Marcus Daly Memorial Hospital

Corporation

1200 WESTWOOD DRIVE PHONE 363-2211
HAMILTON, MONTANA 59840

April 22, 1985

UNITED STATES NUCLEAR REGULATORY COMMISSION
611 Ryan Plaza Drive, Suite 100
Arlington, Texas 76012

Reference NRC License Number: 25-17823-01

Gentlemen:

Marcus Daly Memorial Hospital of Hamilton, Montana requests that their Medical Isotope License be amended to include authorization to use and possess Xenon-133.

The following information is submitted to support the application.

1. (a) It is anticipated that approximately 1 study per week will be done at an average dose of 5 millicuries per study.

(b) The Hospital would like a possession limit of 10 millicuries.

(a) Figure 1 is a diagram of the storage area for Xenon-133. This area is the currently used hot lab and isotope preparation area. The storage area is shielded with 2" x 4" x 8" lead bricks and a commercial L shield assembly.

The room is under negative pressure and has a flow rate of at least 80 CFM.

(b) The location of the input air duct is above the storage area and the location of the exhaust duct is by the door leading to the imaging area.

The input air vent in the imaging area is located near the center of the imaging area at the side of the room. The exhaust vent is located near the counter space in the back of the imaging room near the entrance to the hot lab.

The imaging room is under negative pressure and the air flow rate in the imaging area is at least 80 CFM.

(c) All flow rates will be measured semi-annually and the results of current measurements are shown in Figure 1.

3. (a) Method of administration:
The patient's nose is clamped, and a plastic rebreathing piece and its associated plastic tubing is connected to the RADX Xenon delivery system. The xenon is entered into the RADX delivery system and the release valve is operated so that the patient is breathing oxygen and xenon. The exhaled xenon-air is captured in a charcoal trap.

(b) A RADX xena-con delivery system is used for xenon delivery and trapping (brochure included).

4. An emergency involving the accidental release of xenon-133 will require a temporary closure of the Nuclear Medicine Imaging area. The length of closure will be determined by the total amount of xenon released but shall not be less than 4 complete room air changes. At the current flow rates in the imaging area, a complete room air change takes place every 7 minutes. So, four room air changes would be required in a spill and the room will be vacated for at least 30 minutes. The venting for the exhaust air is separate from the Hospital's air handling system and located at least 100 feet from any input air vent.

5. Air concentration in restricted areas.

(a) It is anticipated that 5 millicuries of xenon-133 will be used per week.

(b) It is assumed that approximately 1 millicuries will be lost per week (20%). The loss may be attributable to: leaking storage containers and loose plastic fittings.

(c) Maximum activity per week = 5 millicuries/week (5000 microcuries/week).

Loss rate of 20 per cent or 1 millicurie (1000 microcuries/week).

The required ventilation rate in the restricted area to keep from exceeding 1 x 10-5 microcurie/milliliter is 10^8 ml/week or 2 CFM. The current ventilation rate is 80 CFM.

5. (b) The exhaled xenon will be trapped by a charcoal cannister contained within the xena-con delivery system.

(2) A survey meter is placed next to the exhaust vent from the xena-con system and action is taken if there is a noticeable increase in the background rate.

(3) The saturated filters are stored in the long term decay area until they are no longer radioactive.

6. Xenon concentrations in unrestricted areas.

The average concentration of xenon in unrestricted areas (in this circumstance the exhaust hood on the hospital room) is determined in the following way.

460614

Average yearly use = 2.6 10^5 microcuries per year

Assume a loss of 20% or 5 10^4 microcuries per year

Room exhaust rate of 80 CFM gives 1.2 10^{12} ml/year

Concentration of xenon at exhaust stack is 4.3 x 10-8 microcuries/ml which is an order of magnitude less than 3 x 10-7 microcuries per year.

We believe that the following data support Marcus Daly Memorial Hospital's ng calculations, statements and application for Xenon-133.

If there are further questions, please do not hesitate to contact us.

