NEWCOMB HOSPITAL
65 SOUTH STATE STREET
VINELAND, NEW JERSEY 08360
(609) 691-9000

DAN L. REX
Chief Executive Officer

November 11, 1987

U.S. Nuclear Regulatory Commission
Region I
Division of Radiation Control
631 Park Avenue
King of Prussia, Pennsylvania 19406

RE: Radiation Material License No. 29-03438-01
Newcomb Hospital

Gentlemen:

Please amend the above referenced license to move the location of the Nuclear Medicine Department. The move is intended to take place during late 1987. Enclosed is a diagram of the proposed new department along with Xenon-133 calculations. Note, at the present time, the exact air exhaust and intake values are not available. The values in the calculations are provided as the minimum air flow rates. Also note that the room will be under negative pressure.

Upon approval from your office and subsequent move, a close out survey of the old department will be performed and the results submitted to your office for review prior to release of the area for unrestricted use.

If you have any questions or require additional information, please do not hesitate to contact the undersigned.

Sincerely,

Thomas J. Rayner
Acting Chief Executive Officer

TJR:pr
Encl.

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By: S. Kimberly

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Xenon-133 Handling Procedures

Quantity to Be Used

1. A maximum of 520 patients per year will be studied with an average activity of 20.0 millicuries per patient.
2. Desired possession limit: 200 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 Rooms is approximately 320 sq. ft, with an 8 foot ceiling, for a total volume of 2560 cubic ft./ each. 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 84 sq. ft, with an 8 foot ceiling, for a total volume of 672 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

If, during the patient study, an accidental release of Xe-133 occurs, the rooms will be evacuated immediately and the doors closed.

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

   $A = (20\ mCi/pt)(10\ pt/week)(1 \times 10^{3}\ uCi/mCi) = 2.0 \times 10^{5}\ uCi/wk$

   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.

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

$$V = \frac{(2.0 \times 10^{5}\ uCi/wk \times .2)}{1 \times 10^{-5}\ uCi/ml} \left(\frac{ft^3/min}{6.8 \times 10^{7}\ ml/40hr\ wk} \right)$$

$$V = 58.8\ ft^3/min$$

2. Hot Lab

   A. A = Maximum activity on hand per week

   $A = 200\ mCi = 2.0 \times 10^{5}\ uCi$

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

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

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

$$V = \frac{(2.0 \times 10^{5}\ uCi/wk \times .05)}{1 \times 10^{-5}\ uCi/ml} \left(\frac{ft^3/min}{6.8 \times 10^{7}\ ml/40hr\ wk} \right)$$

$$= 14.7\ ft^3/min$$

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 or fume hood. There is no recirculation of exhausted air within the facility and the point of exit for the exhaust duct is at least 15 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).
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

   $A = (20 \text{ mCi/pt})(10 \text{ pt/wk})(1 \times 10^{3} \text{ uCi/mCi})(52 \text{ wks/yr}) =$

   1.04×10^{7} uCi/yr

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

Concentrations of Effluents to Unrestricted Areas (continued)

1. Camera Room Exhaust

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

$$V = \frac{Axf}{3.0\times10^{-7}\ uCi/ml}$$

$$V = \frac{1.04\times10^{7}\ uCi/yr \times .2}{3.0\times10^{-7}\ uCi/ml} \left(\frac{ft^3/min}{1.49\times10^{10}\ ml/yr} \right)$$

$$V = 465\ ft^3/min$$

2. Hot Lab Exhaust

A. A = Maximum amount to be released per year

$$A = (200\ mCi/wk)(52\ wk/yr)(10^3 uCi/mCi) = 1.04 \times 10^7 uCi/yr$$

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.

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

$$V = \frac{1.04\times10^{7}\ uCi/yr\ (.05)}{3\times10^{-7}\ uCi/ml} \left(\frac{ft^3/min}{1.49\times10^{10}\ ml/yr} \right)$$

