UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter	)	
	)	
DUKE POWER COMPANY, et al.	)	Docket Nos. 50-413
	)	50-414
(Catawba Nuclear Station,	)	
Units 1 and 2)	)	

APPLICANTS' RESPONSES TO CESG'S DISCOVERY AND DOCUMENT PRODUCTION REQUESTS TO NRC STAFF AND TO APPLICANT RE CESG CONTENTION 18 AND RE DES CONTENTION 17

Duke Power Company, et al. ("Applicants"), pursuant to 10 C.F.R. §2.740b(b), hereby respond to "CESG's Discovery And Document Production Requests To NRC Staff And To Applicant Re CESG Contention 18 and Re Des Contention 17" filed April 1, 1983.

CESG Contention 18

1. Cracks have reportedly been found in used reactor welds by ultrasonic testing, including an Oconee reactor. These reactors have presumably not been submitted to stress under other than ductile conditions, i.e. at temperatures above RT_{NDT}. By what mechanism do you account for the formation of cracks under these conditions?

Applicants are not aware of any cracks in any of its reactor vessels, including the reactor vessels at Oconee. Complete inspections of the Oconee I, II, and III reactor beltline welds were performed recently. These inspections were conducted to meet ASME Section XI code requirements, and the results of the inspections confirmed that the reactor beltline welds at Oconee were within the acceptance criteria of the applicable ASME code provisions. No cracks were identified during these or any previous inspections. All flaw indications, as identified in Section XI of the ASME code, in any welds resulting from the manufacturing

DS03

process are within ASME acceptance criteria. The results of the recent complete inspections are set forth in the Oconee 10 Year In Service Inspection Reports. (CWH)

2. Under what conditions would you expect these cracks to grow? Specifically, relate crack growth to stress at temperatures normally encountered both above and below a RT_{NDT} of 100°F; of 50°F. If you are not in a position to answer this question, explain why it is not of concern.

Not applicable. See response to No. 1. Growth of flaw indications, including cracks, by stress fatigue is evaluated by considering cyclic loading conditions as conservatively defined in the equipment specification. These loading conditions span the full operating range of pressure and temperature (temperatures above and below RT_{NDT}). Calculations show that growth of flaw indications of the sizes experienced at Oconee by stress fatigue is negligibly small. (CWH) (RHF)

3. What is the effect of stress fatigue, whether isothermal tensile, temperature gradient-induced in the absence of applied stress, or a combination of applied and thermal, on RT_{NDT}? Please quantitate your response for a) routinely encountered gradients and stress levels in a reactor and b) under the rapid rate of cooldown encountered in a large break LOCA.

Stress fatigue has no effect on RT_{NDT}. (RHF)

4. The values of RT_{NDT} required under 10CFR Part 50 Appendix G III A and B and Appendix H,II and III are performed on coupons. What plates, welds, welding materials, etc. are exposed? How many samples are there of each type of material?

See Section 5.3.1.6 of the FSAR. (RHF)

5. Pursuant to 4, foregoing, Is the neutron fluence of the coupons identical? How does it relate to the neutron fluence of the reactor?

Within each surveillance capsule, the neutron fluence seen by each coupon is essentially identical. The neutron fluence seen by each surveillance capsule may not be identical due to the location of each capsule around the vessel. The neutron fluence seen by the samples in the surveillance capsules is greater than the maximum fluence at the

reactor wall by a factor of 4.05 for four of the capsules and by a factor of 3.37 for two of the capsules. (RHF)

6. Pursuant to 4., foregoing, For the core to be employed at Catawba, diagram relative neutron fluences around the beltline.

   See Attachment A and FSAR Table 5.3.1-5. (RWO) (RHF)

7. How many heating and cooling cycles are anticipated for the lifetime of the Catawba reactors?

   See FSAR Table 3.9.1-1. (RWO) (RHF)

8. Does RT_{NDT} change with the fatigue history of reactor materials?

   No. (RHF)

9. If the answer to 8 is affirmative, provide quantitative estimates of the differences between reactor materials and corresponding coupons at 25, 50, 75 and 100% of estimated reactor operating life.

