



St. Anthony Medical Center, Inc.

June 10, 1985

U.S. Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Gentlemen:

RE: License #13-15933-01 Control #77675
Renewal Application

In regard to license renewal and in response to your letter (May 15, 1985/received May 16, 1985), the following additional information is submitted:

Item 7*

A representative of the nursing staff, Rebecca Grove, RN, Oncology Unit Director, has been appointed to the Medical Isotopes Committee. (Resume enclosed.)

As stated in our license renewal application, ancillary personnel (clerical, nursing, housekeeping, security, etc.) receive instruction regarding radiation hazards and appropriate precautions. This instruction is given both initially and annually thereafter on a refresher basis. The procedure employed to assure that these employees receive the necessary instructions initially and annually thereafter is:

The Medical Isotopes Committee and Radiation Safety Officer document the Radiation Safety Inservice presentations and instructions given and include them in the Quality Assurance Program Review Criterion. The Medical Center's Education Department also has on record these radiation safety instruction requirements and monitors that the requirements are met. Initial instruction is included in the orientation presentation given to all new employees through the Education Department. The Education Department presents the instructive writeup on radiation hazards and appropriate precautions as prepared by the Radiation Safety Officer. Posters explain labels for radiation materials and radiation area and radiation shipping. Annually, each employee is required to read the instructive writeup. Department Directors and supervisors document that each employee has received and understands the

8507150219 850621
REG3 LIC30
13-15933-01 PDR

Telephones:

Merrillville (219) 738-2100
Crown Point (219) 863-8120
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Cedar Lake (219) 374-9514

Main & Franciscan Road
Crown Point, Indiana 46307

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REGION III

instructions. The initial and annual instruction includes the information that the Radiation Safety Officer and the Medical Isotopes Committee are readily available for questions and to give instructions as needed. Associated ancillary personnel are included in the annual radiation safety presentations given to each employee group working in the vicinity of radiation materials. The Education Department informs all departments of each of these lectures and the department directors assure that all involved persons attend the presentations in order to receive direct, personal radiation safety instruction.

Item 14*

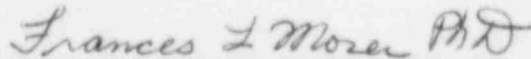
A revision for Item 14 is enclosed. The ambiguities have been removed.

Item 21*

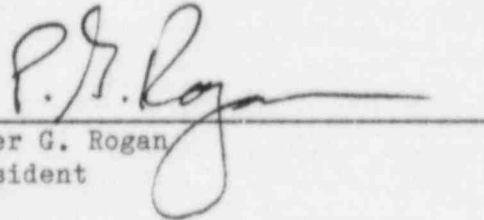
Use of Xenon-133 Gas

We submit a revised more detailed Item #21(enclosed). The airflow rates, vent locations, procedural confirmation information requested are included in this enclosure.

If there is further documentation required, please contact us.



Frances L. Moser, Ph.D.
Radiation Safety Officer



Peter G. Rogan
President

an
Enc.



St. Anthony Medical Center, Inc.

Rebecca A. Grove
630 W. 79th Ave.
Merrillville, In. 46410

EDUCATION: A.D. Nursing from University of Kentucky 1978
Attended Univ. of Evansville toward BSN
Presently attending St. Xavier College, Chicago
toward BSN/MSN.

WORK

EXPERIENCE:	Jan. 1985-present	Unit Director, Oncology St. Anthony Medical Center Crown Point, In.
	Sept. 1982-Jan. 1985	Head Nurse, Oncology (Developed & opened Onc. Unit) Our Lady of Mercy Hosp. Dyer, In.
	May 1978-Sept. 1982	Staff Nurse/Head Nurse 42 Bed Medical Oncology Unit Deaconess Hosp. Evansville, In.

OUTSIDE

ACTIVITIES: Member of National Oncology Nursing Society
Chairperson Membership Committee Local ONS
Member of Board of American Cancer Society
Member of Professional Education Committee ACS
Member of Service Committee of ACS

ST. ANTHONY MEDICAL CENTER, INC.
Crown Point, Indiana

NUCLEAR MEDICINE PROCEDURES

Revised: 6/10/85

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES

Xe-133

- A. 1. a. 6 studies per week
b. 15 mCi/study
- 2. Possession limit = 100mCi
- B. 1. Storage and handling area for Xe-133 will be storage area #1 in the Hot Lab. (See facility drawing, Item 11). Patient studies will be done in camera rooms. Therefore, calculations and air flow studies are for camera room plus Hot Lab.

The Rad-X Unit is stored when not in use at letter I in Item 11, Facility Room drawing. No Xe-133 is handled, stored or used at this location.

- 2. Exhaust, including Hot Lab and camera room together is 1600 CFM minimum. The exhaust is 100% to roof. Closest occupancy is greater than 150 ft. away. The supply air to both Hot Lab and camera room is less than 50% of exhaust rate, assuring negative pressure.
- 3. The drawing for Item 21 enclosed shows the location of the exhaust and supply vents and the air flow rates for the ventilation system.
- 4. The Plant Operations Department measures the air flow rates in the ventilation system semi-annually and the results are logged. The Radiation Safety Officer confirms semi-annually that the air flow measurements have been taken and confirms negative air flow at the exhaust vents.

As supplemental backup procedures, pressure gauges have been installed to monitor the overall air flow in the Nuclear Medicine Department. Regularly, before usage of the Xe-133 system, Nuclear Medicine personnel determine that these gauges read within an acceptable range of values and that the air flow pattern is normal.

- C. 1. Procedure protocol for the routine use of Xe-133 is per operating procedures specified by supplier and manufacturer of the administration and trap system.
- 2. Special apparatus for the administration and trapping of Xe-133 supplied by Rad-X Corp. is Ventil-Con-200A, Model 120. Instructions by supplier for gas trap cartridges will be followed.
- 3. Nose clamps will be used to help reduce leakage.

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES

Xe-133

- D. Emergency procedure in case of accidental release of Xe-133 would be to evacuate rooms and allow time for two complete room air changes. A physical survey of the area is done to determine that an allowed level has been reached before personnel are allowed to reenter the room.
- E. Persons in restricted areas will not inhale quantities of radioactive material in excess of 1×10^{-5} uCi/ml during 40 hours per week for 13 weeks. (See calculations.)
- F. Xenon disposal shall be accomplished by trap system or exhaust to roof of hospital, assuring concentration of less than 3×10^{-7} uCi/ml averaged over one year. (See calculations.) The trap system is monitored for saturation by means of an internal Rad-X Corp. alarm system that indicates when the gas trap has reached saturation. The warm-up procedure for the Rad-X system is performed every day that the unit is used and includes a check to determine that the trap saturation alarm system is operable. Therefore, the gas trap saturation is checked every time the unit is used.
- G. Calculations are based on a conservative selection of parameters. Ventilation rate 1000 CFM is independent of heating/cooling air flow changes. Nonetheless, air flow is carefully monitored when heating/cooling changes occur seasonally.
- H. The purpose of Fan #7 is to maintain Xe-133 air concentrations as low as reasonably achievable and for practical purposes to be able to achieve two or more complete room air changes in a reasonable amount of time. (5940 cu.ft./1000CFM means about 6.0 minutes per complete air change)

We also submit that if fan were inoperable, the 600 CPF minimum rate achieved by Fans 4-6 meets minimum requirements for air flow for 100mCi of Xe-133 per week. The ventilation exceeds the 150 CPF computed in our calculations. Also, disposal through roof exhaust would achieve a concentration less than 3×10^{-7} uCi/ml. The primary disposal system is the Rad-X trap system, not exhaust to roof. When Fan #7 is inoperable, it would be repaired as quickly as possible in order to maintain concentrations as low as reasonably achievable.

