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DRAFT RESOLUTION OF NRC STAFF COMMENTS
ON DRAFT REGULATORY GUIDE, "APPLICATIONS OF BIOASSAY FOR TRITIUM"

A. Resolution of NMSS Comments.

1. Paragraph C.1.a specifies when bioassays are necessary, and is rather definite considering that probabilities of exposure vary considerably with the industrial process or laboratory conditions. The paragraph C.1.b is written to cover only the unusual and unpredictable situation where exposures may be higher than expected. Only the specific licensee would have the data to determine whether bioassays should be performed to detect appreciable exposures under the particular conditions.

2. Reference is made to the NUREG report for further information on the possibility of long-term retention of tritium in organically-bound form in certain compartments. Some simple rules are given for conservatively dealing with such situations.

3. The title of the first column of Table 1 has been changed to explicitly include inorganic compounds. The word "Tritium" has been included in the title of the second column, with HT and T_2 in parentheses.

4. The Appendix will be prepared for publication as a separate NUREG report since the majority of staff comment prefers this method of providing background information for evaluating tritium bioassay programs and results.

5. The abbreviations HTO, etc. have been defined in the guide and report. However, there is a limitation on the amount of space for defining terms, Those who ~~times. who~~ will be able to use the guide and report must be assumed to have the necessary minimal scientific and radiation protection training appropriate for supervising radiation safety programs.

6. All editorial corrections in the marked-up copy have been incorporated.

B. Resolution of NRR Comments

1. The NRR staff finds that the guide provides appropriate technical and administrative criteria for licensees to use in establishing acceptable bioassay programs for tritium. This opinion is weighted accordingly in resolving the other staff comments.

2. The Appendix has been revised to be a separate NUREG report, as suggested both by NRR and NMSS.

3. The following specific resolutions were adopted for the numbered comments attached to the January 25, 1982 memorandum from George Knighton, in respective order of the comments:

   (a) The word change "in the environs of" has been adopted.

   (b) Words have been added to Section 3(d) to reference the later section 5.a.(3) calling for immediate health physics and medical followup of the more serious exposures, in order to avoid the impression at the early part of the document that a casual approach is taken to diagnostic followup. However, when circumstances do not immediately allow or call for many analyses

immediately after the first, a one-week interval in the case of tritium still allows for accurate followup and evaluation of the internal dose commitment. A level of 50 μCi/liter, (the "action" level of Section 5.a.(3))" if present a few hours after a single exposure, may be indicative of an internal dose commitment of 400-500 milirems, which would not necessarily warrant drastic therapeutic measures.

4. An additional subparagraph C.1.e has been added to recommend bioassay when air monitoring indicates possible exposure exceeding 40 MPC-hours in any 4-week period. Also, the reference has been changed in the second line from the bottom on page 4, Section 4a, of the guide, so that Sections 1.a to 1.e are all included as possible indicators of the need for routine bioassay. The 72 hour time period has been retained, however, since it was arrived at in a number of previous discussions with NMSS staff in developing the earlier staff position, and in consideration of the facts that on weekends or in other circumstances it may be impossible to obtain a second bioassay sample within 24 hours, and also the fact that in the case of tritium, no serious exposures will go undetected by waiting for 72-hours.

5. The suggested editorial change to a complete sentence has been adopted.

6. Regulatory Guides do not use the word "shall" - as a matter of NRC policy. Licensing reviewers may recommend specific requirements where they are deemed necessary.

7. The words "... of at least 100 ml urine have been ~~insisted~~ inserted in the first sentence of Section C.4.a.

C. Resolution of IE Comments

1. Other NRC staff have supported the development of Regulatory Positions 1b and 1c - already arrived at in the previous staff position worked out with NMSS. Paragraphs 1b and 1c recognize the gradual lowering of exposure probability and severity as lower amounts of tritium are handled, and allow IE and/or NMSS to take steps to improve radiation safety provisions over a range of operations that would not ordinarily - but may in unusual cases warrant bioassay programs.

2. It is not finally determined whether we are going to adopt ICRP 30 in toto. Further, most materials licensees in the U.S. are continuing to use Q=1.7 for tritium, since recent scientific reviews (some of which were quoted in the Appendix (now NUREG) to the draft guide) indicate experimental values of Q ~~continuing~~ centering more around 2 than 1. Values higher than 2 have been given in these reviews, so we obviously have not "shopped around" for the highest value. The guide has been written so that the general provisions will be reasonable and safe whatever Q is used.

An attempt was made within NRC staff several years ago to resolve the Q issue, but differences arose between NMSS and NRR that were not resolvable at the time - perhaps for good reasons. The ICRP justified lowering Q from 1.7 to 1 only as a "rounding off" process, ~~within~~ without specific literature support. It is not usual practice to round off values in a less safe direction in safety standards, so many in industry and government in the U.S. have not been following this particular ICRP recommendation. Neither has it been the policy of the NRC and its

predecessor to follow ICRP or NCRP blindly and to the letter in writing regulatory standards; the attempt has been to follow these recommendations in spirit, and to provide at least the equivalent degree of protection of public health and safety.

3. The wording of the title to Table 1 of the guide has been changed to "... Above Which Tritium Bioassay Programs Should Be Provided." If the word "required" is inadvertently added, the editorial staff will remove it from any Regulatory Guide.

4. The guide is not intended to either replace or parrot the regulations. Section 20.108 should provide sufficient regulatory authority for the NRC to obtain any needed bioassay reports. The development of any further record requirements for tritium bioassay should probably await the publication of the ANSI standard on this subject.

5. The quantities in Table 1 have been derived to be consistent with respective quantities in other NRC guidance, e.g., Regulatory Guide 8.20 on bioassay of radioiodine, taking into account both the relative radiotoxicities of the respective nuclides in their most hazardous form, and field experience sampled from licensee and other installations to determine relative probabilities of intake in various operational situations (see the appendix and references).

6. The footnote to 20.103 and other suggestions written into the copy will be resolved together with IE staff.