whittaker memorial hospital
1003 twenty-eighth street - newport news, virginia 23607
telephone (804) 380-8100

May 15, 1985

U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N.W.
Suite 3100
Atlanta, Georgia 30303

RE: License No. 45-16973-01

Gentlemen:

Please amend the above-referenced license to reflect the following:

1. Move to new facility (note new facility name):

   Newport News General Hospital
   5100 Marshall Avenue
   Newport News, Virginia 23605

   Facility diagram enclosed. All sealed sources to be transferred to the new location. Radioactive materials will no longer be used at the old location. A close-out survey of the old facility will follow under separate cover.

2. Allow authorization for xenon-133, 100 mCi, blood flow studies. Xenon calculations enclosed.

Enclosed is a check for $120.00.

If you have any questions, please contact the undersigned for assistance.

Sincerely,

David C. Rivas
Administrator

50599 5/21/85 Rec'd

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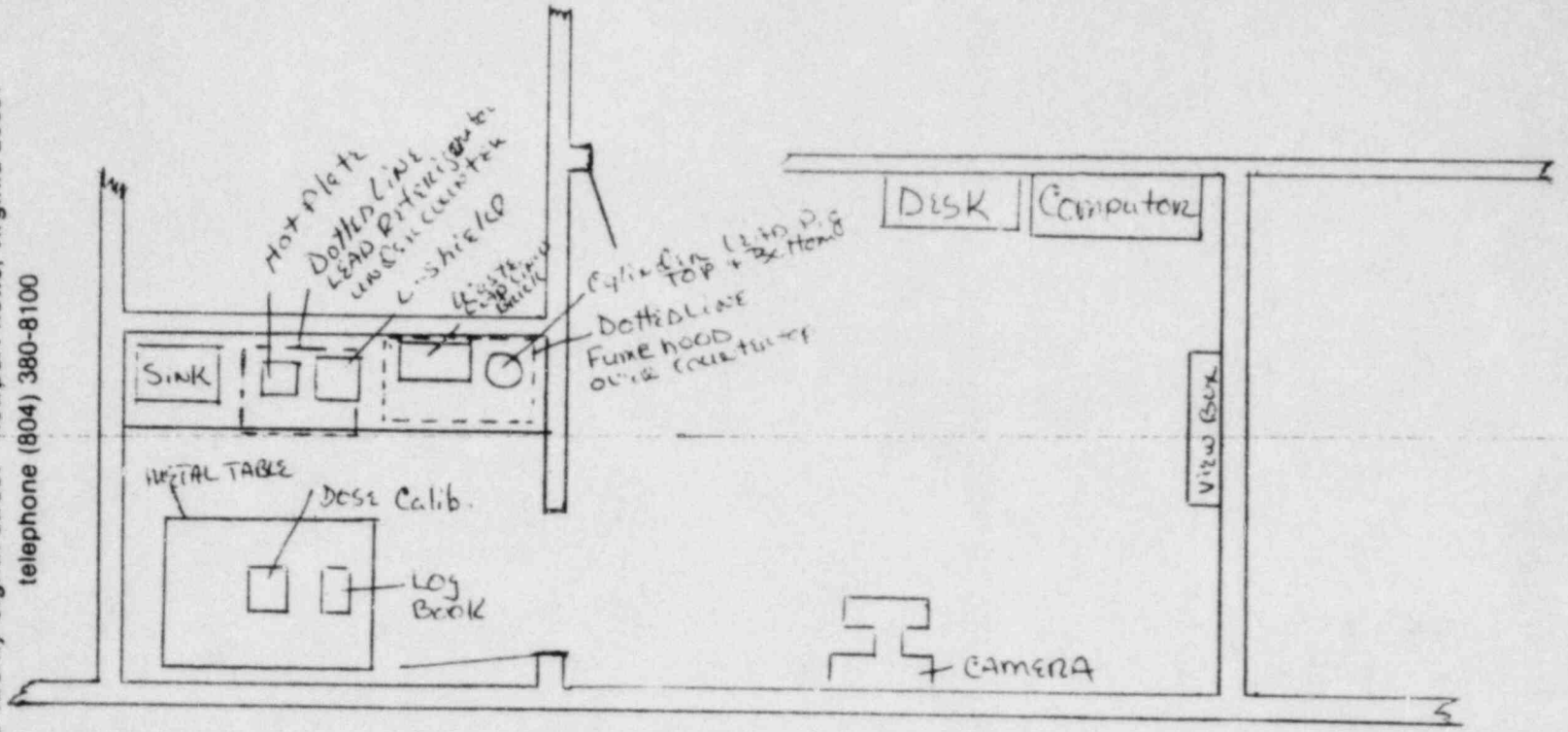