- I. Portions of the Rad-X Venti-Con Operators Manual are enclosed. As stated above, we follow the procedures specified in the operations manual. Filters are replaced at least yearly. The unit is regularly inspected for blue crystals and the crystals are replaced as needed. Prior to removing the filter or CO₂ trap, the system is purged of all radioactivity.

ST. ANTHONY MEDICAL CENTER, INC.
Crown Point, Indiana

NUCLEAR MEDICINE PROCEDURES Revised: 6/10/85

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES

Xe-133

Air Flow Rates

(See Room Drawing)

<u>VENT</u>	<u>TYPE</u>	<u>6/85 RATE CFM</u>	<u>NORMAL RATE CFM</u>
1	Supply	350	200-350
2	Supply	295	200-350
3	Supply	285	200-350
4	Exhaust	350	200-350
5	Exhaust	320	200-350
6	Exhaust	315	200-350
7	Exhaust	*	*

*Fan #7 Rate is 1000 CFM and is turned on for Xe-133 studies.

Normal Rate is as shown with 1-3 total maintained slightly less than 4-6 total.

Item 11 Dept. of Nuclear Medicine
St Anthony's Medical Center
Crown Point, Ind

Location

1. Lead Brick wall 2" thick

Isotope storage

2. Lead Brick wall

2" 4" thick as

needed Waste Storage

3. Radioisotope Storage

Facility Nucl Acc #53-500

4. Lead-lined Refrigerator

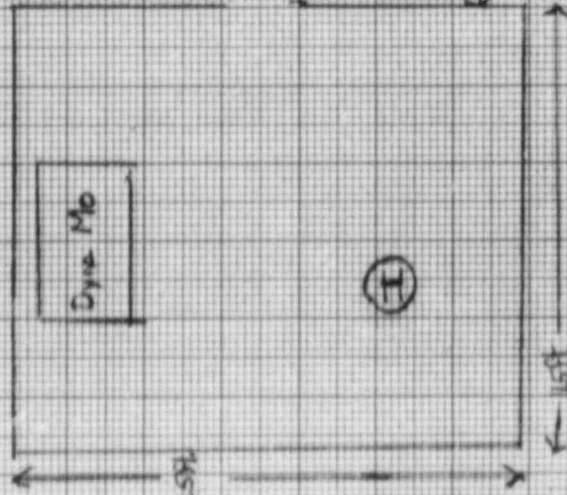
5. Sink

6. Location of 2 survey meters

7. Dose Calibrator

Doors have key locks and Radiation
Warning signs are posted.

