

NEUTRON PRODUCTS inc

1730 M Street, N.W., Washington, D.C. 20036
202/296-0262 Cable: NUSWASH

July 29, 1967

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

Attention: Mr. R. Lindberg

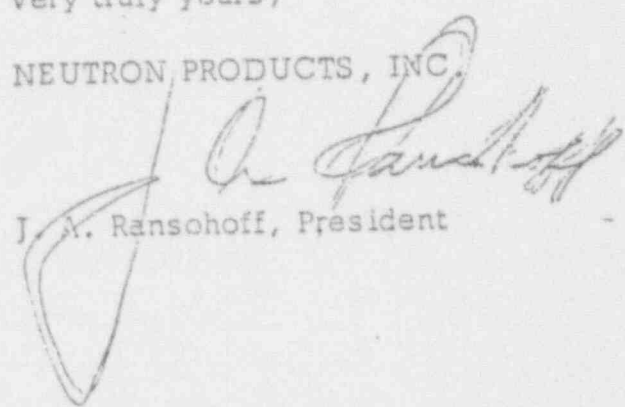
Gentlemen:

Please find enclosed six copies, with revised drawings attached, of the Supplement to our application for approval of containers for the transportation of encapsulated Co-60. We believe that the supplement should serve to satisfy questions raised by the Commission during the meeting held July 24, and in addition we have taken this opportunity to clarify several points on which the original application was not as lucid as it might have been.

Thank you for extending to us the courtesy of a conference, and please convey to those who have participated in the review of our application, our appreciation for the constructive nature of their comments.

Very truly yours,

NEUTRON PRODUCTS, INC.


J. A. Ransohoff, President

JAR:pj

Enclosure (6)

NEUTRON PRODUCTS inc

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SUPPLEMENT TO
APPLICATION FOR APPROVAL OF A CONTAINER
FOR TRANSPORTATION OF 600,000 CURIES
OF ENCAPSULATED CO-60

July 29, 1967

Introduction

Reference is made to Neutron Products' application for a shipping cask license submitted to the Atomic Energy Commission in June, 1967 and further reference is made to a meeting held July 24, 1967 between representatives of the Atomic Energy Commission, Neutron Products, Inc., NUS Corporation, and O. G. Kelley & Co., Inc.

During the course of the meeting on July 24, representatives of the Commission indicated certain areas in which the subject application was in need of clarification. In addition, several comments offered by the Commission have led to modifications in the design of the cask.

This supplement is intended to provide clarification where needed and to present design modifications in view of the Commission's comments.

Items for Clarification

From the original application it was inferred that the cask would be pressurized to 45 psi during normal transport. In fact, the cask will be pressurized with helium to a level only slightly in excess of atmospheric, not in excess of 5 psi gauge in any event. Accordingly, the design pressure during normal shipment will be substantially less than 25 psi gauge, the pressure which would result from an initial pressure of 5 psig and an increase in this temperature on the cask atmosphere from ambient to approximately 600°F.

Licensing is actually sought at this time for four different casks which are shown in Drawing No. 67-0442-2, Rev 2.

The large cask, Mode I, which is the subject of elaborate analysis is designed principally for shipping twice encapsulated sources between the Big Rock Point Reactor and a site at which the outermost capsule will be removed, and the then once encapsulated sources either reencapsulated or trans-shipped to a second site for reencapsulation. The design capacity of this cask is 600,000 curies as shown and licensing is being sought for the use of this cask to ship this quantity of Co-60 either as twice encapsulated sources or as once encapsulated sources contained in a protective sleeve. In either event, the shipments will be dry and a helium atmosphere will be provided.

Mode II is designed to accommodate shipments of up to 400,000 curies either in the form of twice encapsulated sources or in the form of once encapsulated sources contained in a protective sleeve.

For Mode III, license is being sought to ship 200,000 curies either as twice encapsulated sources or as once encapsulated sources in a protective sleeve.

