DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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November 16, 1994

The Honorable Victor H. Reis
Assistant Secretary for Defense Programs
Department of Energy
Washington, D.C. 20585

Dear Dr. Reis:

Defense Nuclear Facilities Safety Board (DNFSB) staff visited the Los Alamos National Laboratory (LANL) on August 31 - September 1, 1994. The focus of the review was on plutonium repackaging and consolidation efforts at the Plutonium Facility. The staff noted that the program to repackage plutonium metal and oxide is progressing. However, the program to characterize and process plutonium-bearing scrap and residues may require additional attention to address concerns expressed by LANL personnel with continued storage of this material that was not intended for long-term storage.

These scrap and residue materials are similar to those discussed in DNFSB Recommendation 94-1. We understand that some of these items have also been addressed in the Department of Energy Plutonium Environment, Safety, and Health Vulnerability Assessment as having specific vulnerabilities associated with them. Thus, it would appear that activities to address this situation should be considered within the overall approach the Department of Energy is developing to address material storage issues raised in DNFSB Recommendation 94-1.

The enclosed report includes observations made during the review and is forwarded for your information. If you have any questions, please call me.

Sincerely,

John T. Conway
Chairman

c: The Honorable Tara O'Toole, EH-1
Mr. Mark Whitaker, EH-6
Mr. Bruce Twining, Manager, Albuquerque Operations Office

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 14, 1994

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: A. De La Paz

SUBJECT: Report on Review of Plutonium Repackaging Program at the Plutonium Facility - Los Alamos National Laboratory

1. **Purpose:** This report documents a review of the plutonium repackaging program at the Plutonium Facility at Los Alamos National Laboratory (LANL) by Defense Nuclear Facilities Safety Board (DNFSB) technical staff member Andrew De La Paz. This review was conducted on August 31 - September 1, 1994. In addition, outside expert Dr. Joseph Leary accompanied Mr. De La Paz during discussions of the Automated Glovebox Can Out (AGC) Program at Sandia National Laboratories - Albuquerque (SNL-ALB) on August 30, 1994. The AGC Program is a joint SNL-LANL effort.

2. **Summary:** LANL personnel are in the process of developing a repackaging program for plutonium metal and oxide at the Plutonium Facility. A program for characterizing and limited processing of plutonium-bearing scrap and residues is just beginning. LANL personnel noted that both programs, as well as research efforts to support these programs, are limited due to a lack of funding.

   LANL personnel stated that the scrap and residue materials pose a significant near-term risk to workers in the Plutonium Facility. The DNFSB staff is also concerned with the continued storage of plutonium-bearing materials that were packaged for short-term storage, primarily scrap and residues.

3. **Background:** The review documented in this report is the third DNFSB technical staff review of plutonium storage issues at LANL. Previous reviews were conducted on October 27-28, 1993, and January 31 - February 1, 1994. The results of those reviews are included in the DNFSB Technical Report DNFSB/TECH-1, *Plutonium Storage Safety at Major Department of Energy Facilities.*

4. **Discussion/Observations:**

   a. Scrap Stabilization and Residue Consolidation: LANL personnel described a new initiative to prioritize (based upon hazard) plutonium-bearing items for repackaging and limited processing and to develop storage criteria and processing options for the large amount of

scrap and residue items that are stored in the Plutonium Facility. Generally, the Plutonium Facility has the facilities, personnel, and procedures for processing the various residue materials. Currently, the repackaging and stabilization are only being performed on plutonium-bearing items regarded as "emergencies" by the LANL TA-55 Nuclear Material Management Group. LANL plans on allocating about $3.5M for this program in fiscal year 1995, but maintains that this funding level is inadequate for the level of risk that this material poses to personnel within the Plutonium Facility.

b. Plutonium-Bearing Items: The Plutonium Facility contains the vast majority of plutonium-bearing items at LANL. The total number of items is about 7,600, which includes about 4,000 containers of reactive residues (e.g., pyrochemical salts), 2,000 containers of oxide, 1,500 containers of metal, and 120 containers of solutions. LANL personnel stated that the packaging of these materials (primarily the reactive scrap and residues) is a significant near-term personnel safety concern at the Plutonium Facility. LANL personnel also stated that specific funding to repackage and/or stabilize these materials has not been allocated.

