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ML:DAN
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United Nuclear Corporation
Chemicals Division
Route 21-A
Hematite, Missouri

*Ref: our memo of
3/19/64 to D.N.*

Attention: Mr. L. J. Swallow
Manager, Operations Control

Gentlemen:

This refers to your consolidated application for renewal of Special Nuclear Material License SNM-33 dated July 15, 1963, as supplemented December 19, 1963, and February 24, 1964. In our letter dated December 13, 1963, which requested additional information regarding your operations, we indicated that a review of your shipping containers and procedures had not been completed and that we would inform you if additional information was necessary.

With respect to the shipping containers described in Section 700 of your renewal application, you did not provide an evaluation of the structural integrity of such containers, as requested in Item V of the application guide transmitted with our letter of December 26, 1963. Therefore, in order to continue our evaluation of this portion of the application, we require that you submit an evaluation of the following containers identified as BE Permit 318, 342, 549, 740, 811, 1091, and 1111, in terms of the following conditions:

1. A drop from 30 feet on any side including top and bottom on an unyielding flat, horizontal surface. The drop should be made on the surface having the least structural integrity (e.g., between supports for other container). The container should be loaded with material similar to the special nuclear material which is to be shipped as to weight and form.
2. A drop of 3.5 feet on an unyielding flat, cylindrical surface no larger than 6 inches in diameter.

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3. Following the 30 foot drop, exposure to the standard one hour fire as described in specifications of the National Fire Protection Association (NFPA No. 251C) and the American Society for Testing Materials (ASTM, Design E 119-61). Heat resistant material may be placed within the outer container in order to reduce the temperature at the inner container.
4. Following the fire test, immersion of the container in water at a depth of at least 3 feet for 24 hours.

Based upon the above conditions, the evaluation should include loss of material from the inner container, reductions in spacing or volume of the container and inleakage of water into the inner container. As a result of conditions 1 and 3, if the maximum loss of spacing exceeds 10% of the distance between the outer surface of the inner container and the inner surface of the outer container, the dimensions of the damaged container shall be used in determining the maximum number of containers in a shipment. Also, the array spacing and the maximum number of containers in a shipment should be based upon water inleakage if this occurs as a result of the immersion test.

In addition to the above, the following specific information is required:

1. With respect to shipment of compounds and solutions having uranium densities greater than 3.2 gm/ml, you propose that the nuclear safety will be based on safe volume. We require your procedures for making the density correction for safe volume and information regarding the design of the inner container.
2. We will require that not more than 10 kgs of U-235 in the form of metal biscuits will be shipped in the container identified as BE Permit 549 unless information is submitted justifying a larger quantity. In this regard, please note that Figure 12, Page F-17, of K-1380 is applicable only to fully enriched, undiluted, unalloyed uranium metal; it is not applicable to metal of lower enrichment or to alloys or compounds of any enrichment.
3. With respect to the container identified as BE Permit 1111, we do not believe that the 5.75" ID by 35" high inner

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container meets the safe geometry requirement. It does not appear that a 5" ID polyethylene bottle or light weight metal can provides a sufficient degree of containment when nuclear safety depends on geometry control.

4. The procedures for periodic and routine inspection of shipping containers including the following:
 - (a) Examination of containers whether newly constructed or for reuse and the method of determining their suitability for use.
 - (b) Confirmation that each package is loaded with the authorized amount and type of special nuclear material of specified isotopes assay and physical and chemical form.
 - (c) Inspection of the preparation of the shipment and the provisions to insure the safe placement of containers in the packaging area, loading dock, and transport vehicle.
 - (d) Confirmation that the number of containers per shipment is limited to that number determined to be safe for transport based on the test results of accidental conditions demonstrated to occur.

In order to assure against commingling of your shipment with other shipments of special nuclear materials, we require that the shipments be transported in accordance with one of the following procedures:

1. Exclusive use of the vehicle with no intermediate unloading.
2. Under escort by a courier assigned responsibility to assure that the shipment is not placed in the same railcar, motor vehicle, aircraft, or hold of a ship with any other special nuclear material and that the shipment at any time during loading, transshipment or delivery is not placed closer than 20 feet from any other special nuclear material, except that the presence of special nuclear material in other vehicles in the vicinity need not be considered.
3. Any other procedure (such as carrier certification) specifically approved by the Commission. If your proposed

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procedures for shipment involve intermediate unloading or transshipment, we require, as a part of the application, a delineation of certified arrangements with all carriers and terminal authorities involved, to assure against commingling of your shipment with other special nuclear materials.

In your telegram dated March 23, 1964, you inquired whether the shipping container shown on Page 67 of TID-7019, "Guide to Shipment of U-235 Enriched Uranium Materials," meets our requirements for a special nuclear material license covering shipment 93% enriched solid scrap. In order to consider the acceptability of the container, the type of evaluation described in the second paragraph of this letter should be submitted.

Very truly yours,

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

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