DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901
(202) 694-7000

February 12, 2004

The Honorable Spencer Abraham
Secretary of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Abraham:

It has been 4 years since the Defense Nuclear Facilities Safety Board (Board) submitted Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*, to the Department of Energy (DOE). At that time, the Board noted that large quantities of plutonium metals, oxides, and residues at Los Alamos National Laboratory (LANL) were still awaiting stabilization, packaging, or disposal. Since then, DOE has issued several revisions to its Implementation Plan for Recommendations 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, and 2000-1, yet LANL is the only DOE site without an Implementation Plan accepted by the Board.

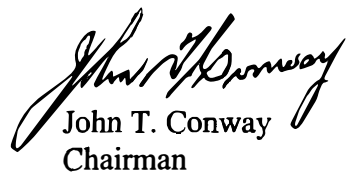
The Board noted in its August 9, 2002, letter to DOE that the schedule for stabilizing nuclear materials at LANL presented in the July 2002 Implementation Plan was too protracted. Since that time, the Board has urged DOE and LANL to move expeditiously to remove high-risk materials from vulnerable packages and repackage these materials in robust containers that would provide greater protection against inadvertent release.

The Board recently conducted a review of stabilization and storage of nuclear materials at LANL. Although LANL has completed a project execution plan for stabilization and disposition activities, the schedule to complete work on legacy materials remains essentially unchanged from the protracted dates of the July 2002 Implementation Plan. In past letters, the Board has suggested specific stabilization plans that warrant acceleration. Examples include repackaging of materials stored in vulnerable containers, processing of non-weapons-grade plutonium, and direct discard of residues. The Board notes that LANL is now directly discarding certain lean residues as previously suggested by the Board, but is still unnecessarily processing some residues to meet an outdated economic discard limit for plutonium. A summary of the correspondence on Recommendations 94-1/2000-1 at LANL and a report summarizing issues noted during the Board's review are enclosed.

Last week the Board was briefed on the results of DOE's Type B investigation of the August 5, 2003, multiple worker uptake event at LANL's Plutonium Facility. This contamination event resulted from the failure of a degraded package of plutonium-238 and should have reinforced the urgency of completing LANL's activities to stabilize and repackage its legacy materials. Although actions are being taken to repackage the plutonium-238 materials in Room 201B, it appears that neither LANL nor the National Nuclear Security Administration has an appropriate sense of urgency with regard to addressing the broader inventory of materials requiring stabilization.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests that, within 120 days of receipt of this letter, DOE provide a revised Implementation Plan for Recommendation 2000-1 for accelerated stabilization, repackaging, or disposition of nuclear materials at LANL reflecting these considerations and the issues noted in the enclosed report.

Sincerely,



John T. Conway
Chairman

c: The Honorable Linton Brooks
The Honorable Jessie Hill Roberson
The Honorable Everet H. Beckner
Mr. Ralph E. Erickson
Mr. Mark B. Whitaker, Jr.

Enclosure

Correspondence on Recommendations 94-1/2000-1 at Los Alamos National Laboratory (LANL)

1998

December 28, 1998, Department of Energy (DOE) 94-1 Implementation Plan (IP) commits to complete stabilization of LANL excess plutonium inventory by fiscal year (FY) 2005.

1999

December 14, 1999, Board letter to DOE urges LANL to give priority to the processing of high-priority legacy residues which are much more likely to have vulnerabilities in the condition of packaging or material than newly generated residues.

2000

January 14, 2000, Board Recommendation 2000-1 notes LANL 94-1 IP is behind schedule in repackaging and/or stabilization of metals, oxides, and residues.

2001

January 19, 2001, DOE 2000-1 IP extends LANL stabilization schedule to FY10.

March 23, 2001, Board letter to DOE raises objections to LANL 5-year delay specifically citing risks of maintaining legacy residues in slip-lid cans for too long.

November 21, 2001, Board letter to DOE reiterates its suggestion that LANL prioritize older residues ahead of newly generated ones due to packaging degradation concerns.

2002

July 22, 2002, DOE 2000-2 IP Rev 2 adds programmatic (non-excess) items to schedule which still extends out to FY10.

August 9, 2002, Board letter to DOE again raises objections to LANL 5-year delay and again cites risks of maintaining legacy residues (suggests direct discard). Reporting requirement asks for DOE to provide date for improved schedule for LANL.

2003

January 15, 2003, DOE letter reports "complete stabilization of nitrides and cellulose rags" at LANL (plutonium-238 cellulose rags were not addressed).

July 29, 2003, Los Alamos Site Office (LASO) approves LANL project execution plan with stabilization schedule unchanged from protracted dates of July 2002 IP.

August 5, 2003, Plutonium-238 release from a slip-lid can containing cellulose rags.

2004

February 2, 2004, National Nuclear Security Administration/LASO/LANL Type B Accident Investigation presentation to Board. Commitment to repackage items in Room 201B and complete Comprehensive Nuclear Materials Packaging and Storage Plan by FY10 (no acceleration of 94-1/2000-1 activities).

