

### 3. Transport

Principles: regulation + packaging + content = hazard;  
regulations: handling, security

Packaging: 10 CFR-71, LLW: LSA H-3 < 5 mCi/ml, contamination < 100 nCi/m<sup>2</sup>, inherently safe, tight package (PW, Fe, C, drums, boxes,..); type A: A1 non dispersible, A2 dispersible, normal conditions, 210 l drums\*; type B: 3000X A1, 3000X A2, 30 kCi max, accident conditions (30' drop, puncture, 800 C 30 min, immersion 8 h 5 m) CNS 15-160B\*, DOT requirements: 0.1% release, inhalation doses for 150 RI 49-CFR-173 activity limits: A1+ A2; spent fuel: shipping casks IF-300\*, truck LWT 25 t, OWT 40 t, rail 75/100 t; HIC: 10-CFR-61, land burial, IE, filters, TRUPACK\* requirements SSC: isolation 300 y (Sr-90), resistance (mechanical, thermal, radiation, corrosion)

Transportation: variety, 90% volume : 10% activity; road: dimensions: regular: 2.4\*12\*4 m, 32 t; overweight, permit, restrictions (roads, time, seasons, bridges, tunnels)

Spent fuel truck shipping casks:

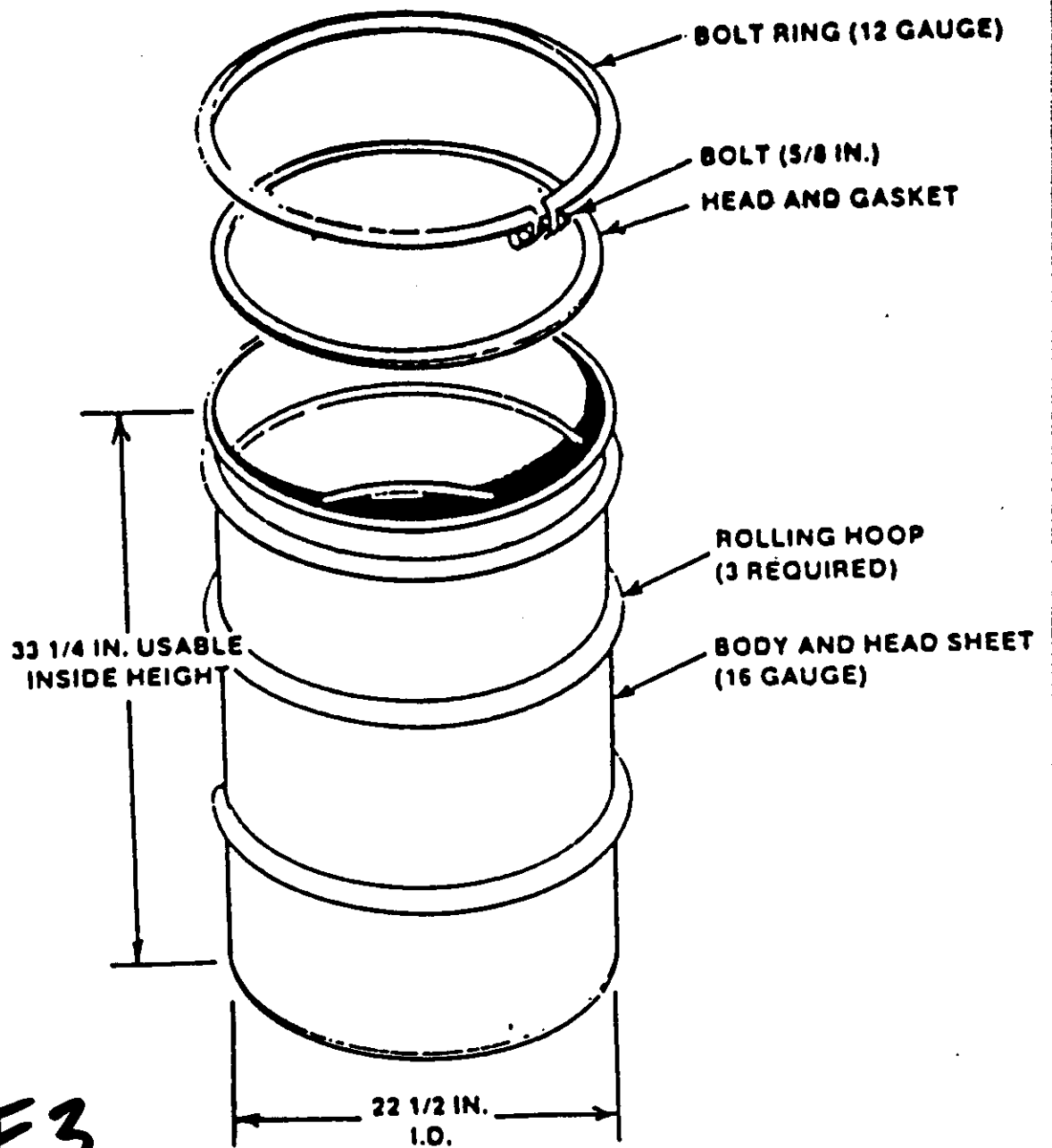
Cask	EW-t	LW-t	C-PWR	C-BWR	L	TM
NLI-1/2	22	23	1	2	LWR	LWT
TN-8	37	39	3	7	LWR	OWT
NAC-1	24	25	1	2	LWR	LWT

