



**Department of Energy**  
**National Nuclear Security Administration**  
Washington, DC 20585  
December 17, 2007

OFFICE OF THE ADMINISTRATOR

The Honorable A. J. Eggenberger  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, N.W., Suite 700  
Washington, D.C. 20004-2901

Dear Chairman Eggenberger:

This is in response to your September 10, 2007, letter requesting a report regarding the National Nuclear Security Administration's (NNSA) utilization of the Materials Accountability and Safeguards System (MASS) at the Los Alamos National Laboratory (LANL).

NNSA Headquarters' review of the LANL criticality safety program raised concerns regarding the potential for improper use of MASS as a criticality safety control system in 2005. During the past year, the Los Alamos Site Office (LASO) identified improper utilization of MASS for criticality safety purposes as a causal factor in a criticality safety infraction involving a mismatch between designated item locations in MASS and posted criticality safety limits on August 15, 2007. The specific issues identified in your letter are addressed below.

1. "Identification of the safety functions that MASS currently performs and upon which management relies, and all new safety functions which will be incorporated into the upgraded system."

The LANL description on the use of MASS is provided as an enclosure. It describes LANL's use of MASS as a Safeguards Nuclear Material Control and Accountability (MC&A) software system that provides a convenient operator aid for tracking fissionable material masses. Operator understanding and compliance with criticality safety limits is a procedural and safety management programmatic requirement implemented independently of the MASS system. MASS is not relied upon to perform a criticality safety function and, therefore, requires no upgrades for criticality safety purposes. LANL is in the process of modifying safety procedures and retraining facility staff to ensure that MASS is used only for its intended purpose.



2. "Discussion of the process for incorporating these new requirements into an improved MASS, and how lessons learned from previous upgrade attempts, including the need for strong project leadership, have been captured in the upgrade strategy and milestones."

NNSA has no plan to incorporate criticality safety requirements into MASS. MASS cannot be used as an effective tool for criticality safety because criticality safety limits typically depend upon parameters other than fissionable material mass (e.g., shape, form, enrichment, spacing, etc.) that a safeguards MC&A does not, and should not, capture and track.

3. "Compensatory measures to ensure the safety of material movements before the MASS upgrade has been completed."

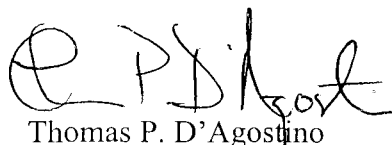
LANL is in the process of modifying safety procedures and retraining facility staff to ensure that MASS is used only for its intended MC&A purpose. NNSA has no plans to perform criticality safety related upgrades for MASS.

4. "Specific actions the NNSA will take to ensure the success of the MASS upgrade."

As noted above, NNSA has no plans to perform criticality safety-related upgrades for MASS. However, LASO will provide operational oversight coupled with two formal assessments in Fiscal Year 2008 using selected requirements from DOE-STD-1158-2002 to ensure the actions detailed in the enclosure are successful in eliminating any real or apparent reliance on MASS for criticality safety issues.

If you have any questions, please contact me or Dr. Jerry McKamy at 301-903-8031.

Sincerely,



Thomas P. D'Agostino  
Administrator

Enclosure

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*Date:* October 25, 2007  
*Refer To:* ADNHHO:07-278

Donald L. Winchell, Jr.  
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**SUBJECT: Identification of the Safety Function that MASS Currently Performs and  
Upon which Management Relies**

Dear Mr. Winchell, Jr.,

The Criticality Safety Program is a Safety Management program, not a Specific Administrative Control, in the TA55 DSA. As such the MASS system is a tool that supports this safety management program. MASS is relied upon as a database from which information on Special Nuclear Material amounts and locations are tracked. The purpose of the MASS system is for Material Control and Accountability. The following is a discussion of the accuracy of the data that resides in MASS.

The process of populating data in the accountability system has two potential initiators. The first is the receipt of SNM in a shipment from off-site. DOE Orders require that such incoming materials be measured, typically by non-destructive assay (NDA) techniques within a specified time limit. Any differences between shipper values and receiver (LANL) values are resolved before acceptance is complete. This material is not released for use until the SNM value is established at LANL.