DIMENSIONS	LENGTH	WIDTH	HEIGHT
NUC. MED.	14'-3"	10'-9½"	9'-6"
HOT LAB	8'-10 3/4"	7'-11⅛"	8'-0"

SCALE ¼" = 1"-0"

Proposed Layout

Items Listed
NOT TO SCALE

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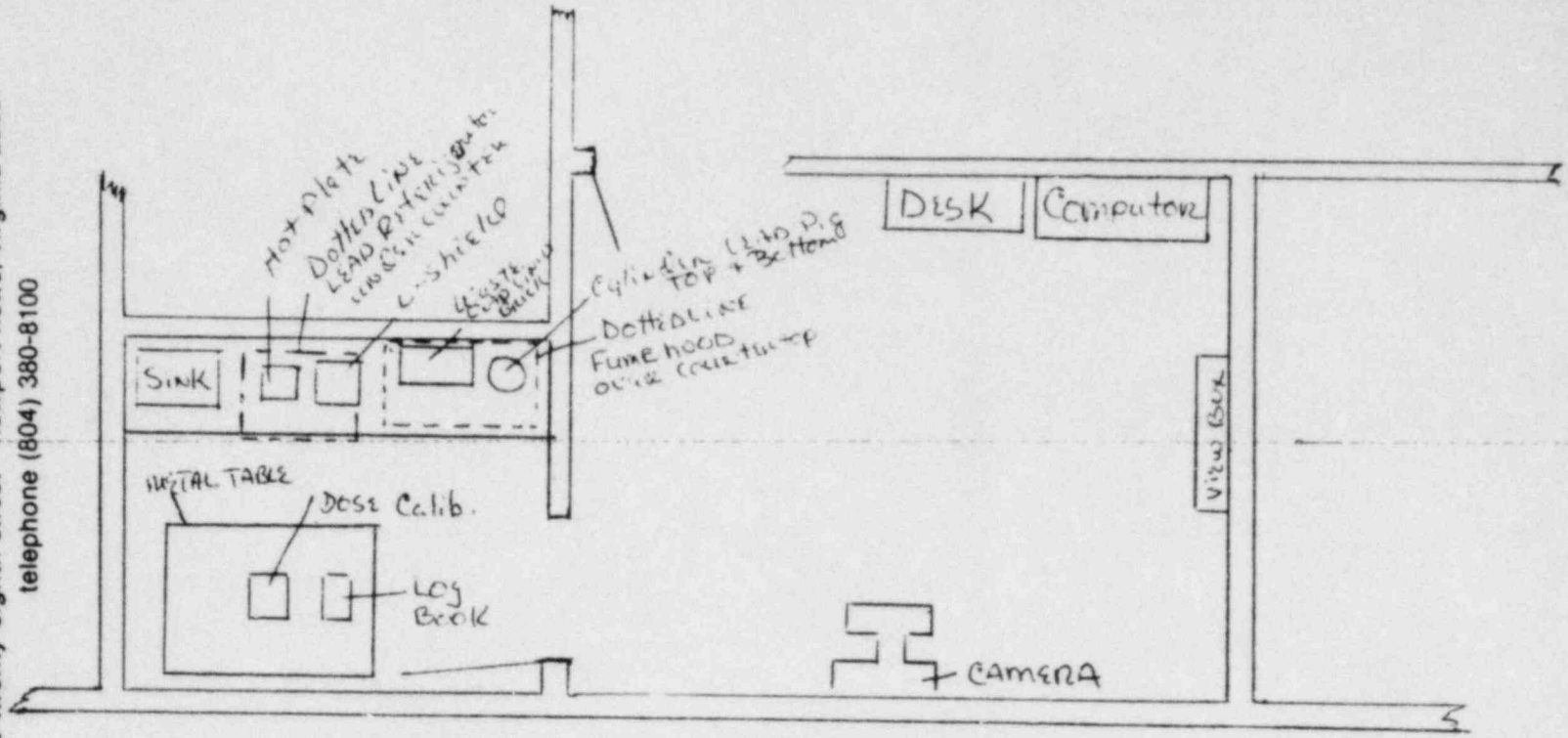

