

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 8, 2006

MEMORANDUM FOR: J. Kent Fortenberry, Technical Director
FROM: B. Broderick and C. H. Keilers, Jr.
SUBJECT: Los Alamos Report for Week Ending December 8, 2006

Transuranic (TRU) Waste Operations: In discussions with LANL this week, NNSA management communicated that they are inclined to reject the proposed safety bases for two key facilities needed to process and ship about 300 high-activity TRU waste drums to WIPP. Based on their partially completed reviews, the NNSA review teams believe that the proposed safety bases over-rely on specific administrative controls over engineered systems and have quality issues, such as low specificity of functional requirements for the few declared engineered safety systems. The site reps observe that the issues seem to arise less from document quality and more from a lack of shared understanding and agreement of the risk tradeoffs involved in key safety basis decisions.

Unmitigated Risk Perspective: Several of LANL's highest-consequence postulated nuclear accident scenarios involve TRU waste stored at Area G. The Area G safety basis that NNSA approved in 2003 posits about three dozen accident scenarios that have unmitigated offsite consequences ranging from 1 to 1,800 rem (CEDE); predicted offsite consequences for about half the scenarios exceed 100 rem.

Several high-consequence scenarios involve about 300 high-activity drums (greater than 56 Ci) that lack an approved disposition pathway; these drums constitute about 2 % by number but about a third by activity of the total above-ground inventory (i.e., 50 kCi of 150 kCi). Without mitigation, small fires or spills involving small numbers of these high-activity drums lead to predicted off-site consequences of about 100 rem or greater. The general population of drums (~ 4 Ci average) can also induce high offsite consequences but only during less-probable large fires or a major earthquake.

LANL has proposed safety bases for processing the high-activity drums in the WCRR facility and shipping them from the RANT facility, thereby opening a disposition pathway that eliminates the risks associated with these high-activity drums. This would require NNSA to accept operations involving an order-of-magnitude more activity in these facilities than previously accepted, but only for the time required to process and ship 2 % of the drums. Without mitigation, large fires or a major earthquake involving these facilities with these inventories are postulated to cause building collapse and result in high offsite consequences (i.e., 50 rem for WCRR, 500 rem for RANT, compared to 1,000 rem for Area G); this corresponds to about 20 % higher risk from WCRR and RANT operations, but it supports achieving a significantly greater risk reduction in Area G for a broad range of accident types.

Mitigation Perspective: Area G has few creditable safety-class engineered systems, mainly just the containers; it is an extrapolation to assert that these systems will provide the two or three orders of magnitude of mitigation necessary to address the postulated accident scenarios. NNSA observed in 2003 that, given the lack of safety systems, removal of material-at-risk is the only way of reducing the potential offsite consequences; therefore, NNSA imposed a requirement to ship about 2,000 higher-activity drums by Sep 2004. This stalled due to a lack of an approved pathway that persists today.

Similar to Area G, WCRR and RANT have few creditable high-pedigree engineered systems that address fire and seismic scenarios. In August, LANL proposed a strategy that involves high reliance on compensating administrative controls; the key strategic assumption was that NNSA could accept short-term increased risk in WCRR and RANT to achieve a much greater and timely risk reduction in Area G. Since Nov 3rd, NNSA has been reviewing the proposed safety bases from a context appropriate for continuous, long-term operations, as opposed to one considering relative risks; this has created conditions for rejection rather than for continued engagement supporting timely resolution of issues.