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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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August 12, 1996

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


Dear Mr. Alm:

The Defense Nuclear Facilities Safety Board (Board) staff reviewed packaging and storage of high assay plutonium metal and plutonium oxide at the Savannah River Site (SRS). Observations are reflected in the enclosed trip report.

The report states that water was observed on the tops of several drums and in puddles on the floor of a plutonium storage vault in the 235-F facility. The Board believes that water infiltration into this plutonium storage vault should be corrected in a timely manner.

The report also notes that the SRS plan for repackaging plutonium metal and plutonium oxide to meet the long-term plutonium storage standard may not meet the schedule committed to in the Implementation Plan for Recommendation 94-1. Department of Energy coordination and close attention will be required in order for the new storage vault to be constructed and the new plutonium repackaging line installed in time to support the SRS repackaging effort.

Sincerely,

  
John T. Conway  
Chairman

c: Mr. Mark B. Whitaker, Jr.

Enclosure

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

June 28, 1996

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director

**COPIES:** Board Members

**FROM:** Roy Kasdorf

**SUBJECT:** Trip Report - Review of Packaging and Storage of Plutonium Metal and Oxide at the Savannah River Site

1. **Purpose:** During a trip to the Savannah River Site (SRS) from June 12 to June 14, 1996, the Defense Nuclear Facilities Safety Board (Board) staff (R. Kasdorf, R. Tontodonato, and M. Merritt) reviewed packaging and storage of high assay (>50%) plutonium metal and plutonium oxide. This review covered current conditions, status of meeting Board Recommendation 94-1, and future plans for packaging and storage of this material.
2. **Summary:** The Board staff reviewed the existing material and storage conditions of plutonium metal and oxide at the SRS and had the following observations and concerns:
  - a. Storage conditions in FB-Line vault 410 are adequate and the material is adequately stored until the material can be packaged to meet the long-term plutonium storage standard in 2002. The roof in the 204 vault in the 235-F facility has been leaking. Water was observed on the tops of several drums and in puddles on the floor. This condition should not be allowed to persist.
  - b. The schedule for meeting Recommendation 94-1 commitments for repackaging plutonium metal and oxide is extremely tight. Additionally, recent changes in the scope of the design effort for the new facility for repackaging and storage may further impact this already tight schedule.
3. **Background:** SRS currently manages approximately 450 containers of plutonium metal and 550 containers of plutonium oxide. About two metric tons of plutonium are stored at SRS. Additional metal and oxides will be generated as a result of ongoing processing of solutions and residues. This material is located in the F-area (vaults in FB-Line and in the 235-F facility).
4. **Discussion/Observations:** During the review the staff noted the following:
  - a. Material Generated at SRS: SRS believes that the material and packaging configuration for material generated at the site is well known and is in an acceptable storage condition

pending repackaging to meet the long-term Department of Energy (DOE) storage standard, DOE-STD-3013-94, *Criteria for Safe Storage of Plutonium Metal and Oxides*.

The typical packaging configuration is a can/plastic bag/can. The inner cans are either slip-lid or food-pack cans. All metal in direct contact with plastic has been repackaged. With the exceptions of several vented cans used for unstable oxide and delta phase plutonium metal, all outer cans are airtight food-pack cans.

As part of safeguards inspections, SRS performs a random sampling of containers for bi-monthly confirmatory evaluations. These evaluations include visual inspection, smears for contamination, monitoring for special nuclear material (SNM), and weight measurement. The goal is to inspect each metal item every two years. All containers are visually inspected bimonthly looking for abnormal conditions (e.g., corrosion, swelling, collapsing). When an item shows a weight gain or an abnormal condition, the item is added to the bimonthly inspection for tracking and trending to ensure container integrity is not lost. SRS is currently tracking ten or eleven such items.

SRS has developed a bagless transfer system which will be installed in FB-Line and is expected to be operational by September 1996. SRS will repack metal items into welded stainless steel containers using this system.

The Board staff believes the conditions and the surveillance program for material generated at SRS are adequate until the material can be packaged to meet the long-term plutonium storage standard.

