RADIATION
THERAPY
CONSULTANTS, P.C.

A. Don Wolff, M.D.

Warren Bryant, R.S.O.
Cleveland Radiation Therapy Consultants
St. B1, 3100 MacCorkle Ave., S.E.
Charleston, W.Va., 25304

Paul R. Guinn
USNRC
Region II, Nuclear Materials Safety Section
101 Marietta Street, Suite 2900
Atlanta, Ga., 30323

10 January 1986

Re: NRC License # 47-15717-03

Dear Sir,

As outlined in the application for our materials license; specifically in the relocation procedures, I have relieved the Radiation Safety Officer at CAMC of all responsibility for the Cs^{137} intracavitary sources. The J.L. Shepherd Model 10 calibrator with 100 mCi (nominal) Cs^{137} source is to remain with CAMC under their license until some internal administrative affairs are resolved.

Relocation of the intracavitary sources was without incident and the sources are now located in the area specified in the license application. All sources are accounted for and have been leak tested within the last six months.

Please contact me if there are any questions. Find attached the correspondence to the CAMC RSO prior to the relocation.

Sincerely,

Warren Bryant

C. RADIATION THERAPY CONSULTANTS

Patient's Name: _____

Room: # _____ Date: _____ Isotope _____

NURSING INSTRUCTIONS

1. Patient must be placed in a Private Room.
2. Pregnant nurses and other pregnant personnel should not be assigned to care of patients receiving radioactive source materials.
3. Door to patient's room will be labeled with a "Radioactive Materials" sign. This sign will be removed only by the Radiation Safety Officer or his designated representative.
4. No special precautions are needed for sputum, urine, vomitus, stool, dishes, instruments, utensils, unless specifically ordered. (Keep linens in room until patient discharged).
5. No children under 18 or pregnant women will be allowed to visit the patient.
6. In the event of an emergency involving the patient, specifically, call the Radiation Therapist. In the event of an emergency involving the radioactive sources specifically, call the Radiation Safety Officer or the Radiation Therapist. Never handle radioactive sources with hands.

RADIATION THERAPIST	RADIATION SAFETY OFFICER
A. Don Wolff, MD or Karen S. Caple, MD	Warren Bryant
372-4212 HOME 345-5777 HOME	744-7647 HOME
345-0667 OFFICE	345-0667 OFFICE

*If there are any questions regarding the type of implant done or the nursing care for the patient, do not hesitate to call the Radiation Therapist 345-0667.

The patient is no longer "radioactive" after the sources are removed.

Bedside attendance is limited to _____ minutes per day per person.

Visitors are limited to _____ minutes per day per person.
Visitors are not allowed to sit on the bed.

MPD (Daily) Attendants _____ Visitors _____

Survey (MR/hr) Bedside _____ at 1 M _____

TIME INSERTED			MATERIAL REMOVED FROM SAFE		MATERIAL RETURNED	
Date	Time	Int.	No.	mg.	No.	mg.
Expected removal date _____						
			No.	mg.	No.	mg.
Time Removal						
			No.	mg.	No.	mg.
Date	Time	Int.	No.	mg.	No.	mg.
			By	Date	By	Date