   Not applicable. See response to No. 8. (RHF)

10. Why are Charpy specimens V notched?

    The purpose of the notch is to simulate a crack and create a stress concentration at the tip of the notch. (RHF)

11. Will a notched specimen fail under tensile stress levels that an unnotched specimen of the same material and minimum cross-sectional area will withstand?

    Yes. (RHF)

12. Will a notch result in failure of a specimen in a ductile state at a lower level of stress than an unnotched specimen of the same effective minimum cross-sectional area? Is the same true of a crack?

    Yes; yes. (RHF)

13. What is your understanding of the mechanism of crack growth?

    Crack growth can proceed by the application of cyclic stresses arising from operating conditions. The fatigue process can be assisted by corrosion and it is the "corrosion fatigue" data that are used in the evaluation of crack growth. By using "corrosion fatigue" data, the

presence of the clad is ignored, thus incorporating about a factor of 10 conservatism in the crack growth rate. (RHF)

14. What is your understanding of mechanisms of crack propagation to failure?

The possibility of failure due to crack propagation is evaluated by comparing the size of an initial flaw, adjusted for crack growth, to the "critical" flaw size for unstable extension. Critical flaw sizes are very large and the rules of ASME Section XI require that the critical flaw size be at least 10 times larger for normal operating conditions and 2 times larger for faulted conditions than the initial flaw size adjusted for crack growth. (RHF)

Respectfully submitted,

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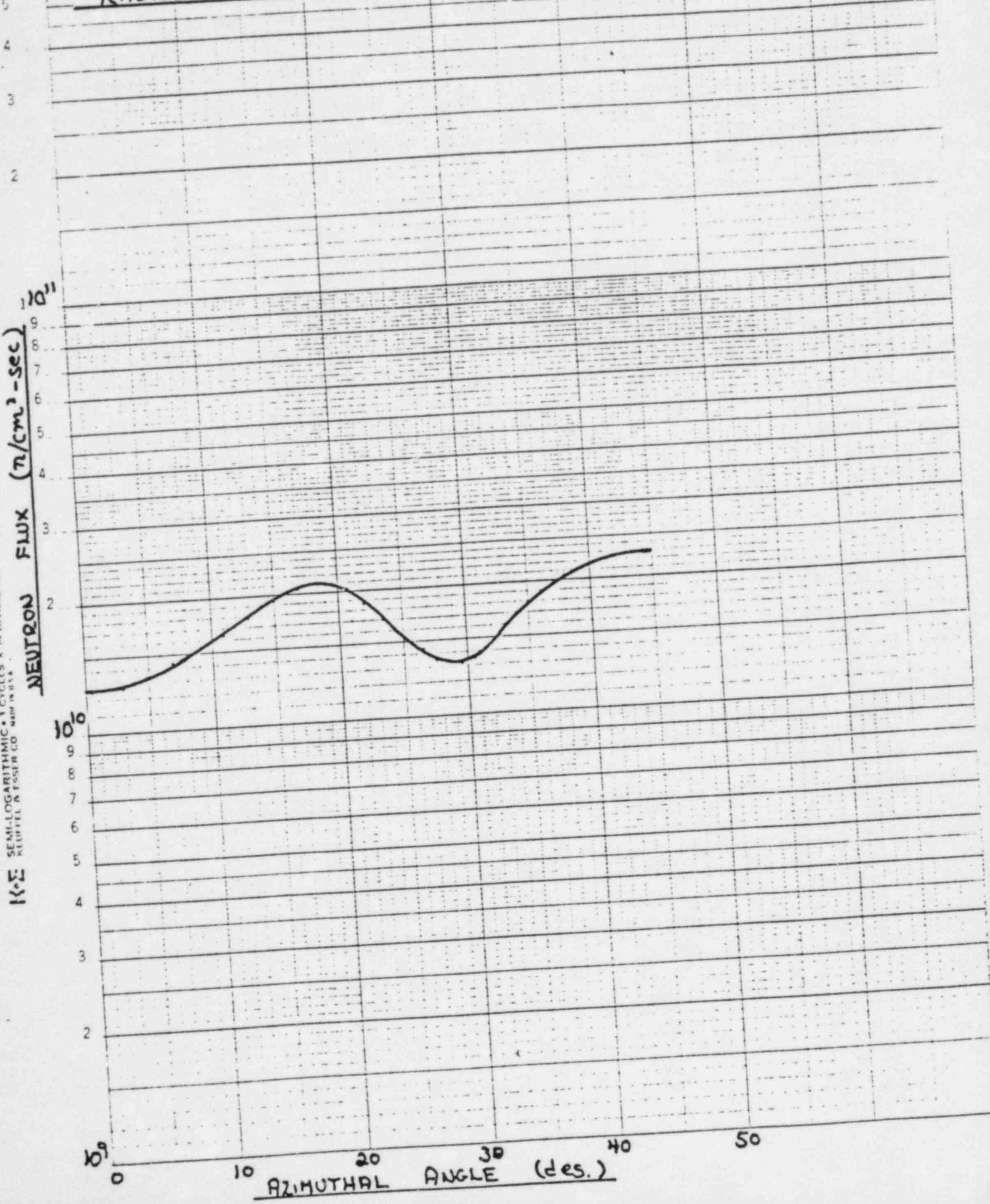
Attorneys for Duke Power Company, et al.

