

Docket 70-36

①

2-5-59

Mallinckrodt 2/5/59

Proposal

① 5 gallon drum in "55 shorty" K-1019
Lim Safe

3% 88 lb. U	1.2 kg	2.64 lb. U-235	2.65 lb.	OK
10% 13 lb. U	.59 kg	1.3 lb. U-235	1.3 lb.	

$\frac{13x}{2.2 \times 55} = 6.7 \text{ kg U-235}$

% mixture 0.2% (12/30/55) $\frac{4 \text{ lb. U-235}}{18 \text{ lb. U-235}} = \frac{.002 \times 6.7 \times 235}{18} = .58 \text{ lb. U-235}$

5 gallon drum 11 1/4" dia x 12 3/4" (22 x)

55 shorty 24" dia x 24" (48 x) (190") (6.7 x)

ED E 12 3/4" max truckload, 70 drums; 90 rail 90 drums

C to E 18 3/8" 3% (1.2 kg U-235 / drum)

C to C 24" Truck 1.2 x 70 = 84 kg U-235
Rail 1.2 x 90 = 108 kg U-235
10% (1.6 kg U-235 / drum)

Truck 42 kg U-235
Rail 54 kg U-235

TID 7016

Density in stacked cubical array



Surface Density
(5/100). V + O = 1.0
24 x 25 1/2 x 25 1/2 = 3906 1/4
10% 3906 / 3750 = .150

Volume $24 \times 24 \times 25 \frac{1}{2} / 1728 = 8.5 \text{ cu ft.}$

Volume 55 shorty $\frac{.755(24)^2(25 \frac{1}{2})}{1728} = 6.7 \text{ cu ft.}$

overall $\frac{8.5}{6.7}$

$\frac{1.2}{6.7} = .179 \text{ kg U-235 / cu ft.}$ TID-7016

3% am. $\frac{1.2}{8.5} = 0.141 \text{ kg U-235 / cu ft.}$ H/X 2-20 H/X ≥ 20

10% am. $\frac{.59}{8.5} = 0.070 \text{ kg U-235 / cu ft.}$ H/X 2-20 H/X ≥ 20

$\frac{1.2}{1.1} = 1.09$ H/X 2-20 H/X ≥ 20

Shipping limits H/X 2-20, 225 kg / a. [50 units, max]

3% $225 / 1.2 = 188$ 50 units

10% $225 / .59 = 381$ 50 units

H/X 2-20 H/X ≥ 20
825

B-27

(B) 15 gallon drum in 88 gallon container
Enrichment $\leq 3\%$ assay

Quantity, "Limited Data" is 350 lb assay
 $350 \times 1/26.7 = 13.1$ gallons.

Shipment, 42 drums (truck), 5 drums (Rail), single layer
Inner drum 16" ID x 18.5" high

Outer drum 30 3/4" dia; $\frac{88 \text{ gal}}{7.48} \times \frac{1}{0.15} = 2.39 \times 27 1/2 \text{ ft. Vol} = 14.7 \text{ cf.}$
 $\frac{34 1/4 \text{ in.}}{12} \times \frac{3.14}{4} \times 27 1/2 \text{ ft. Vol} = 110 \text{ gal}$

Density in 88 gal drum, 3% assay, lim. data = 1.2 kg U-235

$\rho = 1.2 / 14.7 = .082 \text{ kg/cu ft}$ vs $1 \text{ kg. cu. ft. } 1/4 \times 2-20 \text{ TID 7016}$

Volume, 3% $\frac{88 \text{ lb U-235}}{.88} \div 26.7 \text{ lb U-235/gal} = 3.75 \text{ gal. or } 14.2 \text{ liters}$

$\frac{3.75}{15} = 25\% \text{ filled}$ $\text{lb/cu ft} = 14.2 / 14.7 = 0.97$ vs $0.8 \text{ lb/cf TID 7016}$

For 15 gal. $3.75 \times 572 = 2145$, $572 \times 3.75 = 2145$

Interaction, planar array:

Mail 2/5/59 $n = 4.05 \text{ ster/4}\pi = 32.3\% \text{ of } 4\pi$ or if $k = .49$