

JL SHEPHERD & ASSOCIATES

1010 ARROYO AVE., SAN FERNANDO, CALIFORNIA 91340-1822

818-898-2361 FAX 818-361-8095

7100122

April 30, 2012

Attn: Document Control Desk
Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

**AFFIDAVIT OF CONFIDENTIAL INTELLECTUAL PROPERTY
AND PROPRIETARY INFORMATION
CONTAINED IN J.L. SHEPHERD & ASSOCIATES
BU650B DESIGN PROPOSAL
FOR TYPE B (U) RADIOACTIVE MATERIALS TRANSPORT PACKAGE
SLIDE SHOW PRESENTATION**

This Affidavit, prepared by Mary F. Shepherd, Vice President, J.L. Shepherd & Associates, 1010 Arroyo Avenue, San Fernando, California 91340, is to provide the U.S. Nuclear Regulatory Commission's Document Control Desk that pages 15 through 48 (inclusive) of the J.L. Shepherd & Associates BU650B Design Proposal for Type B(U) Radioactive Materials Transport Package Slide Show Presentation contains the confidential intellectual property and proprietary information of J.L. Shepherd & Associates, in accordance with 10CFR 2.930 and 10CFR71.1(a).

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Mary F. Shepherd

Mary F. Shepherd
Vice President
J.L. Shepherd & Associates

NMSSD1

J.L. Shepherd & Associates

BU650B

Design Review

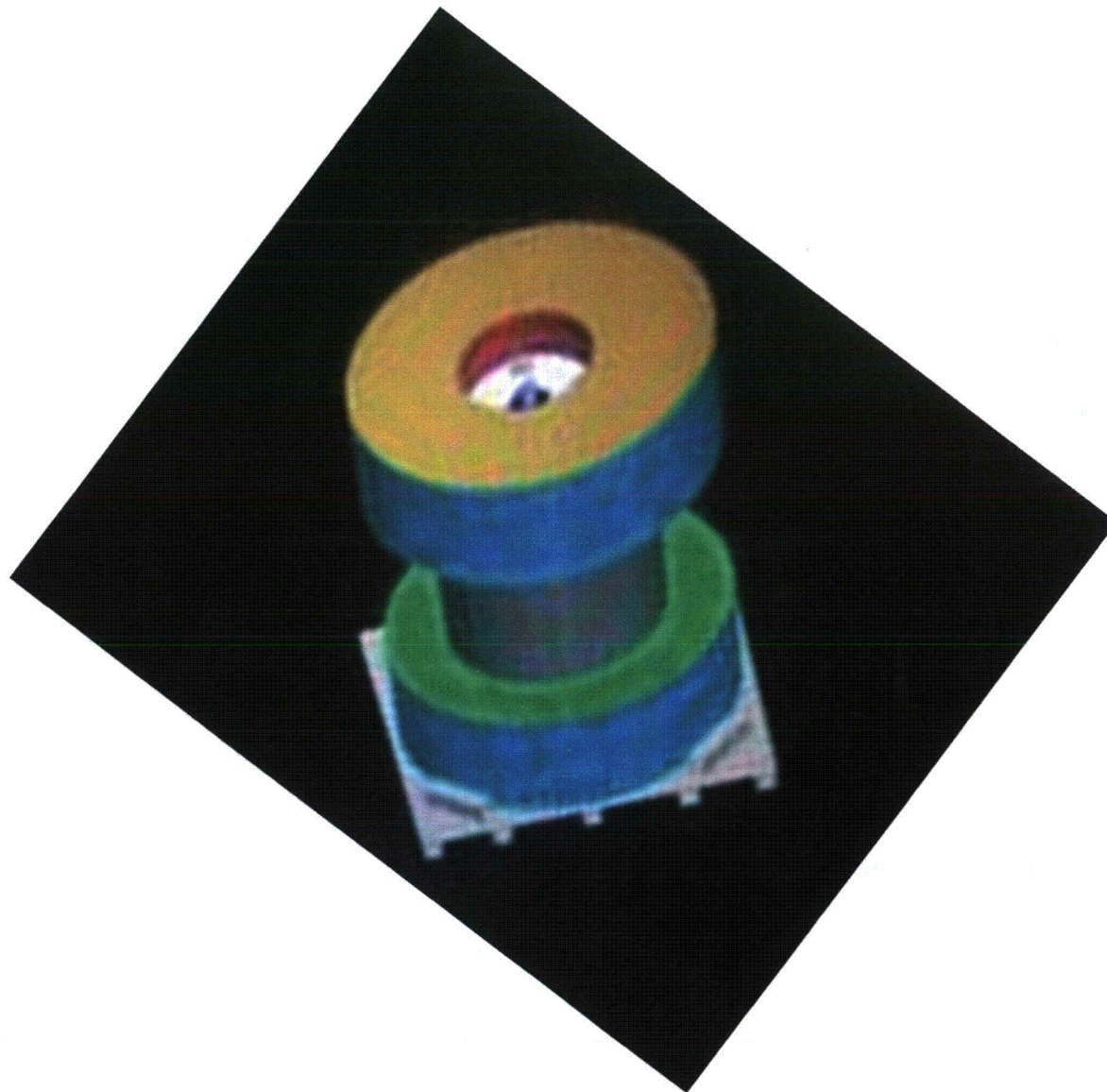
Type B(U)

