GENERAL ELECTRIC

NUCLEAR ENERGY

PROJECTS DIVISION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

MC 682, (408) 925-5003

MFN-219-79

August 27, 1979

U. S. Nuclear Regulatory Commission
Division of System Safety
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Attention: R. P. Denise, Acting Assistant Director for Reactor Safety

Gentlemen:

SUBJECT: ADDITIONAL VOID FRACTION INFORMATION REQUESTED FOR ODYN REVIEW

Reference:
1) Letter, MFN-123-79, K. W. Cook to R. L. Tedesco, "Clarification of ODYN Model Uncertainties," dated April 30, 1979
2) Letter, MFN-186-79, K. W. Cook to Fuat Odar, "Void Fraction Information Requested by the Staff for ODYN Review," dated July 19, 1979

The information contained in the attachment to this letter was telecopied to the staff on August 17, 1979. This information was provided for additional clarification of the uncertainty associated with the neutron effective void correlation discussed in the reference letters. This information supports the GE position that transient results are only weakly dependent upon the void correlation used in the subcooled range.

If you have any questions regarding this transmittal, I would be pleased to review the information with you or your staff.

Very truly yours,

K. W. Cook

K. W. Cook, Sr. Licensing Engineer
Special Projects Licensing
Safety and Licensing Operation

KWC:daj/609

Attachment

cc: L. S. Gifford (GE-Bethesda)
Fuat Odar (NRC)

X50 S/1

903141

7909040590

ATTACHMENT 1

ADDITIONAL TRANSIENT SENSITIVITIES FOR THE NEUTRON EFFECTIVE VOID CORRELATION UNCERTAINTY

To support the contention that the transient results are only weakly dependent upon the void correlation used in the subcooled region, GE has performed transient calculations with two additional formulations for the neutron effective void correlation. The concentration parameters used are shown in Figure 1. The results for the constant Co and neutron effective Co have been presented in Reference 2. The curve labeled "Case A" corresponds to the limiting line discussed with the Staff to account for uncertainties in the subcooled boiling region. In addition, a second calculation was performed in which the concentration parameter was increased with decreasing quality. The void fractions generated by these parameters are plotted in Figure 2 as a function of quality. At a nominal void fraction of 0.2, there is a range of from 0.15 to 0.32 included in the different cases. The transient results obtained using the four models are summarized in Table 1. (The "base case" and Co=constant case were documented in reference 2 and are listed for completeness.)

The Case A transient result is less severe than the constant Co result and is about the same as the base case. Reducing the concentration parameter in the low quality region increased the void fraction in the bottom of the core. This shift in void fraction also causes the change in void fraction $\frac{d\alpha}{dt}$ to be larger near the core bottom, where the void reactivity coefficient is smaller, making the transient less severe. Increasing Co for low qualities should have the opposite effect, so Case B was run to test the sensitivity in this direction. The Case B results show a void fraction about 25% lower than the base case and 12% lower than the Co=constant case in the range where α=0.2. The transient result obtained from Case B shows a slightly higher peak neutron flux, but a negligible change in peak heat flux and CPR/ICPR. These calculations support the contention that the transient results are only weakly dependent on the void correlation used in the subcooled range.

