



Century Industries

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Versa-Pac Shipping Package

NRC Meeting – August 28, 2008



Meeting Objectives

- Inform NRC of intent to design, test, and license a new package
- Identify schedule of activities including submittal and requested approval dates
- Testing based on calculations and performance tests including experience with similar containers
- Identify future activities involving NRC
 - Meet with NRC to present the test plan



Introduction

- Through Rulemaking, the NRC has set timelines on existing licensed fissile packages
 - Oct. 1, 2008 phase-out date
- Versa-Pac design is a suitable replacement for these obsolete packages
 - Type A fissile including product and scrap materials



Schedule

- Key dates:

- Initial Meeting with NRC: Aug. 28, 2008
- Design Completion: September, 2008
- Test Plan Review with NRC: End of September, 2008
- License Package Testing: October, 2008
- SAR Submittal to NRC: Fall, 2008
- SAR Approval: Late 2008 – Early 2009



Package Design

- Package fabricated using standard materials readily used in industry
- 55 and 110-gallon drum designs (UN1A2)
 - 16 gauge body, bottom, and cover
 - 12 gauge closure ring with 5/8” ASTM A307 fastener
 - EPDM gasket
- 3/16” Reinforced bolted cover with silicone gasket bolted to ASTM A36 ring with 4 to 8 1/2” bolts
- Ceramic fiber blanket and rigid polyurethane foam plugs
- Outer & Inner Liner surrounding structural frame
 - 16 gauge insulated liners
 - Vertical & Horizontal stiffeners
- Payload cavity with gasket and bolted blind flange
 - 10 gauge sheet body and bottom with 1/4” flange with 12 1/2” bolts to secure 3/16” cover
- Payload loaded within payload cavity