$$V = 116\ ft^3/min$$

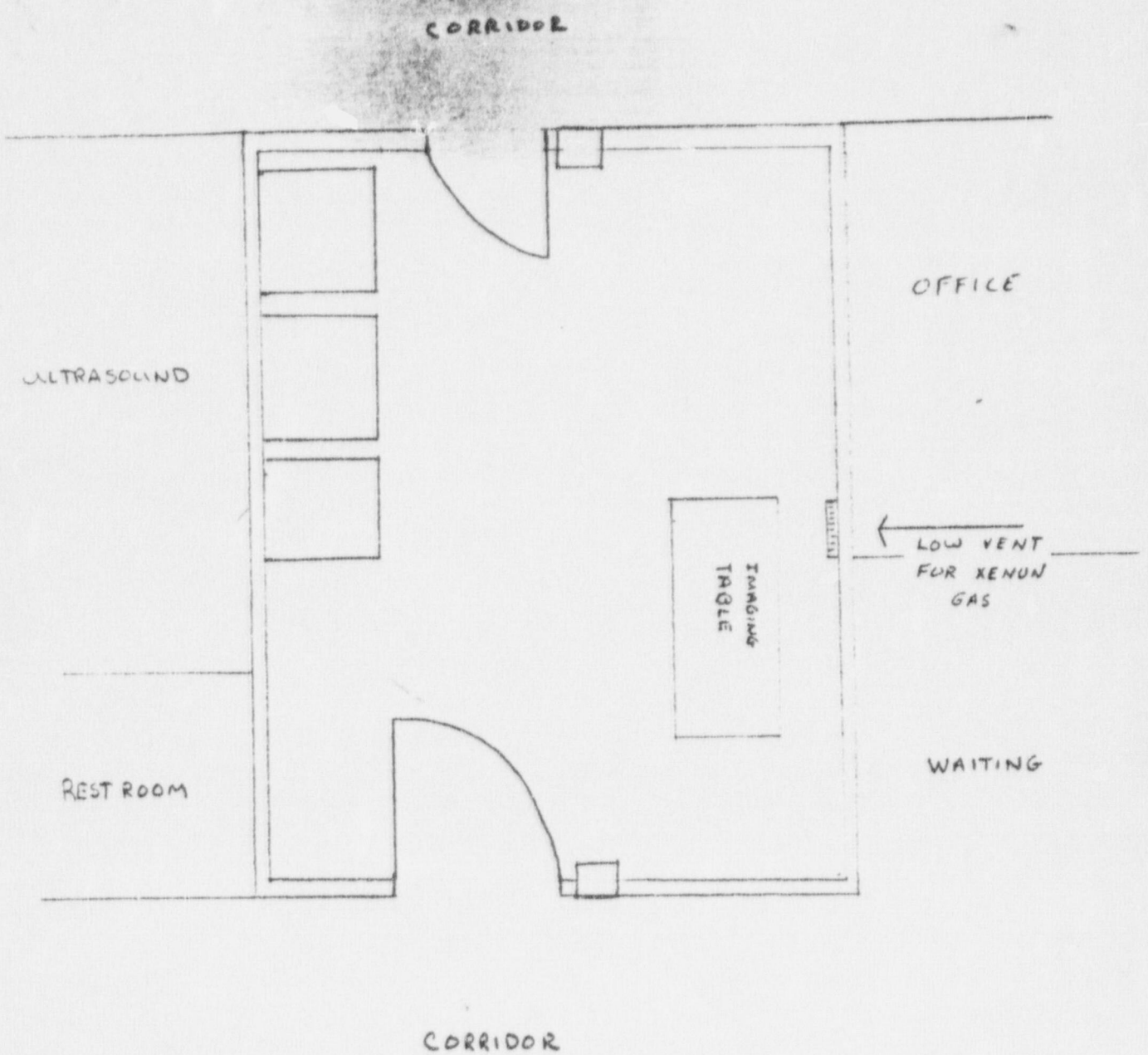
Summary

The minimum ventilation rates required to maintain concentrations of Xe-133 in a restricted area below 1×10^{-5} uCi/ml are 58.8 ft^3/min in the hot lab and 14.7 ft^3/min in the camera room. The minimum ventilation rates to maintain airborne concentrations of Xe-133 in an unrestricted area below 3×10^{-7} uCi/ml are 465 ft^3/min in the hot lab and 116 ft^3/min in the camera room.

The ventilation rates will be no less than 465 ft^3/min in the hot lab and no less than 116 ft^3/min in the camera room. 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.

