UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 19 1980

MEMORANDUM FOR: L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch

FROM: R. G. Page, Acting Chief
Uranium Fuel Licensing Branch

SUBJECT: COMPLETION OF CRITICALITY REVIEW OF UNION CARBIDE CORPORATION APPLICATION DATED JUNE 2, 1980 (DOCKET NO. 70-687)

Reference is made to your memorandum dated May 23, 1980, subject as above, regarding the Carbide April 2, 1980, application, which superseded their original application dated December 28, 1979. As you requested, Ketzlach and Delaney telephoned Mr. Voth, UCC, on May 28, 1980, requesting that he clarify a typographical error and advising him of some potentially nonconservative use of criticality data. The subject June 2, 1980, application has now been reviewed and it is recommended that the nuclear safety aspects be approved on the basis of the following.

Summary Nuclear Safety Evaluation

In addition to the activities already authorized, UCC wishes to process raw fission waste solution to uranium oxide powder with some associated mixed fission products. The liquid remaining from the processing together with the remaining mixed fission products and trace quantities of uranium will be solidified as is presently done. The uranium oxide and associated fission products will be placed in sealed 3" diameter cylinders.

Each Uranium Waste Form Process Cell (UWFPC) shall contain no more than 7600 grams of U-235, of which up to 7200 grams of U-235 shall be in storage in 3" cylinders in an approved array and of which up to 400 grams of U-235 may be in process.

Each 3" diameter storage cylinder shall contain no more than 200 grams of U-235 and the H/U atomic ratio shall not exceed 20. The storage containers will be stored on 12" center-to-center spacings up to two containers high with essentially no limit on height of the containers. UCC has used the surface density analog technique described in the Nuclear Safety Guide,

TID-7016, Rev. 2, to demonstrate the safety of the 6 x 3, 2-high array. We have verified the safety of this array using both the surface density analog technique, and the solid angle method. (The solid angle method may be used since flooding of the cell is not credible.)

In justifying the safety of the process line, UCC has again used the TID-7016, Rev. 2, method but has taken parameters from TID-7028 rather than from TID-7016, Rev. 2. Since the latter data incorporate a safety factor and the TID-7028 data do not, this could lead to nonconservative results. However, since the process lines contain a total of only 400 grams of U-235, the safety of the system is evident.

UCC advises that supporting and storage fixtures in a UWFPC shall be of substantial structural integrity to preclude a change in geometry under normal operating conditions and under credible accident conditions. Sources of pressurized liquid are not allowed in the cell.

On the basis of the above, it is recommended that the nuclear criticality safety aspects of the subject application be approved.

R. G. Page, Acting Chief
Uranium Fuel Licensing Branch