigation Service, 8th Edition, Cover Page and Pages 53-54.	6949	
AWPP Ex. 2	Those Icy Fingers in Your Carburetor, Aviation Consumer Magazine, January 1, 1982.	7046	

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicant's Proposed Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision Relating to LEA's Onsite Emergency Planning Contentions," dated June 8, 1984 in the captioned matter have been served upon the following by deposit in the United States mail this 8th day of June, 1984:

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UNITED STATES OF AMERICA '84 JUN 11 P2:13
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
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