NEWCOMB HOSPITAL

NUCLEAR MEDICINE



APPROXIMATE SCALE

1/4" = 1 foot

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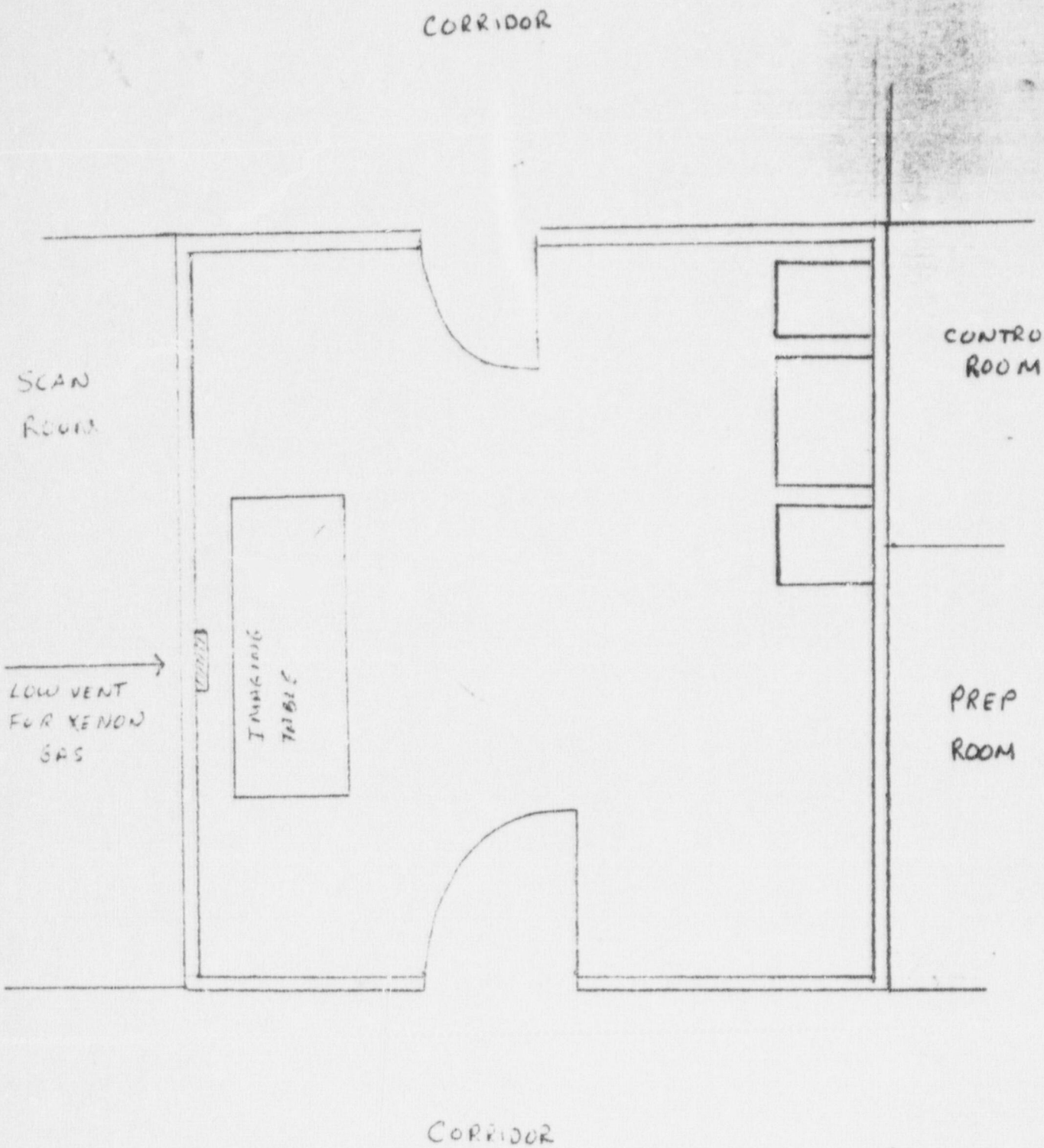
NUCLEAR MEDICINE