For Mode IV, license is sought to ship up to 100,000 curies provided that there is furnished an internal container which is adequate to secure the sources and transfer the heat of self-attenuation to the cask walls in a manner which provides for the maximum source temperature to be no greater than 300°F. It is NPI's intent to ship small lots and odd shapes

in the Mode IV cask, and to provide appropriate internals depending upon the nature of any particular shipment.

Design Modifications

The attached drawings are to be substituted for the drawings furnished with the original application. The modifications made are reviewed below for each drawing.

Drawing No. 67-0442-7 is a new drawing and is provided to describe the details of the horizontal lifting bail.

Drawing No. 67-0442-6 is for a new trailer different from that originally contemplated. No new analyses are deemed necessary since the same principles of attachment apply.

Drawing No. 67-0442-5 has been revised to properly show a set of lifting pads, a revision which did not grow out of licensing considerations. Revision 2 is now the proper drawing.

Drawing No. 67-0442-4 has been revised in response to the Commission's comments. In the original design it is possible that, under limited but conceivable circumstances, a void could be created at the interface between the cask sections which would permit a narrow beam of radiation that might possibly exceed 1 R/hr at a distance of 3 feet. In order to obviate this possible deviation from the licensing criteria a segment has been inserted to provide for shielding of the interface in any event. In addition, Drawing No. 67-0442-4 contains a revised detail of the end plug which provides for confinement of the air void into a space either outside the plug proper or at the inner

surface of the plug. This modification is designed to eliminate the potential streaming problem raised by the Commission as a conceivable consequence of the prescribed accident. This revision in plug design also serves to stiffen the end plate in response to the Commission's comment. The current revision of this drawing is 4.

Drawing No. 67-0442-3 has been revised to provide fins on the extra female section of the cask and the male section has been modified to provide the same expansion and stiffening improvements provided for the plug. Also shown on this drawing is a modification of the female section to provide end plate reinforcement in the event of an end drop in response to the Commission's comments. The current revision number is 4.

Drawing No. 67-0442-2, Rev 2, has been revised to show the various possible cask combinations for which licensing is sought.

Drawing No. 67-0442-1 has been revised to show the new details of the mid-section interface, and to show the end plate modifications, all of which have been previously discussed. It is revision number 5.

Comments

With regard to the licensing of Modes II, III, and IV, it is believed that enough analysis has been performed on Mode I which is the most severe case, to assure safe use of Modes I, II, and III, particularly since the ratio of heat transfer surface to capacity for which license is being sought is greater in Modes II and III than in Mode I.

License to ship in Mode IV is being sought with the restriction that means be provided, comparable to those used in Modes I, II, and III, for securing the sources and transferring the heat of self-attenuation.

With regard to the design modifications, it is believed that the comments raised by the Commission have been satisfied and that no additional detailed analyses are required. Specifically, the matter of streaming at the large cask interface has been resolved by the incorporation of a light steel barrier in order to prevent molten lead from being displaced along the line of the interface. The possibility of streaming through the plug subsequent to the prescribed accident, is considered resolved by modifying the void space so as to trap the air during the accident with the result that the entire periphery of the plug will be filled with lead on resolidification.

Admittedly, voids may develop on resolidification due to the fact that some lead will remain in the void space originally provided, however, it is not considered credible that these voids will be relocated by considerations of gravity rather than heat transfer, and since the periphery of the plug will cool first it is believed incredible that the voids will be concentrated at any point on the periphery. With the plug in an inverted position, voids would clearly be concentrated at the inside of the plug in which case also, the post-accident criteria would be satisfied.

With regard to the matter of protecting the end plug against shear in the event of an end drop it is believed that the original calculations which showed this result not to happen are correct. However, in response to the Commission's comments plates are provided on the cask bottom to support the end plate against the unyielding surface, and on the cask top, the void space cylinder is extended to provide the same effect.

It is believed that with this supplement the subject application is in condition for the issuance of a license.