Checked _____

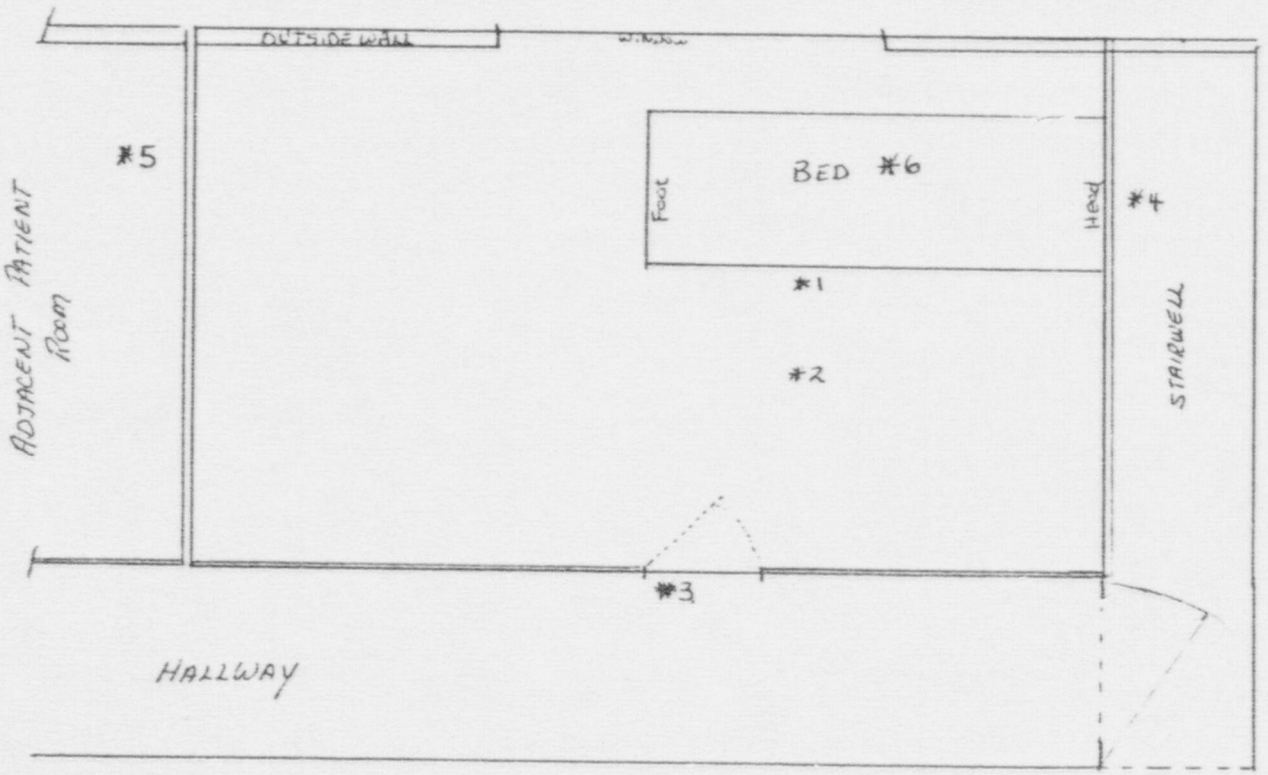
*If neither of the above can be contacted, contact the Hospital Radiation Safety Officer or Radiologist on call.

Revised 16 March 87

DATE: _____ Room #: _____

PATIENTS NAME: _____

ISOTOPE: _____ mgm RA equiv: _____



SURVEY LOCATION	mRem/hr
#1. BEDSIDE (0.5m from sources)	
#2. 1meter from sources	
#3. DOORWAY	
#4. ADJACENT AREA (8" from wall)	
#5. ADJACENT AREA (8" from wall)	
#6. POST REMOVAL SURVEY (PATIENT)	

} EXACT LOCATION = area of highest exposure rate.

SURVEY INSTRUMENT: _____

CALIBRATION DATE: _____

CONSTANCY CHECKED: _____ _____

WARREN BRYANT
RADIATION SAFETY OFFICER
CRTC

_____

A-80

ASSOCIATED RADIOLOGISTS INC.
RADIATION ONCOLOGY
CHARLESTON, WEST VIRGINIA 25304

MONTHLY INVENTORY OF Cs-137 SOURCES

DATE: TIME:

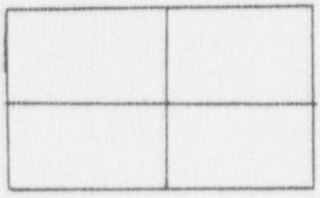
20 mg. Ra Eq (total -4)			15 Mg Ra Eq (total -6)			10 mg. Ra Eq (total -4)		
In use now	In safe	Total	In use now	In safe	Total	In use now	In safe	Total

Signature:

Labels

3 M20 -	3 M15-	3M10-
0181	0202	0235
0193	0207	0232
0183	0104	0204
0182	0189	0215
	0193	
	0185	

Location in the drawer



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 1m) from the patient with sources implanted and at the patient's bedside. 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. At the conclusion of treatment, a survey will be performed in accordance with paragraph 35.404 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.

6. 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.

   c. In the event a private duty nurse is assigned to a therapy patient, personnel radiation dose monitoring means, including at least a film badge, will be immediately obtained. Assigned monitoring devices will be worn only by the nurse to whom it is issued and will 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 RADIATION SAFETY OFFICER. 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.

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 1m) 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 and/or physicist 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 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.

