

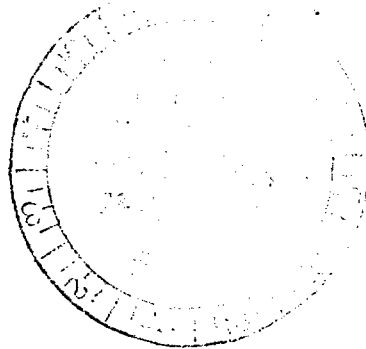
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**UNITED NUCLEAR**  
C O R P O R A T I O N  
FUELS DIVISION

P. O. BOX 1883  
365 WINCHESTER AVENUE  
NEW HAVEN 4, CONNECTICUT  
777-5361

July 9, 1964

Mr. Donald A. Nussbaumer, Chief  
Source and Special Nuclear Materials Branch  
Division of Licensing and Regulation  
United States Atomic Energy Commission  
Washington 25, D. C.



Subject: Docket No. 70-820  
Amendment IV to Special Nuclear Material License No. SNM-777  
Shipment of Uranium-Zirconium Alloy Scrap

Dear Mr. Nussbaumer:

An amendment is requested to our Special Nuclear Material License No. SNM-777, at Wood River Junction, Rhode Island, for the shipment of a maximum of 700 drums containing uranium-zirconium alloy scrap, to the Wood River Junction, Rhode Island Plant. The License amendment approval is requested for one-time-only shipment of scrap in these containers and it is requested that the License be made effective for a period of one year from the date of issuance.

The following conditions will apply to the shipment. A maximum of 500 containers, each containing not more than 350 grams of U-235, will be shipped from our Chemicals Operations Plant at Hematite, Missouri, to our Fuels Recovery Plant at Wood River Junction, Rhode Island, and a maximum of 200 containers, each containing not more than 350 grams of U-235, will be shipped from our Fuels Division Plant at New Haven, Connecticut, to the Fuels Recovery Plant at Wood River Junction, Rhode Island. The containers will be loaded on a truck at the Hematite or New Haven Plant site for exclusive use shipment directly to the Wood River Junction, Rhode Island Plant site. There will be no unloading, trans-shipment or commingling with any other special nuclear material during the shipment of this scrap. At the present time the scrap in question is already packaged in the containers, which consist of an 18-gage, 55-gallon steel drum.

As shown in the attached drawing of the container, the material is packaged in a polyethylene bag which is inserted into a 6" diameter stovepipe. The ends of the polyethylene bag are inserted into 6" diameter cans which fit into the stovepipe, as shown in the drawing. The containers will be filled with vermiculite in the space between the inner stovepipe and the outer 55-gallon steel drum. This is being done to offer cushioning effect on the stovepipe and to aid as a fire retardant.

The drums will be loaded into the truck in a two-tiered array. As shown in the sketch of the truck-loading layout, the entire truck will be filled with 55-gallon steel drums front to back and scrap-containing drums and empty drums will be alternated. In the sketch, for the purpose of visualizing the alternation

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**ACKNOWLEDGED**

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of drums, one need only look at the hexagonal and triangular shapes to determine the loading. The numerical notations and the notation of a fuel drum (shielded) are indicated only for the purposes of the attached solid angle calculation. Each scrap-containing drum currently has a yellow stripe painted around it, and such identification will be retained to identify the alternating array. The empty drums will be painted black, without any yellow stripe marking.

The attached solid angle calculation was based upon stacking one fuel drum on top of the other and one empty drum on top of the other for the second tier. For the purposes of shipment, however, drums will be displaced alternating between the first and second tiers to provide an even more conservative shipping arrangement than that used in the attached solid angle calculation. Other conditions of the solid angle calculation are noted on the attached, entitled "Shipment of U-Zr Scrap."

When the drums are received at the Wood River Junction, Rhode Island Plant, they will be unloaded and either maintained in the same array as they were shipped or else they will be stored in accordance with present criteria established for storage under our current Special Nuclear Material License No. SNM-777.