EEG Laboratories



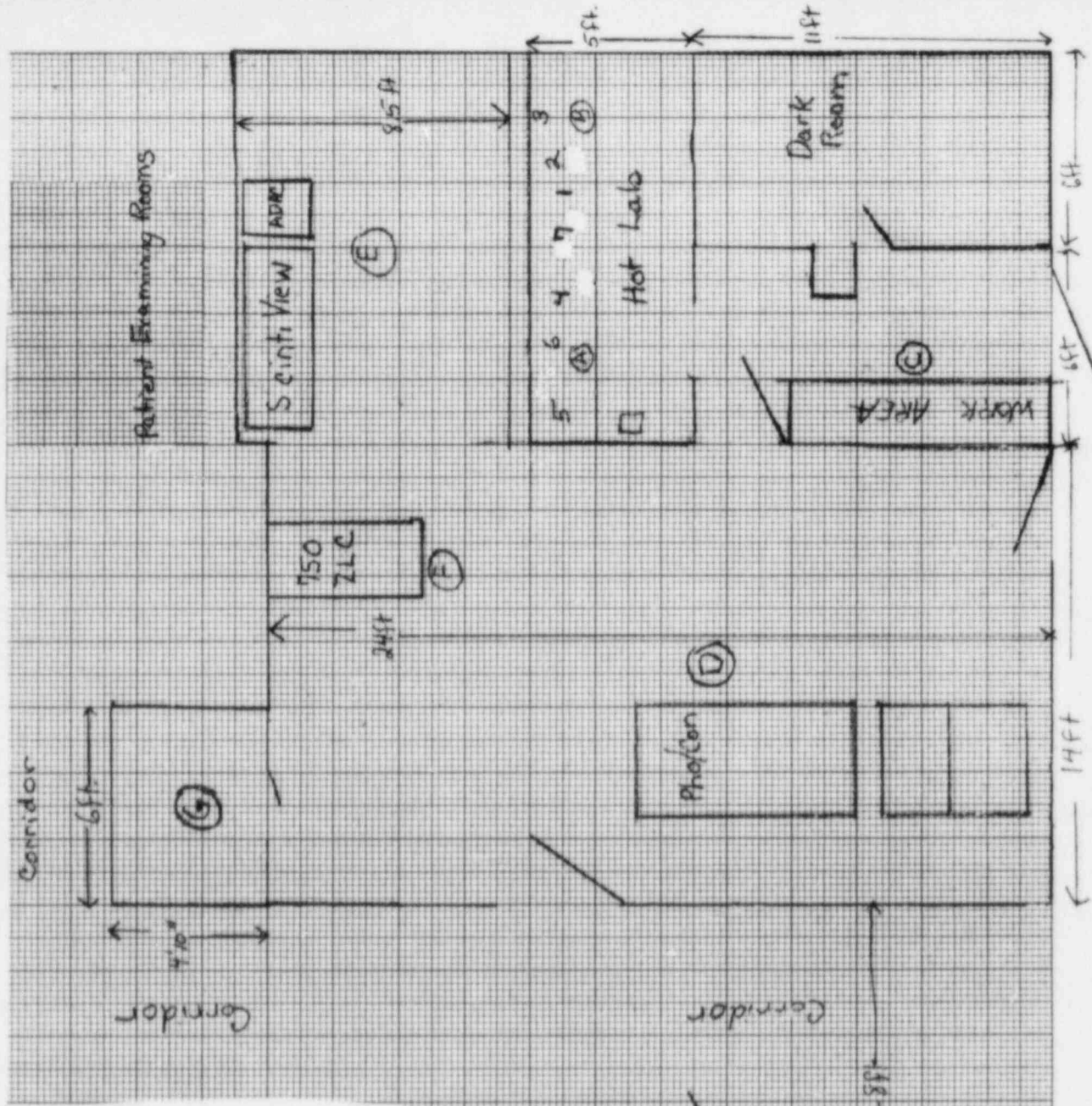
ultra sound

Drawing of Facility
Not to Scale

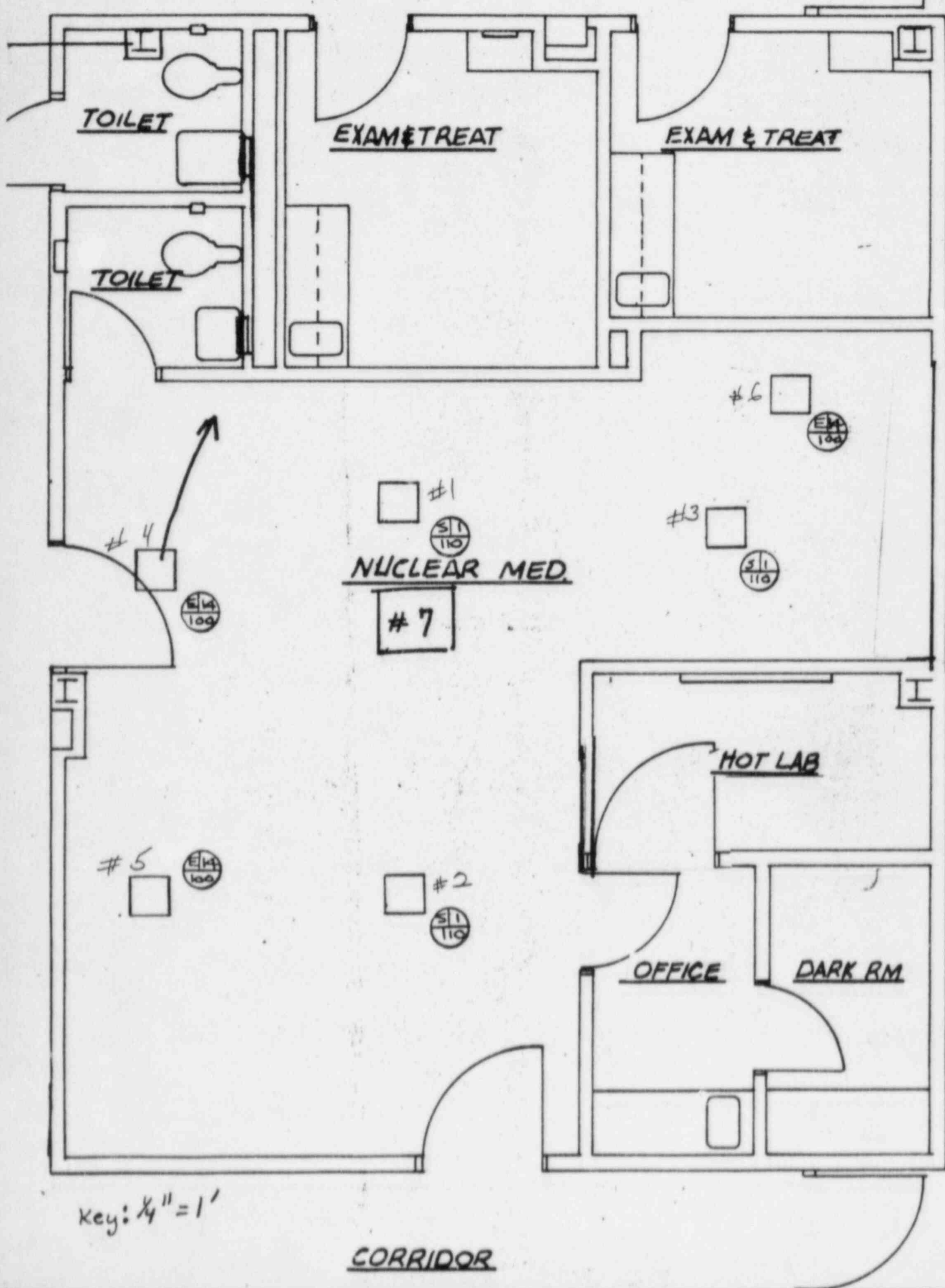
Thickness of walls not shown. Distance and local lead shielding are used
in protection evaluation calculations.

(A)-(H) Location where wipes are taken, minimum interval weekly.

(A)-(H) Location of daily surveys.



Corridor



Key: 1/4" = 1'

CORRIDOR

CALCULATION SHEETXe-133ST. ANTHONY MEDICAL CENTERControlled area (hot lab & camera room)

$$A = 100 \text{mCi} \times 1 \times 10^3 \text{uCi/mCi} = 1 \times 10^5 \text{uCi/week}$$

$$V = \frac{1 \times 10^5 \text{uCi/wk}}{1 \times 10^{-5} \text{uCi/ml}} = 1 \times 10^{10} \text{ml/wk}$$

Required ventilation rate assuming 100% loss to room (restricted area)

$$\frac{1 \times 10^{10} \text{ml/wk}}{40 \text{ hr/wk} \times 1.7 \times 10^6 \text{ml/hr/CFM}} = 1.5 \times 10^2 = 150 \text{ CFM}$$

Room exhaust rate (1000CFM) exceeds this by about 6 times.

Non-controlled area- Disposal

Main disposal by RADX trap. However assuming disposal to roof by exhaust and assuming 50% loss.

$$1 \times 10^5 \text{uCi/wk} \times 52 \text{ wk/yr} = 5.2 \times 10^6 \text{uCi/yr.}$$

$$\frac{5.2 \times 10^6 \text{uCi/yr} \times 0.5}{1000 \text{CFM} \times 60 \text{ min/hr} \times 24 \text{ hr/day} \times 365 \text{ day/yr} \times 2.8 \times 10^4 \text{ml/ft}^3} = 1.8 \times 10^{-7} \text{uCi/ml.}$$

Conclusion: $1.8 \times 10^{-7} \text{uCi/ml} < 3 \times 10^{-7}$
 Therefore, acceptable for restricted area.

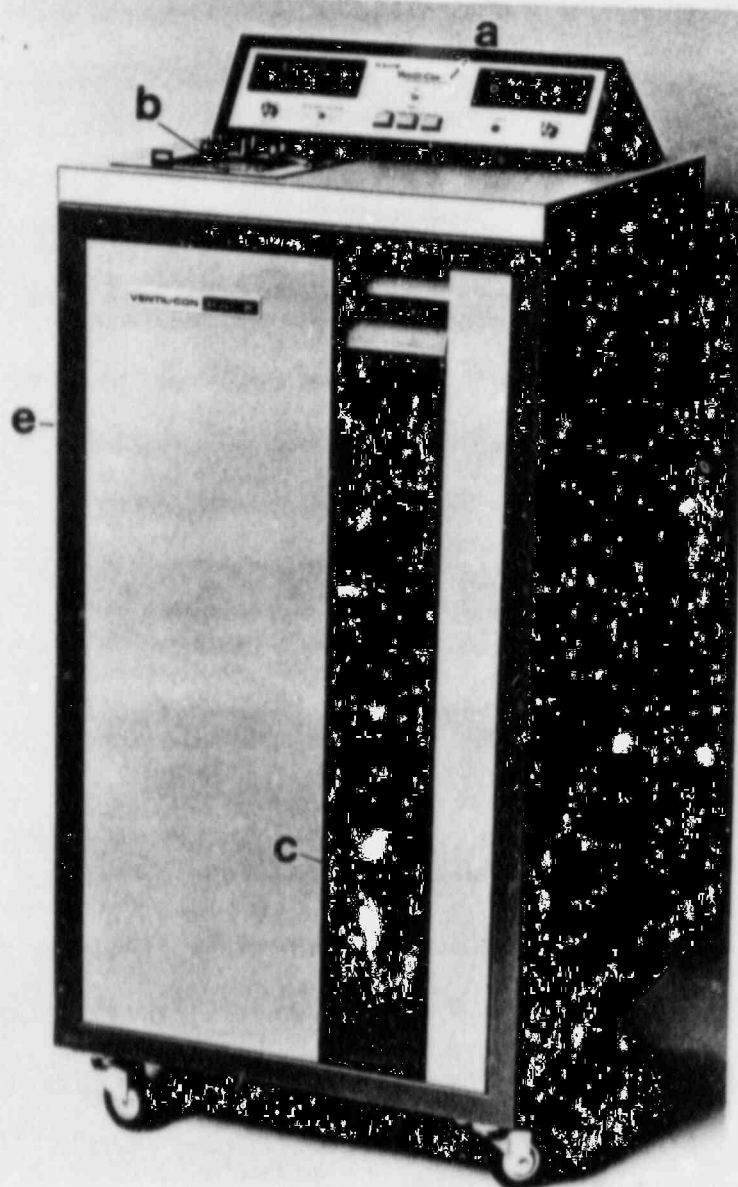


Figure 1. The Ventil-Con with dual channel strip chart recorder.

- | | |
|--------------------------------------|--------------------|
| a. control panel | c. delivery arm |
| b. dual channel strip chart recorder | d. gas inlet valve |
| | e. mobile console. |

VENTIL-CON OPERATION MANUAL

1.0 INTRODUCTION

Since the initial application of radioactive gases for assessment of regional ventilation in 1955, the clinical utilization of this technique has rapidly expanded. Although radioactive gases such as ^{15}O , ^{11}CO , $^{11}\text{CO}_2$, ^{13}N , and $^{81\text{m}}\text{Kr}$ have been used, Xenon-133 is presently the most widely used for ventilation and exchange studies. Furthermore, ^{133}Xe will probably continue to be the preferred radionuclide since these other isotopes must be used near the cyclotron or reactor where produced because of their short physical half-lives.