Memorial Division

Xenon-133 Handling Procedures

Quantity to be Used

1. A maximum of 473 patients per year will be studied with an average activity of 20.0 millicuries per patient.
2. Desired possession limit: 600 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 Imaging Room 130/132 is approximately 310/225, with an 8foot ceiling, for a total volume of 2480/1800 cubic feet. The room will be under negative pressure with the normal air return system exhausted directly to the outside atmosphere. The exhaust vents in both imaging rooms are in walls behind the imaging camera detectors and less than 12 inches above the floor.
2. The Hot Lab, where radioactive material is stored and prepared for dosing, is approximately 208 ft, with an 8 foot ceiling, for a total volume of 1664 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 intergrated 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 vent exhaust rates of 419 cfm, the room will remain vacated for a minimum of 60 minutes, which will allow for at least 10 air exchanges in the Camera Room.

Emergency Procedures (Continued)

3. At the end of 60 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 15 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 130 & 132

   A. A = maximum activity used per week

   $A = (20.0 \text{ mCi/pt})(9 \text{ pt/week})(1 \times 10^{3} \text{ uCi/mCi}) = 1.80 \times 10^{5} \text{ uCi/wk}$

   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.

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

$$V = \frac{(1.8 \times 10^{5} \text{ uCi/wk} \times .2)}{1 \times 10^{-5} \text{ uCi/ml}} \left(\frac{\text{ft}^3/\text{min}}{6.8 \times 10^{7} \text{ ml/40hr wk}} \right)$$

$$= 52.9 \text{ ft}^3/\text{min}$$

2. Hot Lab

   A. A = Maximum activity on hand per week

   $A = 600 \text{ mCi} = 6.0 \times 10^{5} \text{ uCi}$

   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.

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

$$V = \frac{(6.0 \times 10^5\ uCi/wk \times .05)}{1 \times 10^{-5} uCi/ml} \left(\frac{ft^3/min}{6.8 \times 10^7 ml/40hr\ wk} \right)$$

$$= 44.0\ ft^3/min$$

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 wall vents. There is no recirculation of exhausted air within the facility and the point of exit for the exhaust duct is at least 50.0 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 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 Rm. 130 & Rm. 132

   A. A = Maximum amount to be used per year

   $$A = (20 \text{ mCi/pt})(9 \text{ pt/wk})(1 \times 10^{3} \text{uCi/mCi})(52 \text{ wks/yr}) =$$

   $$9.36 \times 10^{6} \text{ uCi/yr}$$

   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.

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

   $$V = \frac{9.36 \times 10^{6} \text{uCi/yr} \times .2}{3.0 \times 10^{-7} \text{ uCi/ml}} \left(\frac{\text{ft}^3/\text{min}}{1.49 \times 10^{10} \text{ ml/yr}} \right)$$

   $$V = 419 \text{ ft}^3/\text{min}$$

Concentrations of Effluents to Unrestricted Areas (Continued)

2. Hot Lab Exhaust

A. A = Maximum amount to be released per year

$A = (600\ mCi/wk)(52\ wk/yr)(10^3 uCi/mCi) = 3.12 \times 10^7 uCi/yr$

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.

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

$$V = \frac{3.12\times10^7 uCi/yr\ (.05)}{3\times10^{-7}\ uCi/ml} \left(\frac{ft^3/min}{1.49\times10^{10}\ ml/yr} \right)$$

$V = 349\ ft^3/min$

Summary

The minimum ventilation rates required to maintain concentrations of Xe-133 in a restricted area below 1×10^{-5}uCi/ml are 52.9 ft3/min in both the hot lab and camera room. The minimum ventilation rates to maintain airborne concentrations of Xe-133 in an unrestricted area below 3×10^{-7}uCi/ml are 4.9 ft3/min in both the hot lab and camera room.

The ventilation rates in the camera room and hot lab will be no less than 419 ft3/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.

General Division

Xenon-133 Handling Procedures

Quantity to be Used

1. A maximum of 208 patients per year will be studied with an average activity of 20 millicuries per patient.

Use and Storage Areas

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

Description of Ventilation System

1. The area of the Camera Room is approximately 17 x 18, with an 8 foot ceiling, the area of the adjacent room is approximately 17 x 28 with a 10 foot ceiling, for a total volume of 7208 cubic feet. The room will be under negative pressure with the normal air return system exhausted directly to the outside atmosphere at the rate of 1000 cfm through exhaust vents in the Camera Room.

