

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

June 22, 1994

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

**COPIES:** Board Members

**FROM:** A. De La Paz

**SUBJECT:** Report on Nuclear Materials Storage - Sandia National Laboratories -  
New Mexico

1. **Purpose:** This report documents an initial review of nuclear materials storage facilities and management at Sandia National Laboratories - New Mexico (SNL-NM) by A. De La Paz, member of the Defense Nuclear Facilities Safety Board (DNFSB) technical staff, and D. Boyd, outside expert. This review was conducted on May 10-12, 1994.
2. **Summary:**
  - a. Although the nuclear material inventory at SNL-NM is approximately 57 metric tons, only a small fraction of this amount is special nuclear material (SNM). In fact, the majority of the plutonium at SNL-NM is maintained as nuclear instrumentation calibration material.
  - b. SNL-NM does not currently have formal packaging requirements for nuclear material that is stored on site. However, the types of packaging utilized at SNL-NM are similar to those found to be satisfactory at other DOE facilities for similar applications.
  - c. The Nuclear Materials Storage Facility (NMSF) has no DOE-approved safety analysis report or Basis for Interim Operation document, nor has SNL-NM been directed by DOE to complete either document.
  - d. Deficiencies in conduct of operations applicable to nuclear materials management were observed in (1) the use and quality of procedures and (2) utilization of facilities.
  - e. Deficiencies in training applicable to nuclear materials management were observed in (1) qualification requirements and (2) records management.
3. **Discussion/Observations:**
  - a. Nuclear Materials Storage Facilities Toured: The nuclear materials storage facilities toured are listed in Attachment 1.

- b. Types and Forms of Nuclear Materials: The total nuclear material inventory at SNL-NM includes approximately 57 metric tons, of which less than 1 metric ton is SNM. The SNM at SNL-NM includes enriched uranium (no uranium-233) and plutonium. Other accountable nuclear materials at SNL-NM include metric ton amounts of depleted uranium and thorium; kilogram quantities of deuterium, enriched lithium, and natural uranium; and gram quantities of americium and neptunium-237.
- c. On-Site Nuclear Materials Packaging Requirements:
1. Currently, there are no formal SNL-NM packaging requirements for the storage of plutonium and other nuclear materials on site. The current practice is for the owner/experimenter, the Storage Services Department (i.e., nuclear materials handlers), and the Radiation Protection Department to informally work together when packaging nuclear materials for on-site storage. The packaging is similar to those utilized at other sites for similar applications.
  2. Several DOE sites have developed formal packaging requirements for the storage of plutonium. SNL-NM stated that requirements for packaging are being developed by SNL-NM for various forms of plutonium. This effort was initiated as a result of reviews by SNL-NM personnel as part of the DOE Environment Safety and Health Plutonium Vulnerability Assessment; there is no DOE Order which calls for these packaging requirements to be developed.
- d. NMSF Safety Documentation: A Basis for Interim Operation (BIO) document, as required by DOE Order 5480.23, *Nuclear Safety Analysis Reports*, has not been directed for the NMSF by DOE. The NMSF does not have a draft or DOE-approved safety analysis report (SAR). DOE currently has no plan to develop a SAR or BIO for the NMSF.
- e. Sealed Container Verification Program: In 1991, SNL-NM initiated a Sealed Container Verification Program to examine and repackage containers which hold multiple packages of SNM. This program is part of the SNM accountability program. Approximately 12 items are examined and repackaged per year. No major packaging problems have been noted to date. The surveillance data resulting from this program could be useful in the development of future nuclear materials packaging requirements. This program excludes some SNM because they are packaged as single items, as well as nuclear materials other than SNM. Surveillance data for these categories of material would be useful for developing packaging requirements for nuclear material.

f. Conduct Of Operations: The following are observations regarding conduct of operations:

1. SOP-7617-4-003, *Criticality Safety Procedures for Storage of Nuclear Materials at Manzano Base*, specifies, among other things, that nuclear criticality limits will be posted and a logbook of the current inventory will be maintained at each storage structure. The structures visited are not in compliance with these requirements. Section 13.b.(4) of DOE Order 5480.5, *Safety of Nuclear Facilities*, requires that "limits for criticality safety shall be posted in conspicuous places near the storage area."
2. Section 13.b.(1) of DOE Order 5480.5 states that "Nonessential combustible materials shall not be stored in the storage area." At several of the Manzano Base storage bunkers, the DNFSB staff observed use of nonessential combustibles (e.g., wood crates and pallets). It was evident to the DNFSB staff that an active effort to minimize combustibles was not in place; this differs significantly from other DOE sites where this requirement is fully implemented.
3. Section 13.b.(12) of DOE Order 5480.5 states that "All containers shall be marked or coded to indicate the type or category of material, amount, degree of enrichment, and the radiation level at the outside surface of the vessel." It was observed that these requirements were not applied consistently at the various nuclear materials storage locations.
4. The material stored in the 3X Vault in TA-V includes two americium-beryllium neutron sources contained in spherical casks. SNL-NM stated that the sources are assigned to the Radiation Protection Department. These items are not included on the list of materials approved for 3X Vault storage by the TA-V Radiological and Criticality Safety Committee (RCSC).

g. Training: The following are observations in the area of training:

1. Several "nuclear materials handlers" in the SNL-NM Nuclear/General Materials Storage Team perform the duties of a fissionable materials handler (FMH) as defined in Section 5.b. of Chapter IV of DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*. The DNFSB staff considers that the SNL-NM position of nuclear materials handler corresponds generally to the FMH position. SNL-NM management stated that this position is not a defined position at SNL-NM for training and certification to DOE Order 5480.20 requirements.

2. SOP-7617-4-013, *Training Plan Nuclear/General Materials Storage Team*, includes various course and on-the-job training (OJT) requirements for initial and continuing training. The format of this procedure is similar to that of a qualification card or checkoff list, but it has not been adapted for this purpose. An individual's status of completing the requirements cannot be readily determined from existing records as required by Section 16 of Chapter I of DOE Order 5480.20.
  - h. Technical Area I (TA-I) Nuclear Facilities: SNL-NM personnel noted that there is an ongoing effort to relocate nuclear material or, where necessary, document the status of nuclear material to exclude buildings in TA-I from designation as nuclear facilities. Hazard categorization inventory limits are delineated in DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*.
4. **Future Staff Actions:** The DNFSB staff will follow DOE and SNL-NM actions related to the observations noted above. The DNFSB staff will continue to follow the progress of DOE approval of the SNL-NM implementation plan for DOE Order 5480.23, including the BIO for the Manzano Bunkers and efforts for the NMSF. In addition, the DNFSB staff will follow the SNL-NM plans to complete a safety analysis report for the Manzano Bunkers.

**Attachment 1**  
**Nuclear Facilities Toured by the DNFSB Staff**

1. Manzano Base structures 37055, 37057, 37078, and 37118,
2. NMSF cells C-15 and C-16,
3. TA-I, Building 819, Nuclear Materials Warehouse,
4. TA-I, Building 867, Nuclear Materials Transportation, Storage and Maintenance Building,
5. TA-V, Hot Cell Facility (HCF) Room 108, monorail storage holes and glove box laboratory,
6. TA-V, Sandia Pulse Reactor Facility (SPRF) Dense Pack storage holes, 3X Vault, SPR II Vault, and the NOVA Vault,
7. TA-V, Annular Core Research Reactor Facility (ACRRF) floor vaults.