



Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585



February 13, 2015

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DNF SAFETY BOARD

The Honorable Jessie H. Roberson
Vice Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Dear Madam Vice Chairman:

This letter is in response to the Defense Nuclear Facilities Safety Board (DNFSB) letter dated December 17, 2014, requesting an updated plan and schedule for completing the alternate seismic analysis for the Los Alamos National Laboratory (LANL) Plutonium Facility (PF-4).

Operations at PF-4 are safe, but the facility does not have the resiliency we would like in the event of a rare severe earthquake (one with peak ground motion that could occur on the order of once in ten thousand years). Since 2008, when the National Nuclear Security Administration (NNSA) first re-evaluated the seismic risks at LANL, NNSA has taken significant actions to improve the structural capability of the building and to better understand both the seismic demand and the facility's response. Actions include removing hazards and nuclear material from the building, adding substantial bracing to individual components and walls, and a significant upgrade to the roof. During this period, NNSA has conducted extensive analysis of the facility including full-scale testing of a key structural element. The attachment to this letter provides a more detailed description of NNSA's completed actions and planned upgrades.

As we committed in September 2012, NNSA has worked closely with the DNFSB staff over the last two years to develop an advanced methodology for an alternative analysis that takes into account the DNFSB technical perspective. This has required an extensive effort not only to develop the approach but also to validate it specifically for PF-4, since the approach suggested by your staff and adopted by NNSA has not been generally validated before.

In October 2014, Simpson, Gumpertz, and Heger (SGH), the seismic analysis contractor, issued reports on the alternate analysis work completed by that time. These reports compare conservative estimates of seismic capacity to seismic demand. NNSA is analyzing these results and comparing them to the previous analyses completed. NNSA expects to complete its review by the end of March 2015.



Once the review of the alternative analysis is complete, we will understand better how to assimilate that information into our existing body of knowledge on the seismic performance of PF-4. At that time, NNSA will have the information necessary to inform and refine our path forward to ensure appropriate seismic margin for this vital, enduring facility. Plans for follow-on work, including the scope and methodology for the portion of the alternate analysis that would evaluate the probabilistic aspects of facility performance, start dates and completion, will be developed with clear technical scope through appropriate contract actions as required.

If there are any questions please contact the Associate Administrator for Safety, Infrastructure and Operations, Jim McConnell, at 202-586-4379.

Sincerely,

A handwritten signature in black ink, appearing to read "Frank G. Klotz". The signature is written in a cursive style with a large, stylized "K" and "t".

Frank G. Klotz

Attachment

cc: J. Olencz, AU-1.1

Description of the Los Alamos Plutonium Facility Upgrades

January 7, 2015

The Department of Energy (DOE), the National Nuclear Security Administration (NNSA), and Los Alamos National Security, LLC, (LANS) are committed to the long-term safe, secure, and environmentally compliant operation of the Los Alamos Plutonium Facility (PF-4) as it executes its vital national security mission. In particular, NNSA and LANS have pursued numerous facility modifications, including but not limited to structural upgrades to make the facility safer in the event of a highly unlikely, large earthquake.

Safety improvements completed in FY 2009-2011 include:

- Installed an automatic seismic shutdown capability for non-vital laboratory room electrical loads to reduce room ignition sources.
- Installed and began using a new nuclear material storage system using fire-rated safes and containers.
- Completed implementing combustible control program procedure, and the removal of tens of tons of combustible material from the facility.
- Implemented ignition source control program.
- Assessed and repaired the facility's main fire-wall.
- Prepared several safety basis iterations and approved an update in October 2011.
- Upgraded portions of the Facility Control System that ensures proper ventilation flow and differential pressure between ventilation zones.
- Developed fire department pre-plans that contain emergency response guidelines for the fire department and other first responders.
- Developed a hydraulic model of the fire suppression system that identified weaknesses that were subsequently addressed.
- Replaced vault sprinkler heads with lower-actuation-temperature heads that will respond sooner and limit the development of a vault fire.

These improvements are further described in the Department's correspondence in response to the Defense Nuclear Facilities Safety Board Recommendation 2009-1 (see the website:

<https://hsspublic.energy.gov/deprep//archive/rec/2009-2.asp>)

Safety improvements completed between FY 2011-2014 include:

- Modifications to enhance the overall structure.
 - Steel columns were installed near column-to-beam connections, supporting the ceiling of glove-box ventilation filter plenum rooms.
 - Additional perpendicular angle-iron supports have been installed on concrete shield walls to prevent shearing of angle-iron bolts with wall movement.

- A 140 ton concrete and steel reinforcement was installed on the existing roof to redistribute loads (Figure 1). This is referred to as the drag strut modification.



Figure 1. New Drag Strut Across PF-4 Roof

- A gap was cut between the plenum room columns and adjacent structures to allow the columns to move (Figure 2).



**Figure 2. Captured Column in Plenum Room
(Wall Cut Back 1.5 in.)**

- Five mezzanines above the main floor were reinforced.
- The top of ceiling beams were anchored to the C-channel beam to provide additional stiffness. In addition, the C-channel beams were stiffened (Figure 3).



Figure 3. Ceiling Beam Brace from Top of I-beam to C-channel

- Angle irons were installed around the perimeter of the glove-box exhaust fan concrete pads to anchor them to the floor (Figure 4).



Figure 4. Glovebox Exhaust Fan and Concrete Base Pad with Bracing shown on the Perimeter of the Fan Pad

- Eight basement columns were wrapped with carbon fiber reinforcement, thereby preventing loss of axial load capacity during and following an earthquake (Figure 5).



Figure 5. Basement Column reinforcement

- The Fire Suppression System was upgraded to more effectively mitigate release from a postulated seismically-induced fire scenario.
- Anchorage of essential electrical distribution components has been improved (Figures 6 and 7).



Figure 6. Motor Control System Anchorage



Figure 7. Anchorage of Uninterruptible Power Supply Auto Transfer Switch

Safety improvements planned for FY 2015 and Out-years include:

- The ends of key roof girders will be reinforced with carbon fiber reinforced epoxy resin stirrups, improving resistance to shear failure. The design is complete; installation will start in FY 2015 and is expected to complete in FY 2016.
- Several glove-box support stands for glove-boxes are being upgraded. The stand upgrades further minimize the likelihood of multiple room fires in PF-4 following a seismic event.