Historically, ^{133}Xe gas ventilation studies have been performed using three basic techniques: 1) intravenous injection of ^{133}Xe dissolved in saline, 2) ^{133}Xe in air administered by a single inhalation; and 3) allowing the patient to breathe a ^{133}Xe air mixture until the lung activity reaches equilibrium and determining the rate of ^{133}Xe clearance during subsequent air breathing. Of these three methods, the third and last has been shown to produce the smallest standard error for measuring the distribution of ventilation (1).

(1). Jones, R.H., Goodrich, J.K., Sabiston, D.C.: Evaluation of ^{133}Xe techniques for measurement of regional ventilation. *J Nucl Med*, 7, 598-604, 1974.

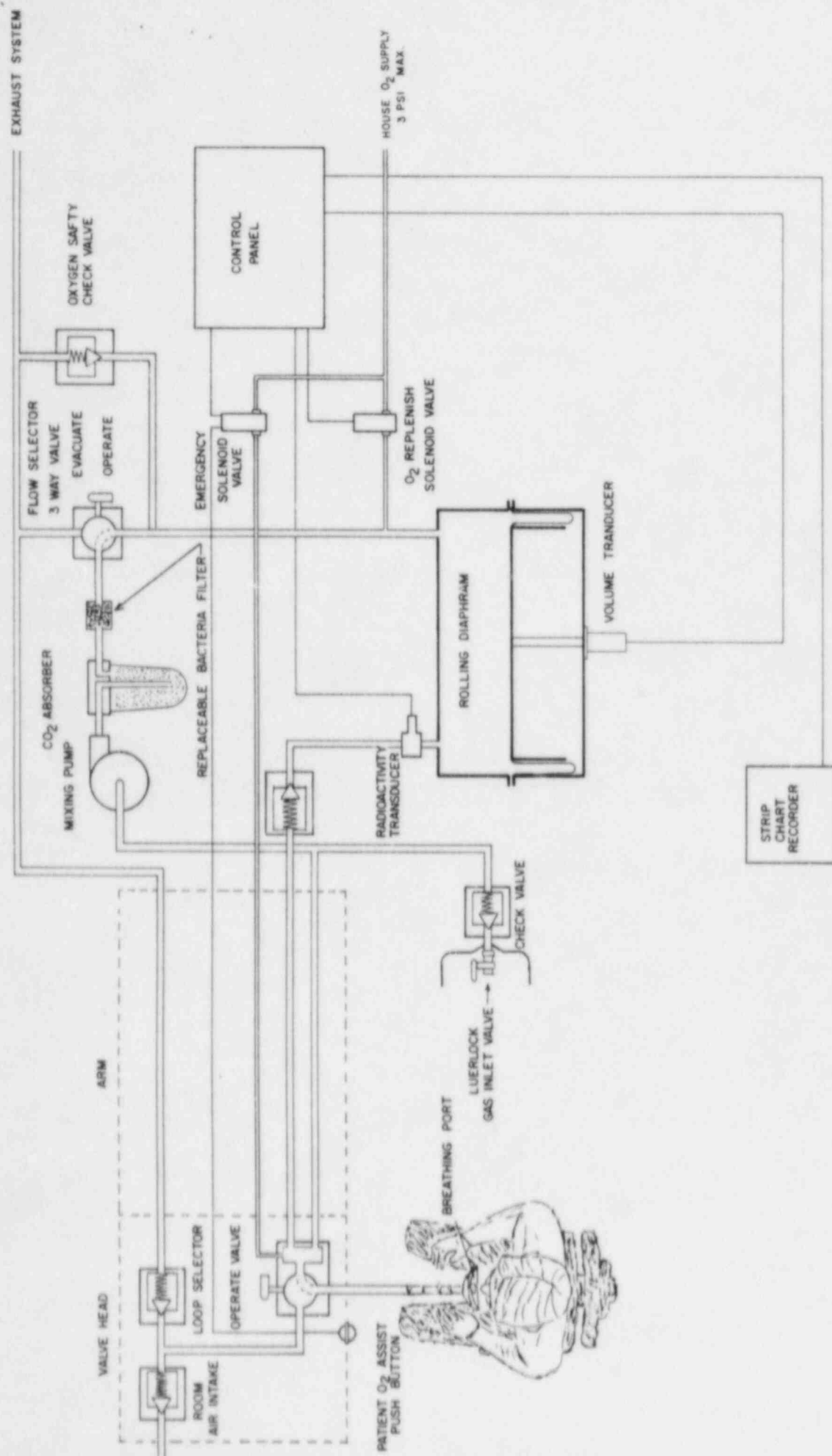


FIG. 2 GAS FLOW DIAGRAM

- 6.3.2.4 Patient should be instructed to breathe deeply and hold the breath while the single bolus image is accumulated.
- 6.3.2.5 When the patient begins normal breathing, the equilibrium phase is begun. The procedure should continue with auto O₂ replenishment through washout as described in Sections 6.1.8 through 6.1.13.

7.0 ROUTINE MAINTENANCE

- 7.1 Bacteriological Filter - The bacteriological filter should be sterilized by autoclaving at least weekly and replaced entirely yearly.
- 7.2 Carbon Dioxide Trap - The soda lime granules in the CO₂ trap turn blue as they become saturated and should be replaced accordingly. Prior to removing the bacteriological filter or CO₂ trap the system should be purged of all radioactivity. See Paragraph 5.3.2 for purging procedure.

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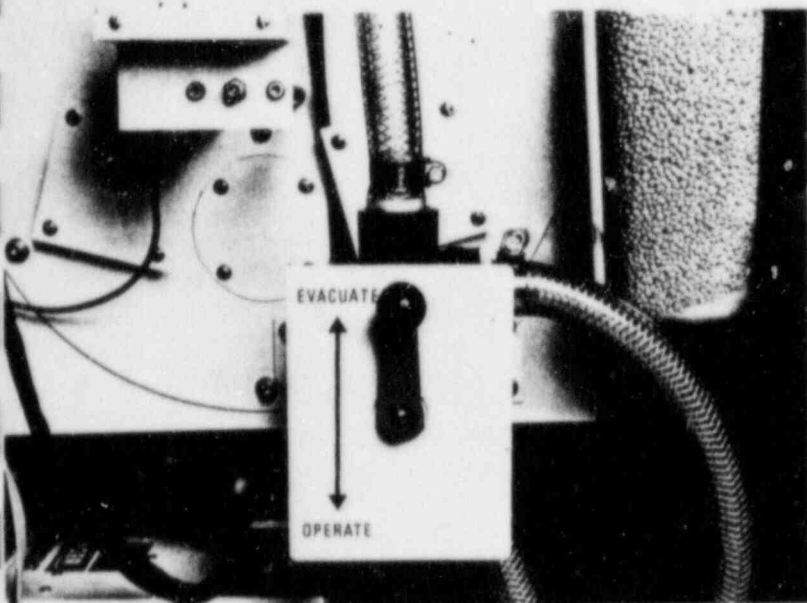


Figure 17. Flow selector valve in the Evacuate position.

5.3.2 Subsequent Calibrations - In subsequent calibrations it is necessary to first completely purge the system of all radioactivity.

5.3.2.1 With the Head Valve in the Stabilization/Xenon Washout position, turn the Operate/Evacuate valve to Evacuate. (See Figure 17.) The spirometer will automatically contract and when the volume meter reaches zero, switch back to Operate mode. In the Evacuate position the contents of the Ventil-Con are exhausted through the exhaust port.