2. The Hot Lab, where radioactive material is stored and prepared for dosing, is approximately 10' x 14' with an 8 foot ceiling for a total volume of 1120 cubic feet. Room air is exhausted to the outside atmosphere at a rate no less than 2.4 cfm through the ceiling vent.

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 a 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 room(s) will be evacuated immediately and the doors closed.

2. The room(s) will remain vacated for a minimum of 36 minutes, which will allow for at least 5 air exhanges in the Camera Room.

Emergency Procedures (Continued)

3. At the end of 36 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 36 minutes and then monitored again to assure that no Xe-133 is present.

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 corrective action, i.e. change of filter, repair, or replacement of exhaust duct, etc.

2. If there should be leakage in the gas trap system, the Xe-133 gas will be exhausted to the outside, or unrestricted area, through the ceiling exhausts at the rate of 1000 cfm.

3. If there should be an accidental release of Xe-133 in the camera room, the gas will exhausted to the outside or unrestricted area through the ceiling exhaust vent at the rate of 1000 cfm in the camera room.

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, on a quarterly basis.

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.

Concentration of Xe-133 in Restricted Area

MPC for restricted areas is 1.0×10^{-5} uCi/ml

Concentration of Xe-133 in Restricted Area (Continued)

Camera Room

The required ventilation rate is 23.5 cfm. The actual rate is 1000 cfm.

$A = (20\ mCi/patient)(4\ patients/week)(1 \times 10^{3} uCi/ml)$

$= 8 \times 10^{4} uCi/week$

Assume a loss rate of 20%

$$V = \frac{A \times f}{1x10^{-5} uCi/ml}$$

$$= \frac{(8x10^{4} uCi/week)(0.2)}{1x10^{-5} uCi/ml}$$

$= 1.6 \times 10^{9}$ ml/wk

$$\text{Required} = \frac{(1.6x10^{9} ml/week)}{(40\ hr/week)} \times \frac{ft^{3}/min}{1.7x10^{6} ml/hr}$$

$= 23.5$ cfm

Hot Lab

The required ventilation rate is 2.4 cfm. No more than 3 vials of Xe-133 will be stored.

$A = (20\ mCi/pt)(4\ pt/wk)(1x10^{3} uCi/ml)$

$= 8 \times 10^{4}$ uCi/wk

Assume a loss rate of 2%

$$V = \frac{A \times f}{1x10^{-5} uCi/ml}$$

$$= \frac{(8x10^{4} uCi/wk)(.02)}{1x10^{-5} uCi/ml}$$

$= 1.6 \times 10^{8}$ ml/wk

$$\text{Required} = \frac{(1.6x10^{8} ml/wk)}{40\ hr/week} \times \frac{ft^{3}/min}{1.7x10^{6} ml/hr}$$

$= 2.4$ cfm

Concentration of Effluents to Unrestricted Areas

MPC for unrestricted areas is 3.7×10^{-7} uCi/ml

Exhausted air from the hot lab and camera room is combined with additional exhaust systems in the hospital. The exhausted air is released at a rate greater than 1000 cfm via roof top exhausts. The average concentrations of Xenon-133 released to an unrestricted area is less than 6.14×10^{-8} uCi/ml. This is almost one order of magnitude less than MPC.

1. Maximum amount to be released per year from the camera room and hot lab exhaust is 9.15×10^{5} uCi/yr.

   Camera Room - Assume a loss rate of 20%

   $A = (4\text{pt/wk})(20\text{mCi/pt})(10^{3}\text{uCi/mCi})(52\text{ wks})(.2)$

   $= 8.32 \times 10^{5}$ uCi/yr

   Hot Lab - Assume a loss rate of 2%

   $A = (20\text{mCi/pt})(4\text{pt/wk})(52\text{wks/yr})(.02)(10^{3}\text{uCi/mCi})$