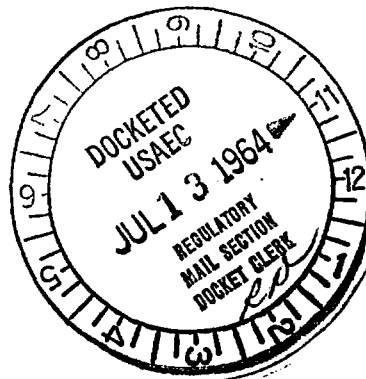
Very truly yours,

UNITED NUCLEAR CORPORATION

*Herbert S. Kalish*

Herbert S. Kalish  
Commercial Fuel Manager

HSK:RM  
Attachments



July 8, 1964

SHIPMENT OF U-Zr SCRAP

Maximum amount of U-235 per container = 350 grams  
 Maximum amount of alloy per container = 5,000 grams  
 Inner container diameter = 6 inches  
 Inner container height = 30 inches

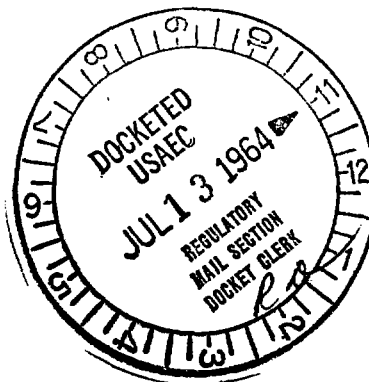
K effective = 0.65 for six inch diameter, 64" pipe with optimum moderation and no reflection

The shipping array will consist of alternately stacked fuel and empty drums, as per the sketch, in a 2 x 4 x 19 array containing seventy-six (76) U-235-bearing containers.

The allowed interaction angle is 2.5 steradians.

The following accident conditions will be assumed for the solid angle calculation:

1. Inner container will be optimally moderated.
2. Space between containers will not be flooded.
3. The second tier will be such that fuel container rests on fuel in the lower tier.
4. The diameter of each container will be reduced to 20-3/4" from 22-1/2".
5. Fuel height will be 64".

