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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	Docket Nos. 50-400 OL
and NORTH CAROLINA EASTERN	)	50-401 OL
MUNICIPAL POWER AGENCY	)	
	)	
(Shearon Harris Nuclear Power	)	
Plant, Units 1 and 2)	)	

APPLICANTS' MOTION FOR SUMMARY  
DISPOSITION OF EDDLEMAN CONTENTION 11

I. Introduction

Carolina Power & Light Company and North Carolina Eastern Municipal Power Agency ("Applicants") hereby move the Atomic Safety and Licensing Board, pursuant to 10 C.F.R. § 2.749, for summary disposition in Applicants' favor of Eddleman Contention 11. As grounds for their motion, Applicants assert that there is no genuine issue of material fact to be heard with respect to Eddleman Contention 11, and that Applicants are entitled to a decision in their favor on this contention as a matter of law.

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This motion is supported by:

1. "Applicants' Memorandum of Law in Support of Motions for Summary Disposition on Intervenor Eddleman's Contentions 64(f), 75, 80 and 83/84," dated September 1, 1983;
2. "Applicants' Statement of Material Facts as to Which There is No Genuine Issue to be Heard on Eddleman Contention 11;"
3. "Affidavit of Richard M. Bucci;" and
4. "Affidavit of Peter M. Yandow, Edward M. Steudel and Harold W. Bowles."

## II. Procedural Background

Eddleman Contention 11 states as follows:

Applicants' FSAR and the SER and ES are deficient and in error because they do not take account of the fact that polyethylene used as cable insulation, deteriorates much more rapidly under long-term doses of gamma radiation than it does when exposed to the same total dose over a much shorter period of time (which is how this material, PE, is tested for service in nuclear plants), as shown by the work of K. Gillen and P. Clough of Sandia Laboratories. The tests these workers conducted show that the insulation becomes embrittled by the radiation's breaking chemical bonds in these polymers (which are long groups of linked chemical units called 'mers'), allowing oxidation of the plastic PE which makes it brittle.

Applicants' Motion for Codification of Admitted Contentions, dated December 17, 1982, Appendix A at 14-15, approved in Memorandum and Order (Addressing Applicants' Motion for Codification), dated January 17, 1983. The contention was admitted by the Board in its September 22, 1982 Memorandum and Order (Reflecting Decisions Made Following Prehearing Conference), LBP-82-119A, 16 N.R.C. 2069, 2091-92 (1982).

Discovery has been conducted on Eddleman Contention 11 since January 1984.<sup>1/</sup> Discovery activity has included: Applicants' discovery requests to Mr. Eddleman of January 24, 1984, to which Mr. Eddleman responded on March 7, 1984; the NRC Staff's ("Staff's") discovery requests to Mr. Eddleman of March 15, 1984, to which Mr. Eddleman responded on April 19, 1984; Applicants' follow-up discovery requests to Mr. Eddleman of March 23, 1984, to which Mr. Eddleman responded on April 12, 1984; Mr. Eddleman's discovery requests to Applicants of March 26, 1984, to which Applicants responded on April 17, 1984; and Mr. Eddleman's discovery requests to the Staff of March 26, 1984, to which the Staff responded on April 18, 1984.

In the course of discovery, it was determined that there are no polyethylene-insulated electrical cables at Shearon Harris Nuclear Power Plant ("SHNPP") which will be exposed to radiation.<sup>2/</sup> This fact, which is documented in an attachment

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<sup>1/</sup> Discovery has, technically, been open since September 22, 1982. See LBP-82-119A, *supra*, 16 N.R.C. at 2113. However, the date for responding to discovery responses on Issue 11 was later deferred. See Memorandum and Order (Reflecting Decisions Made Following Second Prehearing Conference), dated March 10, 1983, at 4.

<sup>2/</sup> In originally opposing admission of the contention, Applicants stated that "certain forms of polymeric material are employed as cable insulation at the Harris plant. . . ." Applicants' Response to Supplement to Petition to Intervene by Wells Eddleman, dated June 15, 1982, at 117 (emphasis added). The Licensing Board interpreted this statement to say that "[t]he Shearon Harris plant will use polyethylene." LBP-82-119A, *supra*, 16 N.R.C. at 2091 (emphasis added).

to a letter from M. A. McDuffie to Harold R. Denton, dated April 26, 1983, was communicated to Mr. Eddleman. See Applicants' April 17, 1984 discovery responses, at 26. The letter and attachment had previously been served on the Licensing Board and the parties.

Despite the fact that Applicants believed Eddleman Contention 11 to be moot, Applicants' counsel and experts met with Mr. Eddleman to exchange substantive information on an informal basis in an effort to settle the contention. Applicants and Mr. Eddleman were unable to agree on a basis for settlement. However, based on the information exchanged during the course of discovery and in settlement discussions, it is apparent that no material issue of fact has been raised with respect to Eddleman Contention 11.

### III. Argument

#### A. Standards for Summary Disposition

The general standards by which motions for summary disposition are judged are set forth in "Applicants' Memorandum of Law in Support of Motions for Summary Disposition on Intervenor Eddleman's Contentions 64(f), 75, 80 and 83/84," dated September 1, 1983, which is incorporated herein by reference.