KWC:pes/804

903142

TABLE 1

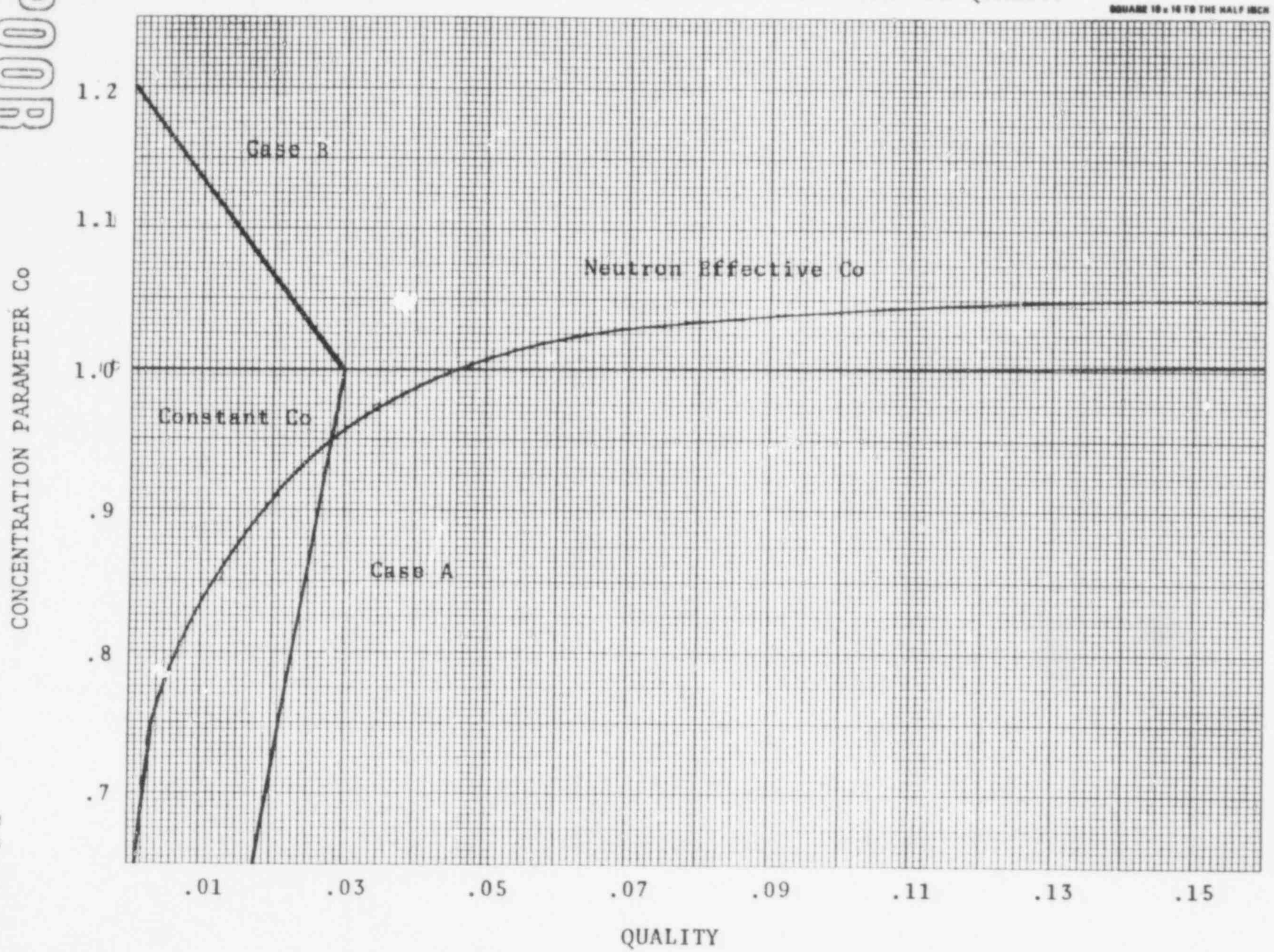
TRANSIENT RESULTS - PEACH BOTTOM-2 END OF CYCLE 2

TURBINE TRIP WITHOUT BYPASS TRANSIENT

	Peak Neutron Flux (% rated)	Peak Heat Flux (% rated)	ΔCPR/ICPR
Neutron Effective Correlation	532.5	128.2	.171
Constant Co	547.9	129.1	.182
"Case A"	523.3	128.0	.170
"Case B:	558.8	129.1	.182

