UNITED STATES
ATOMIC ENERGY COMMISSION
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UNITED NUCLEAR CORPORATION (UNC), HEMATITE, MISSOURI, APPLICATION FOR UO_2 PELLET CONTAINER MODEL UNC-2901, DOCKETS 70-33 AND 70-820, APRIL 10 AND 24, 1970 (REFERENCES: NIS-LJS-70/715, 70/729)

United Nuclear has adopted a method of analysis for demonstrating the safety of the UNC-2901 (a can-in-drum type container for up to 3.75 percent enriched oxide pellets) that is based on computer codes and an over-all approach to arrays with which we are not familiar. The method is generally similar to that used in their analysis of the UNC-1484 Container. We used KENO calculations to evaluate the UNC-1484 arrays and determine that Part 71 nuclear criticality safety requirements were met, but noted a significant discrepancy, a difference between our array multiplication factor and theirs of about 0.05. Both results indicated an adequate margin of safety, hence our approval. The continued use of the method by UNC requires our further understanding and acceptance of it based on demonstrated performance. Accordingly, we suggest that the following comments concerning the method of analysis be sent to UNC.

The validity of your method of array analysis used in NED-414 and NED-550 has not been clearly established. KENO calculations for a reflected array of 48 damaged UNC-1484 containers indicated that the maximum multiplication factor was about 0.95 whereas your calculations indicated a value of 0.90. We therefore request that you supply the following:

1. A demonstration of the validity of the analytical method in NED-550 for arrays by application to experimental critical systems of comparable characteristics.

2. An explanation of how the derived variables in the method for arrays are affected by the independent variables. In particular, how does the migration area vary with the container volume? It would appear that migration area depends solely on moderation. If this were the case, an increase in the deformation of the containers would simply result in an increase instead of a decrease in the critical number in the array.

3. Thus the use of a square lattice pattern in your analysis would provide smaller safe numbers per shipment.

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3. More specific details on the method of calculating the resonance integral and a demonstration that the approach you used provides valid numbers when applied to experimental data for low enriched systems.

Original Signed by
R. L. Stevenson

R. L. Stevenson
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

cc: C. E. MacDonald, DML
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