University of California
LOS ALAMOS SCIENTIFIC LABORATORY
Post Office Box 1663 Los Alamos, New Mexico 87545

PDR
TERA

In reply refer to: Q-13:79:110
Mail stop: 576

April 24, 1979

Dr. Michael Tokar
Nuclear Regulatory Commission
Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Mike:

Enclosed is our final report on the effect of installing the core region constraint devices into the Fort St. Vrain reactor with regard to seismic response. The report is unchanged from the draft version with the exception that we have corrected a few typo's and have cleaned up the figures.

We have not incorporated any response to the comments by the NRC structural engineering branch at this time. We have reviewed these comments, however, and we offer the following response:

1. Regarding comment (1), the assumptions concerning the end restraint produced by the RCDs and resulting frequency increase produced by them (Pg. 3 of Appendix), we agree that the ratios may be high. Obviously, the lower limit is when the RCDs will not change the end condition at all, in which case the expected shear forces in a column will be the same with or without RCDs. While the assumptions of a pinned or fixed end conditions may not be realistic, the assumption does allow us to quantitatively evaluate the effect of stiffening the core in terms of the directions that the shear forces take (i.e., they decrease with stiffening rather than increase). Clearly for the "intuitive" stiffening suggested in comment (1) the shear forces will still decrease, but not as much as those shown in the tables.

2. Regarding comment (2), the axial stiffness was included only as a "what if" case and in fact the entire range of calculated frequencies was bounded from above and below with the same conclusion.

3. Regarding comment (3), our analyses of core block impact and conclusions regarding the FSV core system were not made with total disregard to vertical effects. Our studies with FYSMOD, a generic computer model of core blocks for a core of this type, shows that the general magnitudes of impact forces in a system of this type are relatively unaffected by the presence of the vertical component, (though the motion is somewhat different). Because there is, on the average, as much increase in friction as there is decrease, the

1836 002



8001300256

maximum relative velocities in the system remain about the same. Thus, since the maximum horizontal impact forces are proportional to the horizontal velocities, then their magnitudes are about the same as those in a strictly horizontally excited system.

For your information, I am enclosing a portion of a quarterly report LA-NUREG-6579-PR in which we reported and discussed a portion of this work. In particular, I draw your attention to the general conclusions (2) and (3) and Figures 15 and 16 of this report.

We feel that, while with more time, we can do an extensive analysis of the effect of the RCDs on the FSV core seismic response, our conclusions will remain unchanged. Let us know of your wishes in this regard, and please call me if you have any questions regarding these comments.

Sincerely,

Joel G. Bennett

Joel G. Bennett, Q-13
Reactor and Advanced Heat
Transfer Technology

Enclosure: a/s

CC: ISD-5

003