LAWRENCE LIVERMORE LABORATORY
Hazards Control Department

May 2, 1979

Mr. Walter S. Cool
Dr. John V. Nehemias
Occupational Health Standards Branch
Office of Standards Development
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Cool and Dr. Nehemias:

We appreciate your comments on the Internal Dosimetry Standard for Tritium (N721).

Our responses are listed below:

Comment: (1) "In order to be readily implemented as an NRC Regulatory Guide an ANSI standard must be understandable to all licensees. Many licensees do not have professional health physicists on their staff and lack the sophistication in that field necessary for proper application of the current draft N721."

Response: (1) This Standards Committee believes that little health physics sophistication is required for proper application of this Standard.

Comment: (2) "The dose equivalent of 0.3 rem per calendar quarter selected by ANSI as a lower limit for determining the need for bioassays is too high. This dose equivalent would represent a significant increase over the criterion in the guidelines currently being used by NRC. Selection of 0.3 rems appears to be based on 25% of the external dose limiting standards in 10 CFR Part 20 applicable to whole body. We believe that 10% of the standard, or 0.12 rems per quarter, would be more in keeping with the 'as low as is reasonably achievable' (ALARA) concept, and a better goal for evaluating the effectiveness of tritium control procedures."

Response: (2) This Standards Committee used the ICRP and NCRP recommendations whenever possible and the 0.3 rem per quarter criterion was based upon an ICRP 12 recommendation. ICRP Publication 12 recommends that individual monitoring should be required for workers who might exceed 3/10 of the annual maximum permissible dose equivalent. This dose corresponds to 0.375 rem per quarter which was conservatively rounded by this Standards Committee to 0.3 rem per quarter. (This explanation of the 0.3 rem per quarter will be added to Appendix A.)

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Since this Standard specifies the minimum internal dosimetry program for occupational exposures, the 0.3 rem per quarter is considered adequate. It should be emphasized that a bioassay program is required when personnel exposures might result in greater than 0.3 rem per quarter.

This Standard does not attempt to determine a dose which is as low as reasonably achievable because any dose chosen would be arbitrary and open to debate.

Comment: (3) "Tables 5 and 10 should be relabeled Tables 1 and 2."

Response: (3) We agree.

Comment: (4) "Table 1 stipulates only the total amount of tritium which would be handled in a quarter. There should also be guidelines for quantities which would be handled at any one time, i.e., batch size. Table 1 limits allow a large quantity to be handled once or twice in a quarter without a bioassay requirement."

Response: (4) This Standards Committee does not think there is any difference whether 0.5 Ci is handled once per quarter or 0.01 Ci is handled 50 times per quarter. Both require a bioassay if handled on a bench top.

Comment: (5) "The data in Table 1 are difficult to apply in their present form. We recommend using the total 'through-put' or total daily activity handled and believe that would be simpler for most licensees."

Response: (5) This Standards Committee does not think that the information in Table 1 is difficult to apply. Appendix A includes an example situation.

Comment: (6) "We don't know how 'quantity processed' in Table 1 will be interpreted. The term 'processed' as used in this context should be precisely defined."

Response: (6) The term "quantity processed" does not appear in Table 1. The words "or processed" will be removed from the sentence in Table 1, "The activity concentration of the material in any of the forms handled or processed."

Comment: (7) "There may be some circumstances when use of activity concentration (Ci/kg values in Table 1) is appropriate, but it is not appropriate for most licensees. In order to have it applied correctly, a complete explanation should be included in the text."

Response: (7) This Standards Committee thinks the use of activity concentration values is important and is adequately explained in the reference cited in Appendix A.

Comment: (8) "On page 18, Table 2, for H_c>3 rem include action (5) in the summary of actions to be taken so that it reads 'Take actions (1), (2), (3), (5), and (6). . .'."

Response: (8) The reason for this change is not understood. We think the present version is clear. The difference between action 5 and 7 is the use of "should" and "shall".

Comment: (9) "Section 5 may be confusing to licensees."

Response: (9) Section 5 will be changed to read:

"Section 5.1 A bioassay program shall be required when personnel exposures to tritium might result in a dose equivalent greater than 0.3 rem in a calendar quarter.

If, as a result of the preparatory bioassay (see Section 6) or of known or expected concurrent exposures to other radionuclides or to external radiation, the uncertainty of an individual's total dose equivalent in the year might not meet the criteria given in Section 9.2, the bioassay program shall be implemented at an appropriately lower dose equivalent than 0.3 rem per quarter.

5.2 A bioassay program should be implemented if the values of the tritium activity to be handled in a calendar quarter exceed the values listed in Table 1 for the appropriate material and containment. (An explanation of the values in Table 1 is given in Appendix A.) It should not be inferred that handling the quantities in the containments listed in Table 1 is necessarily good radiation safety practice. Determining appropriate containment and procedures are beyond the scope of this Standard.

5.3 Table 1 is not applicable for all tritium handling situations (e.g., working in the containment of a heavy water nuclear reactor or near large open containers of tritiated water). If Table 1 is not used to determine whether a bioassay program is required, a bioassay program shall be implemented unless the responsible health physicist can demonstrate that the dose from tritium to any individual is most unlikely to exceed 0.3 rem in a calendar quarter.

5.4 The responsible health physicist shall decide when air and surface monitoring are appropriate, and from the results of any such monitoring shall determine if the dose equivalent to an individual might exceed 0.3 rem in a calendar quarter. Determining and interpreting the results of appropriate monitoring methods is beyond the scope of this Standard and may be obtained elsewhere (e.g., NCRP Report No. 47, Tritium Measurement Techniques).

5.5 The bioassay frequencies shall be as given in Section 6."

Comment: (10) "We note that the N721 value of 0.3 rem is exclusive of other internal and external contributions to total dose commitment."

Response: (10) The following will be added to Section 5.1:

"If as a result of the preparatory bioassay (see Section 6) or of known or expected concurrent exposures to other radionuclides or to external radiation, the uncertainty of an individual's total dose equivalent in the year might not meet the criteria given in Section 9.2, the bioassay program shall be implemented at an appropriately lower dose equivalent than 0.3 rem per quarter."

Comment: (11) "It is stated that for calculations described in Section 9, concentrations measured to be less than 2 μCi/liter may be taken as zero. A urine concentration of 2 μCi/liter indicates a dose commitment of about 200 mrem. This may not be an insignificant exposure for chronic tritium intake. It is suggested that this provision be removed from the Standard."

Response: (11) A constant urine concentration of 2 μCi/liter indicates an annual dose equivalent of approximately 200 mrems. This Standards Committee feels that considering concentrations less than 2 μCi/liter as zero will easily comply with the dose accuracy requirements of Section 9.2. This is not a recommendation but is rather permission to consider concentrations less than 2 μCi/liter as zero.

Comment: (12) "In the last two paragraphs on page 21 of Appendix A 'specific activity' and 'concentrations of the material' are used as if synonymous. We believe it would be more precise to use 'concentrations of the material' in each case."

Response: (12) "Specific activity" will be changed to "activity concentration."

Sincerely,

C L Graham

Curtis L. Graham, Chairman
Health Physics Society
Working Group on Internal
Dosimetry Standards for Tritium

CLG:ah