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"A COMMUNITY HOSPITAL"

Xenon-133 Handling Procedures

Quantity to be Used

1. A maximum of 104 patients per year will be studied with an average activity of 10 millicuries per patient.
2. Desired possession limit: 100 millicuries

Use and Storage Areas

The Xe-133 will be used and stored in the Nuclear Medicine Department. Storage of the individual Xe-133 doses will be in a lead container in the isotope storage areas surrounded by lead bricks in the Hot Lab. Patient doses will be administered in the Camera Room.

Description of Ventilation System

1. The total area of the Camera Room is approximately 153 sq. ft, with a 9.5 foot ceiling, for a total volume of 1454 cubic feet. The room will be under negative pressure with the normal air return system exhausted directly to the outside atmosphere.
2. The Hot Lab, where radioactive material is stored and prepared for dosing, is approximately 71 sq. ft , with an 8 foot ceiling, for a total volume of 568 cubic feet. Room air is exhausted to the outside atmosphere by a dedicated ventilation system.

Procedures for Routine Use

1. Xe-133 will be procured in precalibrated doses and delivered directly to the Nuclear Medicine Lab. It will be stored in its shipping container in the isotope storage area until ready for patient administration. Upon receipt, the package will be inspected in accordance with the Procedures for Safely Opening Packages Containing Radioactive Material.
2. Immediately prior to administration, the dose will be measured in the dose calibrator. The patient will be positioned with a self-contained breathing bag and/or nose clamp. All valve positions will be checked for proper settings. The dose will then be injected into the mouthpiece and the scan started. After the scan is completed, the exhaled Xe-133 gas will be collected in the integrated gas trap system and allowed to decay to background. No Xe-133 gas will be exhausted into the atmosphere.

Emergency Procedures

1. If, during the patient study, an accidental release of Xe-133 occurs, the rooms will be evacuated immediately and the doors closed.
2. Based on actual ceiling vent exhaust rates of 350 cfm, the room will remain vacated for a minimum of 21 minutes, which will allow for at least 5 air exchanges in the Camera Room.

Emergency Procedures (Continued)

3. At the end of 21 minutes, the floor will be monitored with a low-range GM survey meter to check for any residual Xe-133 gas. If the resulting measurements are greater than background, the room will be vacated for another 21 minutes and then monitored again to assure that no Xe-133 is present.

Air Concentrations of Xe-133 in Restricted Areas

MPC for restricted areas is 1×10^{-5} uCi/ml

1. Camera Room

   A. A = maximum activity used per week

   $A = (10 \text{ mCi/pt})(2 \text{ pt/week})(1 \times 10^{3} \text{ uCi/mCi}) = 2 \times 10^{4} \text{ uCi/wk}$

   B. Assume a loss rate of 20%, f = .2

   C. V = required ventilation to maintain airborne concentrations of Xe-133 below MPC in a restricted area, when averaged over a 40 hour week.

$$V = \frac{Axf}{MPC} \left(\frac{ft^3/min}{6.8 \times 10^{7} ml/40hr\ wk} \right)$$

$$V = \left(\frac{2 \times 10^{4} uCi/wk \times .2}{1 \times 10^{-5} uCi/ml} \right) \left(\frac{ft^3/min}{6.8 \times 10^{7} ml/40hr\ wk} \right)$$

$$V = 5.9\ ft^3/min$$

2. Hot Lab

   A. A = Maximum activity on hand per week

   $A = 100 \text{ mCi} = 1 \times 10^{5} \text{ uCi}$

   B. Assume a loss rate of 5%, f = .05

Air Concentrations of Xe-133 in Restricted Areas (Continued)

2. Hot Lab

C. V = required ventilation to maintain airborne concentrations of Xe-133 below MPC in a restricted area, when averaged over a 40 hour week.