5.3.2.2 Change the Head Valve to the Xenon Rebreathing position and inflate the spirometer to 10 liters by gently pulling the center rod to its full out position.

5.3.2.3 Change Head Valve to Stabilization/Xenon Washout, the Operate/Evacuate valve to Evacuate and allow the spirometer to deflate to 0 volume.

Several purges may be required to remove all the radioactivity. This is accomplished by repeating steps 5.2.2.2 and 5.2.2.3.

5.3.2.4 Recalibration is accomplished by repeating steps 5.3.1.1 through 5.3.1.5.

6.0 VENTILATION STUDY PROCEDURES

6.1 Initial

6.1.1 Insure that:

1. The flow selector valve is in the "Operate" position.
2. The Ventil-Con has warmed up at least 30 minutes.
3. The soda lime crystals are not saturated with CO₂.
4. The oxygen supply regulator is open and the flow meter is adjusted to approximately 2 liters/min.

NOTE: Steps 6.1.2, 6.1.3 and 6.1.4 may be skipped if the unit has been previously loaded and calibrated as in Steps 5.3.1.1 through 5.3.1.5.

6.1.2 With the Head Valve in the Xenon Rebreathing position, move the spirometer to a position corresponding to a volume of 5 liters by moving the center rod accordingly. Switch Head Valve to the Stabilization/Washout position. It is important that at the beginning of any patient study the spirometer is in such a position that the patient's breathing cannot cause the spirometer to "bottom" or "top out." On subsequent studies when the Ventil-Con contains ¹³³Xe, the volume should be adjusted by the judicious use of the Evacuate mode (decreases volume) and/or the Manual Oxygen (increases volume).

6.1.3 Open the stopcock on Gas Inlet Valve and using a glass syringe inject 30-40 mCi of ¹³³Xe into the Ventil-Con.

6.1.4 Allow a few minutes for gas mixing and check concentration meter. The reading should correspond to the mCi added divided by the total system volume.

For example: The total system volume is 10 liters when the spirometer volume is 5 liters; therefore, if 30 mCi were added, the concentration meter should read:

$$\frac{30 \text{ mCi}}{10 \text{ liters}} = 3 \text{ mCi/liter}$$

ST. ANTHONY MEDICAL CENTER, INC.
Crown Point, Indiana

NUCLEAR MEDICINE PROCEDURES

PROCEDURE FOR RECEIPT, STORAGE AND RETURN OF RADIOACTIVE MATERIALS
OBTAINED FROM AN OUTSIDE NUCLEAR PHARMACY
OF ROUTINE NUCLEAR MEDICINE QUANTITY ("Type A")

1. NRC Procedures, Appendix F, Items 2 and 3, list detailed procedure for opening packages apply. (See page 2)
2. Cases/packages will be visually inspected for damage. If the case/package looks as if it has been dropped and/or damaged in any way, it will NOT be opened and the Nuclear Pharmacy and Radiation Safety Officer will be called immediately.
3. If the case/package passes visual inspection, monitoring of 3 ft. and surface will be done with the geiger counter and the results recorded in the log.
4. Upon opening of the case after checking and recording surface wipes, the individual dose will be placed in the appropriate area. (Isotopes requiring refrigeration will be placed in the lead lined refrigerator and all other doses will be placed behind the lead bricks in the HOT lab.)
5. After the use of any dose, the record copy of the dose label will be filled out with the patient's name, placed in the log book and the date, time of injection, amount of injection and initials of the Technologist will be entered in the appropriate place in the Isotope Log Record.
6. At the end of the work day, all remaining unused doses will have their record copy of the dose label placed in the log book.
7. At that time, all labels for that day will be stamped with the disposal stamp.
8. All doses, used and unused, will then be placed back in the original shipping cases and the Nuclear Pharmacy will pick them up for disposal.

NUCLEAR MEDICINE PROCEDURES

APPENDIX F

PROCEDURES FOR SAFELY OPENING PACKAGES
CONTAINING RADIOACTIVE MATERIAL

Items 2 & 3 apply to Type A Quantities.

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A quantity limits as specified in paragraphs 20.205(a)(1) and (c)(1) of 10 CFR Part 20 (more than 20 Ci for Mo-99 and Tc-99m). They will be monitored for surface contamination and external radiation levels within 3 hours after receipt if received during working hours or within 18 hours if received after working hours, in accordance with the requirements of paragraphs 20.205(a) through (c). All shipments of liquids greater than exempt quantities will be tested for leakage. The NRC Regional Office will be notified in accordance with the regulations if removable contamination exceeds $0.01 \mu\text{Ci}/100 \text{ cm}^2$ or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 m).
2. For all packages, the following additional procedures for opening packages will be carried out:
 - a. Put on gloves to prevent hand contamination.
 - b. Visually inspect package for any sign of damage (e.g., wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.
 - c. Measure exposure rate at 3 feet (or 1 m) from package surface and record. If $>10 \text{ mR/hr}$, stop procedure and notify Radiation Safety Officer.
 - d. Measure surface exposure rate and record. If $>200 \text{ mR/hr}$, stop procedure and notify Radiation Safety Officer.
 - e. Open the package with the following precautionary steps:
 - (1) Open the outer package (following manufacturer's directions, if supplied) and remove packing slip.
 - (2) Open inner package and verify that contents agree with those on packing slip. Compare requisition,* packing slip, and label on bottle.
 - (3) Check integrity of final source container (i.e., inspect for breakage of seals or vials, loss of liquid, and discoloration of packaging material).
 - (4) Check also that shipment does not exceed possession limits.
 - f. Wipe external surface of final source container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., $\mu\text{Ci}/100 \text{ cm}^2$, etc.). Check wipes with a thin-end-window G-M survey meter, and take precautions against the spread of contamination as necessary.
 - g. Monitor the packing material and packages for contamination before discarding.
 - (1) If contaminated, treat as radioactive waste.
 - (2) If not contaminated, obliterate radiation labels before discarding in regular trash.
3. Maintain records of the results of checking each package, using "Radioactive Shipment Receipt Record" (see next page) or a form containing the same information.

* In the case of special orders (e.g., therapy doses), also compare with physician's written request.

ST. ANTHONY MEDICAL CENTER, INC.

NUCLEAR MEDICINE RADIOACTIVE PACKAGING INSPECTION

DATE: _____	TECH: _____
SUPPLIER: _____	RADIOACTIVE _____
	LABEL: _____
CONDITION: _____	READING AT 3 Ft. _____ at Background
OF PACKAGE: _____	Level for Label I or: _____ MR/hr
BACKGROUND: _____	SURFACE _____
	PACKAGE COUNT: _____ MR/hr
	WIPE TEST OK: _____

DATE: _____	TECH: _____
SUPPLIER: _____	RADIOACTIVE _____
	LABEL: _____
CONDITION: _____	READING AT 3 Ft. _____ at Background
OF PACKAGE: _____	Level for Label I or: _____ MR/hr
BACKGROUND: _____	SURFACE _____
	PACKAGE COUNT: _____ MR/hr
	WIPE TEST OK: _____

DATE: _____	TECH: _____
SUPPLIER: _____	RADIOACTIVE _____
	LABEL: _____
CONDITION: _____	READING AT 3 Ft. _____ at Background
OF PACKAGE: _____	Level for Label I or: _____ MR/hr
BACKGROUND: _____	SURFACE _____
	PACKAGE COUNT: _____ MR/hr
	WIPE TEST OK: _____

RADIOACTIVE MATERIAL PACKAGES LABEL CRITERIA

(173.399)

DOSE RATE LIMITS

LABEL	AT ANY POINT ON ACCESSIBLE SURFACE OF PACKAGE	AT THREE FEET FROM EXTERNAL SURFACE OF PACKAGE (TRANSPORT INDEX)
"RADIOACTIVE-WHITE I"	0.5 mR/hr	0
"RADIOACTIVE-YELLOW II"	50. mR/hr	1.0 mR/hr
"RADIOACTIVE-YELLOW III"	200. mR/hr	10. mR/hr

ST. ANTHONY MEDICAL CENTER

A. SEALED SOURCE TYPE AND LOADING

1. Nuclide: Co Cs Other _____
2. Form: Needles Capsules Seeds Others _____
3. Applicator: Fletcher Other _____
4. Owner: SAMC Other _____
5. Implant sketch to the right.