## Rail: 119 t, U.S. Spent fuel rail shipping casks

Cask	EW-t	LW-t	C-PWR	C-BWR	L	TM
IF-300	63-5	68-70	7	18	LWR	OWT
NLI-10	90	97.5	10	24	LWR	rail

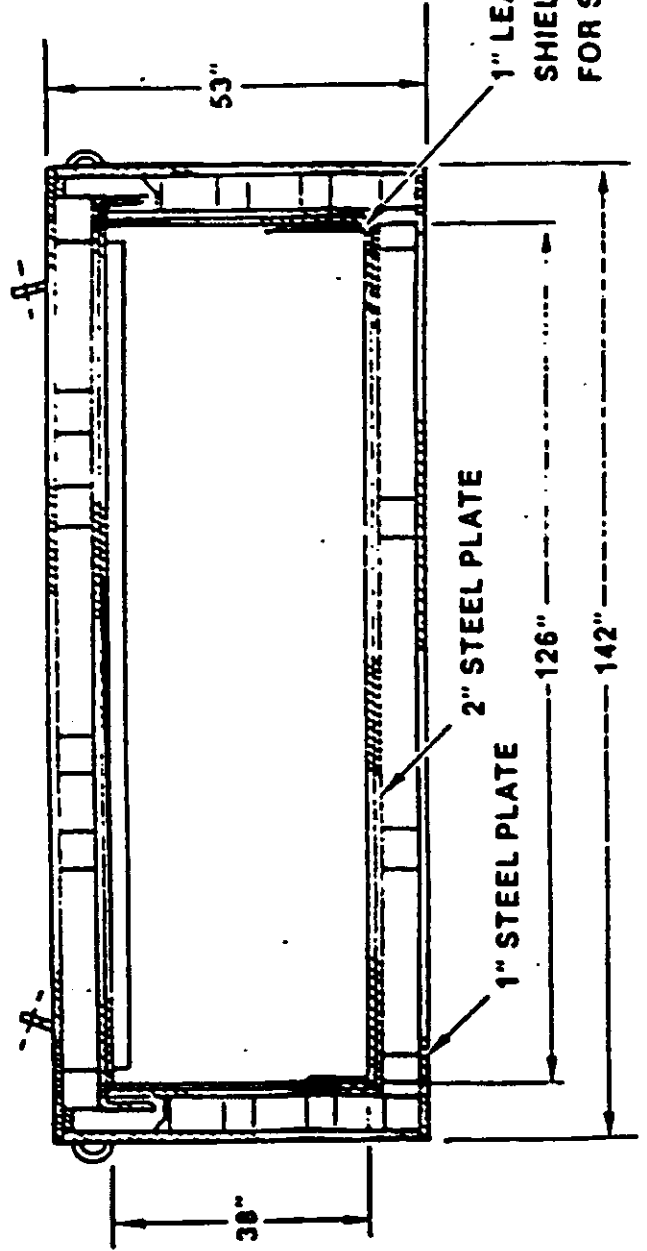
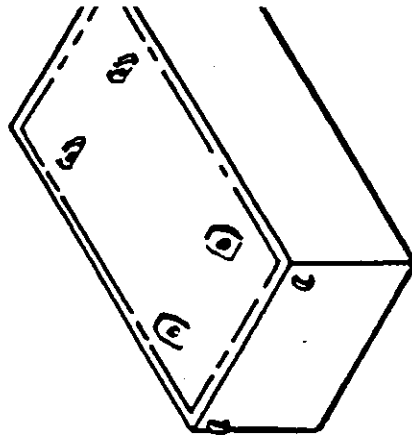
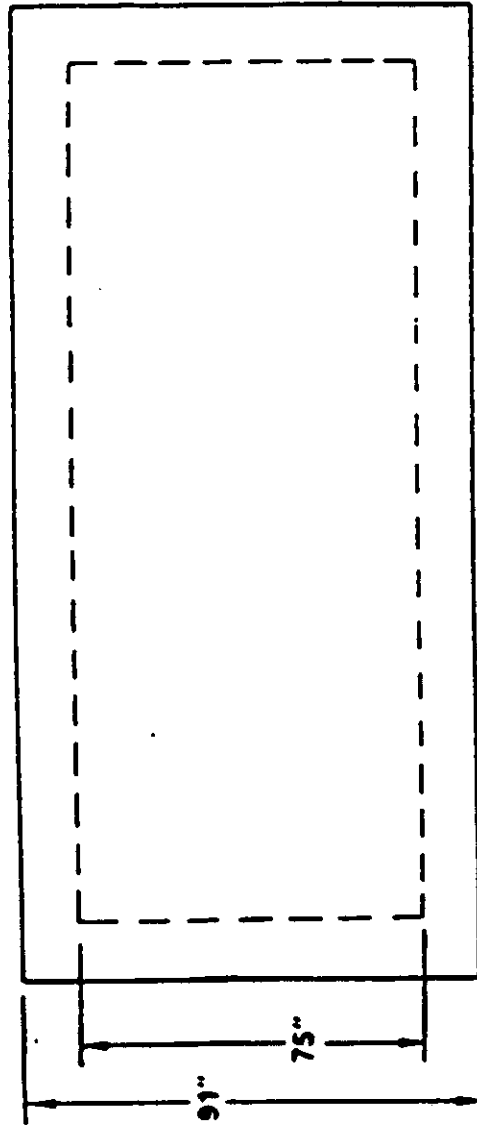
EW = Empty Weight, LW = Loaded weight, C = Capacity (assemblies) L = Licensed use, TM = Transport mode.