   $= 8.32 \times 10^{4}$ uCi/yr

   Total exhaust = 8.32×10^{5} uCi/yr + 8.32×10^{4} uCi/yr

   = 9.15×10^{5} uCi/yr

2. Total air available for dilution is 1.49×10^{13} ml/yr

   $V = (1000\text{ cfm})(1.49 \times 10^{10}\ \frac{\text{ml/yr}}{\text{cfm}})$

   $= 1.49 \times 10^{13}$ ml/yr

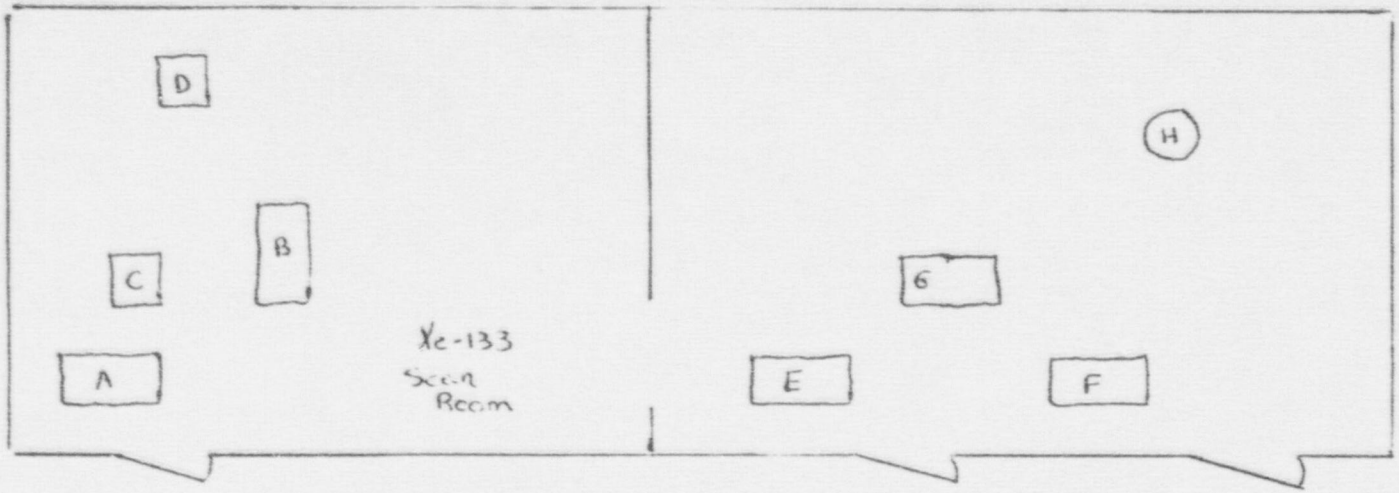
3. Average concentration of released Xenon is 6.14×10^{-8} uCi/ml

   $$C = \frac{9.15 \times 10^{5}\text{uCi/yr}}{1.49 \times 10^{13}\text{ml/yr}}$$

   $= 6.14 \times 10^{-8}$ uCi/ml

   The average amount of Xenon-133 that can be released without exceeding an average concentration of 3×10^{-7}uCi/ml at an exhaust rate of 1000 cfm is 85.6 mCi, whereas, the maximum anticipated release is 20 mCi.

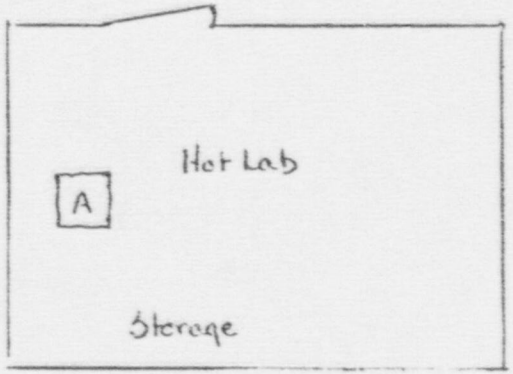
General Division



3/84

A		Input	5½ x 17½"	123 cfm
B		Exhaust	11 x 24"	1440 cfm
C		Input	9 x 9"	120 cfm
D		Exhaust	9 x 14"	360 cfm
E			5½ x 17½	
F			5½ x 17½	
G			5½ x 17½	
H			9" radius	

A-94



A Exhaust

It is requested that licensure for the Lunar GD series of sealed Gd-153 sources (or equivalent NRC registered sealed sources) for use in the Lunar DP3 Dual Photon Bone Densitometer be added to this license. A total possession limit of 3.0 Curies is requested. This will facilitate a new source in the scanning unit and a depleted source which has been replaced by the above referenced new source on board until shipment back to the source manufacturer.

Each source will not exceed 1.5 Curies nominal activity by percent greater than the manufacturer's calibration accuracy. The source in use in the densitometer will be the only Gd-153 routinely in possession of the licensee in the absence of an on-board exchange source.

The densitometer unit will be maintained by factory trained personnel or other duly trained and qualified persons.