**Radioactive Materials Transport
Package**

AGENDA

Introductions:	15 min.
Presentation of BU650B Public Portion:	15 min.
Presentation of BU650B Proprietary Portion:	45 min
Questions and Answers:	30 min
Conclusion:	15 min.

J.L. SHEPHERD & ASSOCIATES BU650B TYPE B(U) RADIOACTIVE MATERIALS TRANSPORT PACKAGE



Design Basis (71.107)

- Provide a package capable of transporting
SEALED SOURCES in Special Form
 - Utilizes Shielded Liner concept
 - All Shielded Liners manufactured from identical materials and methods of construction
 - May have different shapes/sizes
 - Bounded by a maximum payload criteria
 - Representative Computer-aided Modeling of payload variations performed to substantiate purpose.

- Design Basis (71.107) cont'd.
 - Initial CoC application to consider largest Shielded Liner to be used
 - Subsequent application amendments to consider use of smaller Shielded Liner(s) in various configurations.

PACKAGE DESCRIPTION (71.33)

- Maximum Gross Weight: ~12,500 pounds
- Useful Load: 6,500 pounds
- Transportation of “Sealed Sources” in Special Form Only. Special Form sources meet the requirements of §71.75.
 - 450 Watts (Decay Heat)
 - 29,250 Ci Co-60
 - 96,750 Ci Cs-137
- Shielding is obtained through use of Shielded Liners
- Not intended for transport of fissile materials
- No need for criticality control features
- Not intended for transport of gasses, liquids, or waste in any form.

Package Description (71.33)

DIMENSIONS (With Impact Limiters Installed)

- Inner Cavity is 35" diameter by 54" high.
- The overall height of the package is approx. 90"
 - 66.5" without impact limiters
- The outer diameter of the package is approx. 69"
 - 44.5" without impact limiters.

WEIGHT:

- Estimated empty: 5,800 pounds (2636.4 Kg) (with Impact Limiters installed)
- Pay load: 6,500 pounds, maximum
- Shoring (if required) up to 200 pounds
- Maximum Gross Weight: 12,500 pounds (5681.8 Kg)

- Technical Description of Package (71.33)
 - Package body consists of an external 304 stainless steel shell and an internal 304 stainless steel shell.
 - The inner package bottom is comprised of an inner disc of 3/8" stainless steel plate, circumferentially welded to the inner wall.
 - The annular space between the inner and outer walls and bottom (4" each) is filled with a thermal barrier material known as "Kaolite 1600."
 - The extreme bottom of the package is fabricated from a disc of 1/2" stainless steel plate, circumferentially welded to the outer wall.
 - The closing ring and lid are fabricated from 304 stainless steel rings and discs in order to form an interior 4" pocket for thermal barrier; a rigid inner lid (1/2" thick plate); the base plate of the lid assembly (1/2" plate) and a 2" tall "energy absorber" which sits atop the lid assembly. There is a lifting ring attached which is used for lifting of the lid only.
 - There are Impact Limiters installed at the top and bottom of the main package body.