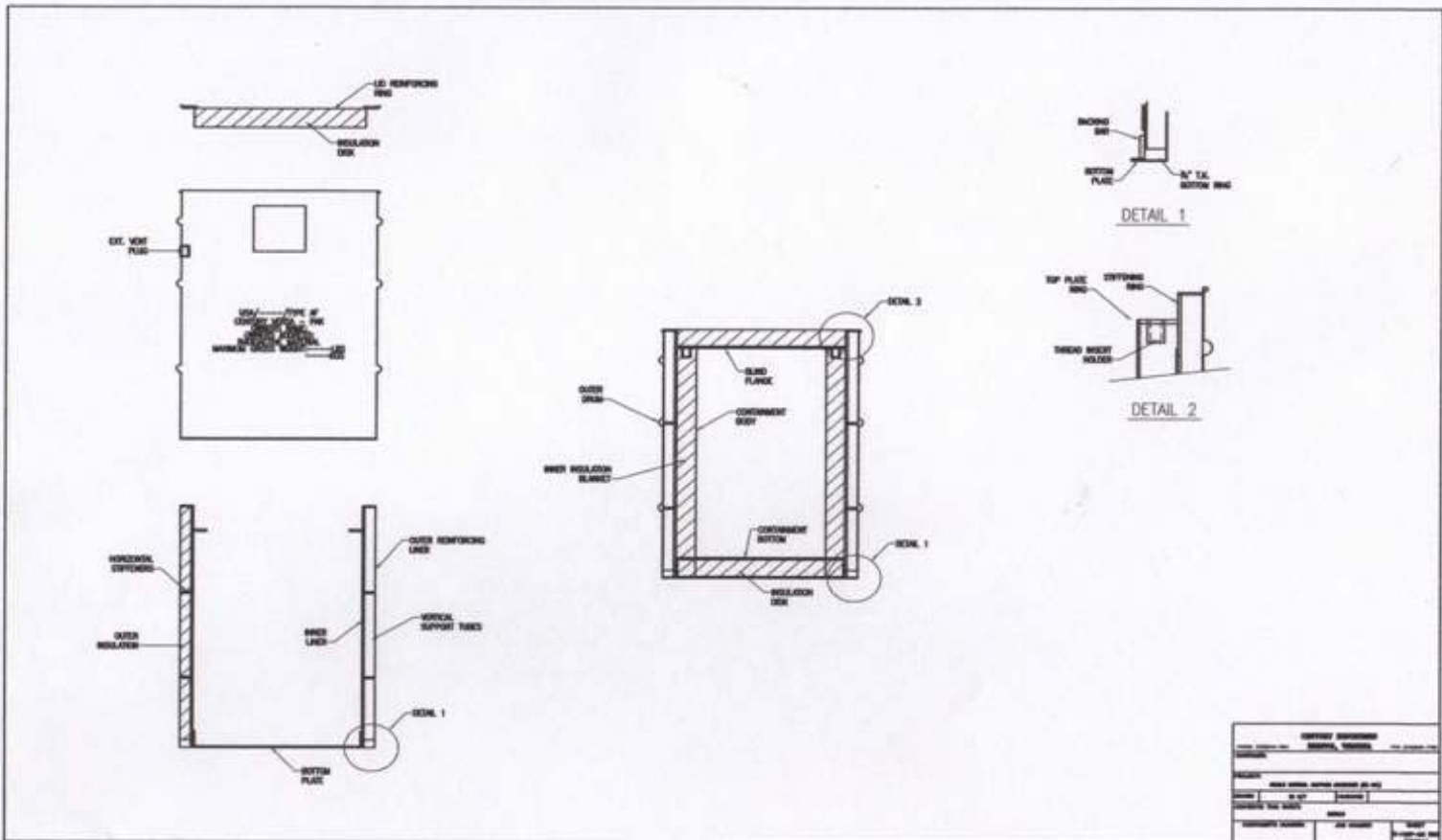


Package Design

- Payload cavity loaded directly or
 - With inserts to reduce the inside diameter
 - With 30 gallon drum

Package Design

US Patents Pending



Package Design

Preliminary Fabrication Photo's

Versa-Pac Photo's



Internal Containment Vessel Showing Insert Blocks on Flange



Skeleton of Secondary Containment Showing Reinforcement Rings and Vertical Stiffeners



Side View Showing Skeleton and 16 Ga. Intermediate Liner



Side View of the Outer Insulation and Stiffening/Reinforcing Sheet

Package Design



Insulated Inner Containment Being Installed into the Outer Shell



Bottom End Plate Installed over Urethane Foam Insulation Plug



Completed Installation of Bottom Plug



Old Photo of Top View Internal Configuration 55-Gallon Version



Payload Description

- Type A radioactive and fissile materials
 - Product and scrap materials
 - No free standing liquids
- Fissile payload
 - 350 grams – 100 wt% enriched
 - Water and/or graphite moderated
 - Metal, oxides, fluorides, nitrates
- Criticality Safety Index – 1.5



Testing

- Testing in accordance with 10CFR71
- Testing site dependant upon final requirements
- Most damaging impact configuration(s), considering thermal test and most reactive condition for criticality
 - Based on conceptual designs, containment is the primary concern and criticality is the secondary concern



Testing

- Package testing based on calculations and similar analyses including prior testing experience
 - Preliminary 30 foot drop tests were conducted on both the 55 & 110 gallon versions on both the Top & Bottom Corners thru C/G's of 55 to 58 degrees
 - 55 Gallon
 - Top corner damage 16" long x 1/12" deep
 - Bottom corner damage 8" long x 1/14" deep
 - No tears, breach or separations in sides, seams or cover
 - 110 Gallon
 - Top corner damage 14" long x 3" deep
 - Bottom corner damage 18" long x 2-1/2" deep
 - No tears, breach or separations in sides, seams or cover



Testing

- Preliminary 30 foot crush tests were conducted on both versions with the packages positioned on their side
 - 55 Gallon
 - Impact of crush plate caused the package to egg shape slightly
 - No further opening or tears in the body noted
 - 110 Gallon
 - Impact of crush plate caused a minor egg shape of the container
 - The package was impacted thru the edge of one vertical stiffener to test the use of only 4 bolts in the outer cover, this test verified the need for additional bolts in the cover, causing the cover to buckle upward approximately 2” on the impact side. Design corrected to 8 cover bolts on the 110 gallon version
- Preliminary pin test onto 6” diameter pin on side
 - No package breach occur
- Thermal acceptance based on calculations



Discussions

- Criticality considerations
 - Optimum internal and external flooding
 - Moderation by water & graphite
 - Square & triangular lattice
 - KENO V.a and/or VI
 - Validated in accordance with NRC requirements (NUREG/CR-6361)
 - Model includes homogeneous and non-homogeneous lumped fuel
 - Minimum spacing based on HAC performance
- Containment considerations
 - No dispersal



Summary

- Container Model No: Versa-Pac 55/110
- Review test plan with NRC when completed
 - Drop test orientations – determined by calculation and similarity to prior tests of other designs
- Keep NRC informed of the project status through regular meetings, phone discussions, and electronic information exchange



Questions to NRC

- Performance of the tests : requirements?
- Thermal test?
- Payload test simulation?
- Maximum enrichment considerations?
- File Management?
 - Use Docket identifications for submittals?
- Schedule acceptable to NRC?