



national accelerator laboratory

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To: Staff, RSO's

From: C. Moore *Craig Moore*

Subject: Temperature Response of Pocket Dosimeters

Larry Lindeen has performed the following measurements on the temperature response of pocket dosimeters to changes in temperature. Both sets of measurements were done as follows. Three dosimeters were irradiated, one was heated, allowed to cool to room temperature, cooled further, and then allowed to warm up to room temperature.

One of the remaining dosimeters was examined in the reverse order.

The entries in the table are in mR.

Table I.

<u>Temperature</u>	<u>1R</u>			
	<u>#407025</u>	<u>#407011</u>	<u>#407001</u>	<u>#407001</u>
23.7°C	290	300	300	
6°C	310			
23.9°C	290			
41.4°C	0			
23.8°C	280	300		
41.4°C		60		
23.8°C		280		
7°C		330		
23.8°C	290	290	290	

Table II.

200 mR

<u>Temperature</u>	<u>#407180</u>	<u>#407201</u>	<u>#407213</u>
24.5°C	125	120	122
7°C	121		
24.5°C	125		
41.4°C	139		
24.5°C	125		
41.4°C		128	
24.5°C		120	
7°C		115	
24.5°C		120	

Both the upper and lower temperatures are reasonable temperatures at this lab, i.e. outside temperatures can easily approach zero and some enclosures can approach the higher temperature. There is an easy scenario which will lead to serious discrepancies: a person who has kept his 1R dosimeter in an outside pocket logs in before entering a hot enclosure, after he has worked there for a while he could easily find that his dosimeter has gone down. To avoid this, dosimeters should be kept in good thermal contact with the body or else dosimeters should be issued which are at the temperature of the enclosure.

The ANSI Standards (ANSI N13.5-1972) do not appear to specify the reaction of a dosimeter to a change in temperature, however they do state that between -10°C and 50°C the error should not exceed 12% of full scale. As a check of this for the 1R dosimeters, 3 dosimeters were exposed, one in ice water, one in warm water and one at room temperature. The dosimeters which were not exposed at room temperature were then allowed to approach room temperature and were then read again.

Table III.

<u>Temperature</u>	<u>#401187</u>	<u>#401183</u>	<u>#401176</u>
40°C	110		
24°C	105		
7°C		110	
24°C		140	
24°C			110

Hence the instruments appear to meet the ANSI specifications, in that they read the correct dose in the specified temperature range.