c. LANL Criteria for Repackaging Plutonium Metal and Oxide: The LANL criteria for the repackaging of plutonium metal and oxide items are essentially the same as the criteria being developed by the Department of Energy (DOE) as drafted (dated March 31, 1994) in *U.S. Department of Energy Criteria for Storage of Plutonium Metals and Oxides*. LANL personnel are performing experimental work using plutonium oxide to determine material characteristics such as loss-on-ignition (LOI)--a method to determine the amount of water and organics that are adsorbed on the oxide--and particle size distribution as a function of the calcination temperature and the type of oxide (from metal or precipitate). LANL personnel believe that the results of this experimental work can be used to show that oxide fired at less than 1,000 degrees C or handled in an environment with more than 100 ppm water (conditions required by the draft DOE criteria include heating the oxide to at least 1,000 degrees C and handling and packaging oxide in a dry atmosphere to retain 0.5% LOI) may be acceptable under some circumstances. The Plutonium Facility has at least three calcining ovens that have the capability to fire oxide at 1000 degrees C.

d. Status of Plutonium Metal and Oxide Repackaging: The primary purpose of the DNFSB technical staff visit was to review the status of metal and oxide repackaging in the Plutonium Facility. A LANL document entitled *TA-55 Metallic and Oxide SNM Repackaging Plan*, dated January 13, 1994, provided a preliminary plan for the repackaging of metal and oxide plutonium materials. This plan calls for the long-term storage of plutonium metal and oxide in two welded, nested, stainless steel containers without the use of organic materials. The welding is planned to be completed in existing gloveboxes with a helium atmosphere that contains less than 100 ppm water. The goal is for long-term packaging at LANL to generally be accomplished to the requirements of the draft DOE criteria. LANL personnel currently plan on implementing such a program in the

spring of 1995. A demonstration of the repackaging capability is tentatively planned to be completed before October 1, 1994. The major items to be completed prior to beginning this program include the certification of a process to weld the stainless steel containers, as well as setup of the welding process, and the development of procedures for the entire repackaging program.

Recently, 28 metal items were retrieved from the TA-55 vault and radiographed to determine the degree that these items had oxidized. The sample was random. The radiographs indicated that approximately one third of the items exhibited various degrees of oxidation, indicative of air leakage into the containers.

e. Resource Conservation and Recovery Act (RCRA) Implications: LANL personnel noted that DOE has not provided clear guidance to LANL to aid in defining which plutonium-bearing materials are to be regulated under RCRA. LANL personnel suspect that RCRA constituents potentially exist in a large fraction of the plutonium-bearing vault materials. The implications for classifying material to be regulated under RCRA include: 1) that if materials are to be stabilized, the stabilization processes may need to be permitted by the New Mexico Environmental Department (NMED); and 2) inspection and labeling requirements may not be in consonance with As Low As Reasonably Achievable (ALARA) practice. In the interim, processes that are used to stabilize materials on an emergency basis are not permitted by NMED, other than as noted below.

f. Nitrated Rags: DOE recently received a 90-day permit from the NMED to thermally stabilize nitrated rags that were previously in storage under water in gloveboxes. LANL personnel noted that it took over a year for NMED to approve the emergency permit request by DOE to thermally stabilize this material.

g. Automated Glovebox Can Out (AGC) Program: A joint program exists between SNL and LANL to develop an AGC process that could be utilized at the Plutonium Facility at TA-55. This program was initiated in January 1994 and includes the intent to meet the DOE long-term plutonium metal and oxide storage criteria that is cited above. The AGC concept would utilize two robots. One robot would receive a material container from an electrolytic decontamination station, check for contamination, and place this container in a leak testing station. The second robot would place the material container into a boundary container, and then place the boundary container in successive stations where it would be welded and then leak tested. The AGC program currently plays a very minor role in LANL's plan for developing a metal and oxide repackaging process. This is partly due to current SNL planning to perform site testing at LANL in early 1996.

5. **Future Staff Actions:** The DNFSB staff will follow LANL progress in the metal and oxide repackaging program, as well as the scrap and residue characterization and processing program.