NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

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| Mr. Edson G. Case | Carolina Power & Light Company<br>Raleigh, North Carolina<br>M. A. McDuffie | 12/15/77 | 12/21/77 |

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**DESCRIPTION**

PLANT NAME: Shearon Harris 1-2-3-4
RJL 12/21/77 (2-P)

**ENCLOSURE**

Consists of information re. the observance of a minor geological feature near the Shearon Harris Site.....w/att Certificate of Service.....

(2-P)

### FOR ACTION/INFORMATION

| | |
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CP&L
Carolina Power & Light Company
December 15, 1977



Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

RE: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NOS. 1, 2, 3, AND 4
DOCKET NOS. 50-400, 50-401, 50-402, AND 50-403
GEOLOGICAL FEATURE NEAR THE SHEARON HARRIS NUCLEAR PLANT SITE

Dear Mr. Case:

On December 12, 1977, Carolina Power & Light Company formally notified the Nuclear Regulatory Commission that a minor geological feature had been observed at the Shearon Harris Nuclear Power Plant during excavation associated with the railroad relocation previously approved by the staff. This feature is greater than 300 feet from the nearest Seismic Class I structure. In the December 12, 1977, letter, we indicated that we would continue to keep the staff informed. Since then, our consultants have been analyzing this feature, and we are now reporting the results of this assessment. Our results are based on field studies. An NRC staff geologist visited the site on December 14, 1977, to independently observe this feature with our consultants.

This feature consists of a quartz vein, approximately three centimeters in width, which cuts across a gneiss layer beneath the spillway west of the main dam and is disrupted where it intersects with an amphibole-chlorite schist layer about 70 centimeters in thickness. The quartz vein within the schist is offset 3 to 8 centimeters relative to its position in the gneiss. The vein is nearly planar and is clearly a joint filling. The offsets occur near the contact between the schist and the gneiss, suggesting that either the quartz was injected in this configuration or that the plastic deformation which accompanied regional deformation hundreds of millions of years ago was responsible for breaking the continuity of the quartz vein.

The schist layer pinches and swells along strike and appears to be less than 30 meters long. It does not separate two different types of rock; the gneiss is the same on both sides of the schist layer. The orientation of the schist layer (strike N 80° E, dip about 30° NW) is parallel to the orientation of foliation partings in the gneiss, suggesting the schist layer was emplaced prior to the latest episode of regional deformation in Paleozoic time.

Undeformed euhedral crystals and crystal aggregates 0.5 to 1 cm in length of asbestos, ilmenite or rutile, at least two generations of quartz, and possibly zeolites are contained within the schist layer. The schist is deformed around the larger masses of quartz, demonstrating that the earliest quartz was injected prior to the last phase of compressive deformation of Paleozoic times. Crystals of amphibole and chlorite in the schist are undeformed, suggesting absence of deforming stresses since a time of high heat flow and/or extremely deep burial when the crystals were formed.



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If the quartz vein was actually offset by movement and was not injected in an apparently offset condition, the offsets were formed by compressive strain. These rocks have not undergone deforming compressive stresses since the deposition of Triassic sediments in the adjacent Durham Basin. The gneiss rock was dated using core samples taken at the main dam and two other nearby locations. This information was reported to the staff in "Shearon Harris Nuclear Power Plant, Fault Investigation: responses to Mr. W. R. Butler's letter of May 16, 1975, Question 9" transmitted by our letter of June 12, 1975. This response proves the gneiss rock underwent a sustained thermal event more than 250 million years ago and records the latest tectonic phase of activity in the late Paleozoic period. This activity produced the latest tectonic offsets and vein infillings in most of the Piedmont as reported in the "Final Geological Report Brecciated Zones," Catawba Nuclear Units 1 and 2, Duke Power Company, March 1, 1976, and January 31, 1977. The identified quartz vein offset is believed to be at least older than 250 million years and is not of regulatory significance as defined in Appendix A, Part 100 of Chapter 10 in the Code of Federal Regulations.

The initial investigation of the site for the railroad relocation, main dam and spillway at Shearon Harris was extensive, involving numerous core borings, seismic refraction lines, and trenching. The results of this work are contained in the SHNPP Preliminary Safety Analysis Report and have been reviewed and approved by your staff. The minor offset reported upon by this letter is typical of geological features in the Slate Belt rocks. Several ages of gneiss and intrusions of granite are recognized in the region. Quartz veins are very common in these rocks, and in many locations these intrusive rocks are jointed and faulted. However, most of these faults and joints occurred during pre-Triassic time (more than 180 million years ago), and relatively few are found in Triassic and younger rocks in the region. A number of these relic structural features may be found as excavation proceeds. These features should not be of concern.

Yours very truly,

M. A. McDuffie
Senior Vice President
Engineering & Construction

MAM/mf

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| CAROLINA POWER & LIGHT COMPANY | ) | Docket Nos. 50-400 |
| | ) | 50-401 |
| (Shearon Harris Nuclear Power Plant | ) | 50-402 |
| | ) | 50-403 |
| Units 1, 2, 3, and 4) | ) | |

CERTIFICATE OF SERVICE

This is to certify that a copy of Mr. M. A. McDuffie's letter of December 15, 1977, to Mr. Edson G. Case concerning a geological feature near the Shearon Harris Nuclear Power Plant site has this 15th day of December 1977, been served upon the Chief Executive Officers of Wake and Chatham Counties, North Carolina, by deposit of the same in the United States mail addressed as follows:

Mr. Vassar P. Shearon, Chairman
Board of County Commissioners of Wake County
P.O. Box 550
Raleigh, North Carolina 27602

Mr. Ben Wimberly, Chairman
Board of County Commissioners of Chatham County
Post Office Box 111
Pittsboro, North Carolina 27312

A copy of this letter has also been served this day upon each member of the Atomic Safety and Licensing Board, other appropriate NRC personnel, and additional parties to the proceedings by deposit of the same in the United States mail addressed as follows:

Ivan W. Smith, Esq.
Atomic Safety and Licensing Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. Glenn O. Bright
Atomic Safety and Licensing Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. J. V. Leeds
10807 Atwell
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Associate General Counsel
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Dated: December 15, 1977