1901 Chouteau Avenue
Post Office Box 149
St. Louis, Missouri 63166
314-554-2650

UNION ELECTRIC

Donald F. Schnell
Senior Vice President
Nuclear

August 31, 1992

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Gentlemen: ULNRC-2691

CALLAWAY PLANT
DOCKET NUMBER 50-483
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING
REVISION TO TECHNICAL SPECIFICATION 3/4.9.12
"SPENT FUEL ASSEMBLY STORAGE"

Ref: 1. ULNRC-2647, 6/12/92, "Callaway Plant/Docket Number 50-483/Revision to Technical Specification 3/4.9.12 /'Spent Fuel Assembly Storage'"

Union Electric Company herewith responds to an NRC request for additional information regarding our previously submitted application for amendment to Facility Operating License Number NPF-30 for the Callaway Plant (Reference 1).

In a telephone conversation with Union Electric personnel on August 4, 1992, the NRC staff requested additional information regarding codes, methodology, and modelling which account for differences between the k-infinity versus pool water temperature curves of Reference 1 and the Callaway Final Safety Analysis Report, i.e., Figure 15 and Figure 9.1A-22, respectively.

Union Electric's response to the request for additional information is herewith attached and, as requested by the staff on August 20, 1992, is submitted for inclusion on the Callaway docket.

If any additional information is needed, please contact us.

Very truly yours,

Donald F. Schnell

GAC/kea
Attachment

040009

A001
1/1

K-INFINITY VERSUS TEMPERATURE DISCREPANCY
CALLAWAY REGION 2 CRITICALITY ANALYSIS

An evaluation was performed to resolve the discrepancies between the k-infinity versus temperature curves for the Region 2 spent fuel rack analysis performed by Union Electric (UE) and that previously performed by Pickard, Lowe, and Garrick (PLG). The previous analysis showed a constant increase in k-infinity with temperature, while the UE analysis shows k-infinity peaking at approximately 90 degrees F and then decreasing. The major areas which were reviewed to determine the cause of the discrepancies in the curves are: 1) PDQ model geometries, 2) cross section data (trends with temperature), and 3) cross section generation models.

The UE models used the CASMO and GRPDQ codes for determining overall spent fuel rack k-infinities, while PLG utilized the LEOPARD, CINDER, and PDQ codes. Comparison of the PDQ input decks showed that the overall models were similar with fuel in three out of four cells and the fourth cell being a water hole (flux trap). The UE model used a finer mesh spacing for the gap and stainless steel to better model the changes in flux.

The actual cross section data was also compared to determine any possible discrepancies. Review of the cross section data showed some minor deviations as trended by temperature, mostly with respect to water and stainless steel. This may be partly attributed to the use of finer mesh spacings by UE when generating the cross section data using CASMO. The other noted disparity in cross section data is use of a different set of cross sections by UE for the water in the fuel cells versus the water in the flux trap region. This approach was utilized due to the differences in spectrum with a large water gap versus the gap between the fuel assembly and the stainless steel.

The final area of comparison was the codes utilized to generate the actual macroscopic cross section data. PLG used a 4 group input from LEOPARD/CINDER to PDQ (diffusion theory code), while UE used a four group input from CASMO to GRPDQ (a modified version of PDQ-7). CASMO generates cross section data from a 40 group nuclear data library, ENDF/B-V, while LEOPARD uses a cross section library which pre-dates ENDF. It should be noted that the CASMO code used by UE for generating cross sections is a multi-group two-dimensional transport theory code. The LEOPARD and CINDER codes are not considered to be as rigorous mathematically as CASMO. Since UE does not use the LEOPARD or CINDER codes, the inputs could not be compared to determine any other modeling differences. Also, information on the composition of the LEOPARD library was not available. As a final check, several PLG input decks for PDQ were run using the GRPDQ

code. No differences were noted from the PLG results, thus the PDQ codes can be eliminated as a source of error.

In summation, the discrepancy in the k-infinity vs. temperature curves for the UE and PLG analyses is mainly due to differences in cross section data, some minor modeling differences, mostly in the area of mesh spacing in the gap and stainless steel regions by UE, and improved codes and methodology. Based on the above, it is UE's conclusion that the "humped" temperature curve is a more theoretically correct representation of the pool temperature effects on k-infinity.

STATE OF MISSOURI)
) S S
CITY OF ST. LOUIS)

Donald F. Schnell, of lawful age, being first duly sworn upon oath says that he is Senior Vice President-Nuclear and an officer of Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Donald F. Schnell
Donald F. Schnell
Senior Vice President
Nuclear

SUBSCRIBED and sworn to before me this 31st day of August, 1992.

Barbara J. Pfaff

BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1993
ST. LOUIS COUNTY

cc: T. A. Baxter, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, D.C. 20037

Dr. J. O. Cermak
CFA, Inc.
18225-A Flower Hill Way
Gaithersburg, MD 20879-5334

L. Robert Greger
Chief, Reactor Project Branch 1
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Bruce Bartlett
Callaway Resident Office
U.S. Nuclear Regulatory Commission
RR#1
Steedman, Missouri 65077

L. R. Wharton (2)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
1 White Flint, North, Mail Stop 13E21
11555 Rockville Pike
Rockville, MD 20852

Manager, Electric Department
Missouri Public Service Commission
P.O. Box 360
Jefferson City, MO 65102

Ron Kucera
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102