$$V = \frac{Axf}{MPC} \left(\frac{ft^3/min}{6.8 \times 10^7 ml/40hr\ wk} \right)$$

$$V = \frac{1 \times 10^5 \frac{uCi}{wk} \times .05}{1 \times 10^{-5} uCi/ml} \left(\frac{ft^3/min}{6.8 \times 10^7 ml/40hr\ wk} \right)$$

$$V = 7.4\ ft^3/min$$

Method of Disposal

1. The Xe-133 expired air will be vented through the exit port in the integrated gas trap system. To insure proper operation of the Xenon-133 trap, the exhaust from the exit port of the trap will be monitored weekly with an end-window GM survey meter. The monitoring will be performed either during a Xenon study or with all of the expired gas from a study. Any increase above 2 times background level readings will be cause for appropriate replacement of exhaust duct, etc.
2. If there should be leakage in the gas trap system, the Xe-133 gas will be exhausted directly to the outside, or unrestricted area, through the exhaust vents. There is no recirculation of exhausted air within the facility and the point of exit for the exhaust duct is at least 25 feet from the closest point of air intake.
3. If there should be an accidental release of Xe-133 in the Camera Room, the gas will be exhausted to the outside or unrestricted area through the emergency exhaust vent.
4. The air from the outlet port of the trap system will be collected into a clean unused bag, which will be monitored weekly with a GM survey meter to check on system performance, and to determine when the filters approach saturation point. Readings of twice above background indicate the need to replace the charcoal cartridge. Saturated filters will be removed from the system and stored within the hot lab in airtight shielded containers until the Xe-133 activity decays to background (meter readings less than 0.05 mR/hr).

Method of Disposal (Continued)

5. A velometer will be used to assure the ventilation rate is adequate. This will be conducted prior to the initial use of Xe-133 studies, after any repairs which may alter the flow rate, and quarterly thereafter.
6. Weekly surveys will be made of the storage area and xenon delivery system to insure radiation levels are within allowable limits, and as low as reasonably achievable.
7. Records will be maintained of all monitoring and disposal.

Concentrations of Effluents to Unrestricted Areas

MPC for unrestricted area is 3×10^{-7} uCi per ml.

1. Camera Room Exhaust

   A. A = Maximum amount to be used per year

   $$A = (10 \text{ mCi/pt})(2 \text{ pt/wk})(1 \times 10^{3} \text{ uCi/mCi})(52 \text{ wks/yr}) = 1.04 \times 10^{6} \text{ uCi/yr}$$

   B. Assume a loss rate of 20% during use (f), f = .2

   C. V = The required ventilation to maintain airborne concentrations of Xe-133 below MPC in an unrestricted area.

$$V = \frac{Axf}{3.0 \times 10^{-7} \text{ uCi/ml}}$$

$$V = \frac{1.04 \times 10^{6} \text{ uCi/yr} \times .2}{3.0 \times 10^{-7} \text{ uCi/ml}} \left(\frac{\text{ft}^3/\text{min}}{1.49 \times 10^{10} \text{ ml/yr}} \right)$$

$$V = 46.5 \text{ ft}^3/\text{min}$$

Concentrations of Effluents to Unrestricted Areas (Continued)

2. Hot Lab Exhaust

A. A = Maximum amount to be released per year

$A = (100\ mCi/wk)(52\ wk/yr)(10\ uCi/mCi) = 5.2 \times 10^{6}\ uCi/yr$

B. Assume a loss rate of 5% during storage (f), f = .05

C. V = The required ventilation to maintain airborne concentrations of Xe-133 below MPC in an unrestricted area.

$$V = \frac{Axf}{3.0\times10^{-7}\ uCi/ml}\left(\frac{ft^3/min}{1.49\times10^{10}\ ml/yr}\right)$$

$$V = \frac{(5.2\times10^{6}\ uCi/yr)(.05)}{3\times10^{-7}\ uCi/ml}\left(\frac{ft^3/min}{1.49\times10^{10}\ ml/yr}\right)$$

$$V = 58.2\ ft^3/min$$

Summary

The minimum ventilation rates required to maintain concentrations of Xe-133 in a restricted area below 1×10^{-5} uCi/ml are 8 ft^3/min in both the Camera Room and Hot Lab. The minimum ventilation rates to maintain airborne concentrations of Xe-133 in an unrestricted area below 3×10^{-7} uCi/ml are 59 ft^3/min in both the Camera Room and Hot Lab.

The ventilation rates in the Camera Room and Hot Lab will be no less than 59 ft^3/min. This will insure airborne concentrations in restricted and unrestricted areas are less than permissible concentrations of 1×10^{-5} uCi/ml and 3×10^{-7} uCi/ml, respectively.