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

January 30, 2004

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: R. Rosen

SUBJECT: Nuclear Materials Stabilization and Storage at Los Alamos National Laboratory (Recommendations 94-1/2000-1)

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of nuclear materials stabilization and storage at Los Alamos National Laboratory (LANL). The purpose of the review was to assess the progress of LANL's activities in response to Recommendations 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, and 2000-1, *Prioritization for Stabilizing Nuclear Materials*. The review was performed during December 9–11, 2003, by staff members R. Rosen, J. Contardi, R. Kasdorf, R. Tontodonato, and C. Keilers and outside expert J. Leary.

Background. The goal of the materials stabilization activities at LANL is to stabilize and package all nuclear materials into containers that meet Department of Energy (DOE) standard DOE-STD-3013, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*; Technical Area (TA)-55 Site Standard Pack containers; or transuranic waste containers certified for disposal at the Waste Isolation Pilot Plant. LANL has developed a project execution plan to achieve this goal in accordance with the laboratory's portion of the DOE's July 2002 Implementation Plan for Recommendations 94-1/2000-1. Although the project execution plan elaborates on the stabilization, packaging, and disposition activities at LANL, the schedule remains essentially unchanged from the July 2002 Implementation Plan that was rejected by the Board in its August 9, 2002, letter to DOE. On August 5, 2003, radioactive material was released from a degraded package containing cellulose rags contaminated with plutonium-238 (^{238}Pu), which resulted in intake by two LANL workers. This event reinforces the need to complete inventory stabilization activities expeditiously. Under LANL's current schedule, the repackaging or disposition of nuclear materials stored in nonstandard containers (i.e., those not providing safety-significant confinement) would not be complete until 2010.

Materials Stabilization Schedule. LANL has made progress toward stabilizing, packaging, and disposing of plutonium-bearing items in nonstandard containers. During fiscal years 2001 through 2003, LANL completed work on nearly 20 percent more items than was planned. However, LANL's stabilization schedule is still based upon the unsatisfactory commitment dates of DOE's July 2002 Implementation Plan for Recommendations 94-1/2000-1. Approximately 2,900 excess items and 1,400 programmatic items remain to be stabilized, repackaged in approved

containers, or disposed. This schedule does not reflect an appropriate sense of urgency on the part of LANL or the National Nuclear Security Administration (NNSA) with regard to removing materials from nonstandard packages that pose a higher risk of failure, such as slip-lid cans. The Board's staff has reminded LANL and NNSA's Office of Los Alamos Site Operations that the Board still expects NNSA to provide an improved schedule for LANL's stabilization activities, consistent with the request in the Board's August 9, 2002, letter. The stabilization schedule originally listed in the July 2002 Implementation Plan and also listed in the project execution plan is shown in the following table (the total number of items completed from 2001 to 2003 was presented by LANL during the staff's review).

LANL Inventory Stabilization Schedule by Fiscal Year (Item Count)									
Process Line	2001–2003	2004	2005	2006	2007	2008	2009	2010	Total Planned
Vessels	0	3	3	3	4	0	0	0	13
Roasting and Blending	316	150	150	150	150	125	0	0	1041
Non-Weapons-Grade (Exposure Reduction Line)	15	0	0	0	280	280	280	233	1088
Nitrate Operations	139	45	45	45	45	45	45	43	452
Chloride Operations	314	130	130	130	130	130	130	133	1227
Unique Items	45	20	20	20	17	0	0	0	122
Programmatic Repackaging	357	175	280	280	280	210	100	93	1775
Total Planned	1186	523	628	628	906	790	555	502	5718
Total Completed	1403	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The project execution plan does not address all nuclear materials stored in unsatisfactory conditions at LANL, or even within TA-55. For example, the packages of ^{238}Pu-contaminated cellulose rags responsible for the August 2003 worker contamination event are not included in the above table. Likewise, NNSA's January 15, 2003, letter to the Board reporting that LANL had

completed stabilization of nitrides and cellulose rags from plutonium operations did not consider these materials.

LANL has been generating contaminated cellulose rags from ^{238}Pu operations and has continued to package and store these residues in nonstandard containers for future recovery. Approximately 155 such containers have been generated and stored on the floor space of Room 201B in the TA-55 ^{238}Pu laboratory since 1996. LANL does not have formalized controls governing the package configuration or length of time that items can be stored on laboratory floor space. The staff learned that only 12 of these containers had been stabilized during the 2 years of pyrolysis operations, even though it takes only a few days to process each container. The staff is unaware of any compelling reason why more timely processing of these residues could not have been accomplished.