B. SOURCE REMOVAL, PREPARATION, IMPLANTING AND UNUSED SOURCE RETURNED

1. From safe and prepared by: _____ Date _____ Time _____
2. Transported to implant by: _____
3. Implanted by: _____ Activity implanted _____
4. Implant date: _____ Time: _____
5. Implant to remain to date: _____ Time: _____ Hours: _____
6. Unused sealed sources immediately returned by: _____

C. IMPLANT REMOVAL AND SOURCE RETURN

1. Implant removed by: _____ Date: _____ Time: _____
2. Sources returned to storage area by: _____
3. Checked and stored in safe by: _____ Date: _____ Time: _____
4. Activity stored: _____ Total activity accounted for: _____
5. Activity checked by: Lable Calibrator Other _____

D. SURVEY (MAXIMUM VALUES AT THE POINTS INDICATED)

- ∅ 1. Incoming shipping package surface _____ mR/hr: at 1 meter _____ mR/hr
- ∅ 2. In transite to implant: at container _____ mR/hr: at 1 meter _____ mR/hr
- ** 3. Implanting area after all source removal _____ mR/hr
- * 4. Patient's room: Sources IN _____ mR/hr at 1 meter
- * 5. Patient's room: Sources OUT _____ mR/hr of 1 meter
- ∅ 6. In transite to safe: at container _____ mR/hr, at 1 meter _____ mR/hr
- ∅ 7. Outgoing shipping package: Surface _____ mR/hr, at 1 meter _____ mR/hr

* Obtain for all implants.

** Does not apply to after loading cases.

∅ Applies when sources have been shipped from NRC approved supplier.

M.D.

Radiation Safety Officer_____
Radiation Therapist

DEPARTMENT OF RADIATION THERAPY
INTERSTITIAL AND INTRACAVITARY SEALED SOURCES

Item 20d

ST. ANTHONY MEDICAL CENTER

SURVEY DATE _____

ROOM _____

SOURCES _____

STRENGTH(mCi Total) _____

INSERTED _____

REMOVAL _____

NAME _____

HOURS _____

AREA SURVEY

POSITION	DOSE RATE (mrem/hr)	HOURS ALLOWED	MPD	REMARKS
----------	------------------------	---------------	-----	---------

1 Meter

Chair (6')

Doorway

Adj. Walls

N

S

E

W

Floor

Ceiling

CHECK LIST:

Warning on door

Warning on chart

Nursing instructions on chart

Sketch

SURVEY BY _____

EVALUATION _____

Radiation Safety Officer

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH BRACHYTHERAPY SOURCES

Patient's Name: _____

Room Number: _____ Physician's Name: _____

Isotope and Activity: _____

Date and Time of Administration: _____

Date and Time Sources Are To Be Removed: _____ Isotope: _____

Exposure Rates in mR/hr

Bedside

3 feet from bed

10 feet from bed

(Comply with all checked items.)

- _____ 1. Wear film or TLD badge.
- _____ 2. Wear pocket chambers for supplementary personnel monitoring of individual tasks.
- _____ 3. Wear rubber gloves.
- _____ 4. Tag the following objects and fill out the tag:

_____ door _____ chart
 _____ bed _____ wrist
- _____ 5. Place laundry in linen bag and save.
- _____ 6. Housekeeping may not enter the room.
- _____ 7. Visiting time permitted: _____
- _____ 8. Visitors must remain _____ from patient.
- _____ 9. Patient may not leave the room.
- _____ 10. Patient may not have visitors.
- _____ 11. Patient may not have pregnant visitors.
- _____ 12. Patient may not have visitors under 18 years of age.
- _____ 13. Patient must have a private room.
- _____ 14. A dismissal survey must be performed before the patient is discharged.

Item 20e cont.

- _____ 15. All items must remain in the room until approved for disposal by the Radiation Safety Officer or his designee.
- _____ 16. Contact the Radiation Safety Office when temporary sources (nonpermanent implants) are removed to perform a survey to be sure all sources are removed from the patient, to do a physical source count, and to be sure no sources remain in the room.
- _____ 17. Contact the Radiation Safety Office when the patient is discharged to survey the room prior to its assignment to another patient.
- _____ 18. Other instructions.

RSO

Name

On-duty/Off-duty Telephone Numbers

ST. ANTHONY MEDICAL CENTER
DEPARTMENT OF RADIATION THERAPY
NURSING CARE FOR PATIENTS WITH REMOVABLE RADIOACTIVE SEALED SOURCES

RADIONUCLIDE _____ QUANTITY _____ mCi, mgm Ra. equivalent

LOCATION: (part of body) _____

INSERTED ON _____ AT _____

TO BE REMOVED _____ AT _____ BY _____
phone ext. 1471

EXPOSURE RATE AT ONE METER FROM PATIENT _____ mR/hr.

1. Patients are normally treated in a private room. Other arrangements are possible but should have prior approval from the Radiation Officer.
2. Nurses or other attendants shall limit patient care to the maximum of _____ hours per case. No baths or other care requiring long exposure will be done. If personnel must be present for longer than the designated time instructions shall be obtained from the Radiation Therapy Officer.
3. No nurses or attendant that is pregnant shall be assigned to the care of these patients. They must also be over the age of 18 years.
4. Instruments and containers used to handle sources do not become radioactive. This also applies to sputum, urine, vomitus, feces, dishes, instruments, utensils and bedding.
5. Surgical dressings and bandages should be changed only as directed by the Radiotherapist or the Physician designated by him. Perineal care will not be given for GYN patients during treatment. Pads may be changed under direction of the Radiotherapist. Do not discard surgical dressings, bandages, and pads unless directed to do so by the Therapist or Radiation Safety Officer.
6. If a source capsule, needle or applicator is accidentally removed or works itself out, do not touch or handle; immediately contact the Radiation Therapy Department.
7. Visitors shall remain at least _____ feet from the patient. No visitors shall remain in the room for more than _____ hours per day. No visitors are to be less than 18 years of age or pregnant.
8. Personnel monitoring is required for all nurses providing extended personal care to patients with implants.
9. All items must remain in the room until approved for disposal by the Therapist or Radiation Safety Officer or his designee.

IF THERE ARE ANY QUESTIONS RELATED TO THESE INSTRUCTIONS, PLEASE CONTACT THE DEPARTMENT OF RADIATION THERAPY, EXT. 1471 OR THE RADIATION SAFETY OFFICER.

(IMPRINT PLATE)

Radiation Safety Officer

Signature: _____ M.D.