The second, more common, initiator is internal to LANL. This may be as a result of processing, handling, or other programmatic uses. All SNM is contained within a material balance area (MBA). In turn, MBAs may be subdivided into smaller units called a process status (P/S). For TA-55 operations that involve the handling, processing, or storage of SNM, there is a process accountability flow diagram (PAFD). The PAFD is based on the specific activities within a P/S or MBA. The PAFD provides specific guidance that indicates where NDA measurements are required in the process; what type of measurement, including specific instruments; and product and side stream naming conventions for items leaving the activities covered by that specific PAFD. The use of process statuses and PAFDs allows a single unit operation or small number of unit operations to be monitored, material balances drawn, and any inventory differences in those material balances to be evaluated on a batch-by-batch basis.

A daily check is performed by MASS Operations personnel on the overall material balance for operations. This consists of the beginning inventory values plus any additions (e.g. incoming shipments) less any removals (e.g. outgoing shipments, waste that is removed from accountability). This value is then compared to end of day inventory balance. Any differences are investigated and resolved immediately. A further balance is performed at the end of the month by both CM&A and MASS Operations personnel.

All accountability measurements are made on qualified instruments that are maintained under a strict measurement control program. This program includes the use of standards of the same or suitably similar matrix, and SNM quantity as the process materials to be measured on that particular instrument. The SNM content of these standards is obtained through using destructive analyses techniques during preparation of the standard. All instruments, including balances, undergo measurement control checks on established schedules. These are based on either duration (i.e., daily) or after a specified number of measurements. An instrument that has not been calibrated, or that does not meet measurement control limit requirements, cannot be used for accountability measurements.

Finally, there are additional, independent, checks and balances on the MASS inventory data. All P/S and MBAs have statistically developed control limits. Apparent losses or gains of SNM are monitored to assure no trends or patterns. This is a two step process that begins with an item adjustment (IA). Individual IAs are performed by Safeguards MC&A personnel, not operations personnel. IA data is collected, by P/S or MBA, and reviewed weekly to identify any issues. The second step is the review of inventory differences (ID), which is a summation of IAs by P/S or MBA. This review is performed monthly. These two reviews are part of the material control indicators used to assure the accuracy of SNM data recorded in the MASS system.

All of these factors, when combined, provide a high level of confidence that the SNM values recorded in the MASS system are correct and accurate within the measurement limitations of the NDA instrumentation.

That being said, it is the expectation that Fissile Material Handlers will use the MASS system to determine amounts and locations of fissile materials when planning fissile material movements. They are further expected to make use of postings and visual inspections to validate the information. Calculations should then be performed to sum the quantities of material, which are then compared to the posted Criticality Safety Limits. Furthermore, should they need to move the items through locations that have pass-through limits they are to verify that they are within those pass-through limits, and check the material in the box to ensure that there is not currently an over-mass condition existing prior to movement.

TA55-AP-522 was changed following an infraction where it was thought that MASS might have been able to allow the error that was made to be caught prior to the movement. At the time the change was made, TA55-Notice-011 was issued that discussed the change and the intent of the change, which is to give operators another tool to help ensure they are within their limits. TA55-AP-522 is currently under revision. This revision was driven by the Nuclear Criticality Safety Board at TA55. The revision will include specific steps to reflect those listed in the previous paragraph. In addition, the revision will pilot some additional/replacement operator aids based on

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the results of an internal criticality safety assessment performed in the spring of 2007, and input on how fissile material movements are performed at other sites. It is important that the procedure clearly and unambiguously list the expectations for Fissile Material Handlers when making fissile material movements. The laboratory is currently implementing an improved Fissile Material Handler certification program, which is in line with the changes to this procedure.

The MASS system does include an operation limit warning for the vault. This warning is based on a very simplistic sum totaling of material and a comparison to the most restrictive limit for the location. The complexity that accompanies many of the criticality safety limits spanning various material types has not been coded into the system. The vault procedure includes a discussion of operational limits, but still relies on the operator calculating the material quantities for a location and comparing them to the limit for the location prior to moving material. Whether the operation limit warning is displayed or not, vault operators perform calculations and compare the results of those calculations to the criticality safety limit. The vault work instruction PMT3-WI-101 will be revised to clarify the use of the operational limit, and better describe how the calculated totals are compared to Criticality Safety Limits.

In summary, MASS is a Material Control and Accountability program. Criticality Safety is a safety management program in the TA55 DSA. Workers are expected to verify by calculation and inspection, that material movements remain within the Criticality Safety Limits. The procedural implementation of this program is being revised such that this expectation is clear to workers.

Sincerely,



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