

## APPENDIX F

### APPLICATION OF BIOASSAY FOR TRITIUM

#### A. CONDITIONS UNDER WHICH BIOASSAY IS NECESSARY

1. Routine bioassay is necessary when quantities of tritium processed by an individual at any one time or the total amount processed per month exceed those for the forms of tritium shown in Table 1.

**Table 1.**

#### ACTIVITY LEVELS ABOVE WHICH TRITIUM BIOASSAY IS REQUIRED

Types of Operation	HTO and Other Tritiated Compounds (Including Nucleotide Precursors)
Processes in open room or bench with possible escape of tritium from process vessels	25 mCi (925 MBq)
Processes with possible escape of tritium carried out within a fume hood of adequate design, face velocity and performance reliability	25 mCi (925 MBq)
Processes carried out with gloveboxes that are ordinarily closed but with possible release of tritium from process vessels and occasional exposure to contaminated box and box leakage	250 mCi (9250 MBq)

2. Bioassay is not required, when process quantities handled by an individual are less than those in Table 1.

#### B. PARTICIPATION

All individuals involved in the processing of tritium under conditions specified in Section 1 or in the immediate area of the process should participate in the bioassay program.

#### C. TYPES OF BIOASSAY THAT SHOULD BE PERFORMED

1. Baseline (preemployment or preoperational)

A baseline bioassay should be conducted not more than one month prior to the individual beginning work with tritium in amounts that would require participation in the bioassay program.

2. Routine Urinalysis

Regular bioassays should be conducted to monitor routine operations at frequencies specified in Section D.

3. Emergency

If the initial sample or other data indicates a possible exposure high enough to warrant immediate medical attention, a complete and immediate follow-up should be conducted as described in Section E.1.b.

4. Post-Operational and Termination of Usage

A bioassay should be performed within one month after the last possible exposure to tritium such as when operations are being discontinued, or when the individual is terminating activities with potential exposure.

5. Diagnostic

Follow-up bioassay should be performed as soon as possible but within one week of any sample exceeding levels given as action points in Section E, in order to confirm the initial results and in the case of a single intake, to allow an estimate of the effective half-life of the tritium in the body.

**D. FREQUENCY OF SAMPLING**

Initial Routine

A bioassay sample of at least 50 ml of urine should be taken within 72 hours following entry of an individual into an area where operations require bioassay according to Section A and then every month or more frequently thereafter, as long as the individual is working with tritium. When work with tritium is on an infrequent basis (less frequently than every month), bioassay should be performed within 10 days of the end of the work period during which tritium was handled.

**E. ACTION POINTS AND CORRESPONDING ACTIONS**

1. Monthly and Other Sampling

a. If urinary excretion rates exceed 5  $\mu\text{Ci/L}$  (0.18 MBq/L), but are less than 50  $\mu\text{Ci/L}$  (1.8 MBq/L), the following course of action should be taken:

- (1) A survey of the operations involved, including air and surface contamination monitoring, should be carried out to determine the causes of the exposure and evaluate the potential for further exposures or for the possible involvement of other individuals.
- (2) Any reasonable corrective actions that the survey indicates may lower the potential for further exposures should be implemented.
- (3) A repeat urine sample should be taken within one week of the previous sample and should be evaluated within a week after collection. Internal dose commitments should be estimated using at least these two urine sample evaluations and other survey data, including the probable times of the intake of tritium.

- (4) Any evidence indicating that further work in the area might result in an individual receiving a dose commitment in excess of the limits established in 64E-5.304, should serve as cause to remove the individual from work in this operation until the sources of exposure is discovered and corrected.
  - (5) Reports or notification must be provided as required by 64E-5.344 and 64E-5.345 of Chapter 64E-5 or as required by conditions of the license.
- b. If urinary excretion rates exceed 50  $\mu\text{Ci/L}$  (1.8 MBq/L), the following course of action should be taken:
- (1) Carry out all steps in item a of Section E.1.
  - (2) If the projected dose commitment exceeds levels for whole body as provided in 64E-5.304 of Chapter 64E-5, provide appropriate notification to DOH.
  - (3) Refer the case to appropriate medical/health physics consultation for recommendations regarding immediate therapeutic procedures that may be carried out to accelerate removal of tritium from the body and reduce the dose to as low as is reasonably achievable.
  - (4) Carry out repeated sampling (24 hr urine collections) at approximately one week intervals at least until samples show an excretion rate less than 5  $\mu\text{Ci/L}$  (0.18 MBq/L). If there is a possibility of long term organic compartments of tritium that require evaluation (reference NUREG-0938), continue sampling as long as necessary to ensure that appreciable exposures to these other compartments do not go undetected and to provide estimates of total dose commitments.