DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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August 27, 1999

The Honorable Carolyn L. Huntoon
Assistant Secretary for
Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Dr. Huntoon:

Staff members of the Defense Nuclear Facilities Safety Board (Board) visited the Rocky Flats Environmental Technology Site (RFETS) on June 16–17, 1999, to review the design and installation of the plutonium stabilization and repackaging system. This system is central to meeting the milestone in the Board's Recommendation 94-1, *Improved Schedule for Remediation*, for packaging of plutonium metals and oxides in accordance with Department of Energy (DOE) standard DOE-STD-3013, *Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage,* by May 2002. RFETS stated that its packaging equipment may not be able to prevent radiological contamination of the outer surfaces of the inner container. This condition would not meet the requirements of the DOE standard. The Board's staff was advised that RFETS plans to modify the design to minimize the contamination and to request that this requirement be removed from the standard. However, in a briefing to the Board on August 12, 1999, DOE reconfirmed its intention to maintain the requirement for outer surfaces of the inner container to be contamination free. An inner container sufficiently contamination free to permit outer packaging to be done safely outside a glovebox would be of considerable advantage. The Board encourages DOE to take appropriate actions to ensure plutonium packaging is conducted in accordance with the standard.

Staff observations related to this issue are included in the enclosed report. If you have comments or questions on this matter, please do not hesitate to contact me.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Ms. Jesse M. Roberson

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

July 22, 1999

MEMORANDUM FOR: G. W. Cunningham, Technical Director
J. K. Fortenberry, Deputy Technical Director

COPIES: Board Members

FROM: D. Grover

SUBJECT: Review of Plutonium Stabilization and Packaging System

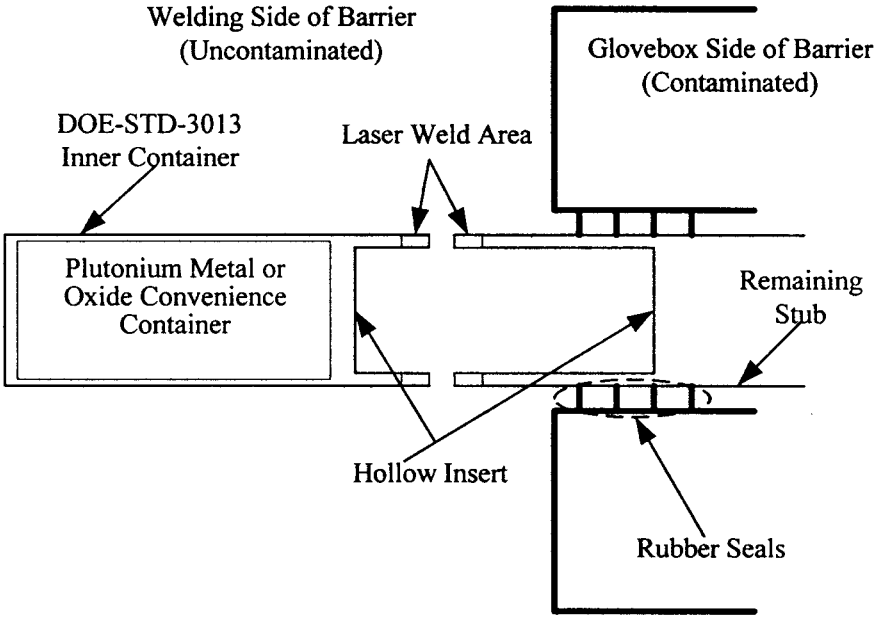
This memorandum documents an issue associated with the Plutonium Stabilization and Packaging System (PuSPS). This issue was reviewed by members of the staff of the Defense Nuclear Facilities Safety Board (Board) D. Grover and M. Sautman on June 16–17, 1999, at the Rocky Flats Environmental Technology Site (RFETS).

Contamination on Inner Container. Per DOE-STD-3013, *Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage*, the outer surface of the inner container of a plutonium package is required to be free of removable surface contamination in excess of the limits specified in 10 CFR 835. In the RFETS PuSPS, the inner can is partially inserted into the side of the glovebox through a series of rubber rings that forms a contamination seal around the can. Plutonium metal or oxide is then inserted into the can, followed by a hollow insert that forms an interference fit in the opening of the inner container. A laser is then used to weld the inner can to the hollow insert. Finally, a laser cuts through the can and hollow insert in the welded area. One side of the hollow insert forms the lid of the now sealed, contamination-free container; the other side remains attached to the upper remnant of the inner can, forming a plug that seals the glovebox port (see Figure 1). RFETS has identified the potential for plutonium oxide present between the container and hollow insert to become trapped in the weld and subsequently vaporized during the laser cutting operation. This material could deposit on the container and result in transferable radiological contamination exceeding that allowed by the storage standard.

To deal with this deficiency, RFETS has initiated procedural and design changes to minimize the extent of the contamination on the containers. Daily housekeeping of the gloveboxes will be performed to minimize the quantity of oxide available to contaminate the container. In addition, a fume hood will be added next to the welding and cutting area to draw contamination away from the outer surface of the inner container during cutting. Finally, a confinement barrier will be placed around the weld equipment housing to prevent contamination from being released into the general work area. However, these proposed changes may not prevent the accumulation and migration of contamination along the process path, with eventual release outside of the planned confinement area. RFETS has also initiated an effort to revise the plutonium storage standard to remove the requirement for a contamination-free inner container,

thus eliminating the need to decontaminate or repackage any inner containers that might become contaminated despite the design modifications.

Figure 1. DOE-STD-3013 Inner Container and Glovebox Port Configuration



The requirement for two contamination-free containment boundaries has been in DOE-STD-3013 since its inception. The philosophy of double containment of nuclear materials has been used in industry to ensure a reliable contamination barrier. One example is the Nuclear Regulatory Commission requirement under which reliance on surface inspections to ensure weld integrity is allowed for spent fuel canisters with two welded barriers, whereas canisters with a single welded barrier must undergo full volumetric weld inspection to ensure an equivalent barrier reliability. The PuSPS storage containers are equivalent to the former configuration, with the inner and outer container leak checks providing the verification of weld integrity. The staff notes, that this double containment is warranted as a minute quantity of plutonium in dispersible form can cause a major contamination problem if released.

The staff considers the planned process improvements appropriate to minimize the probability of contaminating an inner container. However, the PuSPS does not have a method for checking the inner container for contamination to determine whether the container meets the storage standard or identify the extent of any contamination. The PuSPS also lacks the capability to remove any contamination. Additional design changes to incorporate the ability to check inner containers routinely for contamination would be appropriate, allowing verification that the requirements of the standard are being met. In addition, an adjacent work area for removal of contamination above the limits of the standard would be useful to minimize the number of containers not meeting the requirements of the standard.