B. There Is No Genuine Issue of Material Fact as to Eddleman Contention 11

Eddleman Contention 11 states that Applicants do not take into account that polyethylene, used as cable insulation, deteriorates much more rapidly under long-term doses of gamma radiation than when exposed to the same total dose over a much shorter period of time. As discussed in the Affidavit of Richard M. Bucci ("Bucci Affidavit") and the Affidavit of Peter M. Yandow, Edward M. Steudel and Harold W. Bowles ("CP&L Affidavit"), attached hereto, there is no reasonable basis to believe that radiation dose-rate effects on polyethylene cable insulation or other electrical insulation at SHNPP will cause unsafe conditions to occur.

The Bucci Affidavit shows that the dose-rate effect postulated in the Gillen and Clough studies at Sandia National Laboratories, upon which Eddleman Contention 11 is based, is insignificant as applied to SHNPP. First, Gillen and Clough based their conclusions on the results of testing performed over a range of dose rates that were far too high to be representative of the normal dose rates in commercial nuclear plants. Bucci Affidavit at ¶ 19. In addition, the Savannah River operating experience which prompted the Gillen and Clough investigations suggests a minimum threshold dose rate below which dose-rate effects are not significant; that minimum threshold dose rate appears to be somewhere between 13 and 25

rads/hr. Id. at ¶ 20. All radiation zones at SHNPP will have normal operating dose rates below the minimum threshold. Id. at ¶¶ 20, 34. Total integrated normal operating doses at SHNPP also will be below the minimum total doses at which significant dose-rate effects and significant degradation have been shown to occur, in all materials tested except for simple polyethylene. Id. at ¶¶ 22, 35.

Second, the Gillen and Clough tests indicate important differences in sensitivity to dose-rate effects among insulation materials. Id. at ¶ 23. While there is evidence of significant dose-rate effects under certain conditions in simple polyethylene, other, improved compounds have only exhibited minor effects. Id. Simple polyethylene is not used as electrical cable insulation at SHNPP and, to Applicants' knowledge, is not used as insulation on any electrical equipment at SHNPP inside containment. Id. at ¶¶ 31-32.

Third, the material properties measured to detect degradation in the Gillen and Clough tests were not those relevant to the function of electrical insulation (i.e., mechanical properties rather than electrical properties were measured). Id. at ¶ 24. Nuclear industry cable qualification tests, and a later Sandia study responding to Gillen and Clough's work, demonstrate that cable with substantial degradation in mechanical properties of the insulation continues to provide sufficient insulation properties to allow the cable to perform its electrical function. Id. at ¶¶ 24-25.

Fourth, cable qualification testing standards account for any possible dose-rate effects by applying cumulative doses during testing that exceed the most severe doses the cables could experience under normal operating and accident conditions. Id. at ¶ 29. None of the Sandia tests has shown that a low total dose occurring over a long period of time, as in the 40 year normal operating life of a commercial nuclear power plant, causes more degradation than an extremely high total dose applied over a short period of time, as in qualification testing. Id. at ¶ 30.

Operating experience at Carolina Power & Light's ("CP&L's") Brunswick and Robinson plants, as described in the CP&L Affidavit, also indicates that electrical cable insulation at SHNPP will not experience significant degradation due to radiation dose-rate effects. CP&L's review of the operation and maintenance history of electrical cable insulation used at Brunswick and Robinson, which have a total operating life of 29 years, showed no evidence that cable insulation (or other electrical insulation) has exhibited any degradation attributable to dose-rate effects. CP&L Affidavit at ¶ 8.

Finally, as shown by the CP&L Affidavit, SHNPP will have a surveillance and maintenance program that will include features that will enable identification of equipment degradation. See id. at ¶¶ 9-17. In addition, CP&L already has in place a comprehensive system for collecting and evaluating other nuclear



industry operating experience, including any experience with radiation dose-rate effects in cable or other electrical insulation. Id. at ¶ 17 . This operational experience feedback system will provide information for maintenance activities. Id. at ¶¶ 9, 14. Since dose-rate effects, if they occur, are a long-term phenomenon, there will be ample means for identifying significant degradation before unsafe conditions can occur. Id. at ¶ 17.

#### IV. Conclusion

In conclusion, there is no genuine issue of material fact to be heard with respect to degradation of polyethylene cable insulation or other electrical insulation at SHNPP from radiation dose-rate effects. Applicants respectfully request that



the Licensing Board grant summary disposition of Eddleman Con-  
tention 11 in their favor.

Respectfully submitted,

*Michael A. Swiger*

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Thomas A. Baxter, P.C.  
Michael A. Swiger  
SHAW, PITTMAN, POTTS & TROWBRIDGE  
1800 M Street, N.W.  
Washington, D.C. 20036  
(202) 822-1000

Richard E. Jones  
Samantha Francis Flynn  
CAROLINA POWER & LIGHT COMPANY  
P.O. Box 1551  
Raleigh, North Carolina 27602  
(919) 836-6517

Counsel for Applicants

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