Routes: controversy, Boroughs of Queens 1986 BNL (LI), preferred routes, notify NRC + states; procedures: 10 CFR-61, 49 CFR-172, safety officer, contamination, inspection of truck, radiation protection, bracing, seal, record, emergency procedures, warning labels (RW-I,RY-II,RW-III), radiation <200 mrem/h, 10 mrem/h at 1 m, exclusive use: 1000 mrem/h package 200 mrem/h vehicle 10 mrem/h at 2 m, theft, sabotage; inspection: defects, pallets, bolts, labels, record, RA+C survey, activity; loading: cranes 23 t; safety restrictions: driving times 10 h/d 60 h/w



**F3**

DOT Spec. 17C steel drum (55 gallons). (Reprinted from)



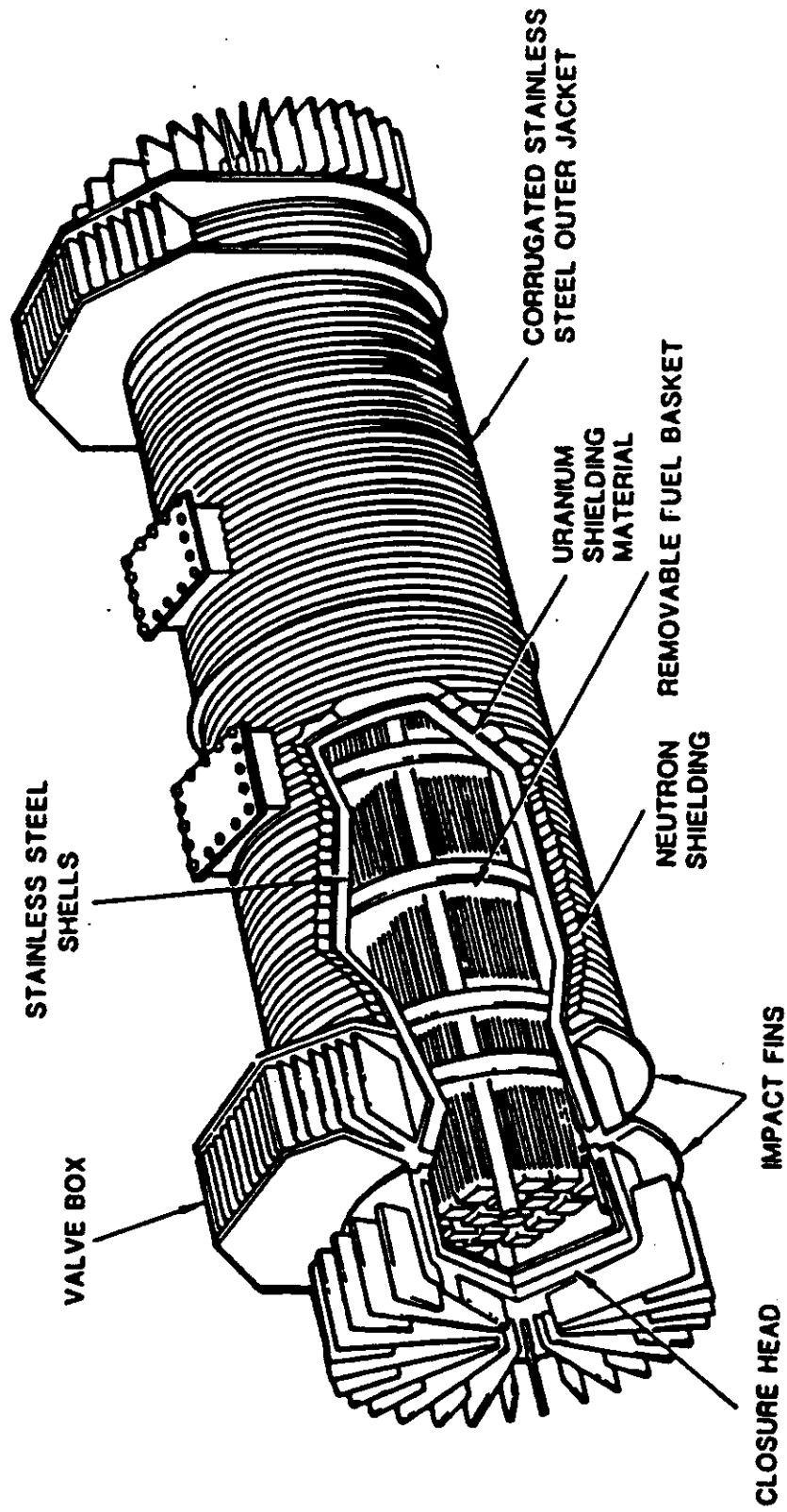


Figure 5-8 IF-300 spent fuel shipping cask. (Reprinted from ASME 1986.)