MAIN PACKAGE BODY

CONSISTS OF:

1. LOWER PACKAGE ASSEMBLY
2. LID ASSEMBLY

- **THREE BASIC LID COMPONENTS**

- 1. Closing Ring

- Fully welded to Lower Package Assembly

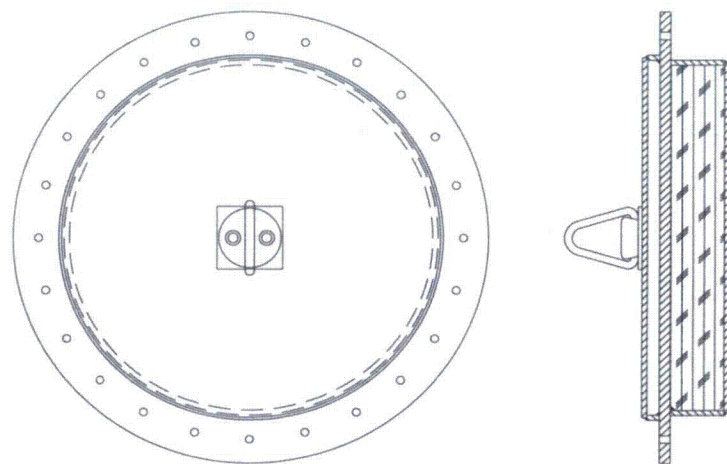
- 2. Lid

- Top has a 2" energy absorber with lifting ring attached
 - 24 Bolt Closure. Bolts are $\frac{3}{4}$ -10 UNC x 2", 316 SS

- 3. 4" thick Kaolite 1600 thermal barrier on the inner portion, fully contained in stainless steel.

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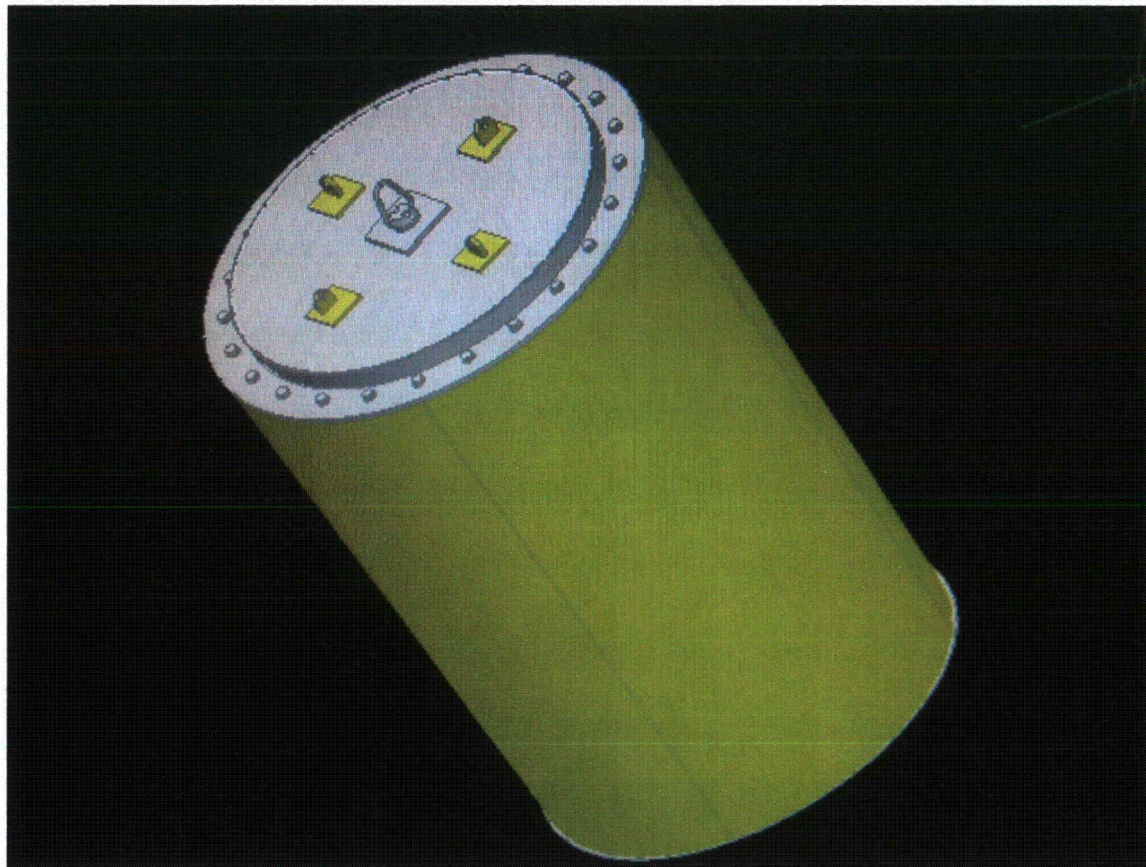
LID ASSEMBLY



SKETCH-2

Reference Only

Lower Package Assembly



Design and Intended Use allows for:

— Rugged Construction

- Stainless steel walls, per ASTM Standard
- Stainless steel ends and lid, per ASTM Standard
- Fully welded, per ASME Section IX, AWS D1.1
- Easily installed/removed Impact Limiters (4 stainless steel pins & clips)

— Ease of use.