Radiotherapist Ext. 1485

APPENDIX L

RADIATION SAFETY PROCEDURES FOR THERAPEUTIC USE OF SEALED SOURCES*

1. All patients treated with brachytherapy sources will be placed in a private room that has a toilet.
2. The patient's room will be properly posted or attended in accordance with §§ 20.203 or 20.204 of 10 CFR Part 20.
3. Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after sources are implanted. Exposure rate measurements will be taken at 3 feet (or 1 m) from the patient with sources implanted, at the patient's bedside, at 3 feet (or 1 m) from the bed, and at the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times and the exposure rate at 3 feet (or 1 m) from the patient on the patient's chart.
4. Immediately after sources are implanted, the form "Nursing Instructions for Patients Treated with Brachytherapy Sources" will be completed and attached to the patient's chart.
5. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraphs 20.105(b)(1) and (b)(2) of 10 CFR Part 20.
6. Nurses caring for brachytherapy patients will be assigned film or TLD badges. TLD finger badges will also be assigned to nurses who must provide extended personal care to the patient. Pocket dosimeters may be assigned in addition to a film or TLD badge.
7. At the conclusion of treatment, a survey will be performed in accordance with paragraph 35.14(b)(5)(vii) of 10 CFR Part 35 to ensure that all sources other than permanent implants have been removed from the patient and that no sources remain in the patient's room or in any other area occupied by the patient. At the same time, all radiation signs will be removed and all film and TLD badges assigned to nurses will be collected. If the patient is to be discharged, the final survey will also include a notation on the patient's chart that the activity remaining in the patient meets conditions for release from the hospital.
8. Instructions to Nurses
 - a. Special restrictions may be noted on the precaution sheet on the patient's chart. Nurses should read these instructions before administering to the patient. The Radiation Safety Officer should be contacted to answer any questions about the care of these patients in regard to radiation safety precautions.
 - b. Nurses should spend only the minimum time necessary near a patient for routine nursing care. Obtain and wear a film or TLD badge or a pocket chamber as instructed by the Radiation Safety Officer.
 - c. When a nurse is assigned to a therapy patient, a film or TLD badge should be obtained immediately from the Radiation Safety Officer or his designee. The badge shall be worn only by the nurse to whom it is issued and shall not be exchanged among nurses.
 - d. Pregnant nurses should not be assigned to the personal care of these patients.
 - e. Never touch needles, capsules, or containers holding brachytherapy sources. If a source becomes dislodged, use long forceps and put it in the corner of the room or in the shielded container provided; contact Radiation Therapy, the Radiation Safety Officer, or the Nuclear Medicine Department at once.
 - f. Bed bath given by the nurse should be omitted while the sources are in place.
 - g. Perineal care is not given during gynecologic treatment; the perineal pad may be changed when necessary unless orders to the contrary have been written.
 - h. Surgical dressings and bandages used to cover the area of needle insertion may be changed only by the attending physician or radiologist and MAY NOT BE DISCARDED until directed by the radiologist. Dressings should be kept in a basin until checked by the Radiation Safety Officer or his designee.

Special orders will be written for oral hygiene for patients with oral implants.
 - i. No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments, or utensils unless specifically ordered, but these items should be saved for a check with a radiation survey meter to ensure that no sources have been inadvertently displaced into them.

* Be sure to submit complete responses to Items 20a through 20f in addition to referencing procedures in Appendix L.

Item 20 cont.

- j. All bed linens must be checked with a radiation survey meter before being removed from the patient's room to ensure that no dislodged sources are inadvertently removed.
- k. These patients must stay in bed unless orders to the contrary are written. In any event, patients will remain in their assigned rooms during the treatment period.
- l. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the precaution sheet on the patient's chart.
- m. Visitors should sit at least 3 feet (or 1 m) from the patient and should remain no longer than the time specified on the form posted on the patient's door and on his chart.
- n. No nurse, visitor, or attendant who is pregnant should be permitted in the room of a patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.

o. Emergency Procedures.

- (1) If an implanted source becomes loose or separated from the patient, or
- (2) If the patient dies, or
- (3) If the patient requires emergency surgery, immediately call _____

Telephone No. (days) _____

(nights) _____

- p. At the conclusion of treatment, call the Radiation Safety Officer to (1) survey the patient and room, (2) count the radiation sources to be sure that all temporary implants have been removed prior to discharging the patient, and (3) record a summary of the final survey results on the patient's chart. If any permanent implants are to remain in the patient, the Radiation Safety Officer will brief the patient on precautions for minimizing radiation exposure to others after discharge from the hospital.

ST. ANTHONY MEDICAL CENTER

Item 21 Procedures and precautions for use of Radioactive Gases

Xe-133

- A.
 - 1.
 - a. 6 studies per week.
 - b. 15mCi/study
 - 2. Possession limit = 100mCi
- B.
 - 1. Storage and handling area for Xe-133 will be the storage area #B in the hot lab (See drawing Item 11). Patient studies will be conducted in camera room.
 - 2. Exhaust, including hot lab and camera room together is 1000 CFM. The exhaust is 100% to roof. Closest occupancy is greater than 150 ft. away. The supply air to both hot lab and camera room is approximately 50% of exhaust rate, assuring negative pressure.
- C.
 - 1. Procedure protocol for the routine use of Xe-133 supplied by supplier and manufacturer of the administration and tray system.
 - 2. Special apparatus for the administration and trapping of Xe-133, supplied by Rad X Corp. is Ventil-Con-200A, Model 120. Instructions by supplier for gas trap cartridges will be followed.
 - 3. Nose clamps will be used to help reduce leakage.
- D. Emergency procedure in case of accidental release of Xe-133 would be to evacuate rooms and allow time for two complete room air changes.
- E. Persons in restricted areas will not inhale quantities of radioactive material in excess of 1×10^{-5} uCi/ml during 40 hrs per week for 13 weeks. (See calculations)
- F. Xenon disposal shall be accomplished by trap system or exhaust to roof of hospital, assuring concentration of less than 3×10^{-7} uCi/ml, averaged over one year. (See calculations)

CALCULATION SHEETXe-133ST. ANTHONY MEDICAL CENTERControlled area (hot lab & camera room)

$$A = 100\text{mCi} \times 1 \times 10^3 \text{uCi/mCi} = 1 \times 10^5 \text{uCi/week}$$

$$V = \frac{1 \times 10^5 \text{uCi/wk}}{1 \times 10^{-5} \text{uCi/ml}} = 1 \times 10^{10} \text{ml/wk}$$

Required ventilation rate assuming 100% loss to room (restricted area)

$$\frac{1 \times 10^{10} \text{ml/wk}}{40 \text{ hr/wk} \times 1.7 \times 10^6 \text{ml/hr/CFM}} = 1.5 \times 10^2 = 150 \text{ CFM}$$

Room exhaust rate (1000CFM) exceeds this by about 6 times.