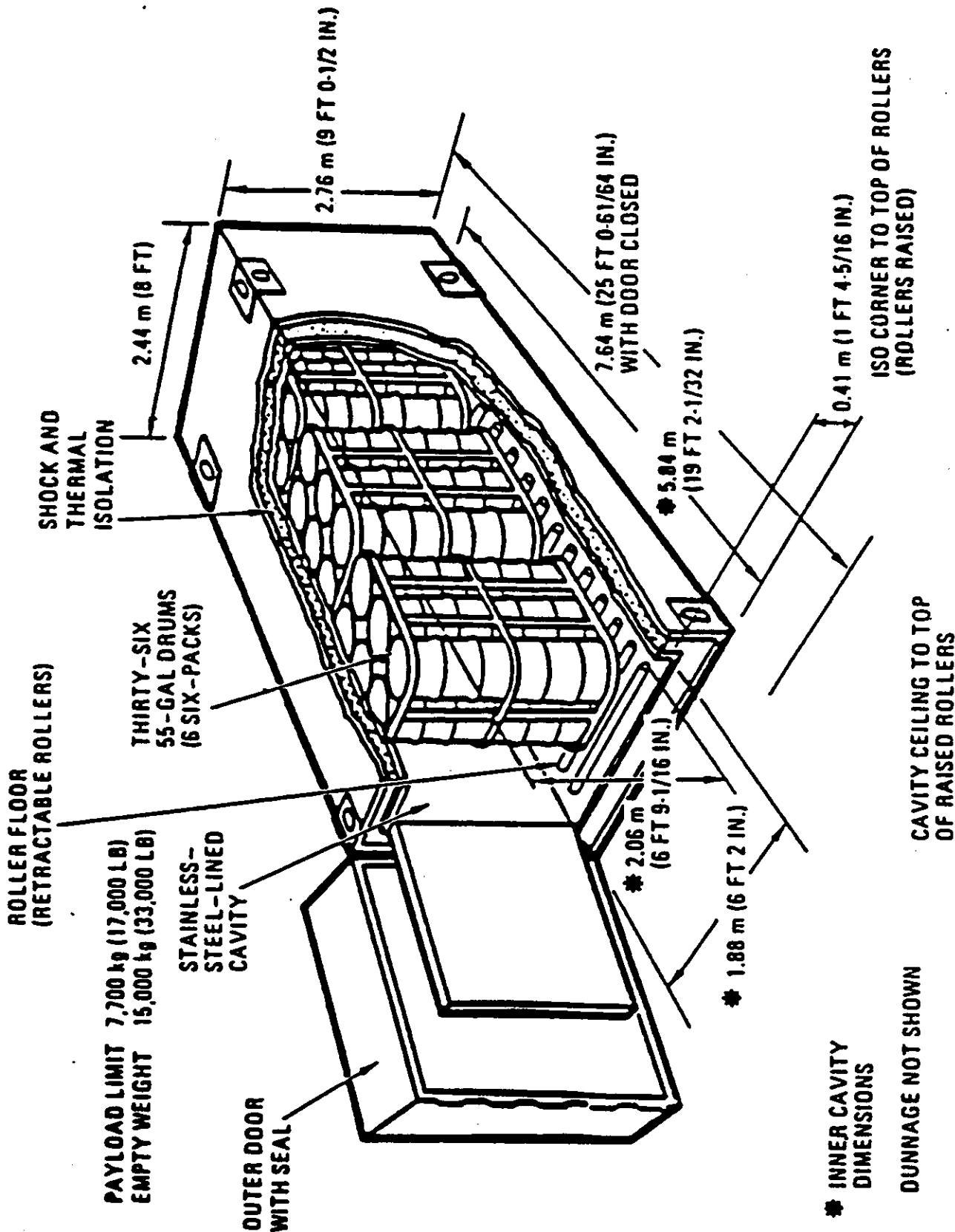


Figure 5-30 TRI-PACT 1 loaded with six packs of drums (Dunnage not shown)

