



**NNSA**  
National Nuclear Security Administration

**M3**  
MATERIAL MANAGEMENT  
AND MINIMIZATION  
CONVERT, REMOVE, DISPOSE

  
Office of Nuclear  
Material Removal

# *Packaging of Critical Assembly Fuel Materials for Shipment in the ES-3100*

Trent Andes



**M3's Office of Nuclear Material Removal:  
Less is More**



# Details of Packed Material

	U bearing Coupons	U bearing Plates	U bearing other
Items to Pack	6816	1548	20
Enrichment (%)	93	93/45	93
Covering	Epoxy	Aluminum Clad	Canned

Total U (kg)	No. of Containers Required
45	75

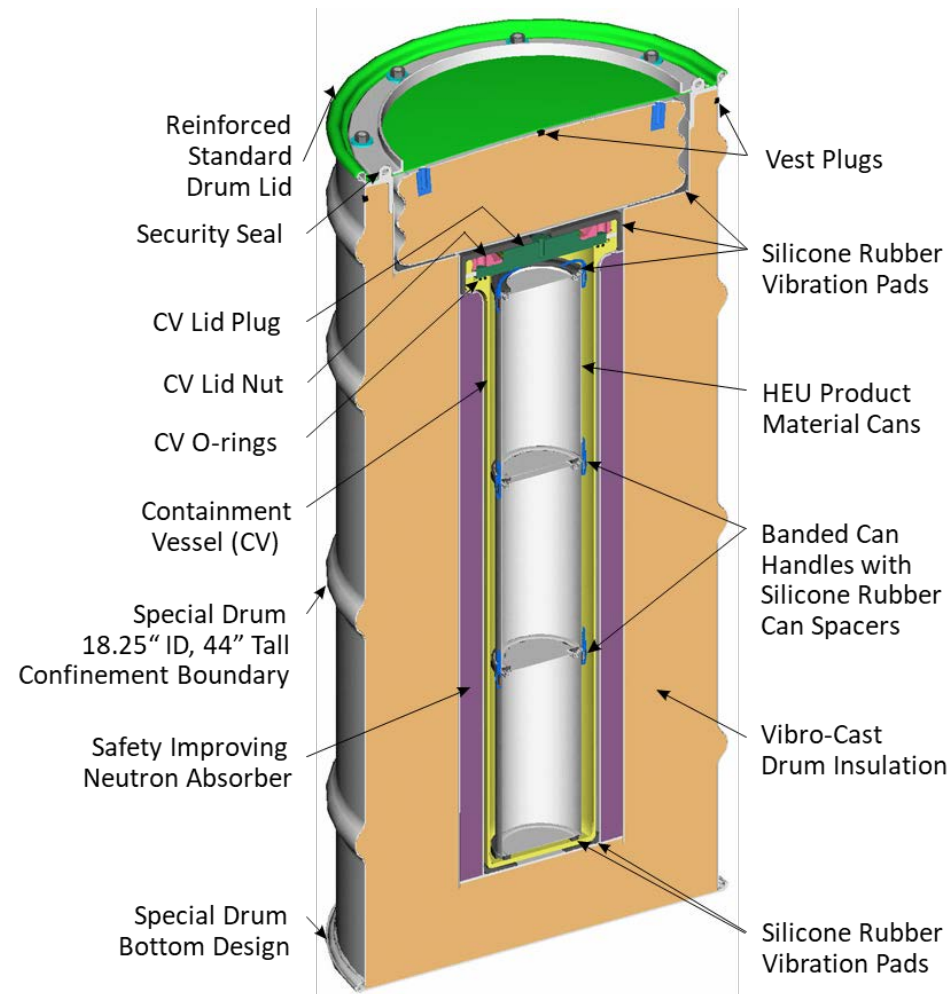


# Key Documents

- Statement of Intent (SOI) between DOE and MEXT concerning Minimization of HEU
- Implementation Plan (IP) for Cooperation on Removal of All Highly Enriched Uranium from the Kyoto University Critical Assembly
- Notice to Ship Nuclear Material from Japan to the United States Pursuant to the U.S. – Japan Agreement for Cooperation
- Contract between NNSA and Kyoto University
- Material Packaging Description Documents “Scrap Declarations”
  - History of Material (U supply, drawings, reports, unique identifiers)
  - ORIGEN models as applicable
  - Weights (gross, net, tare) of items, cans, bundles, shipping containers
  - Radiological surveys (dose, removable contamination)
  - Record of applied tamper indicating devices

# ES-3100 Type B Shipping Container

- Overall Container
  - 49.2 cm in diameter
  - 110.5 cm in height
  - Empty weight ~150 kg
  
- Containment Vessel
  - 12.85 cm ID
  - 78.74 cm useable length
  - Leak Testable
  
- Previously validated in Japan in 2015





# ES-3100 Validation for Japan

- 45 specific ES-3100s validated by Japan's Nuclear Regulation Authority (NRA)
- Certificate J/2025/B(U)F-96 (dated November 16, 2018)
  - included specific contents of coupons and plates
- Certificate J/2040/B(U)F (dated December 20, 2021)
  - Added Other material
- The validation required
  - Yearly maintenance
  - Use of Cargo Restraint Transporters (CRT) during transport
  - Pressure Durability Inspection (vacuum not approved)
    - Croft Calt 9 leak test units utilized



# Loading Activities Plates / Bundles



# Loading Activities Coupons





# Loading Activities Other





# Loading Activities Crimp Sealing

Required use of a crimp seal can and sealer. Cans with particulates were inerted.



# ES-3 I 00 Operations

Leak testing



Weighing and Surveys



TID Application





# Preparing for Shipment







# Mission Accomplished