- b. Material Not Generated at SRS: SRS has several hundred packages of Central Scrap Management Office (CSMO) materials which were generated elsewhere. This material is generally not well characterized. The records are poor and often do not provide information on the packaging. This material is stored in FB-Line vault 309 and in 235-F facility vaults. Pits are also stored in vaults in the 235-F facility.

The CSMO materials are still in their original shipping containers and have never been opened at SRS. Some of this material has been at SRS since the mid-1970s. As part of safeguards inspections, SRS performs a random sampling of containers for semiannual, confirmatory evaluations. These evaluations include visual inspections to the extent possible, smears of accessible areas of the shipping containers for contamination, and monitoring for SNM. Additional random monthly contamination smears are also made. SRS believes that the shipping container would contain any material even if the inner container loses its integrity. SRS does not currently have the ability to open some of the larger CSMO shipping containers. SRS plans to construct a process line in FB-Line to allow all containers to be opened for characterization of the material.

SRS intends to characterize the CSMO material using a combination of sampling and radiography. This will determine the type of internal packaging and the general nature of the material. Material would either be processed for long-term storage or sent for dissolution and plutonium recovery in H-area depending on the characterization results. This characterization effort is planned to start in the summer of 1998. Considering the extended time some of these materials have been stored, the poor characterization of the material, and the fact that existing surveillances will not identify problems until all layers of packaging have failed, it is not clear to the Board staff why these materials are not given a higher priority at SRS.

In October 1995, Lawrence Livermore National Laboratory conducted a surveillance of several pits and was reportedly satisfied with their condition.

- c. Storage Vaults: There are two storage vaults in FB-Line and three vaults in the 235-F facility in use at the SRS. Each of these vaults has engineered safety features: (1) Halon fire protection, (2) air monitoring, (3) filtered ventilation, (4) criticality monitors, and (5) storage locations. Administrative controls on material handling, personal protective equipment, combustibles (SRS personnel stated that none are allowed but, as noted below, combustibles were in one vault), and nuclear safety controls are also required.

The Board staff toured the 410 vault in FB-Line and all the vaults in the 235-F facility. During the tour of 204 vault in the 235-F facility, staff noted rust and water on the tops of several drums and several puddles on the floor. Plastic had been draped over several drums in an effort to protect them from water leaking through the roof. SRS personnel stated that the roof had been repaired on several occasions, but the repairs have not been successful. The Board staff does not believe that these conditions should be allowed to persist. Drums could easily be moved from below the leaks until the roof is repaired.

Additionally, the staff noted one drum in the 102 vault which had extensive corrosion on the bottom. The staff is attempting to obtain an engineering evaluation which SRS personnel indicated would normally have been performed for a questionable drum.

- d. Future Plans: DOE and SRS believe that the most cost-effective approach for meeting the long-term storage standard is to build a new, highly automated storage facility for processing, packaging, and storage of plutonium metal and oxide. There is a "baseline" conceptual design for this facility. The conceptual design is for 2,000 storage locations but has not been approved by DOE. In fact, at the meeting DOE informed SRS that the scope of the effort was being revised to pursue a parallel design for an additional 5,000 storage location facility which could accommodate material from Rocky Flats (e.g., scrub alloy; sand, slag, and crucible). A pit dehydride process line Advanced Recovery

Integrated Extraction System (ARIES) is also being considered. Construction is to start in early 1998 and completed in late 2001. The Plutonium Stabilization and Packaging (PuSAP) system currently being developed by DOE would be located in the new facility.

SRS believes that repackaging of metal and oxides will be completed in the first year of operation meeting the Recommendation 94-1 Implementation Plan commitment to repackage plutonium metal and oxide in accordance with the long-term storage standard by May 2002. The Board staff considers that the schedule for this facility is very aggressive. Additionally, the schedule impact of the revised scope of the design effort is not known and may jeopardize meeting the Recommendation.

5. **Future Staff Actions:** In the next few months, the Board staff is planning to review the material and storage conditions at all of the DOE defense nuclear facilities which have significant plutonium metal and oxide inventories. In addition to these reviews, the Board staff intends to review the prioritization of material processing at SRS, tour the 309 vault in FB-Line (the only F area vault at SRS which the staff has not toured), and review the status of CSMO material currently at Hanford.