- Bolt closure (Stainless Steel Hardware)
- No operational seals (Sources are sealed)
- Stainless Steel Pin and clip retention of Impact Limiters
- Standardized, durable cribbing/retaining media

Design and intended use allows for (cont'd):

- Ease of Maintenance
 - 2 basic sub-assemblies
- Easy to follow routine inspection regimen
- Only 4 circumferential welds on Lower Package Assembly. Seam welds of inner and outer packages are not aligned. (Other components are sacrificial).
- Closure hardware easily obtainable. (Catalog parts carried by QA-approved, Nation-wide hardware distributors).

General Standards for All Packages (71.43)

Materials and methods of construction provide excellent safety factors. Preliminary LS-Dyna Modeling Calculations show that from a 30' drop, the

- Impact Limiter Assembly
 - Absorbs shock on impact (approx. 66% effective)
 - Top Drop
 - Bottom Drop
 - Corner Drops
 - Top Corner Drops (angular) (15° most damaging)
 - Bottom Corner Drops (angular)

Lifting and Tie-Down Mechanisms

- TIE-DOWN Mechanism (Handling Only)
 - Package may be transported in covered van or via flatbed trailer
 - Package is secured to conveyance by blocking bars or chains extending through a spider frame which interface with the top of the Impact Limiter
 - Secondary security is provided by a set of chain chocks located at the base of the package pallet assembly. (Package nests on a specially made steel pallet designed for lifting and securing the package during transport).
- LIFTING (Handling Only)
 - A specially designed pallet is used for lifting purposes.
 - Lifting occurs by utilizing a forklift.

Opening and Closing, Subpart G (Part 71.89)

- Opening
 - Requires removal of the top Impact Limiter, bolts and lid
 - Payload is lowered into the package by lifting means (crane, forklift, chain fall, etc)
 - Shoring or cribbing as needed to restrict movement
- NO THERMAL MODERATION OR EXTERNAL CAGING REQUIRED
- Closure
 - Replacement of lid assembly
 - Installation of 24 bolts properly torqued
 - Re-installation of Impact Limiter

Hypothetical Accident Conditions (71.73)

Safety Factors Obtained from preliminary LS Dyna Model Calculations:
(assumes maximum payload of 6,500 pounds in all calculations)

- Most Damaging Configuration:

- CG over Bottom/Top Corner Drop (15 deg)

- Average Shielded Liner Safety Factor: 5
 - Closure Mechanism (bolt heads, cores, and closure flanges provide an average safety factor of: 10
 - Welds: 2

Hypothetical Accident Conditions (71.73)

Puncture Test models reveal excellent puncture resistance, in any configuration.

- Corner of Peg

Most damaging peg configuration requires removal of Impact Limiter(s).

- Edge of Peg

Concentration of energy into a small surface area

Adequate deflection, minimal troughing (1.625")

Minor plastic deformation of Outer Shell (minor thinning)

Thermal Barrier and Inner Shell remain intact and effective

Hypothetical Accident Conditions (71.73)