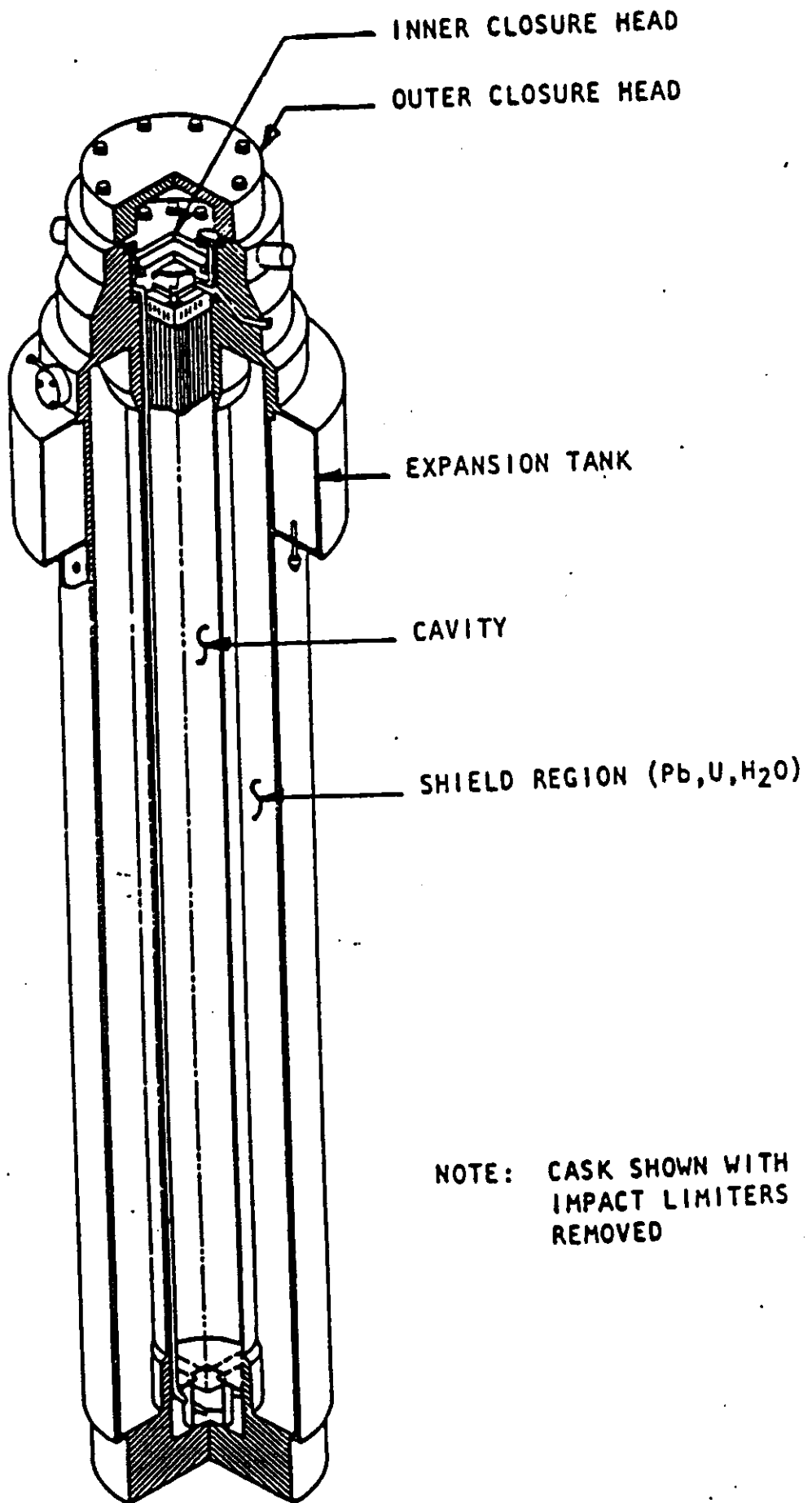


FIG 5-26 NLI-1/2 legal weight truck cask. (Reprinted from ASME)

