

SLAC MEMORANDUM

October 9, 2001

To: H. Lynch and S. H. Rokni
From: W. R. Nelson and K. Jobe WRN
Subject: Dosimetry results for the roof area of the NLCTA

On February 7, 2000 the Radiation Safety Committee approved the "Unattended Operation of NLCTA" mode (see RSC-00-001), with the condition that a report be made on the *integrated dose during RF processing*. This memo is a follow-up to that request.

Background information

Aside from the normal beam operation mode, which is not the subject of this memo, the primary radiation sources on the roof of the NLCTA are X-rays coming from the couplers and bends of waveguide structures. A set of experiments (memo by Nelson to Jobe dated January 17, 2000, attached to RSC-00-01) was presented to the committee that showed that the dose rate 1-ft away from these sources could be as high as 10 mrem/h -- i.e., a 2000-h integrated dose of 20 rem. The memo also stated that an transmission factor of 0.03 would be obtained by covering these sources with wooden boxes lined with 1/8-inches of Pb. The projected integrated dose would then be reduced to 600 mrem/y, which is below the 1000 mrem/y shielding design limit. Accordingly, Unattended Operation of the NLCTA was approved provided that Pb-lined boxes were installed.

OHP Event Monitoring results

On December 19, 2000, TLDs were placed on the outside of the wooden boxes during a 49-day period of RF processing. The TLDs associated with Stations 0 and 2 all read zero and the highest dose measured at Station 1 was 73 mrem. The integrated dose extrapolated to 365 days is 544 mrem and for a working week of 40-h becomes 124 mrem. However, this is the *contact dose* and the dose measured 1-foot away from the shield will drop off by at least a factor of two, resulting in an integrated dose less than 100 mrem per year (i.e., the non-radiation worker limit).

Additional information

Prior to the installation of the Pb-lined boxes there had been frequent trips of the BSOIC that is purposely located near Station 1 which, in fact, led to the series of X-ray measurements that were reported by Nelson on January 17, 2000. Since the Pb-lined boxes were installed this BSOIC has never tripped once due to radiation.

Also, during the period October 2000 – March 2001 the Area Monitors around the entire NLCTA, including the roof area, never measured a dose exceeding 4 mrem, which is essentially at the level of "background noise".

Summary

We conclude that the Pb-lined boxes are performing their function as expected and the shield-design criteria ($D < 1$ rem/y) has been met.