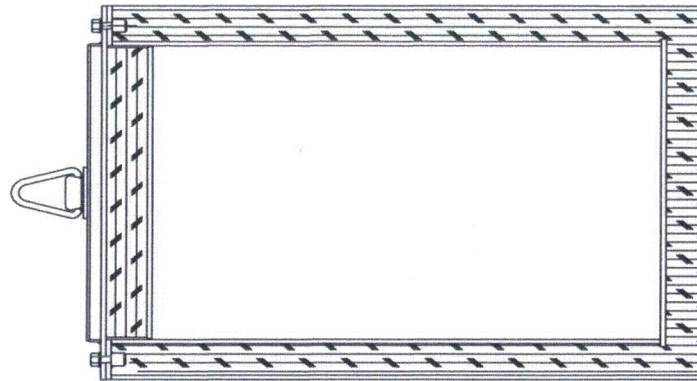
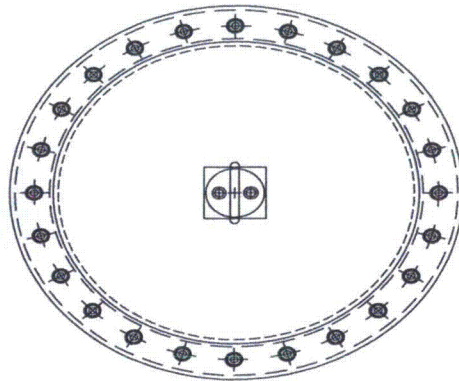
Thermal Test Calculations reveal excellent heat transfer / heat dissipation characteristics.

- Interior Shielded Liner Cavity temperature rises to 371.1°F when package is immersed in 800° C Thermal Bath for 30 minutes.
- Package interior temperature with 450 Watt payload rises to 345.7°F
- Combined thermal effect of test: Safety factor of 2, based upon a phase change of lead occurring at 620°F.

- Fabrication consists of two principal sub assemblies:
 - 1. The Main Package Body (Subpart H; Quality Assurance)
 - 2. Impact Limiter Assemblies (Subpart H; Quality Assurance)

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Lower Package Assembly - Reference Only