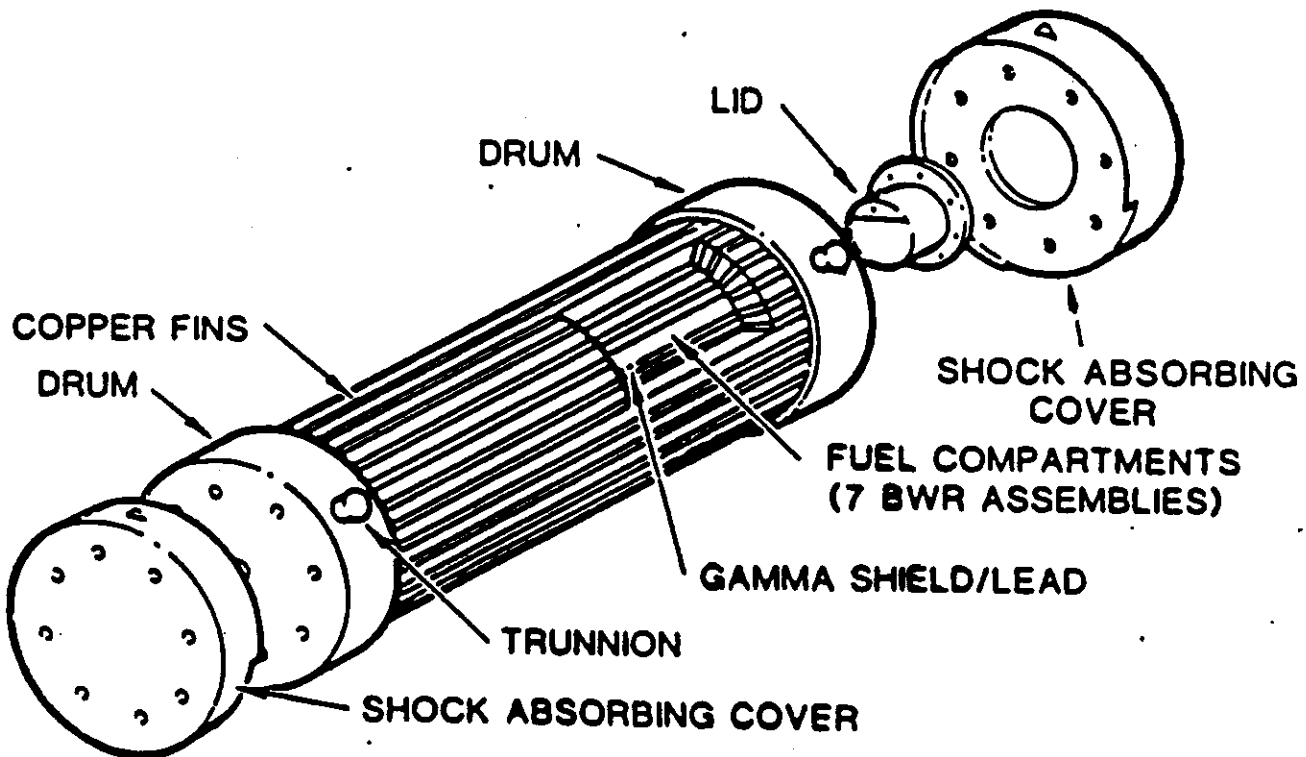
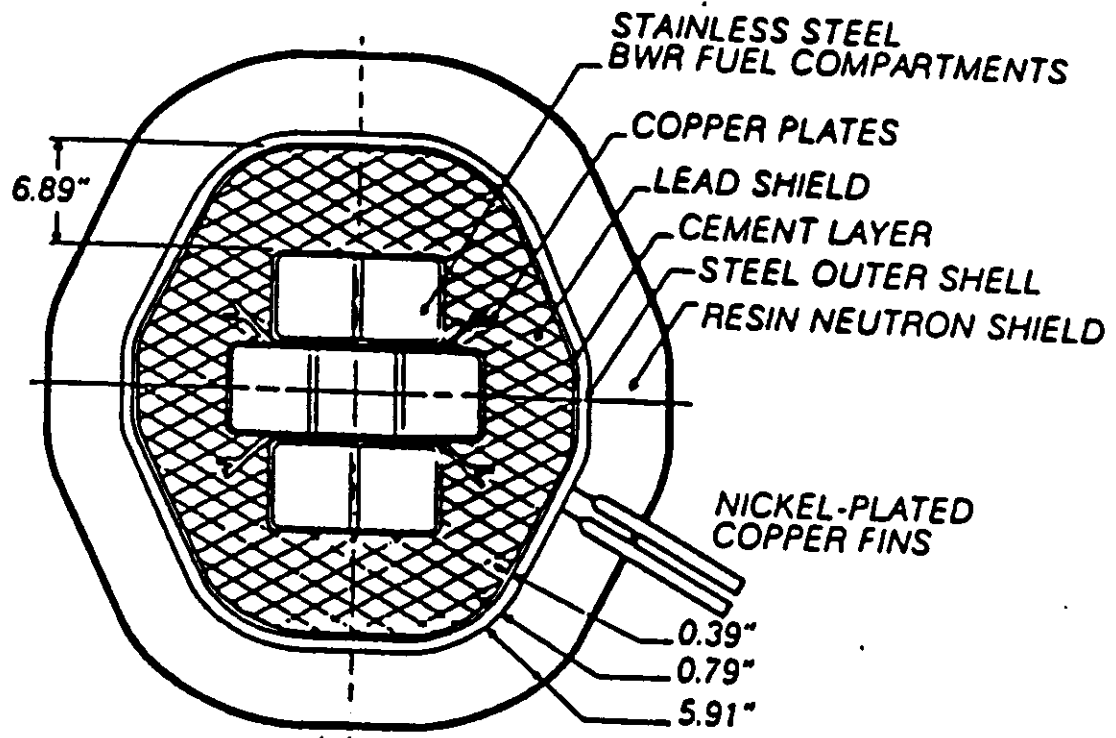
