The Secretary of Energy
Washington, D.C. 20585

March 27, 2013

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Your January 3, 2013, letter requested Department of Energy (DOE) senior leadership provide a report on its assessment of the current state of public and worker protection for Plutonium Facility (PF-4) seismic accident scenarios and the risk reduction measures to be applied to mitigate near term seismic risks. The enclosed report provides this assessment.

Please be assured that DOE is focused on improving the seismic safety posture of the PF-4 at Los Alamos National Laboratory and has taken a significant actions to reduce PF-4 seismic-related risk including installing significant structural upgrades, removing tens of tons of combustible material, and repackaging or disposing of hundreds of kilograms of plutonium. DOE is continuing to take further actions to reduce the amount of plutonium at PF-4 and to improve the facility's seismic capabilities (including further peer review of our analyses and an alternative modeling approach to guide facility improvements). Since PF-4 can provide its confinement safety function based on our current seismic analysis and the identified near-term risk reduction measures will further reduce potential consequences, I have concluded that PF-4 can continue to operate safely while longer-term structural modifications are completed.

My evaluation of DOE safety analyses has highlighted that our analytical methods, while appropriate for determining safety control classification within our safety basis construct, may benefit from use of best risk assessment practices applicable from the nuclear industry to provide additional confidence in the effectiveness in our analysis and to assess true risk, when needed. As such I have directed the Office of Health, Safety and Security to investigate using national and international standards, and best regulatory practices, to determine how we may take advantage of them to improve safety at DOE. I invite your participation in this effort.

The National Nuclear Security Administration will schedule a briefing on this report as soon as is mutually convenient.

Sincerely,

Steven Chu

cc: N. Miller, NA-1
G. Podonsky, HS-1
M. Campagnone, HS-1.1

Assessment of PF-4 Seismic Accident
Risk and Risk Reduction Measures

This report provides an assessment of the current state of public and worker protection for PF-4 seismic accident scenarios and the risk reduction measures to be applied to mitigate near term seismic risks.

Background Analysis

PF-4 was designed to the best available earthquake information when it was constructed in the 1970s. Consistent with Department requirements, a re-evaluation of seismic data, assumptions, and modeling was performed. This re-evaluation determined that PF-4 facility could undergo a collapse in a severe earthquake (one with peak ground motion that could result in collapse on the order of one in ten thousand years). The consequences from this event were above the expectations for design of new Department of Energy (DOE) nuclear facilities and posed a risk that warranted actions to minimize the risk to the extent possible. Many significant actions have been taken to mitigate these risks.

Current State of Public Protection at PF-4

Actions taken to date have both reduced the potential for collapse of PF-4 and reduced the magnitude of release that may occur. Currently, the analysis shows that the facility building provides its intended confinement safety function for an earthquake of an annual probability of exceedance of 1.2×10^{-4}. Although this is beyond the DOE Standard 1020 criteria for new buildings, it is within the Standard 1020 allowance provided for existing facilities (i.e., 2×10^{-4}).

Because of the way PF-4 was built, the margin between loss of confinement and onset of collapse is small; so, further evaluations of the consequences of the event have been performed. These evaluations considered bounding values for significant factors such as plutonium inventory and building fragility.

The analyses indicate that if loss of confinement occurs by building collapse, offsite consequences could be 40 times greater than if the facility performed its confinement safety function. The likelihood of a release is small, and consequently the risk from this accident is well within DOE quantitative safety objectives in DOE's Nuclear Safety Policy (DOE Policy 420.1).

Nevertheless, additional near-term compensatory measures are being taken that will reduce the dose consequence by 30% to 60%. Further, National Nuclear Security Administration (NNSA) is continuing to refine its seismic analysis to provide better understanding of its response and safety margins, and to inform decisions on additional facility modifications that could be made to improve safety at PF-4. NNSA and Los

Alamos National Laboratory (LANL) also have targeted to remove or robustly repackage 500 kg or more, plutonium equivalent, this fiscal year, which will also reduce calculated offsite consequences; this is part of a continuing program that will substantially reduce the excess and legacy material-at-risk inventory during the next five years.

Further Risk Reduction Measures to be Applied to Mitigate Near-Term Seismic Risk

NNSA is taking the following near-term measures to further reduce risk at PF-4:

- Reduce the first floor plutonium inventory limit;
- Reduce the vault plutonium inventory limit;
- Implement a new safety-class container for heat source plutonium, which is predominantly plutonium-238; and
- Remove one kilogram of heat-source plutonium from the PF-4 first floor.

The first three near-term measures are scheduled to be completed thirty days after the DSA Addendum has been approved and the last is scheduled to be completed in calendar year 2013. Additionally, conceptual designs have been developed for two structural modifications that will reduce the probability of collapse and will be installed during the next two to three years.

Emergency Management Improvements

On February 26, 2013, LANL completed an emergency tabletop exercise that included a PF-4 seismically-induced collapse scenario. Since the level of ground motion that induces PF-4 collapse would also induce wide ranging structural collapses both at LANL and in the local community, the table-top exercise focused on improving the emergency preparedness that would require a regional or national-level emergency response.

Conclusion

PF-4 meets its plutonium confinement safety function, although additional margin is warranted. The identified near-term risk reduction measures will further reduce potential consequences of a seismic event. Since PF-4 can provide its confinement safety function based on our current seismic analysis and the identified near-term risk reduction measures will further reduce potential consequences, I have concluded that PF-4 can continue to operate safely while longer-term structural modifications are completed.