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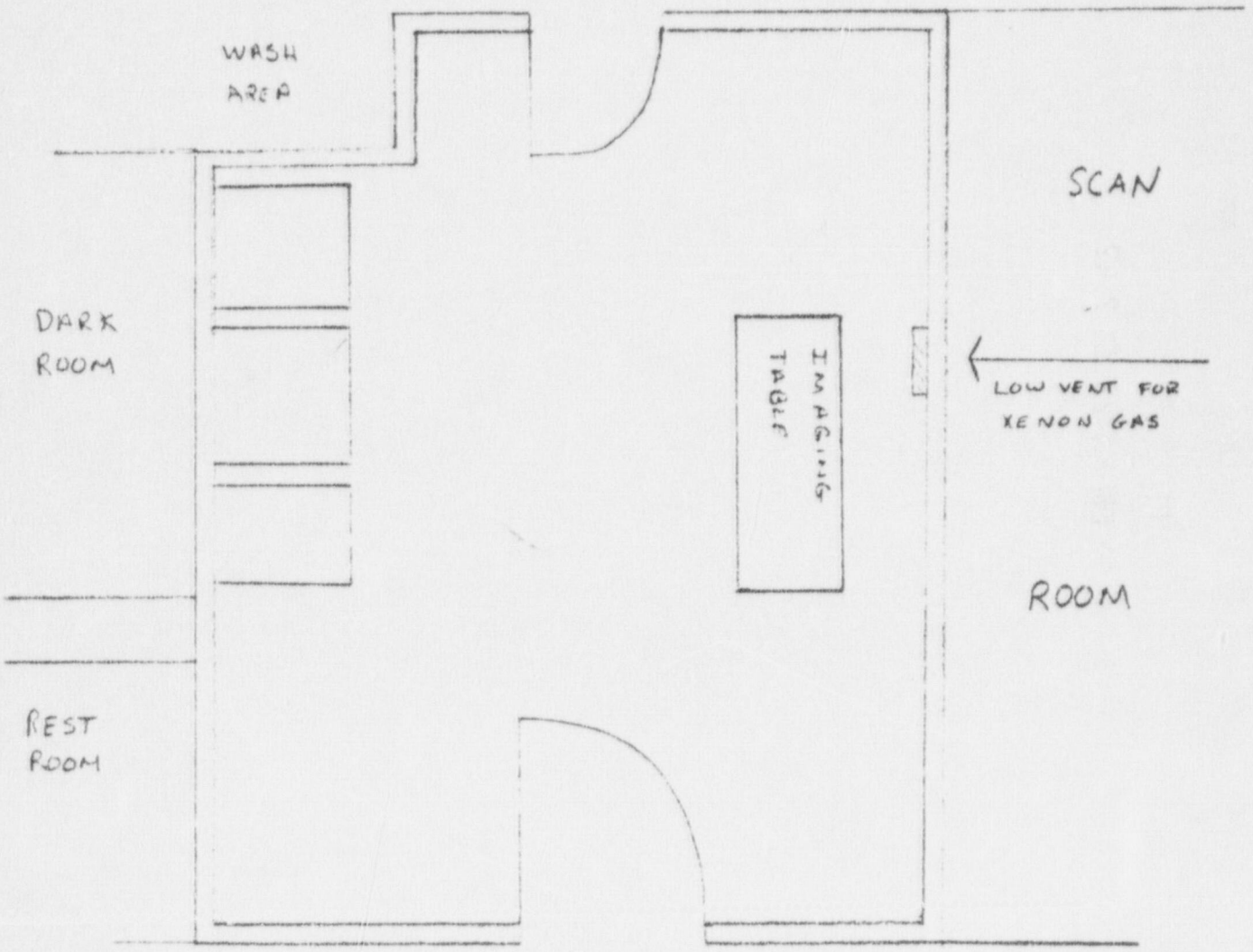

APPROXIMATE SCALE

1/4" = 1 foot

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BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LMS

PROGRAM CODE: 02120
STATUS CODE: 0
FEE CATEGORY: 7C
EXP. DATE: 19900630
FEE COMMENTS: _____

LICENSE FEE TRANSMITTAL

A. REGION 1

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: NEWCOMB MEDICAL CTR.
RECEIVED DATE: 871123
DOCKET NO: 3002473
CONTROL NO.: 108105
LICENSE NO.: 29-03438-01
ACTION TYPE: AMENDMENT

2. FEE ATTACHED
AMOUNT: $120.00
CHECK NO.: 120437

3. COMMENTS

SIGNED M. Wessenberger
DATE 12-18-87

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED (✓))

1. FEE CATEGORY AND AMOUNT: 7C $120

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ✓
RENEWAL _____
LICENSE _____

3. OTHER _____
_____

SIGNED D. Kimberly
DATE 12/28/87