QUESTION 3

You are the Health Physicist at a manufacturer of tubes for tritiated exit signs. Workers at your facility are enrolled in a tritium bioassay program. The facility is equipped with workplace air monitors (flow through ionization chambers). Facility maintenance is being conducted on the waste cleanup systems when a room air monitor alarms. Assume the room ventilation is shut off during the maintenance job.

GIVEN:

Time in room = 1 minute
DAC (HT) = 5.4×10^5 μCi m^{-3}
DAC (HTO) = 20 μCi m^{-3}
Height of room = 4 m
Room Area = 200 m^2
DCF (Acute Intake) = 2.8 mrem per μCi L^{-1} in urine (first 24 hours)
DCF (Chronic Intake) = 0.2 mrem day^{-1} per μCi L^{-1} (average daily concentration)
Specific Activity (HTO) = 1450 Ci g^{-1}
Specific Activity (HT) = 5800 Ci g^{-1}

STATE ALL ASSUMPTIONS

POINTS

15 A Calculate the dose equivalent you would expect a worker to receive from a room air concentration of 5000 μCi m^{-3} as measured by workplace air monitor.

5 B The individual involved in this incident submits a post incident bioassay sample collected during the first 24 hours. The results indicate tritium concentration in urine of 0.05 μCi L^{-1}. Calculate the dose equivalent received in mrem.

10 C Assume that the dose equivalent calculated from the urine concentration differs from the dose equivalent that was calculated from the room air concentration. Assume that the measurements and calculations were done correctly. Provide **two** likely sources of this discrepancy. **Number each response. Only the first two numbered responses will be graded.**

20 D Identify **two** techniques that can be used for tritium air monitoring. Specify one advantage and one disadvantage of each technique **Number your responses. Only the first two numbered responses will be graded.**