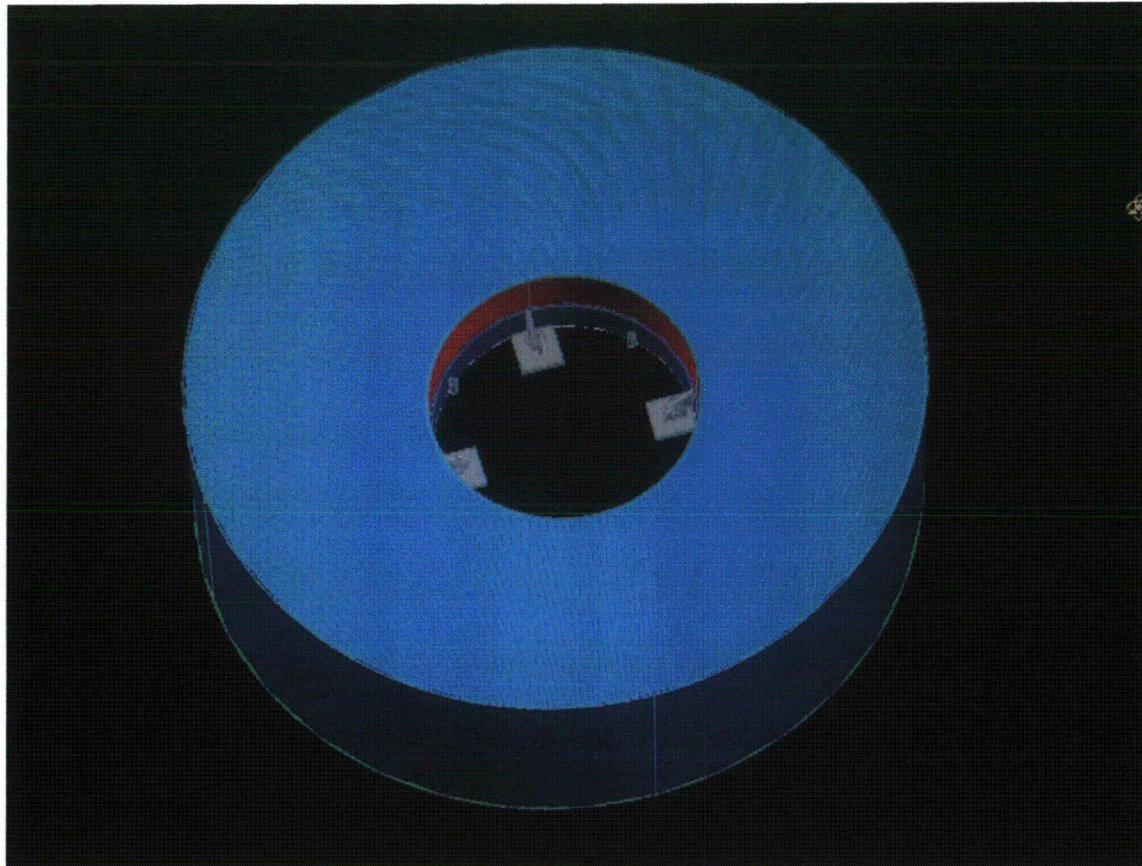


SKETCH-1

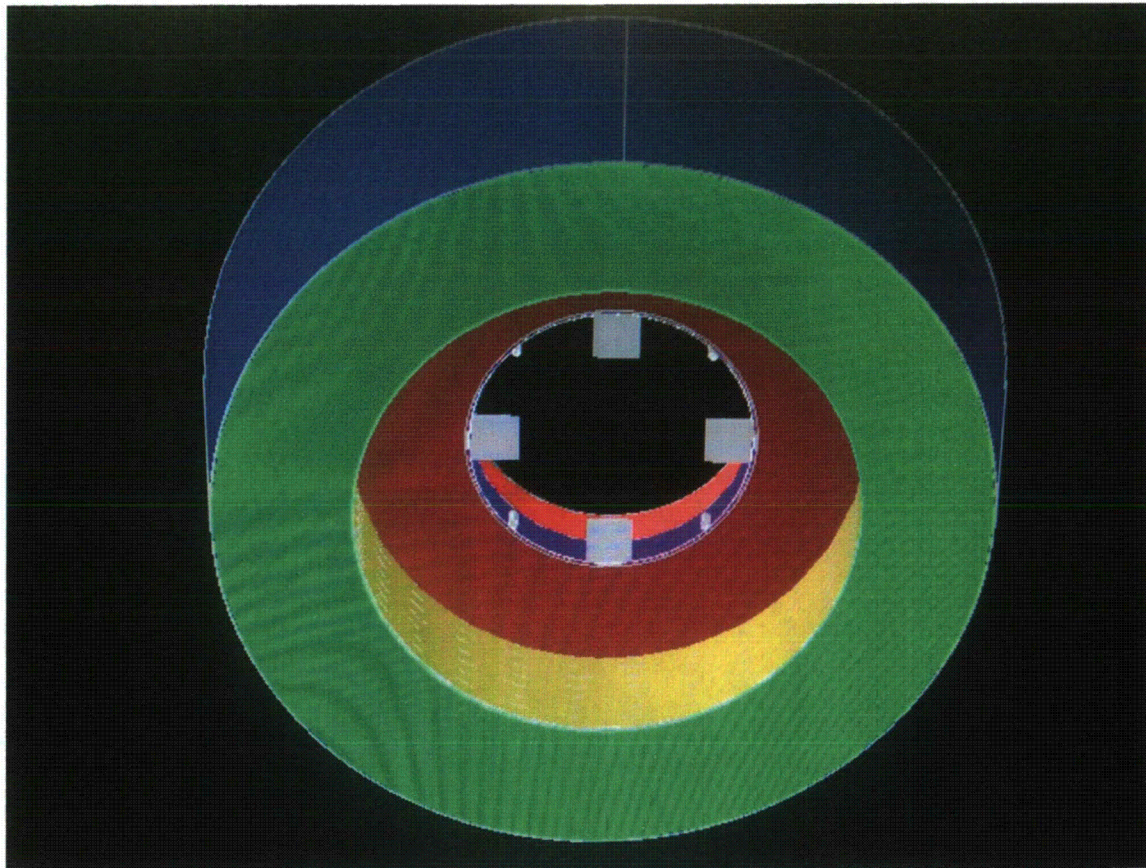
IMPACT LIMITERS

- TWO
 - One Top (10" thick on top x 12" thick on sides)
 - One Bottom (identical)
 - Affixed as "crowns" to the top and bottom of the main package body and extend down the side of the main package a distance of 24"
 - Foam Filled (General Plastics Last-A-Foam, FR3712)
 - Made from 12 gage, 304 Stainless Steel, fully welded and structurally reinforced to assure maximum transfer of energy from package body to Impact Limiter during transport mishap.
 - Attached to top and bottom of main package body ends at four hardened points

Impact Limiter - Top View



Impact Limiter - Bottom View



CONCLUSION

1. Modeling results indicate a favorable package performance.
2. The package is relatively simple in design and has a limited purpose.
3. JLS&A is anticipating provision of a Safety Analysis Report to NRC by June 30, 2012.