April 20, 1983

AZIMUTHAL DISTRIBUTION OF MAXIMUM FAST NEUTRON FLUX (E > 1.0 MeV) AT THE PRESSURE VESSEL INNER RADIUS - CATAWBA UNITS 1 + 2



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Units 1 and 2)	)	

AFFIDAVIT

I, Roger W. Ouellette, being duly sworn, hereby state that I am employed by Duke Power Company as Assistant Engineer - Licensing, Nuclear Production Department.

I have been responsible for furnishing the basic information used in responding to those Interrogatories on Carolina Environmental Study Group's Contention 18 by which my initials appear. Those responses are true and correct to the best of my knowledge and belief.

Roger W. Ouellette

Roger W. Ouellette

Subscribed and sworn to before
me this 20th day of April, 1983

Sue C Sherrill

Notary Public

My Commission Expires: September 20, 1984

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AFFIDAVIT

I, C. W. Hendrix, being duly sworn, hereby state that I am employed by Duke Power Company as Maintenance Engineer, Nuclear Production Department.

I have been responsible for furnishing the basic information used in responding to those Interrogatories on Carolina Environmental Study Group's Contention 18 by which my initials appear. Those responses are true and correct to the best of my knowledge.

CW Hendrix Jr

C. W. Hendrix, Jr.

Subscribed and sworn to before
me this 20th day of April, 1983

Sue C. Sherrill
Notary Public

My Commission Expires: September 20, 1984

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Units 1 and 2)	)	

AFFIDAVIT

I, Robert H. Faas, being duly sworn, hereby state that I am employed by Westinghouse Electric Corporation as an Engineer - RCS Components Licensing, Nuclear Safety Department.

I have been responsible for furnishing the basic information used in responding to those Interrogatories on CESG Contention 18 by which my initials appear. Those responses are true and correct to the best of my knowledge and belief.

Robert H Faas

Subscribed and sworn to before me this 19 day of April, 1983.

Paulette Slonska
Notary Public

My Commission expires:
PAULETTE SLONSKA, NOTARY PUBLIC
MONROEVILLE BORO, ALLEGHENY COUNTY
MY COMMISSION EXPIRES MARCH 10, 1986
Member, Pennsylvania Association of Notaries

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NUCLEAR REGULATORY COMMISSION

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CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicants' Response To CESG's Discovery And Document Production Requests To NRC Staff And To Applicant Re CESG Contention 18 And RE Contention 17" in the above captioned matter have been served upon the following by deposit in the United States mail this 20th day of April, 1983.

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