Sincerely,

R. C. Atkins

R. C. ATKINS,
Administrator

RCA:pl
Enclosure: Figure 1

760614

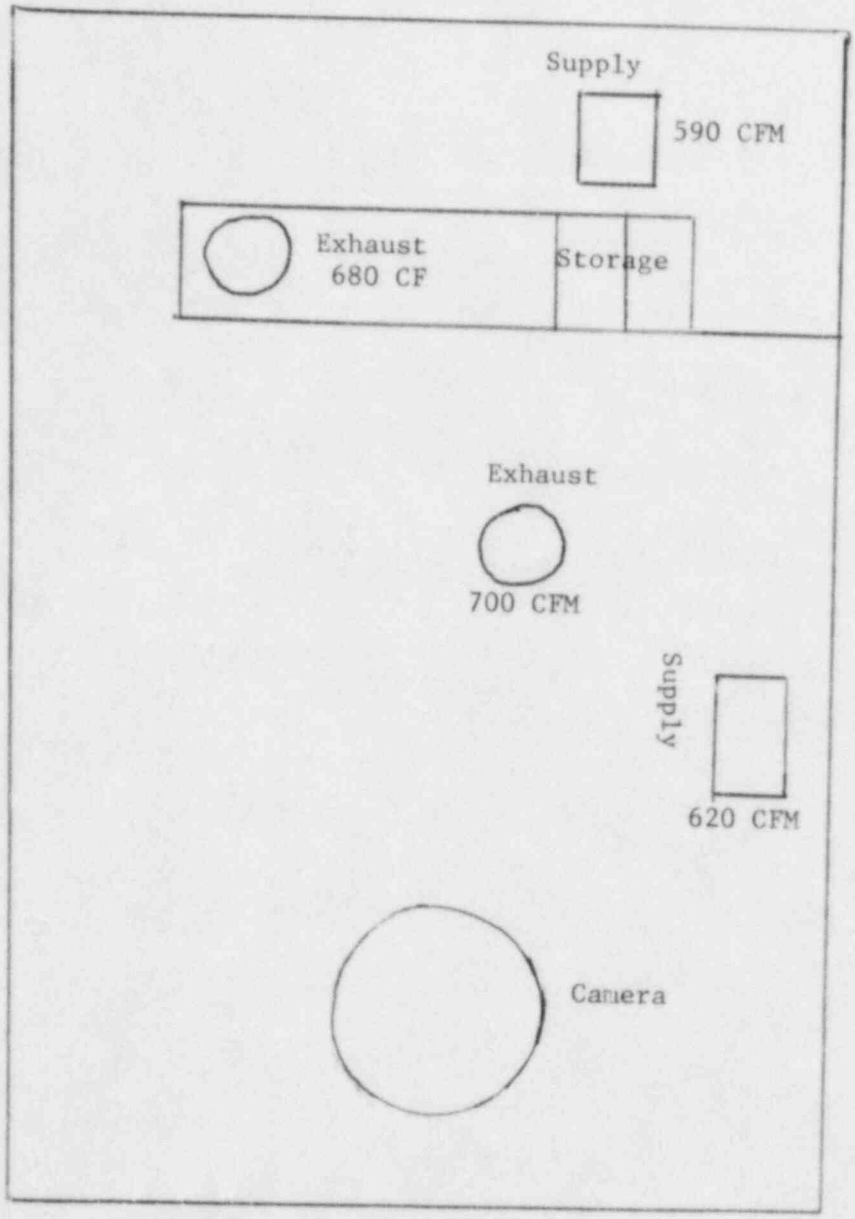

FIGURE 1

460614

Marcus Daly Memorial Hospital
Corporation
1200 WESTWOOD DRIVE · PHONE 363-2211
HAMILTON, MONTANA 59840

UNITED STATES NUCLEAR REGULATORY COMMISSION

611 Ryan Plaza Drive, Suite 100

Arlington, Texas 76012