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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



June 11, 2012

The Honorable Thomas P. D'Agostino
Administrator
National Nuclear Security Administration
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0701

Dear Mr. D'Agostino:

The Defense Nuclear Facilities Safety Board (Board) has reviewed the preliminary design and safety basis for the Transuranic Waste Facility (TWF) project at Los Alamos National Laboratory. The preliminary design distributes the radiological material-at-risk among six waste storage buildings and credits several engineered controls to limit the dose consequences for the public and worker during potential accidents. The Board's review revealed several issues that could impact the identification, design, and functional classification of these safety-related controls. These issues include: (1) the use of non-conservative values for accident analysis parameters such as airborne release fraction, respirable fraction, and deposition velocity; (2) inadequate bases for screening external man-made accidents from consideration in the accident analysis; and (3) an inadequate definition of the credited boundary for a system supporting the operability of the safety-related fire suppression system during cold weather. The enclosure to this letter further describes these issues, as well as the Board's understanding of the preliminary design and safety strategy for the TWF project.

Although the preliminary design is complete, the Board understands that the project team is deferring the Critical Decision-2 milestone in order to further mature the design. The Board is identifying issues with the preliminary design in advance of this milestone to support the project's adherence to the safety-in-design process outlined in Department of Energy Standard 1189, *Integration of Safety into the Design Process*, as the design matures. Pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 60 days of receipt of this letter identifying actions taken or planned by the National Nuclear Security Administration to resolve these safety issues.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter S. Winokur".

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Glenn S. Podonsky
Mr. Kevin W. Smith
Mrs. Mari-Jo Campagnone

ENCLOSURE

SUMMARY OF THE TRANSURANIC WASTE FACILITY PROJECT AND RELATED ISSUES

Project Summary. The Transuranic Waste Facility (TWF) will be a Hazard Category 2 nuclear facility located at Los Alamos National Laboratory's Technical Area-63. It will provide storage, staging, and characterization for transuranic (TRU) waste generated by the laboratory's operations after 1999. TWF will be capable of storing 1,240 drum equivalents of waste containing up to approximately 30,000 plutonium-239 equivalent curies of material-at-risk (MAR). The facility may also store up to 10,000 plutonium-239 equivalent curies¹ of MAR in the form of sealed sources for the purpose of calibrating the onsite waste characterization equipment.

The Carlsbad Field Office's Central Characterization Project will perform characterization activities required for waste certification in mobile trailers permanently staged onsite. The trailers will be located on an outdoor pad adjacent to the storage buildings. Characterization activities include non-destructive assay (neutron and gamma counting) and radiography. TWF operations staff will transfer waste containers to the characterization area using an electric forklift. Personnel from the Central Characterization Project will perform headspace and flammable gas sampling and analysis in one of the six waste storage buildings.

The preliminary design distributes the MAR among six independent steel-framed storage buildings (Seismic Design Category 2, Limit State B) for TRU waste and a transportainer-style structure for the sealed sources. Safety-significant waste containers such as drums, standard waste boxes, and standard large boxes will provide confinement of TRU waste. Cladding, which is not credited, will confine the radiological material in the sealed sources. No waste containers will be opened at the facility. The preliminary design credits several engineered controls for protecting the radiological material in TRU waste containers and sealed sources from release during potential accidents:

- Safety-significant storage containers will help protect the waste from potential insults such as fires and impacts.
- Safety-significant fire suppression systems in the TRU waste storage buildings will help protect stored waste from a fire.
- Safety-class storage safes in the sealed source storage area will protect sources from insult by fire or impact.
- A safety-class seismic electrical isolation switch will eliminate the potential for electrical faults to initiate a post-seismic fire.

¹The Board understands that during the development of the Preliminary Documented Safety Analysis the TWF project team is planning to reduce the MAR limit in the sealed source storage area.

- A safety-class stand-off distance around the site will reduce the likelihood of a wildland fire impacting waste or sealed sources.
- A safety-class separation distance between waste storage buildings, supported by a safety-class control requiring non-combustible building construction, will reduce the likelihood of a fire involving multiple structures.
- A safety-class slope for the site will direct spilled liquids such as diesel fuel away from areas storing MAR.
- Safety-class vehicle barriers will reduce the likelihood of an off-site vehicle impacting waste or sealed sources.
- Safety-significant waste storage buildings will reduce the likelihood that a collapsing building will impact MAR during a seismic event (the building dimensions are safety-class controls to reduce the likelihood of an aircraft impact and the potential consequences of a seismically-induced facility collapse).

With these safety controls, potential insults to the radiological material stored in waste containers and sealed sources are limited. The storage buildings are therefore not designed to perform a confinement function.

Safety Issues. The following safety issues identified by the Board with the preliminary design and safety basis for the TWF project could impact the identification, design, and functional classification of safety-related controls.

- Key parameters in the accident analysis for events involving sealed sources may not be conservative or compliant with the bounding values recommended in Department of Energy (DOE) Handbook 3010, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*. Specifically, the project's safety analysts adopted airborne release and respirable fractions from DOE Standard 5506, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, which are not appropriate for modeling of accidents involving sealed sources. The postulated radiological consequences from insults to the sealed sources are therefore underestimated.
- The project team is not fully adhering to the May 2011 safety bulletin from DOE's Office of Health, Safety and Security regarding deposition velocity and therefore lacks an adequate basis to support the value of 1 centimeter/second used in the accident calculations. As a result, the calculated dose consequences to the public from postulated accidents at the TWF are non-conservative.
- The project team's conclusion that an event involving an aircraft crash impacting a waste storage building is incredible may not be defensible, since the analysis on which it is based did not follow the process established by DOE Standard 3014-2006, *Accident Analysis for Aircraft Crash into Hazardous Facilities*. The standard defines a facility to include "the collection of such structures that could be affected by a

single aircraft impact.” The analysis did not account for the potential of a single aircraft to impact multiple storage buildings. As a result, the probability of an aircraft impacting the TWF could be higher than the screening threshold for external man-made accidents identified in DOE Standard 3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

- The calculation used by the project team to screen large truck crashes from consideration in the design of the safety-class vehicle barriers is based on a number of non-conservative and inadequately supported assumptions. As a result, the vehicle barriers may be undersized.
- The approach to protecting the safety-significant fire protection system from potential freeze damage relies in part on non-safety-related components to perform a credited alarm and notification function. This approach is not consistent with DOE’s guidance for freeze protection in the *Interim Guidance for Design and Operation of Wet Pipe Sprinkler Systems and Supporting Water Supplies*.