



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 29, 1978

MEMORANDUM FOR: Files
FROM: Allen Brodsky, OHSB
SUBJECT: EVALUATION OF TRITIUM EXPOSURES

As requested in the memorandum from G. Wayne Kerr to I. C. Roberts, dated March 21, 1978 (Enclosure 1), the following information is provided and documented to assist in interpreting exposures to tritium in various forms.

As shown in Enclosure 2, a concentration of 28 microcuries per liter in urine would be interpreted to indicate that the body water was exposed at a rate of 5 rems per year, assuming an RBE or QF of 1.7 (which is still often used in practice for conservatism). Also, as indicated in Enclosures 2 and 3, it would be sufficiently conservative to assume that only organic compounds that are DNA precursors might have a somewhat greater biological effectiveness than that implied on the basis of internal dose calculations based on measurement of urine concentration as HTO. Thus, in the enclosed branch position on bioassay of tritium (Enclosure 4), the guidelines on bioassay requirements in Table 1 are based on the assumption that compounds that are non-DNA precursors have the same radiotoxicity as HTO and also may be evaluated through urinalysis since most of the organic compounds are largely converted to HTO in the body (see Enclosure 2). DNA precursors are evaluated using a factor of safety of 10 over that for HTO, although even this factor may be too conservative (see clipped pages of Enclosure 2). Thus, the urinary concentrations of the employees A-E may be assumed to have exposure rates on the order of only 1 - 2% of rates that, if continuous, would lead to permissible exposure limits. Enclosure 3 may provide some further information of interest in regard to the risks from working with tritiated luminous products.

As indicated in Enclosure 2, the Health Physics Society has a subcommittee developing an ANSI standard on internal dosimetry of tritium, and OHSB is participating in this project. However, we do not know to what degree the subcommittee product will be consistent with the information in this memo, or with the branch position that we have developed with B. Singer's branch, NMSS, during the interim. Nevertheless, we feel that the assumptions and information provided in this memo will be on the safe side in evaluating the numerous types of tritium compounds to which licensee employees are exposed.

Allen Brodsky
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Occupational Health Standards Branch
Office of Standards Development

Enclosures: see next page

March 29, 1978

Enclosures:

1. Memo, Kerr to Roberts, dtd 3/21/78, subject: Request for Assistance - Evaluation of Tritium Exposures
2. "Derivation of Criteria for Determining the Need for a Tritium Bioassay Program," Allen Brodsky, unpublished, 1976.
3. "Experience with Intakes of Tritium from Various Processes," A. Brodsky, Health Physics 33, July 1977, pp 94-98.
4. Branch Position on Bioassay of Tritium

cc: B. Singer, NMSS

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OFFICE	SD:OHSB <i>20 (emh)</i>	SD:OHSB			
SURNAME	ABrodsky:emh	REAlexander			
DATE	3/29/78	3/29/78			