QUESTION 4

You are the radiation safety officer for a radiopharmaceutical laboratory. A laboratory worker reports to you that he accidentally boiled to dryness a beaker containing 15 mCi of ^{131}I in a room that is 5 m × 5 m × 5 m. He was not using the available fume hood. Assume that the ^{131}I is instantaneously vaporized and uniformly distributed at $t = 0$, and the worker is in the room for one hour after $t = 0$.

GIVEN

- Breathing rate, $B = 1.2\ m^3\ h^{-1}$.
- Room ventilation rate, $F = 100\ m^3\ h^{-1}$.
- Fractional thyroid uptake of ^{131}I from blood = 0.3 (remainder goes directly to excretion).
- Respiratory tract deposition fraction = 0.75. (Assume 100% goes instantaneously to blood).
- Committed dose to the thyroid = 5.5 rad μCi^{-1} ^{131}I deposited in the thyroid.

POINTS

30 A. Calculate the worker's thyroid uptake of ^{131}I and the committed dose due to that uptake. **Show all work.**

20 B. In addition to performing bioassay on the worker, list five actions you will take following the accident. **Number your responses. Only the first five responses will be graded.**