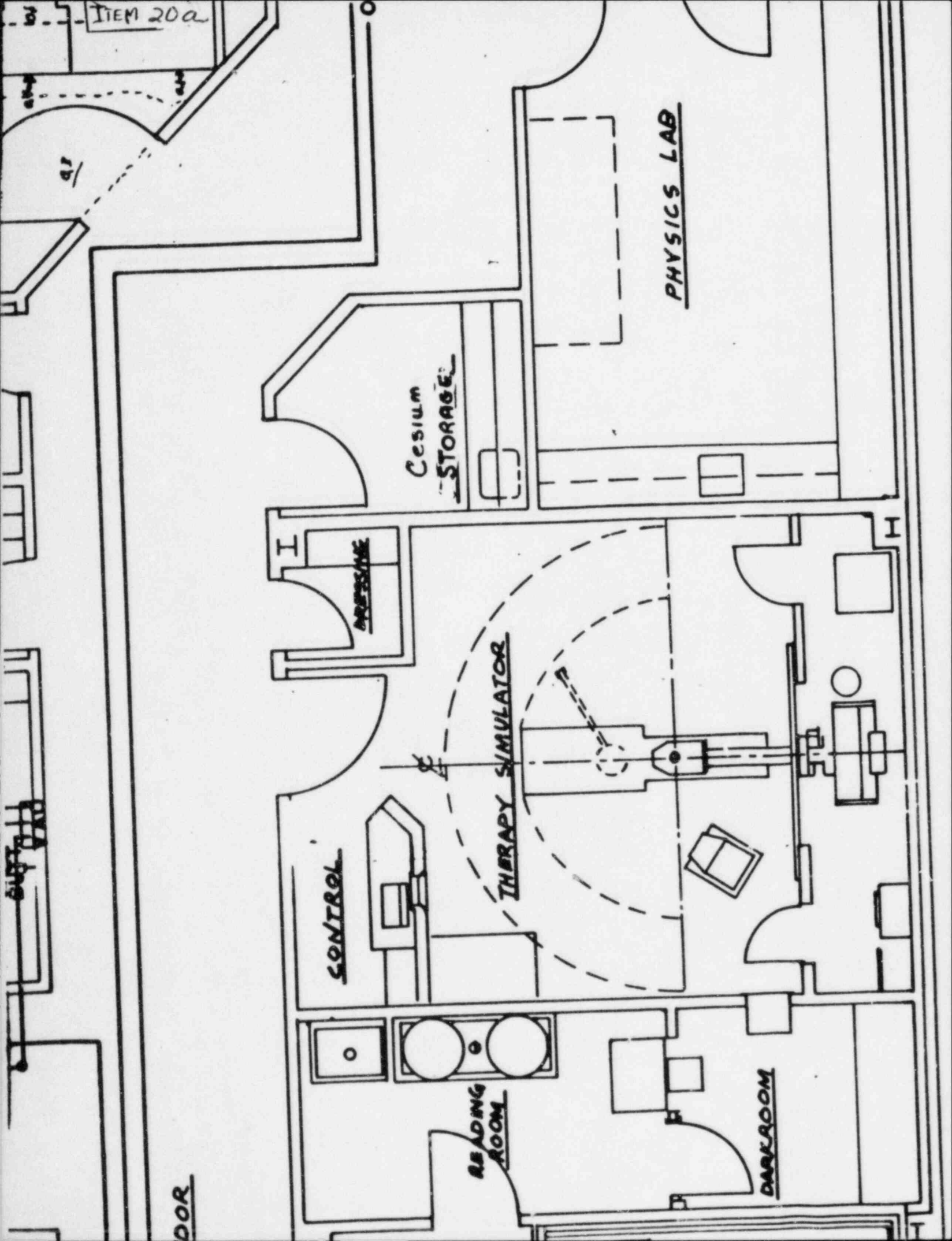
Non-controlled area- Disposal

Main disposal by RADX trap. However assuming disposal to roof by exhaust and assuming 50% loss.

$$1 \times 10^5 \text{uCi/wk} \times 52 \text{ wk/yr} = 5.2 \times 10^6 \text{uCi/yr.}$$

$$\frac{5.2 \times 10^6 \text{uCi/yr} \times 0.5}{1000 \text{CFM} \times 60 \text{ min/hr} \times 24 \text{ hr/day} \times 365 \text{ day/yr} \times 2.8 \times 10^4 \text{ml/ft}^3} = 1.8 \times 10^{-7} \text{uCi/ml.}$$

Conclusion: $1.8 \times 10^{-7} \text{uCi/ml} < 3 \times 10^{-7}$
 Therefore, acceptable for restricted area.



SHIELDING, STORAGE and WORK STATIONS

Item 206

Radioisotope Storage Safes

- Provide maximum radiation protection.



67-745
Four-Drawer
Storage Safe

Made of steel with 7.6 cm (3") or 10 cm (4") of lead. Each safe has a door key-lock and is fire-proof. Storage area in each drawer is 15 cm long x 4.4 cm wide x 4.7 cm deep (6" x 1 1/4" x 1 3/4").

All 7.6 cm (3") thick lead safes are supplied with lead inserts. Please state source dimensions and number of drilled holes desired.

Custom-Designed Drawers

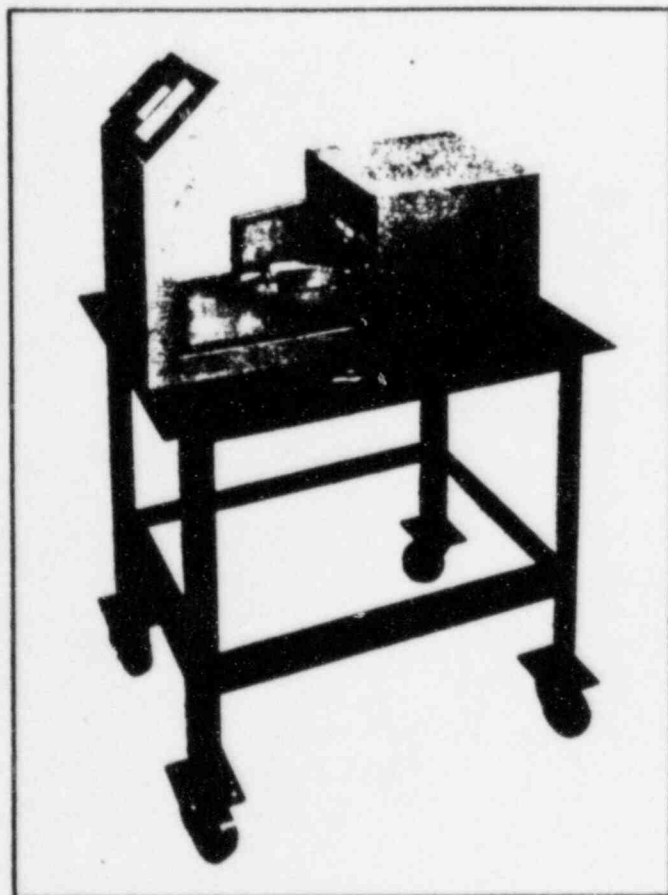
- 67-701 Special safe drawer with front opening drilled for storing ten (10) MICRAD sources.
- 67-703 Lead insert for safe drawer drilled with 36 holes for upright storage of tube sources. Required with 67-744, 67-745 and 67-746 Storage Safes.
- 67-704 Safe Drawer Insert for interstitial sources.

STORAGE SAFES—10 cm Lead

Model No.	No. of Drawers	Size of Safe			Net Weight
		Length	Width	Height	
67-743	1	36.8 cm (14 1/2")	26.7 cm (10 1/2")	26.7 cm (10 1/2")	344.7 Kg (760 lbs.)
67-744	2	36.8 cm (14 1/2")	31.8 cm (12 1/2")	26.7 cm (10 1/2")	306.2 Kg (675 lbs.)
67-745	4	36.8 cm (14 1/2")	32.4 cm (12 3/4")	32.4 cm (12 3/4")	430.9 Kg (950 lbs.)
67-746	6	36.8 cm (14 1/2")	38.1 cm (15")	32.4 cm (12 3/4")	521.6 Kg (1150 lbs.)

STORAGE SAFES—7.6 cm Lead

67-708	2	31.8 cm (12 1/2")	26.7 cm (10 1/2")	21.6 cm (8 1/2")	172.4 Kg (380 lbs.)
67-709	4	31.8 cm (12 1/2")	26.7 cm (10 1/2")	26.7 cm (10 1/2")	240.4 Kg (530 lbs.)
67-710	6	31.8 cm (12 1/2")	31.8 cm (12 1/2")	26.7 cm (10 1/2")	308.4 Kg (680 lbs.)



Radioisotope Shielded Work Station

- Assures optimum work conditions when using radioisotopes.

This sturdy work station is the ideal vehicle for the safe storage of radioisotopes. It provides optimum protection from radiation exposure when storing isotopes, and it has sufficient work and storage area to allow flexibility when using its contents. Heavy-duty 5" casters (on 67-650) lend mobility to the work station and permit the transportation of radioisotopes under hazard-free conditions.

Components and Options:

- 67-751 L-Block Lead Shield. Wall is 4.4 cm thick (1 3/4" shielding).
- 67-752 Heavy-Duty L-Block Lead Shield. 5 cm (2") shielding.
- Storage Drawer**
- 67-761 Stainless Steel Tray
- Shielded Storage Safe.** In 5 sizes.
- 67-750 Steel Table. Swivel casters.
- 67-749 Steel Table. Same as 67-750 but without casters.



67-753 Optional
Magnifying Viewing
Lamp