903143

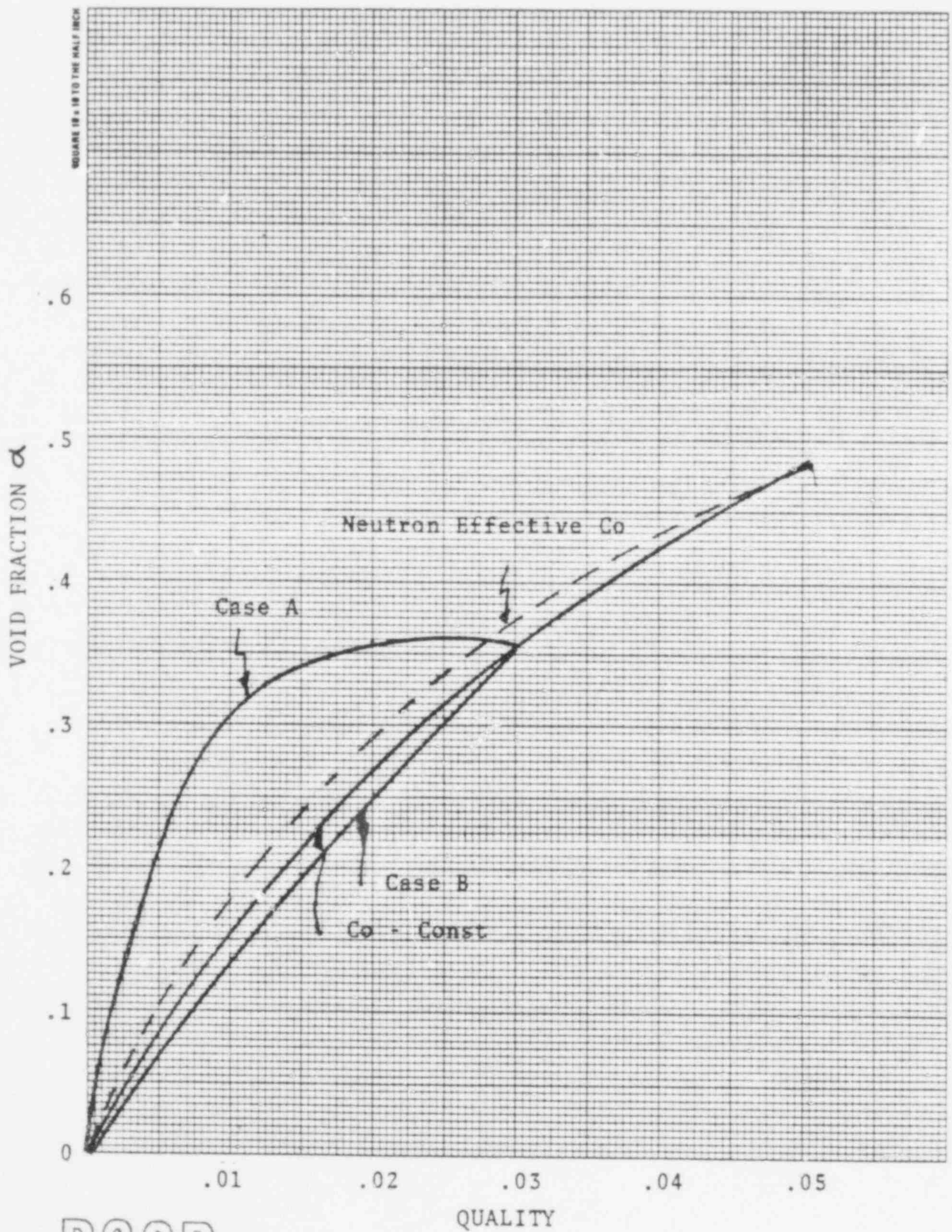
FIGURE 1. PLOT OF CONCENTRATION PARAMETER VS. QUALITY



POOR ORIGINAL

503144

FIGURE 2. PLOT OF VOID FRACTION VS. QUALITY



POOR ORIGINAL

363145