

Overview of

TRITIUM CALCULATIONS WITH IMBA **(OCAS-TIB-002, Rev. 0)**

Workers at certain Department of Energy and Atomic Weapons Employer facilities have the potential of receiving a radiation dose to their whole body and their internal organs from tritium, a radioactive form of hydrogen known as an isotope. At these facilities, tritium, which can be present in several different chemical forms, may unknowingly be inhaled or ingested by eating or drinking. While in the body, the tritium undergoes radioactive decay, which contributes to the total radiation dose received by the tissues and organs.

The *Tritium Calculations with IMBA* (OCAS-TIB-002) technical information bulletin (TIB) provides guidance on how to calculate doses to the body and internal organs due to tritium. Dose reconstructors are required by the governing regulations to use the best available science, including guidance provided by the International Commission on Radiological Protection (ICRP). A computer code (i.e., computer program) called IMBA (Integrated Modules for Bioassay Analysis) is used to facilitate the calculation of internal doses using the methods and assumptions recommended by the ICRP. The exposure to specific organs is determined using IMBA and the associated assumptions provided in the computer code. The ICRP has specified five different categories of tritium compounds; however, many of these compounds are classified as gases or vapors. While IMBA currently includes tritium, it does not yet handle gases and vapors. It is, nonetheless, possible to utilize IMBA to calculate doses for these compounds if certain procedures are followed. The TIB provides instructions for performing these calculations.

SUMMARY OF FINDINGS RESULTING FROM THE TECHNICAL REVIEW

The technical contractor for the Advisory Board on Radiation and Worker Health (the Board) reviewed the TIB and produced the two findings summarized below:

Finding #1: The TIB is inconsistent in referencing certain ICRP publications.

Finding #2: The instructions provided for handling IMBA's inability to handle gases and vapors directly are cumbersome under certain circumstances.

RESOLUTION OF FINDINGS

In response to the findings identified above, the National Institute for Occupational Safety and Health (NIOSH):

- (1) Agreed with Finding #1. The TIB's reference section does not contain all the references used and mentioned in the document, and does contain some references not used in the document. This will be corrected in a future revision of the TIB.

- (2) Agreed with Finding #2. Instructions for handling gases and vapors are a bit cumbersome, but provide correct results. The Advisory Board's technical contractor independently verified the procedure by following it and duplicating its results with another computer program. The procedure will be modified in a future revision of the TIB.

All issues were resolved to the satisfaction of the Board.