LA-UR- 97-2259

Approved for public release; distribution is unlimited.

Title: Skeletons in the Closet: Implementation of the Packaging Program at Los Alamos

CONF-971125--

Author(s): Thomas E. Ricketts

Submitted to: American Nuclear Society 1997 Winter Meeting

November 16-20, 1997

Albuqerque, NM

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

19980330 019

UNCLASSIFIED NOT UCNI

FSS-16 JUN 19 1997 date

Los Alamos
NATIONAL LABORATORY

Form 836 (10/96)

DISCLAIMER

American Nuclear Society 1997 Winter Meeting

Thomas Ricketts
Nuclear Materials Technology Division
Los Alamos National Laboratory
Los Alamos, NM 87545

Session 8.5,
"Stabilization of Legacy Plutonium Materials for DNFSB 94-1"

Skeletons in the Closet: Implementation of the Packaging Program at Los Alamos

Thomas E. Ricketts

In May 1994, the Defense Nuclear Facility Safety Board (DNFSB) issued recommendation 94-1 to the Secretary of Energy indicating the need for improved remediation efforts within the defense nuclear facilities complex. The primary concern was for the safety of the workers, the public, and the environment as a result of improperly stabilized and packaged fissile materials. The DNFSB recommended that an integrated plan be formulated to convert the identified materials to forms or conditions suitable for safe interim storage. In addition, the DNFSB recommended that plutonium metal and oxides (>50 weight-percent plutonium) be stabilized and packaged in accordance with the criteria stated in the DOE storage standard (DOE-STD-3013). In response to the recommendations, DOE requested input from all the defense-related sites and as a result, individual Site Integrated Stabilization and Management Plans (SISMP) were established. The following two milestones are identified in the Los Alamos SISMP:

* Stabilize high-risk vault items and recover the plutonium as oxide for packaging to meet the long-term storage standard by September 1997.

* Stabilize the remaining residue inventory and recover the plutonium as oxide. Repackage the existing plutonium metal and oxide (>50% plutonium assay) for long-term storage by May 2002.

To address the actions identified in the SISMP, Los Alamos implemented two programs: Packaging and Vault Work-off. The Packaging Program is responsible for the processing and repackaging of plutonium metal and oxide (>50 weight percent) for long-term storage (LTS) according to the criteria stated in DOE-STD-3013. The Vault Work-off Program is responsible for the processing and recovery of plutonium from residues and other low-level feed sources. The plutonium oxide recovered will then become feed for the Packaging Program. The primary emphasis of this presentation will focus on the packaging/stabilization of plutonium-bearing materials for LTS.

The Packaging Program was initiated in the beginning months of 1995, and the first plutonium metal and oxide items packaged for LTS were in June 1995 and September 1996, respectively. Since then, a total of 106 pure plutonium metal items containing 424 kgs and 6 items of pure plutonium oxide containing 17 kgs have been packaged consistent with DOE storage standard (DOE-STD-3013-94). During the packaging campaign, many skeletons have been discovered. Most of the items retrieved from the storage vault were in an acceptable condition. However, there were a number of items in which the integrity of their containment was questionable and it appeared that it was only a matter of time before a potentially significant contamination incident could occur. With a qualified container design and installation of a surveillance diagnosis device (pressure-measuring bellows), the packaging of the identified plutonium materials was initiated. Due to the extensive experience in handling and processing plutonium metal (via. weapon components), the packaging demonstration of pure plutonium metal was first to begin. Since a similar knowledge base for oxides does not exist, a rather significant effort was conducted to characterize pure plutonium oxide in an attempt to develop actual procedures for the preparation and handling of oxide for LTS. The following experimental data was collected and evaluated: loss-on-ignition (LOI) vs. calcination temperature, surface area vs. calcination temperature, and adsorption kinetics of calcined oxide. In reviewing the experimental data, it appeared that the LOI specification of 0.5 weight-percent, as stated in the DOE storage standard, should be a relatively easily attainable goal. Since then, the process experience

gained from packaging pure plutonium oxide has demonstrated that the LOI results obtained, thus far, are consistently an order of magnitude lower than the LOI specification stated in the storage standard. To better understand the different aspects of the Packaging Program, a radiation dose study had been performed for the items packaged in FY96 for LTS. A grand total of eighty-one containers were packaged during this time-frame. Of those, seventy-nine contained plutonium metal totaling ~325 kgs and two contained plutonium oxide totaling ~6 kgs. In evaluating the radiation dose for the personnel involved, the following average dose rates were obtained: 1) 390 mrem per person per year; and 2) 5 mrem per person per LTS container.

Since the inception of the Packaging Program, five LTS containers containing plutonium metal have had to be opened for production commitments. The opportunity was taken to evaluate the condition of the stainless steel containers as well as the actual material. On average the material had been in storage for approximately 12 months. Upon opening of the containers, no anomalies or loose oxide were noted. The plutonium metal, in a couple of instances, was slightly discolored indicating an oxide passivation layer. The remaining items looked almost identical as they did the day they were placed into the container. Our observation was confirmed by validating the original net weights. With the information collected thus far, it appears that the Packaging Program at Los Alamos is meeting its intent of successfully storing plutonium in a safe manner. It also appears, at present time, that the Packaging Program is not creating any additional skeletons which might haunt future generations.

Document Summary:

pages	3
words	838
characters	4732
paragraphs	9
lines	95

Report Number (14) LA-UR-97-2259
CONF-971125--

Publ. Date (11) 199708
Sponsor Code (18) DOE/DP, XF
UC Category (19) UC-722, DOE/ER

DOE