LANL's Response to ^{238}Pu Contamination Release. As a result of the ^{238}Pu release, LANL committed to reconfiguring and repackaging all of the ^{238}Pu residue items stored on the floor space of Room 201B after completing an assessment that prioritizes these items based on a risk assessment. LANL also described to the Board's staff a plan for a comprehensive review of nuclear materials packaging and storage. This plan would initially involve a review of all items in TA-55 and the Chemistry and Metallurgy Research (CMR) Facility to identify items not stored in a safety-significant confinement system. These items would then be prioritized for repackaging based on a risk assessment. Eventually, this repackaging effort would be extended to all nuclear materials at LANL not stored in a safety-significant confinement system.

The staff learned that LANL's risk assessment will be based principally on isotopic content (material-at-risk), with little consideration of the chemical reactivity or age (length of time since packaging) of the materials. In earlier letters to DOE, the Board has suggested that the age of residues should be considered when establishing priorities for processing because older items are more likely to have vulnerabilities in material condition and packaging. Nonetheless, LANL's surveillance and repackaging plans for all nuclear materials stored in nonstandard containers is a positive effort that should be implemented without further delay. The Implementation Plan should be revised to include new milestones for all of the items not previously included in the project execution plan. The staff also believes it would be appropriate for LANL to immediately issue a Laboratory Implementing Requirement for compulsory storage of nuclear materials in containers that provide safety-significant confinement.

Areas for Accelerated Stabilization. The staff believes all areas of LANL's inventory stabilization schedule should be considered for accelerated stabilization, repackaging, and disposition. The following areas are of particular concern.

Programmatic Repackaging—This category includes items in the TA-55 storage vault and CMR Facility that are not defined as excess and are packaged in nonstandard containers, such as slip-lid cans. Any programmatic items not included in the project execution plan, such as those in Room 201B, need to be added to the schedule. The items in this category will be reprocessed or repackaged into TA-55 Site Standard Pack containers for future use. These standard containers are robust and well suited for safe interim storage. The staff believes the current schedule, which does

not eliminate nonstandard containers from LANL's inventory until 2010, should be accelerated based on a risk assessment that prioritizes items according to the age of the package and form of material as well as the material-at-risk. The Implementation Plan should be revised to include accelerated milestones for all programmatic repackaging.

Non-Weapons-Grade Materials—This category of items includes reactor-grade plutonium oxide and other higher-dose-rate items (>100 mrem/hr). LANL plans to construct a new Exposure Reduction Line in TA-55 to process these items for packaging into DOE-STD-3013 containers or disposal. The precise configuration and capabilities of the Exposure Reduction Line have not yet been defined, but this process line will serve to reduce the dose to operators and avoid contamination of equipment used to process weapons-grade plutonium. LANL has delayed work on designing and installing this equipment because of funding constraints and limited numbers of personnel. However, some non-weapons-grade materials are being stabilized using existing process lines.

The staff noted that the schedule for stabilizing these items, which does not begin until 2007, was too protracted considering that these isotopes pose a higher hazard than the weapons-grade plutonium materials. LANL stated that limited processing of the higher-dose isotopes could be done each year in the weeks immediately before TA-55's annual cleanup and inventory. The staff encouraged LANL to define and schedule this activity to show how much progress could be made in the interim through such an approach. The staff believes LANL should expedite the design, installation, and startup of a dedicated line for processing non-weapons-grade plutonium to accelerate stabilization of these items. The Implementation Plan should be revised to include accelerated milestones for stabilization of non-weapons-grade materials.

Direct Discard of Residues—In its August 9, 2002, letter to DOE, the Board strongly urged LANL to pursue direct discard of lean plutonium-bearing residues as a means of accelerating its nuclear materials stabilization program. NNSA has now approved LANL's plan for termination of safeguards for legacy residues, opening the way for direct discard as transuranic waste. LANL recently made progress by discarding some of the lean residues. However, LANL still insists on evaluating items individually to determine whether they should be processed or discarded, instead of evaluating entire categories of materials for discard based on a uniform criterion. Additionally, LANL is continuing to process some residues to meet an outdated economic discard limit for plutonium. The staff believes NNSA and LANL should reevaluate this limit to allow direct discard of residue items having little current value, thereby accelerating their disposal. The Implementation Plan should be revised to include accelerated milestones for direct discard of residues.

Building 164 Drums—Approximately 34 packages containing excess uranium materials are stored in Building 164 at TA-18. Most of these packages are 55-gallon steel drums. LANL plans to process these materials in the CMR Facility, but the schedule for this activity has been delayed because of competing processing requirements. These drums present an unknown hazard because the contents and condition of the packages are not entirely known. The staff believes these drums should be characterized and processed or repackaged, as appropriate, as soon as possible.

Non TA-55 Excess Items—LANL's project execution plan includes a discussion of excess materials stored in facilities outside of TA-55. The plan characterizes these items as generally low risk, but requiring inspection in order to verify that the materials are in a safe storage form. It is not clear when these inspections would be performed, but the project execution plans states that disposition is not likely to be scheduled until after 2010. The staff believes these excess items should be inspected to verify safe storage conditions sooner, rather than later, and that disposition should be completed well before 2010.