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May 25, 1984

OFFICE OF SECRETARY  
UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

APPLICANTS' STATEMENT OF MATERIAL  
FACTS AS TO WHICH THERE IS NO  
GENUINE ISSUE TO BE HEARD ON  
EDDLEMAN CONTENTION 11

Pursuant to 10 C.F.R. § 2.749(a), Applicants state, in support of their Motion for Summary Disposition of Eddleman Contention 11, that there is no genuine issue to be heard with respect to the following material facts:

1. 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. See 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.

2. To simulate the cumulative effects of the relatively low radiation exposure rates to which electrical cable insulation in commercial nuclear power plants is normally subjected, the generally accepted industry practice is to use dose rates on the order of 10E6 rads/hr. Affidavit of Richard M. Bucci ("Bucci Affidavit"), at ¶ 13.

3. Accelerated aging is expressly permitted by 10 C.F.R. § 50.49(e)(5). Id. at n.2.

4. Gillen and Clough, in studies done at Sandia National Laboratories, have questioned the practice of irradiating test specimens at elevated dose rates. Id. at ¶ 13.

5. Gillen and Clough's investigations were prompted by the discovery of degraded polyethylene electrical cable insulation at the non-commercial Savannah River K-reactor. Id.

6. Portions of the Savannah River cable exposed to a dose rate of approximately 25 rads/hr. for the 12 year operating life of the plant were significantly degraded, while portions exposed to approximately 13 rads/hr. were not significantly degraded. Id.

7. Gillen and Clough postulated that degradation of the Savannah River cable was caused by the relatively low dose rate to which the cable was exposed, compared to the elevated rates typically used in industry testing. Id. at ¶ 14.

8. Gillen and Clough tested their hypothesis on a number of materials used in electrical cable insulation and jacketing, and found radiation dose-rate effects for all materials tested. Id. at ¶¶ 15-16.

9. The Savannah River operating experience suggests a minimum threshold dose rate, below which dose-rate effects are not significant, of between 13 and 25 rads/hr. Id. at ¶ 20.

10. All of the radiation zones at SHNPP will have normal operating dose rates below that threshold. Id. at ¶¶ 20, 34.

11. Design basis accident dose rates are not of concern with respect to radiation dose-rate effects. Id. at ¶ 36.

12. 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 excepted simple polyethylene. Id. at ¶¶ 22, 35.

13. Although there is evidence of significant dose-rate effects under certain conditions for simple polyethylene, dose-rate effects in other, improved compounds are only minor. Id. at ¶ 23.

14. Simple polyethylene is not used as electrical cable insulation at SHNPP; neither are Applicants aware of any electrical equipment inside containment which is insulated with simple polyethylene. Id. at ¶¶ 31-32.

15. 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.

16. Nuclear industry cable qualification tests, as well as a later Sandia study by Minor and Furgal, demonstrate that electrical 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 ¶ 25.

17. Nuclear industry qualification testing standards account for possible dose-rate effects by applying total integrated doses which exceed the most severe doses the cables could experience in actual use. Id. at ¶ 29.

18. In qualification testing for SHNPP, test doses were applied which far exceeded the maximum calculated 40 year normal operating plus accident dose. Id. at ¶ 30.

19. 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.

20. A review of the operation and maintenance history of electrical cable insulation used at Carolina Power & Light's ("CP&L's") Brunswick and Robinson plants, which have a total operating life of 29 years, showed no evidence that cable or other electrical insulation used in these commercial nuclear power plants exhibits significant degradation attributable to radiation dose-rate effects. Affidavit of Peter M. Yandow,

Edward M. Steudel and Harold W. Bowles ("CP&L Affidavit"), at ¶ 8.

21. Cross-linked polyethylene-insulated electrical cables in the drywell at Brunswick Unit 1 have been exposed to dose rates as high as 171 rads/hr., for a total 9 year integrated dose of  $1.35 \times 10^7$  rads, which is an order of magnitude higher than the highest total integrated dose which will occur in 40 years of normal full power operation at SHNPP. See Bucci Affidavit at ¶ 7.

22. SHNPP will have a surveillance and maintenance program which will include features that will enable identification of equipment degradation. See CP&L Affidavit at ¶¶ 9-17.

Respectfully submitted,

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