The Lunar DP3 Dual Photon Absorptiometry unit is recognized via U.S.N.R.C. devise registration # NR-430-D-101S.

This densitometer will be located and used at 800 Pennsylvania Avenue, Charleston, West Virginia 25302.

Documentation for items in 6.b. has been previously referenced on page 1. The applicable pages are A-4, A-5 thru A-11, A-12 thru A-15, and A-95.

The facility ALARA program is forwarded on the following pages A-97 thru A-103.

CHARLESTON AREA MEDICAL CENTER

3200 MacCorkle Avenue, S. E. • Charleston, West Virginia 25304 • P.O. Box 4396
304/348-5432

FOREWORD

Ionizing radiation is among the most versatile and useful tools of modern medicine and biomedical research. Like many other instrumentalities of medicine, ionizing radiation is potentially hazardous unless used with strict adherence to safety rules and procedures. Thus, the safety rules which gomern the uses of radiation are concerned with preventing genetic damage as well as with protecting the health of the exposed individual.

The rules and procedures set forth here have one single, straightforward purpose: to protect the patients, employees, and visitors from unnecessary and potentially harmful radiation.

The existing radiation safety porgram has many facts designed to keep the levels of exposure to personnel at a minimum. This program has three main phases:

PHASE I

Achieve the objective of maintaining radiation exposures to "As Low As Reasonably Achievable" (ALARA) to employees, visitors, students, and patients who are not under medical supervision for the administration of radiation or radioactive materials for diagnostic or therapeutic purposes.

PHASE II

Control operational procedures by the user of radiation sources.

PHASE III

Evaluate the radiation safety program performed by the Radiation Safety Officer, health physics consultant, and the Radiation Safety Committee.

We, the management of this hospital, are committed to the program procedures and develop new procedures as appropriate to implement the ALARA concept.

Administrator

Date

RADIATION SAFETY PROGRAM (ALARA)

I. INTRODUCTION

A. Purpose

This program sets forth the philosophy and general management policies that are established by this hospital to achieve the objective of maintaining radiation exposures to "as low as reasonably achievable" (ALARA), for employees, visitors, students, and patients not under medical supervision for the administration of radiation or radioactive materials for diagnostic or therapeutic purposes.

B. Policy

In addition to complying with the limits set forth in pertinent regulations, guides, and standards, users and supervisors of radiation sources shall make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas to as low as reasonably achievable.

II. MANAGEMENT COMMITMENT

A. The management and the entire staff of this hospital are committed to the program described herein for keeping radiation exposures, individual and collective, to as low as reasonably achievable.

B. We will perform a formal annual review of the radiation safety program including ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants.

C. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

D. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

E. The services of Health Physics Services, Inc., have been contracted to assist in the program management to insure that all pertinent hospital staff and employees receive appropriate briefings and training in radiation safety including ALARA concepts.

III. RADIATION SAFETY COMMITTEE

In addition to other responsibilities delineated in pertinent radiation control standards, the Radiation Safety Committee (RSC) shall:

A. Determine whether current procedures are, in fact, maintaining radiation exposures to ALARA. The efforts of the radiation safety officer (RSO), health physics consultant, users and supervisors of radiation sources will be reviewed during the committee meeting.

B. When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should have systematized procedures to ensure ALARA, and shall have incorporated the use of special equipment such as syringe shields, rubber gloves, etc., in his proposed use.

C. Perform an annual audit of all aspects of the radiation safety program to insure that the overall philosophy and policies of the ALARA program are being accomplished.

D. The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and the uses for which he has applied, to assure that the applicant will be able to take appropriate measures to maintain exposure ALARA.

E. Delegation of Authority

1. The RSC will delegate authority to the RSO and his consultant staff for enforcement of the ALARA concept.

2. The RSC will support the RSO in those instances where it is necessary for the RSO to assert his authority. Where the RSO has been overruled, the Committee will record the basis for its action in the minutes of the Committee's quarterly meeting.

F. Review of the ALARA program

1. The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.

2. The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table 1 below are exceeded. The principle purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded.

3. The RSC will evaluate our institution's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers as well as those of management.

IV. RADIATION SAFETY OFFICER, AND HIS CONSULTANT STAFF ARE RESPONSIBLE FOR THE FOLLOWING:

A. Annual and Quarterly Review

1. Annual review of the Radiation Safety Program. The RSO will perform an annual review of the Radiation Safety Program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.

