

DUPLICATE NO. 70-58

File Copy

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

MARTIN COMPANY

August 14, 1964

Refer to: ACC-318
Mail No. 845

J.S.A.
AUG 14 PM 4 04

RECEIVED

Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

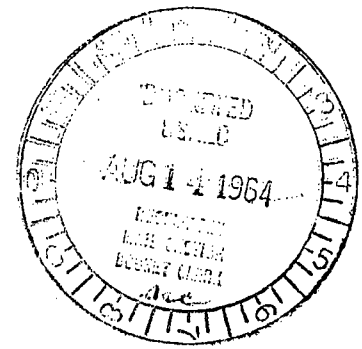
Attn: Mr. Donald A. Nussbaumer, Chief,
Source & Special Nuclear Materials Branch

Subject: Additional Information for Amendment No. 21 to
Special Nuclear Material License No. 53

Gentlemen:

In our latest revision of proposed amendment No. 21 to SNM-53 submitted on August 4, 1964, we indicated that Nuclear Fuel Services would obtain AEC shipment approval for the shipment of loaded tubes containing uranium oxide pellets enriched to approximately 5% in U-235. Because of vacation interference at NFS, we are now submitting the request for shipping approval using the containers previously described.

Our nuclear safety evaluation for the shipment is based on a complete truck loading of 84 containers in a 4 x 21 array of the shipping containers. Since partial shipments will probably be needed to expedite the shipment schedule, we are also depicting (as an example) the proposed tie downs which would be used for a shipment of 32 drums. As you will notice from the drawing, we propose to use a wood frame hold down secured with metal banding which coincides with shoring used previously for shipments of scrap utilizing these containers. Shipments of tubes which will be by exclusive use of van are scheduled intermittently until about October 15, 1964.



2 Copy Provided Compliance
ICy PDR, ICy CB. K&L 8/18/64

4186

August 14, 1964

Refer to: ACC-318
Mail No. 845

The first shipment is scheduled for August 24, 1964 and, thus, approval will be needed by August 21, 1964 for both the shipment of the tubes as well as the fabrication procedures to be used as outlined in our August 4, 1964 revision.

Thank you very much for your usual expeditious handling and approval of this submission.

Very truly yours,



C. W. Keller
Nuclear Accountability
and Licensing Representative

CWK:jn

Nuclear Safety Evaluation

Shipment of MH-1A Fuel Tubes from Martin Vendor

Discussion:

The nuclear safety analysis has been completed for the MH-1A fuel tube shipping containers. The container analyzed consisted of a 4-inch diameter pipe centered in a 22-inch diameter 55 gallon drum. Each shipping container will contain a maximum of 27 loaded fuel tubes which limits the U-235 content to 1.31 kg. For the 4.45% enriched pellet and 0.97 kg. for the 4.07% enrichment.

The calculations were based on the maximum number of loaded shipping containers that could be physically placed on the bed of a 40-foot train car. This resulted in a maximum of 80 shipping containers arranged in a 4 x 20 array. An illustration of the array is shown in Figure 1.

The results consist of determining the neutron multiplication factor (k) for an individual container and the total solid angle subtended at the most remote center of the array. The multiplication factor and the total solid angle were determined by the methods described in proposed revision to NRC Reg. 70 sections 70.44, 70.51 and 70.5.

The limits imposed on mass, enrichment values, and cylinder diameter for maximum criticality for 4.45% enrichment are:

Mass Limit (kg. of U-235)	Volume Limit (Liters)	Cylinder Diameter Limit (inches)
0.10 ± 2.75 ± 3.2	15 ± 2.75 ± 4	8

These limits were determined from figures 19, 20, and 21 of section 70.44. A shape allowance factor of 1.75 (maximum length of 36 inches on a 4-inch diameter pipe) was applied to the mass and contains volume limit. The shape factor was taken from Figure 10 in proposed revision of 10 CFR Part 70.

The neutron multiplication factor (k) for a single shipping container was 0.58 since the geometry is outside the requirements of section 70.52. The maximum total solid angle subtended is equal to 9.4 plus 10 k or 3.26 steradians. The total solid angle for the 4 x 20 array was 2.488. Figure 1 illustrates the array, the geometry and calculations for determining the total solid angle.

* The solid angle calculations were based on a 36" effective fuel length. The assemblies in fact would be 48" or 54" in length, approximately 62" in length.

Conclusion.-

The use of the shipping container described in this letter presents no potential hazards from the nuclear safety standpoint. The calculations assume that the Mervin Co. has exclusive and controlled use of the moving

Pages 5 through 8 redacted for the following reasons:
