DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 19, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: A. De La Paz

SUBJECT: Report on Review of Plutonium Repackaging and Residue Disposition - Savannah River Site

1. **Purpose:** This report documents a follow-up review of the plutonium packaging program and residue disposition efforts at the Savannah River Site (SRS). This review was conducted by Defense Nuclear Facilities Safety Board (Board) technical staff A. De La Paz, D. Grover, and W. Von Holle and outside expert H. Lowenberg on April 10-11, 1995.

2. **Summary:** The Department of Energy (DOE) and the Westinghouse Savannah River Company (WSRC) are performing actions to address Board Recommendation 94-1. Generally, the commitments in DOE's implementation plan for Board Recommendation 94-1 are consistent with current planning at SRS. The one exception is that current plans call for a new processing and packaging facility to be built by 2001. This plan leaves no margin to meet the Recommendation's May 2002 date for bringing all plutonium metal and oxide into conformance with the 50-year storage standard.

   Several observations related to DOE's implementation plan efforts for Board Recommendation 94-1 at the SRS are discussed below.

3. **Background:** The review documented in this report is the fourth Board technical staff review of plutonium storage issues at SRS. Previous reviews were conducted on June 18, 1993, January 5-6, 1994, and September 23, 1994. The results of the June 1993 and January 1994 reviews are included in the Board Technical Report DNFSB/TECH-1, *Plutonium Storage Safety at Major Department of Energy Facilities.*

   On February 28, 1995, the DOE forwarded to the Board their revised implementation plan for Recommendation 94-1. Recommendation 94-1 includes specific recommendations that plutonium metal and oxide be repackaged in accordance with the 50-year storage standard and that possibly unstable residues be processed (including plutonium solutions). In their implementation plan, DOE committed to actions to satisfy these recommendations. Many of these actions are applicable to SRS.

4. Discussion/Observations:

a. Plutonium Metal and Oxide Repackaging: WSRC is currently planning to install a bagless transfer packaging system in FB-Line by September 1997. This system in FB-Line would only be used for the packaging and repackaging of plutonium metal to comply with the boundary container requirements of DOE-STD-3013-94, *Criteria for Safe Storage of Plutonium Metals and Oxides* (the 50-year storage standard). These containers of plutonium metal would then be placed into an additional container in a new facility (as discussed below) beginning in 2001. Once placed in this second container, these packages of plutonium metal would be in full compliance with the 50-year storage standard. WSRC personnel are studying the feasibility of installing high temperature furnaces in FB-Line for the processing of oxide for compliance with the 50-year storage standard. However, preliminary conclusions are negative.

DOE and WSRC believe that the most cost-effective approach for coming into compliance with the 50-year storage standard is to build a new facility for the processing, packaging and storage of plutonium metal and oxide. Current plans for this new facility include the processing and packaging of all plutonium oxide for conformance with the 50-year storage standard. Construction of this facility is currently planned to begin in early 1998 with operations beginning by July 2001. WSRC believes that the facility can process and repackage all plutonium metal and oxide to comply with the 50-year storage standard by May 2002. The Board's staff is concerned with the compressed schedule for constructing the facility and processing and packaging the plutonium.

b. Low-Assay Plutonium-Bearing Solids Disposition: WSRC has identified several classes of low-assay plutonium (<50 w/o plutonium) scrap and residue that require processing. The material that WSRC has identified as requiring processing includes sand, slag, and crucible (SS&C), glovebox sweepings from FB-Line operations, metal turnings from the sampling of FB-Line buttons, and other miscellaneous metal unsuitable for interim storage. Current WSRC planning shows that the sweepings and turnings would be processed in the FB-Line dissolvers beginning in July 1996 and converted to metal by December 1997. The SS&C and miscellaneous metal would be processed beginning in September 1996 with dissolving completed by May 1997.

For the balance of the low-assay plutonium-bearing materials, WSRC plans to begin characterization and repackaging in FB-Line (with processing as needed) in accordance with the to-be-issued DOE standard for low-assay plutonium materials in September 1997. This standard is planned to be issued by DOE in final form in December 1995. Any materials that would require processing would not be processed to a low-fired oxide until February 2000 in HB-Line. This oxide would then be processed and packaged in the new

facility discussed above so that the oxide would be in full compliance with the 50-year storage standard.

During discussions with DOE and WSRC, the Board's staff raised questions about priorities for characterizing and processing low-assay plutonium-bearing materials. Specifically, the characterization and processing priorities do not appear to be consistent with the priority of vulnerabilities identified in DOE report DOE/EH-0415, *Plutonium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Plutonium Storage*. For example, in this report, plutonium oxide packaged in direct contact with plastic was ranked as a much higher vulnerability (8th) than SS&C and sweepings (21st). The SS&C and sweepings are to be processed by 1997, as discussed above, while the plutonium oxide packaged in direct contact with plastic will not be processed and repackaged until 2002. Current WSRC plans do not appear to consider the repackaging of this oxide into food-pack cans until the material can be processed and packaged to comply with the 50-year storage standard. The benefits of this option would need to be weighed against the cost and radiation exposure to workers from handling this oxide twice.

c. FB-Line and 235-F Plutonium Surveillance: WSRC personnel described their activities to monitor the stored plutonium items in the FB-Line vaults. This includes surveillance of plutonium metal, oxide, and low-assay plutonium-bearing materials. This program includes a bi-monthly physical inventory of all plutonium items including a visual inspection of plutonium containers. Also, a selection of containers is removed from the vault, and the containers are examined and weighed. Based upon these surveillances, a container may be radiographed and the amount of deflection of the lid may be measured (food-pack cans only). Currently, action levels for the repackaging of the material have been established for plutonium button weight gain and amount of container lid deflection for plutonium materials contained in food-pack cans. WSRC is planning to document the technical basis for these surveillances and action levels for all plutonium items. The Board staff noted that this program was discussed during the September 1994 review but has yet to be documented. Also, WSRC should consider defining action levels (and the technical bases) for all materials.

Surveillance of plutonium materials in Building 235-F is limited to bi-monthly outer container examinations and contamination surveys. The majority of this material is packaged in several containers (e.g., shipping containers) such that pressurization and even rupture of an inner container could go undetected. WSRC personnel have discussed the feasibility of using radiography to examine the inner containers. However, none have been examined using such a technique.

5. **Future Staff Actions:** The Board's staff will continue to follow the issues as noted above.