2. Quarterly review of Occupational Exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of paragraph VII of this program.

3. Quarterly review of records of Radiation Level Surveys. The RSO will review radiation levels in unrestricted andf restricted areas to determine that they were at ALARA levels during the previous quarter.

B. Education Responsibilities for an ALARA Program

1. The RSO will schedule briefings and educational sessions to inform workers of ALARA program efforts.

2. The RSO will assure that authorized users, workers, and ancillary personnel who may be exposed to radiation will be instructed in ALARA philosophy and informed that management, the RSC and the RSO are committed to implementing the ALARA concept.

C. Cooperative Efforts for Development of ALARA Procedures

Radiation workers will be given opportunities to participate in the formulation of the procedures that they will be required to follow.

1. The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.

2. The RSO will establish procedures for receiving and evaluating the suggestion of individual workers for improving health physics practices and encourage the use of those procedures.

D. Reviewing Instances of Deviation from Good ALARA Practices

The RSO will investigate all known instances of deviation from good ALARA practices and, if possible, determine the causes. When the cause is known, the RSO will require changes in the program to maintain exposures ALARA.

V. AUTHORIZED USERS

A. New Procedures Involving Potential Radiation Exposures

1. The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radiation sources for a new procedure.

2. The authorized user will evaluate all procedures before using radiation sources to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

B. Responsibility of the Authorized User to Those He Supervises

1. The authorized user will explain the ALARA concept and his commitment to maintain exposures ALARA to all of those he supervises.

2. The authorized user will ensure that those under his supervision who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

VI. PERSONS WHO RECEIVE OCCUPATIONAL RADIATION EXPOSURE

A. The worker will be instructed in the ALARA concept and its relationship to his working procedures and work conditions.

B. The worker will know what recourses are available if he feels that ALARA is not being promoted on the job.

VII. ESTABLISHMENT OF INVESTIGATIONAL LEVELS IN ORDER TO MONITOR INDIVIDUAL OCCUPATIONAL EXTERNAL RADIATION EXPOSURES

This institution hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the Radiation Safety Officer or consultant staff. The Investigational Levels that we have adopted are listed in Table 1 below. These levels apply to the exposure of individual workers.

TABLE 1

	Investigational Levels - (mrems per calendar quarter)	
	LEVEL I	LEVEL II
1. Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	125	375
2. Hands and forearms; feet and ankles	1875	5625
3. Skin of whole body*	750	2250

* Not normally applicable to medical facilities except those using significant quantities of beta emitting isotopes.

The Radiation Safety Officer will review the results of personnel monitoring, film badge report, not less than once in any calendar quarter, as is required by 10 CFR 20, 20.401. The following actions will be taken at the Investigational Levels as stated in Table 1:

A. Quarterly exposure of individuals to less than Investigational Level I.

Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's exposure is less than Table 1 values for the Investigational Level I.

B. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II.

The RSO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I. He will report the results of his reviews at the first RSC meeting following the quarter when the exposure was recorded. If the exposure does not equal or exceed Investigational Level II, no action

related specifically to the exposure is required unless deemed appropriate by the Committee. The Committee will, however, consider each such exposure in comparison with those of others performing similar tasks as an index of ALARA program quality and will record the review in the Committee minutes.

C. Exposure equal to or greater than Investigational Level II.

The RSO will investigate in a ti[illegible]y manner the cause(s) of all personnel exposures equaling or e[illegible]eeding Investigational Level II and, if warranted, take action. A report of the investigation, actions taken, if any, and a copy of the individual's film badge record will be presented to the RSC at the first RSC meeting following completion of the investigation. The details of these reports will be recorded in the Committee minutes. Committee minutes will be sent to the management of this institution for review. The minutes, containing details of the investigation, will be made available to NRC inspectors for review at the time of the next inspection.

D. Re-establishment of an individual occupational worker's Invewstigational Level II above that listed in Table 1.

In cases where a worker's or a group of workers' exposure needs to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Levewl II will be documented.

The Radiation Safety Committee will review the justification fro, and will approve, all revisions of Investigational Levels II. In such cvases, when the exposure equals or exceeds the newly established Investigational Level II, thuse actions listed in paragraph C above will be followed.

VIII. SIGNATURE OF CERTIFYING OFFICIAL

I hereby certify that this institution has implemented the ALARA Program set forth above.

Signature of Administrator

Name (type or print)

Exec. Vice President

Title