



U.S. DEPARTMENT OF
ENERGY



DOE 3013 Container Program

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July 26, 2022

Background

- Prior to 1989 plutonium product and scrap storage was for relatively short duration while the material was awaiting use or recovery
- In 1989, the facilities were either shut down or operations were sharply curtailed
- 1994 Department decided to stabilize, package and store excess plutonium until final disposition
- 1994 Department issued Standard DOE-STD-3013, "Stabilization, Packaging, and Storage of Plutonium-Bearing Materials"
- Plutonium stabilization and packaging began in late 2001
 - Hanford Site
 - Lawrence Livermore National Laboratory (LLNL)
 - Los Alamos National Laboratory (LANL)
 - Rocky Flats Environmental Technology Site (RFETS)
 - Savannah River Site (SRS)

Example of 3013 Container Configuration



Welded Outer
Container – design
the same for all sites

Welded Inner
Container – design
differs between
packaging sites

Vented Convenience
Container – design
differs between sites

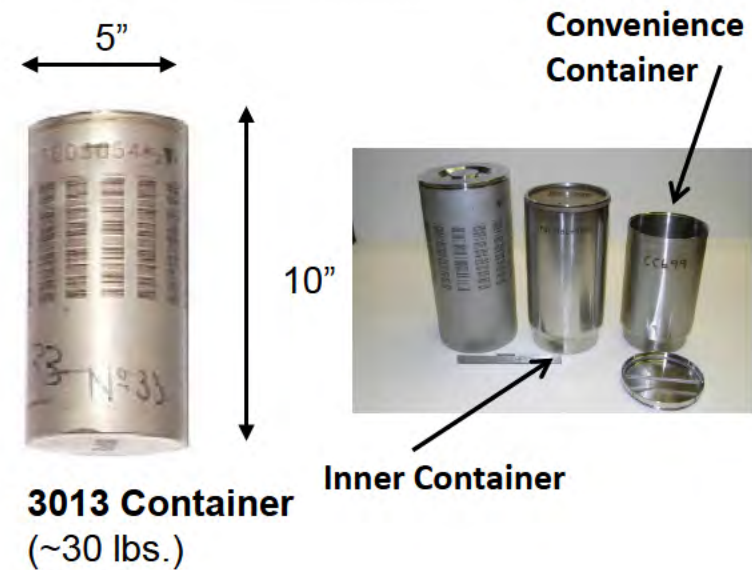
Additional 3013 Container Details



Storage in
K-Area



Type B - 9975
Plutonium
Shipping
container
(~400 pounds)



Opened
3013
Container

DOE-STD-3013 Overview

- The original standard, issued in 1994, was based on decades of experience with short-term storage of plutonium and sought to avoid conditions that had led to previous container concerns
 - Designed to be sufficient for 50-year storage
 - Sets limits on contents
 - Outer container design working pressure of 699 psig (about twenty times your average vehicle tire pressure)
 - Leak-tight after dropping from the distance of a rooftop of a two-story house
- Revised in 1996, 1999, 2000, 2004, 2012 and 2018 to incorporate lessons learned
- Over 5000 containers were packaged between 2001 and 2005
- Formal surveillance (monitoring) program began 2003

Integrated Surveillance Program (ISP)

- **One integrated program covers all Pu storage sites, not just SRS**
 - Initial ISP identified no credible failure mechanisms for stored metal and two potential mechanisms for oxide – pressurization and corrosion
 - Evaluates performance of containers vs. 50-year service life
 - Two parts of surveillance program are Shelf-life Testing and Field Surveillance
- **Shelf-Life Program**
 - Accelerated performance testing using both representative samples from the packaging sites as well as worst-case materials
 - Both small scale and full-scale units
- **Field Surveillance**
 - Both Non-Destructive and Destructive Examination of containers in storage inventory
 - Containers selected by both random sampling and engineering judgment
 - 149 Destructive Examinations and 152 Non-Destructive Examinations performed to date

ISP Findings and Conclusions

- **Pressurization**
 - Maximum gas pressure is significantly lower than estimated
 - Any oxygen present in the gas phase decreases, so no flammable gas composition
- **Corrosion**
 - Corrosion rates decrease over time
 - Potential failure of inner containers due to stress corrosion cracking has not been eliminated
 - *A small number of containers have significant amounts of chloride salts present with elevated moisture*
 - *In those containers, some cracking has been observed (none through-wall)*
 - No outer container concerns have been observed
- Findings are used as feedback in the 3013 Standard revision process
- Surveillance program has not identified any condition that would challenge the 50-year storage life