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United Nuclear Corporation
Commercial Products Division
Route 21A
Hematite, Missouri 63047

Attention: Mr. L. J. Swallow, Manager
Nuclear & Industrial Safety

Gentlemen:

This refers to your application dated January 14, 1970, as supplemented by the nuclear safety analysis dated January 26, 1970, requesting an amendment to Special Nuclear Material Licenses Nos. SNM-33 and SNM-777 to authorize the delivery of special nuclear material to a carrier for transport in the Model UNC-1484 package.

In connection with our review of this application, we need the following information:

1. It is stated that a value for the age of 100 square centimeters is conservative in calculating k_{eff} using the formula on page 5 of NED 414. However, no information is provided to establish the validity of the formula (Number 1 on page 4) for the age by predicting k_{eff} values using experimental data for just critical systems. When formulas (1) and (2) are applied to the critical dimension for a bare, dry enriched oxide sphere (LA 3612, page 19, adjusted to 4 gm U/cc density), the k_{eff} is predicted to be well below unity. Information is therefore needed to establish the validity of the k_{eff} values for individual units based on formulas (1) and (2).

2. In the summary and conclusions of NED 414, it is stated that the presence of water within the fueled inner container did not increase the reactivity of the arrays. However, on page 9 the defined conditions for the array of damaged containers do not include water in the inner container. Also, the calculation on page 12 for the array of damaged containers with water in the inner containers results in a smaller number per shipment (50/2 or 25) than the 36 proposed. This inconsistency should be explained or it should be established that the inner

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container will remain dry under the test conditions considering the comments in our letter dated February 3, 1970, regarding the testing of the Model UNC-1484.

3. The basis for using an extrapolation distance of 6.5 cm. in the array calculations should be provided.

The relevant safety analyses are based on materials that have a maximum uranium density corresponding to 5.3 g U/cc and we propose to condition the amendment accordingly. Also, in our review the density-moderator relationship for UO_2-water mixtures was assumed. We therefore propose to require that the materials shipped be limited to compounds which do not exceed the theoretical density-moderator relationship of UO_2-water (Figure 1.D.17 in the UK Handbook).

Since you did not propose to ship uranium metal in your January 14, 1970, application, we have not reviewed that part of NED 414 in which calculations were made for metal shipments.

Sincerely,

Original Signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Source & Special Nuclear
Materials Branch
Division of Materials Licensing

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