

RI-15

RI-15 HOUSING AND HANDLING OF RADIOACTIVE ANIMALS

PURPOSE

This procedure specifies conditions and methods for handling animals, bedding materials and excrete from experiments involving radioisotopes administered to animal subjects. This procedure addresses only the radiation protection aspects of such experiments; all other aspects of animal care are controlled by the Animal Care and Use Committee.

RULES AND REGULATIONS

All animals containing radioisotopes must be housed in designated radioisotope laboratories and cared for by workers trained in radiation safety.

DEFINITIONS

An **animal unit** is one large animal occupying a single cage or run, or a group of small animals housed in cages carried on a single rack or cart, or any comparable grouping of experimental animals.

A **combined ALI quantity** is the sum of the fractions of individual isotopic reference quantities contained in one animal unit. Reference quantities for most commonly used radionuclides are listed in "RADIONUCLIDE DATA" (RI-10).

ANIMALS REQUIRING RADIOLOGICAL CONTROL

Animals **must** be housed in designated radioisotope laboratories if they exceed either one of the following criteria:

- 1 the external dose rate at one meter from one **animal unit** exceeds 0.2 mrem/hr, or
- 2 the radioactivity that will be excreted from one **animal unit** exceeds **1/10 combined ALI** per day.

Contaminated bedding material and animal carcasses must be treated as radioactive waste and handled as outlined in "RADIOISOTOPE ACQUISITION AND DISPOSITION" (RI-13). Excreta may be put down the sewer provided that a record of the activity released to the sewer is kept as specified in RI-13.

ANIMALS NOT REQUIRING RADIOLOGICAL CONTROL

Animals that meet the following criteria represent no hazard to the individuals that handle them, and require no special control of contamination or external exposure:

1. Animals that contain only nuclides that are present in such small quantities, or that are so tightly bound, that no more than **1/10 combined ALI** is excreted per **animal unit** per day. A record that verifies this allowed release by calculation or measurement must be maintained.
2. The external dose rate from the animals may not exceed 0.2 mrem/hr at one meter from one **animal unit**.

All administrations of radionuclides are to be performed in an established radioisotope laboratory.

Bedding material and carcasses of animals that do not require radiation controls for handling and housing must still be disposed of as radioactive waste (See RI-13).

An **animal unit** containing more than 10 **combined ALI's** must be labeled with a CAUTION RADIOACTIVE MATERIAL sign on the cage, run or cage rack, even though the external dose rate is less than 0.2 *mrem/hr at one meter*.

CALCULATION OF EXTERNAL DOSE RATE

A calculation can be made prior to labeling an animal to estimate whether or not the 0.2 mrem/hr dose rate limit is likely to be exceeded. The dose rate in mrem/hr at one meter is the sum of the products of the activity of each isotope in millicuries (mCi) and the external dose rate constant (X), as found in "RADIONUCLIDE DATA" (RI-10).

$$\text{Dose rate (mrem/hr)} = \text{SUM} [A_i(\text{mCi}) \times X_i(\text{mrem/hr-mCi @ 1m})]$$

Example 1: A dog is labeled with 90 μCi of ^{85}Sr , 85 μCi of ^{95}Nb and 90 μCi of ^{75}Se ; the dose rate at 1 meter would be:

$$\text{Dose rate} = (0.09 \times 0.75) + (0.085 \times 0.48) + (0.09 \times 0.86) = 0.19 \text{ mrem/hr}$$

This would be an acceptable dose rate for animals not requiring radiological control, however, the excretion-rate criterion would also have to be satisfied.

Example 2: The dog is labeled with the same quantities of ^{85}Sr and ^{95}Nb , and 300 μCi of ^{75}Se . The dose rate at 1 meter would now be:

$$\text{Dose rate} = (0.09 \times 0.75) + (0.085 \times 0.48) + (0.3 \times 0.86) = 0.37 \text{ mrem/hr}$$

The investigator should plan to keep this animal in a designated radioisotope laboratory, at least until a measurement of the external exposure rate with an appropriate instrument demonstrated it to be less than 0.2 mrem/hr.

DETERMINATION OF DAILY EXCRETION RATE

The daily excretion rate of the administered radionuclides will depend on the elemental characteristics of the radionuclide, the chemical form, the method of administration and the animal species. Frequently, a significant fraction of the material is excreted within the first day or two after administration. If the metabolic behavior of the administered material is not known in advance, the investigator should plan to keep the animals in a designated radioisotope laboratory for the first day or two and measure the activity excreted. When it can be demonstrated that the excretion rate has decreased to less than **1/10 combined ALI** per day, and if the exposure rate is less than 0.2 mrem/hr at one meter, the animals are not required to have radiological control.

If the metabolic behavior of the administered material is well known, calculations of expected excretion may be substituted for measurements. If the excretion even during the first day after administration will be less than **1/10 combined ALI**, the animals are not required to have radiological control.