UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

AFFIDAVIT OF ARMANDO S. MASCIANTONIO IN SUPPORT OF NRC STAFF RESPONSE TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF EDDLEMAN CONTENTION 11

I, Armando S. Masciantonio, being duly sworn, state the following:

1. I am employed by the U.S Nuclear Regulatory Commission as an Equipment Qualification Engineer in the Equipment Qualification Branch, Division of Engineering, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission. I am responsible for the technical reviews, analyses and evaluations of the adequacy of the environmental qualification of electric equipment important to safety and safety-related mechanical equipment whose failure under postulated environmental conditions could adversely affect the performance of safety systems in nuclear power plants.

Before joining the NRC I was employed as an engineer by Vitro Laboratories Division of Automation Industries, Inc. I was responsible for the environmental and seismic qualification of the safety-related

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electronic control equipment supplied by Vitro Laboratories Division. Specifically, my duties were to develop and write the environmental and seismic qualification test plans, procedures and reports and oversee the test and procurement activities in support of qualification.

Prior to that, I was employed at the U.S. Naval Surface Weapons Center as a mechanical engineer. My duties involved support of the development, test and evaluation of advanced naval weapons.

I have a B.S. degree in Mechanical Engineering (1972) from Drexel University, Philadelphia, Pennsylvania and a Masters degree in Mechanical Engineering (1976) from the Catholic University of America, Washington, D.C. I also hold a Masters degree in Administrative Science (1980) from the Johns Hopkins University, Baltimore, Maryland.

I am the Staff's technical reviewer for the Shearon Harris project. I have knowledge of the matters set forth herein and believe them to be true and correct.

2. I give this affidavit in response to Applicants' Motion for Summary Disposition of Eddleman Contention 11, dated May 25, 1984 [Applicants' Motion]. Eddleman Contention 11 states:

> Applicant's 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 insula-

> tion, 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.

3. I have reviewed the Applicants' Motion and its supporting papers. I do not fully agree with statements made in ¶¶ 17 and 20 of the Applicants' Statement of Material Facts which I believe may be somewhat misleading.

a) Paragraph 17 states,

> 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.

Industry qualification standards and NRC requirements recognize that aging effects which cannot be adequately accelerated must be accounted for in a qualification program. This includes any effects of dose rate differences between actual and test conditions; however, the NRC has not formally recognized any method by which the effects of different dose rates can be accounted for by increased radiation doses during tests.

b) Paragraph 20 states that a total operating time of 29 years at the Brunswick and Robinson plants is available as a data base to determine operational effects on cables.

This is misleading because the total operating time data base should not be the combined operating time of the two plants but the greater of either the Robinson or Brunswick plant operating time.

4. The Applicants were requested to provide, for each electrical cable important to safety installed at the Shearon Harris Nuclear Power Plant (SHNPP), Units 1 and 2, a listing of the manufacturers and complete description of the cable insulation and jacketing materials. In response to this request, by letter from M. A. McDuffie (CP&L) to H. R. Denton (NRC), dated April 26, 1983, the Applicants identified all materials used as a cable insulation and jacket. Contrary to the assertion made in Eddleman Contention 11, according to the information provided to the Staff in the above letter, Polyethylene, is not used as cable insulation in the SHNPP. Polyethylene, as Chlorinated Polyethylene and Chlorosulfonated Polyethylene, is identified as a cable jacketing material; however, the cable jackets serve only to provide mechanical protection to the insulated conductors and perform no electrical safety function.

5. Final rule, 10 C.F.R. § 50.49, permits accelerated aging for the purpose of demonstrating environmental qualification. It states in part that the qualification program must be based on the type of radiation and total dose expected, including dose-rate effects. Also, IEEE Standard 383-1974, the industry standard for type test

of Class IE electric cables, endorsed by Regulatory Guide 1.131, allows radiation doses up to 1×10^6 rads/hr in aging cables.

6. The Staff recognizes that some materials deteriorate to a greater degree under long-term doses of radiation than when exposed to the same total dose over a shorter period of time. Because of this known dose-rate effect, material aging data generated at high dose rates are treated cautiously if a low dose-rate application is intended. In order to account for dose rate effects, the Staff requires applicants for an operating license to develop and implement surveillance and maintenance procedures which will detect age related degradation and take corrective action before a safety problem develops.

7. Regulatory Guide 1.33, Revision 2, "Quality Assurance Program Requirements (Operation)," and the industry standard which it endorses, ANSI N18.7-1976/ANS-3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," contain recommendations for surveillance and maintenance procedures acceptable to the Staff.

8. The Applicants have committed to follow the guidance in Regulatory Guide 1.33, Revision 2, in developing the surveillance and maintenance procedures for the Shearon Harris Nuclear Power Plant.

9. The Staff will verify that an appropriate surveillance and maintenance program is implemented at the Shearon Harris Nuclear Power Plant which is intended to specifically address unanticipated age related degradation of electrical cables.

10. Based on the above statements, I believe that there is adequate assurance that any increased deterioration of cable insulation due to the expected lower radiation dose rate will be discovered, if any exists, and will not cause an unsafe condition to occur. My disagreement with paragraphs 17 and 20 of the Applicants' Statement of Material Facts does not alter my conclusion.

Armando S. Masciantonio

Armando S. Masciantonio

Subscribed and sworn to before
me this 11th day of June, 1984

Melinda L. McDonald

Notary Public

My Commission expires: 7/1/86