

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC LICENSING AND SAFETY BOARD

In the Matter of the Application of)
Public Service Company of Oklahoma)
Associated Electric Cooperative, Inc.) Docket Nos. STN 50-556
and) STN 50-557
Western Farmers Electric Cooperative)
(Black Fox Station, Units 1 and 2)

AFFIDAVIT OF GREGORY C. MINOR

Concerning

ECCS ISSUES RELATED TO BLACK FOX STATION

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) ss.

GREGORY C. MINOR deposes and says under oath as follows:

I. BACKGROUND OF AUTHOR

1. My name is Gregory C. Minor. I have twenty years of experience in the design, development, research, start-up and management of nuclear reactor systems. I worked for sixteen

years for the General Electric Company and for the past six years as an independent technical consultant. I am a founder in 1976 and vice president of MHB Technical Associates. I received a B.S. in electrical engineering from the University of California, Berkeley, and an M.S. in electrical engineering from Stanford University. Since 1976, I have participated in a variety of reactor studies addressing nuclear safety issues for Federal, State, and citizens group. I am presently a consultant on several nuclear plant cases concerning the adequacy of current designs to meet existing regulations. I am a member of the Nuclear Power Plant Standards Committee for the Instrument Society of America. Also, I participated in a Peer Review Group of the NPC/TMI Special Inquiry Group, under the direction of Mitchell Rogovin. My complete experience record is appended to this affidavit as Attachment A.

II. PURPOSE

2. The issue of the adequacy of the ECCS function on BWR's in general and Black Fox Station in particular has been the subject of considerable debate and litigation. Recent evidence has raised additional questions about the ECCS, which, to date, have not been fully resolved. The purpose of this affidavit is to address these unresolved areas.

III. DISCUSSION

3. The ECCS used on Black Fox to a large extent relies on computer predictions of performance and a series of piecewise or partial tests attempting to verify the ECCS performance. However, absent a full core test using high-exposure fuel and an accurately simulated accident condition starting from full power, the piecewise approach of verifying efficacy and design adequacy cannot be assured. Thus, results of tests or analyses which erode the basis for assumed adequacy, must be resolved or the possible design deficiencies corrected if safe operation is to be assured. The recent reports dealing with clad swell (NUREG 0630) and deviant core spray test results (Japanese tests) definitely require resolution since they deal with basic questions of cooling geometry of the fuel and cooling flow distribution.

4. The GE models underpredict the incidence of clad swell and rupture under conditions which are possible in a BWR, although not the most likely conditions.

5. GE tries to argue that the conditions covered by the NUREG 0630 curves are not relevant to GE BWR fuel. However, there is no discussion of off-normal operation or transient conditions where the fuel might experience conditions comparable to those in the NRC curves; conditions which GE now considers "do not warrant application to GE BWR fuel" (Hill @ 5).

6. GE has not addressed the relevance of the NRC curves to inner vs outer fuel rods where the inner rods may not see the effect of a cold shroud which GE claims will reduce the perforation strain (Hill @ 5).

7. The Staff is seeking deferral of the rupture temperature and burst strain issues as it is too soon to conclude that they conform to Appendix K (Staff @ 8).

8. Japanese tests showed an uneven distribution of core spray which resulted in inadequate distribution of cooling water to the center fuel bundles. The tests were on a 60° sector of a full scale core and included steam flow.

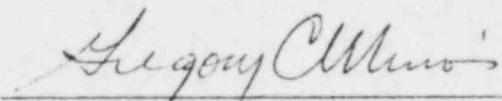
9. The Board Notification dated 12/3/81 points out how the Japanese 60° sector test may contradict the 360° air/water tests.

10. GE states that "(n)either the Lynn nor the Japanese data is representative of a 360° BWR configuration" (Hill @ 7). This directly contradicts GE testimony in the Black Fox Construction Permit Hearings in October 1978 (Tr. 6387-6398), and supports the intervenors concerns regarding ECCS and Board Question 2. GE testified at length as to the representative nature of the Lynn tests and how they could be used to extrapolate to the 360° configuration and to answer the technical concern expressed in the Board Question. GE even casts doubt on the reliability of 360° test results by predicting deficiencies in the Japanese 360° tests. (Hill @ 7).

11. The Staff admits that there is only preliminary data from the Japanese tests. However, there is enough data to conclude that some previous tests in air are not applicable to other BWR configurations in steam. The Staff has not taken the necessary step of verifying that the tests in air for 360° configuration is truly representative of a full core 360° test with hot fuel and steam.

12. Based on the numerous contradictory test results and the uncertainty of the applicability of the test results to a full-core hot fuel steam/water configuration, there is no assurance that core spray will provide the necessary cooling under worst case conditions, nor is there assurance the fuel cladding integrity and geometry for cooling will be maintained.

Further the deponent sayeth not.



Gregory C. Minor

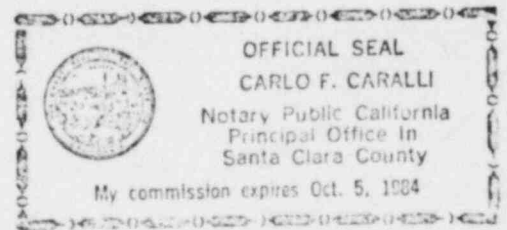
February 11, 1982

Subscribed and sworn to before
me this 11th day of February, 1982.



NOTARY PUBLIC

My commission expires: Oct. 5, 1984



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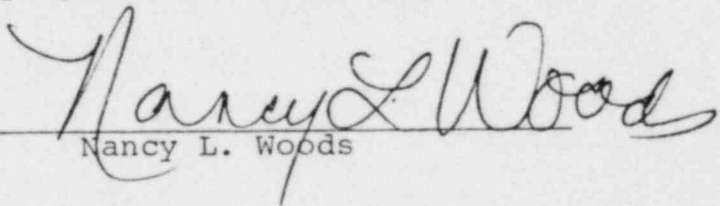
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CERTIFICATE OF SERVICE

I, Nancy L. Woods, one of the attorneys for Citizens Action for Safe Energy (C.A.S.E.), certify that copies of the following:

"Intervenors' Response Regarding
ECCS Issues"

have been served on the persons shown on the attached list by United States Mail, postage prepaid, this 12th day of February, 1982.



Nancy L. Woods

February 12, 1982

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