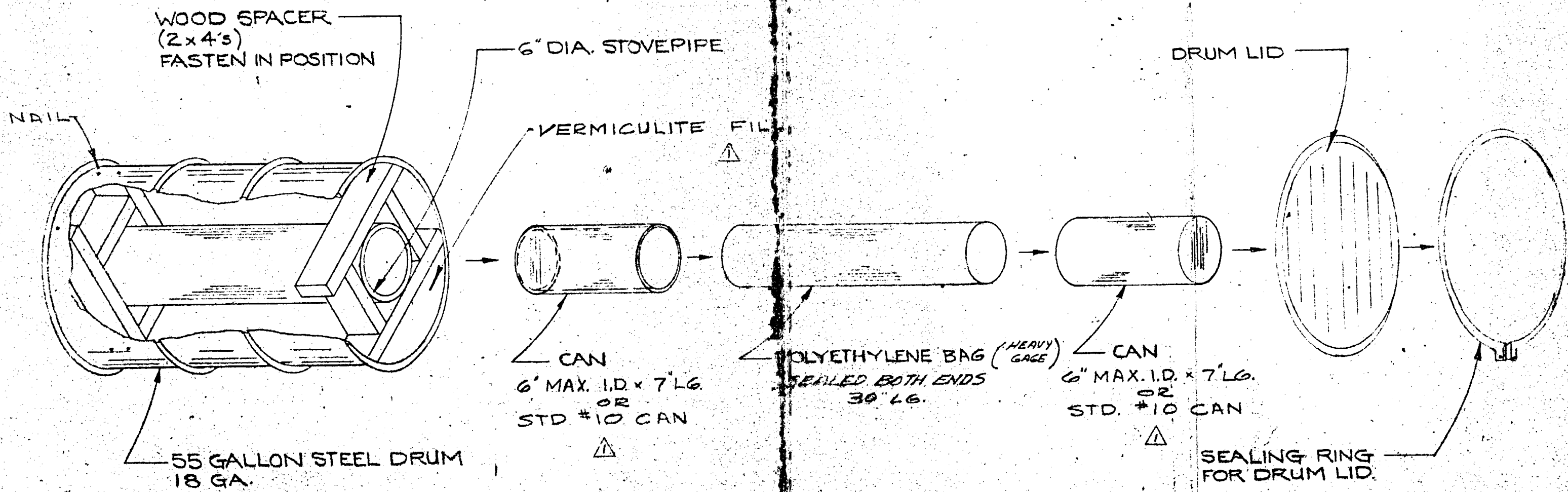


Container Identity	Number of Such (n)	h	$\frac{2d(L/2)}{h}$	$\sqrt{(L/2)^2 + h^2}$	$(L/2)^2 + h^2$	$\Omega_1$	$n \Omega_1$
2	4	29.34	13.087	1,848	42.99	.3044	1.2176
3	3	41.50	9.253	2,746	52.402	.17657	0.5297
4	4	65.74	5.841	5,345	73.109	.07989	0.3196
5	4	105.72	3.632	12,200	110.456	.03288	0.1315
6	4	146.70	2.6175	22,544	150.146	.01743	0.0697
7	4	187.90	2.0436	36,330	190.604	.01072	0.0429
8	2	92.54	4.149	9,587	97.916	.0424	0.0848
9	2	170.98	2.2458	30,258	173.948	.01291	0.02582
Shielded	10						
Central	1						

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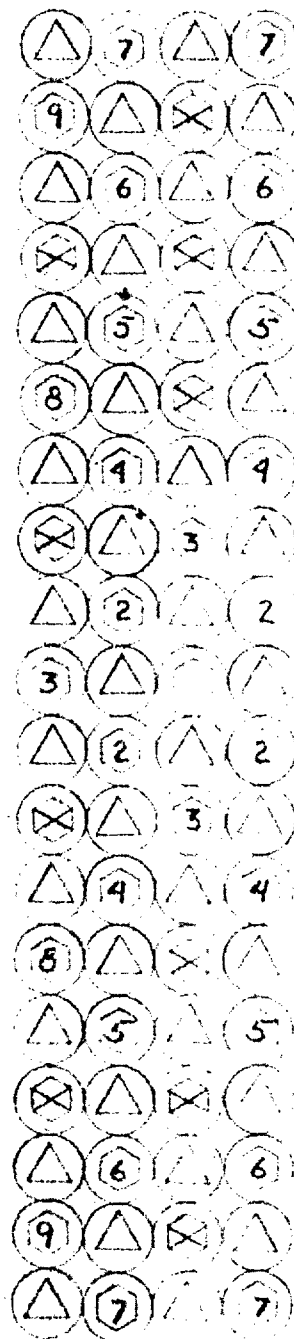

$$\Omega = 2.42$$

$\Sigma = 38$  Double height fueled containers

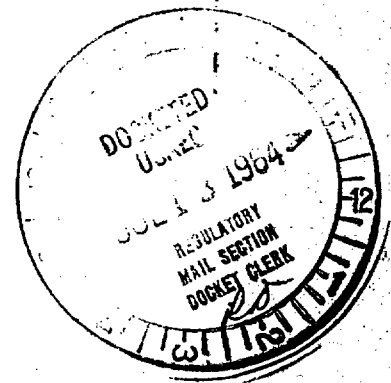


UNITED NUCLEAR CORP.  
DRAWN BY: LJN - DATE: 1/4/63  
SCALE: NONE

55 GAL DRUMS  
CONTAINING A MIN  
OF 350 GRAMS  
U 235 AS FULL  
ALLOY SCRAP.  
(76 DRUMS TOTAL)

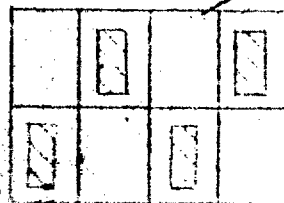


55 GAL DRUM EMP  
(76 DRUMS TOTAL)



2ND TIME  
OVER EMPTY AND  
EMPTY OVER

- △ - EMPTY DRUM
- - FUEL DRUM
- ⊗ - FUEL DRUM (SHIELDED)



TRUCK CONTAINING

64X100