DOT TYPE A TESTING OF AMMUNITION CONTAINER

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Motivation

- DUMC Radiopharmacy previously supported nuclear medicine procedures at Aesthetics Center

  - Required transport over public road

  - Triggered DOT compliance issues

  - Using Ammo Cans would be convenient

The Catch

49CFR173.415 (a):

- **"Each offeror of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide to DOT on request, complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification."**

Could not locate required package testing documentation

Goals and Objectives

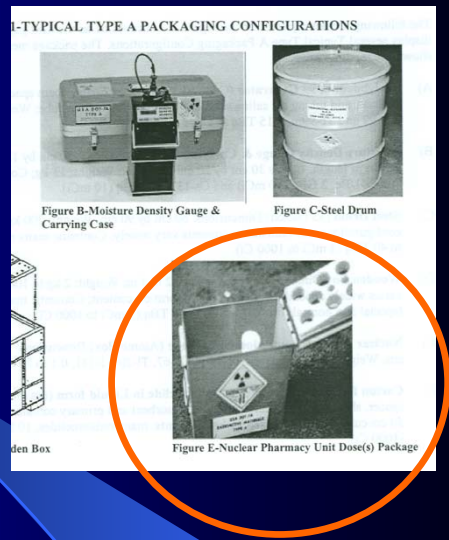
<u>Goal</u> : Enable Legal "Ammo Can" Use as Type A Package for RAM Ground Transport

Ojectives:

- **Comprehensive Review of Regulations and Guidance**
- **Develop Testing Plan**
- **Assemble Test Materials**
- **Conduct Tests**
- **Create 49cfr173.415(a) Test Documentation**
- **Present & Publish Results**

Why Ammo Cans?

- “Everyone uses ammo cans for this purpose”
- “Ivy league university where I used to work used ammo cans”
- “US DOT HazMat website had ammo can picture as example Type A container”
- “NucMed Vendors advertise their use of ammo cans”
- “They ship ammunition in ammo cans, so they must be adequate for radioactive material”
- THE BOSS SAID SO!



The Plan

- Publish Paper
- Purchase & mark new Ammo Cans
- Generate Test Documentation
- 173.410(f)/178.608 vibration test
- 173.466 30 foot drop & penetration tests
- 173.465 water spray, penetration, drop & stack tests
- Develop Test Plan & Gather Materials
- Review Regulations

M2A1 Steel Ammunition Box

- **Dimensions: 30.5 cm long x 15.2 cm wide x 19 cm tall**
- **Material: 16 Gauge Steel**
- **Weight: Empty - 2.4 kg Loaded - 10.3kg**

Inner Packaging

- Six 11” x 5 ½” x 1” pieces of blue extruded polystyrene
- Customized to fit 4 specific lead pigs
- Lead pigs house single glass vials with a rubber septum

Water Spray Test

49 CFR 173.465 (b)

- Conditioning phase meant to prepare for subsequent tests
- Water must spray from 4 different directions for a duration of 1 hour
- Leakage observed visually and by measuring change in weight

Drop Test

49 CFR 173.465 (c)

- **Dropped from 4 ft onto various facets of the can: lid, latch, side, base, and corner**
- **Must fall onto horizontal flat surface**
- **Pass/fail: No leakage of inner components or significant damage to outer packaging**

Penetration Test

49 CFR 173.465 (e)

lust use a ‘bar of 3.2 cm in
ameter with a
emispherical end and a mass
f 6 kg’

ropped from 1meter above
e target which rests on a
gid horizontal surface

ass/fail: interior packaging
ust remain intact

Compression Test

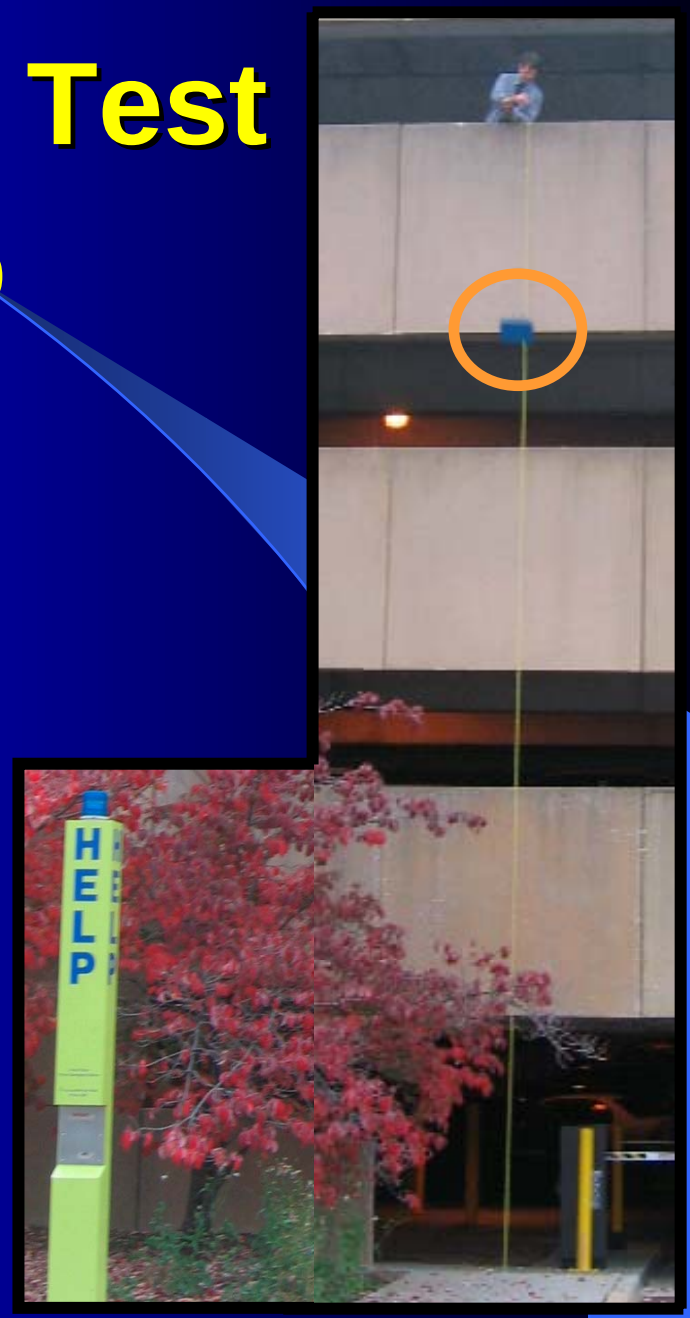
49 CFR 173.465 (d)

- Compressive load must be 5 times the weight of the package
- Duration of 24 hours
- Pass/fail: No significant deformation which would result in stack instability

30 Foot Drop Test

49 CFR 173.466 (a)

- Specially required for *liquid* or gaseous RAM packages
- Same conditions as the previously described drop test except the increased drop height
- Pass/fail conditions also the same



Conclusion

- As configured, ammo cans cannot pass a 30 ft drop test.
- Options:

  - redesign inner packaging to exclude largest pig

  - include exterior securing mechanism
- No current need for ground transport for Radiopharmacy (nuke med studies halted at Aesthetic Center)
- Possibility of future need