August 2, 1983

50-267

Docket No. 50-267

Mr. O. R. Lee, Vice President
Electric Production
Public Service Company of Colorado
P. O. Box 840
Denver, Colorado 80201

Dear Mr. Lee:

We have reviewed the information provided in your January 28, 1983 (P-83033) letter concerning H-451 graphite, and find that additional information is needed for us to complete our evaluation. Therefore, we request that you provide a response to the questions contained in the enclosure within 30 days of their receipt.

Since this request relates solely to the Fort St. Vrain station, fewer than ten respondents are affected; therefore, OMB clearance is not required under P. L. 96-511.

If you have any questions on this subject, please contact the NRC Project Manager.

Sincerely,

Original Signed By
G. L. Madsen

G. L. Madsen, Chief
Reactor Project Branch 1

Enclosure: Questions on H-451
Graphite

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8008

QUESTIONS ON FORT ST.VRAIN SEGMENT 9 RELOAD OF H-451 GRAPHITE

1. The data and conclusions presented in GA-A16402 appear to differ in some areas from the information presented in the H-451 graphite generic licensing topical report GLP-5588, which NRC reviewed and approved in 1979. GLP-5588 provided the basis for allowing the substitution of near-isotopic H-451 graphite fuel and reflector elements for the original reference needle-coke H-327 graphite elements in the FSV reactor. In the new report, GA-A16402, it is indicated that creep rates in tension are higher than in compression, whereas in GLP-5588 it was stated that the same equation can be used for both tensile and compressive irradiation-induced creep. The recommended creep equation in GA-A16402 thus differs from that contained in GLP-5588. Moreover, in GA-A16402 it is indicated that the thermal expansivity, Young's Modulus, and Poisson's ratio are affected by the creep strain, whereas, there was no mention of such an effect in GLP-5588. Discuss the safety significance of the revised design equations for irradiation-induced creep and other physical properties. Explain how this new understanding of the effects of irradiation on creep and other properties has been factored into the design of the H-451 graphite elements. Note that if the design equations and curves in GLP-5588 are no longer applicable to safety analyses, an amendment to that NRC-approved report should be submitted containing the corrected information.

2. In view of the discovery of cracked H-327 graphite elements at the last refueling and the planned insertion of H-451 graphite elements in Segment 9, we believe some surveillance, consisting of interim visual examinations equivalent to those recommended for "first core loadings" (see attachment to Speis' January 3, 1979 letter), is necessary for the new reference fuel elements. This will provide confirmation that the H-451 graphite elements are performing satisfactorily as predicted and are not encountering the same or worse cracking behavior than the original H-327 reference material. Accordingly, please propose a surveillance program that will provide such confirmation.

3. In GLP-5588 it was stated that the H-451 fuel elements would have higher calculated stress levels than H-327 graphite elements, but that design stress margins would be improved by the use of H-451 elements because the higher strength of H-451 more than compensated for the increased stresses. However, the stress models, FESIC, SAFE/GRAPHIT and the like, that have been used for HTGR graphite stress analysis, have never received NRC review, and the finding of cracked blocks in FSV, where none had been predicted, calls into question the reliability of these modeling techniques. Therefore, please discuss any improvements that have been made in the graphite stress models or analytical input currently in use for the FSV graphite blocks. Demonstrate how the new H-451 blocks will retain adequate margin for structural integrity. What exists in the form of confirmation of the adequacy of the analytical models now in use?