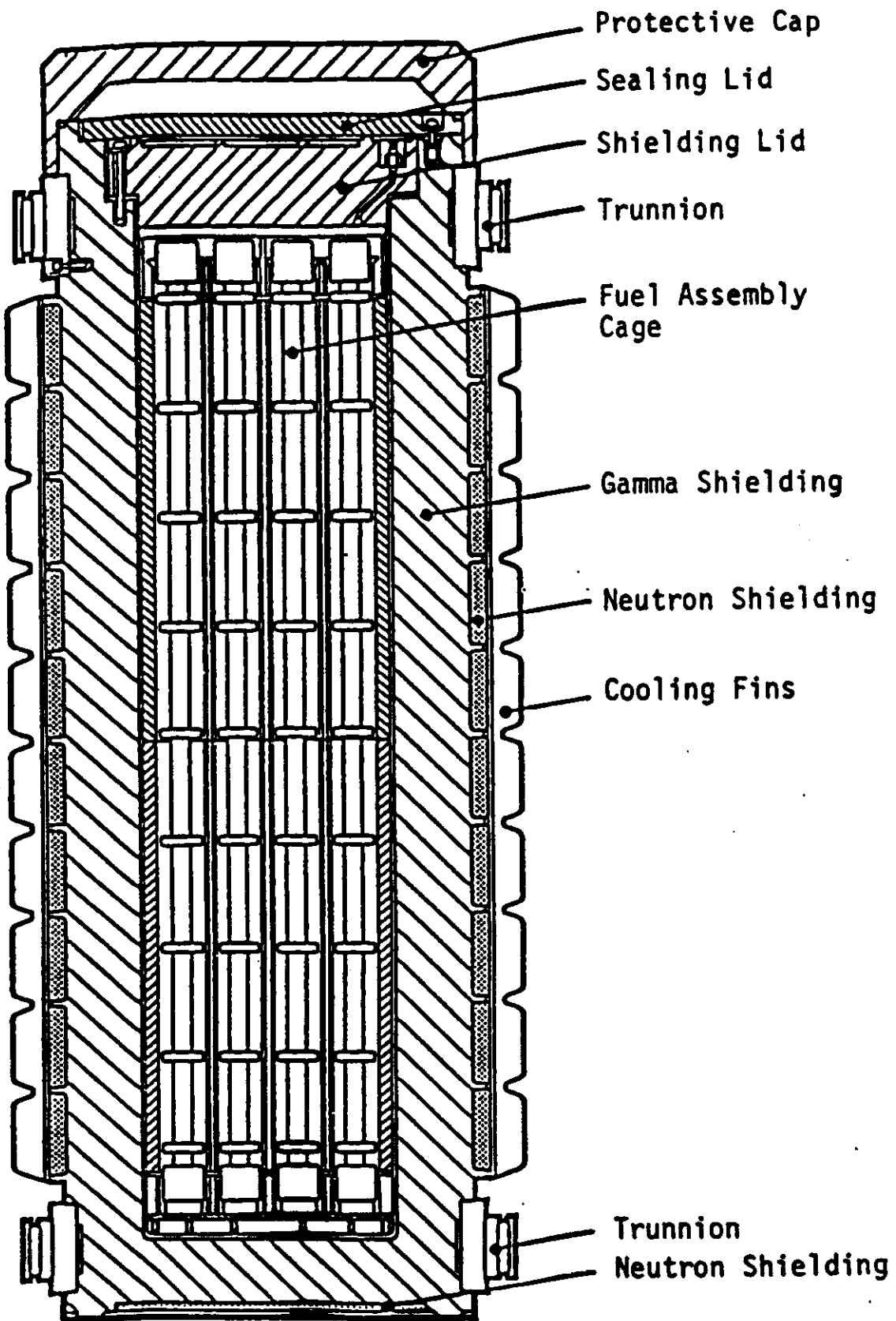


Figure 5-27 TN-9 overweight truck spent fuel cask. (Reprinted from ASME 198





**Fig.5.3. Transport and storage cask TN 1300**