NRC FORM 313
(7-86)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS. IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
NUCEAR MATERIALS SAFETY SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
NUCLEAR MATERIALS SAFETY SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER #40-07328-03

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

St. Mary's Hospital
803 North Dakota
Pierre, South Dakota 57501

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED:

Same as #2.

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION | TELEPHONE NUMBER

Mark J. Kapelinski, Executive Vice President, Stan A. Huber Consultants | (815) 485-6161

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time: See attached.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED: See attached.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE: See attached.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS: See attached.

9. FACILITIES AND EQUIPMENT: See attached.

10. RADIATION SAFETY PROGRAM: See attached.

11. WASTE MANAGEMENT: See attached.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: 7C | AMOUNT ENCLOSED: $580.00

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE–CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
	James Russell	Administrator	07-28-87

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS
- [ ] <$250K
- [ ] $250K–500K
- [ ] $500K–750K
- [ ] $750K–1M
- [ ] $1M–3.5M
- [ ] $3.5M–7M
- [ ] $7M–10M
- [ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial–proprietary–information furnished to the agency in confidence.)*
- [ ] YES
- [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
	3801220406 870806 REG4 LIC30 40-07328-03	PDR	for fee info per app. dated 6/16/87	DATE 8/14/87

REF: NRC 313 ITEM 5 AND 6

ITEM 5 - BYPRODUCT MATERIAL	AMOUNT	ITEM 6 - PURPOSE
A) MATERIAL IN 35.100	AS NEEDED	MEDICAL USE
B) MATERIAL IN 35.200	AS NEEDED	MEDICAL USE

REF: NRC 313 ITEM 7

RADIATION SAFETY OFFICER & AUTHORIZED USERS

ITEM 7.1 - RADIATION SAFETY OFFICER

TRAINING, DUTIES, AND AVAILABILITY

The training and experience descriptions of the Radiation Safety Officer are appended to this application or referenced as already on file with the NRC.

The R.S.O. is responsible for the overall Radiation Protection Program within the institution. The R.S.O. has authority to implement and enforce all NRC license stipulations and regulations pertaining to the institution on a daily basis and has the authority to immediately terminate any hazardous operation. The R.S.O.'s responsibilities involve not only routine applications and occupational personnel within the restricted areas using radioactive materials in the institution, but also all non-occupational personnel and visitors in non-restricted areas, as well as security and handling procedures from the time radioactive shipments arrive in the hospital, day or night, through the time all such sources are properly used or disposed. The R.S.O. must provide and document extensive education (initially, as needed, and at least annually) of all personnel and public who may come within the vicinity of radioactive materials.

The R.S.O. must provide back-up 24 hours per day coverage during illness, vacations, or emergency, by providing Administration and the occupational personnel with the phone numbers of consulting physical scientists and the Regional NRC Division of Compliance.

ATT 7.1.1

AUTHORIZED USERS

NAME	AUTHORIZED USER
RADIATION SAFETY OFFICER	
Dai M. Park, M.D.	Item 5 A) B)

For training and experience, please reference License No. 40-07328-03

ATT 7.1.2

AUTHORIZED USERS

NAME	AUTHORIZED USER
G. M. Huet, M.D.	Item 5 A) B)
Dai H. Park, M.D.	Item 5 A) B)
Paul Bloom, Jr., M.D.	Item 5 A) B)

For training and experience, please reference License No. 40-07328-03.

REF. NRC 313 - ITEM 8

APPENDIX A

PERSONNEL TRAINING PROGRAM

We will establish and implement the model training program that was published in Appendix A to Regulatory Guide 10.8, Revision 2 and append a table ATT 8.1 that identifies the groups of workers who will receive training and the method of training.

ATT 8.1

WORKERS RECEIVING TRAINING AS STATED IN APPENDIX A:

Nuclear Medicine Personnel

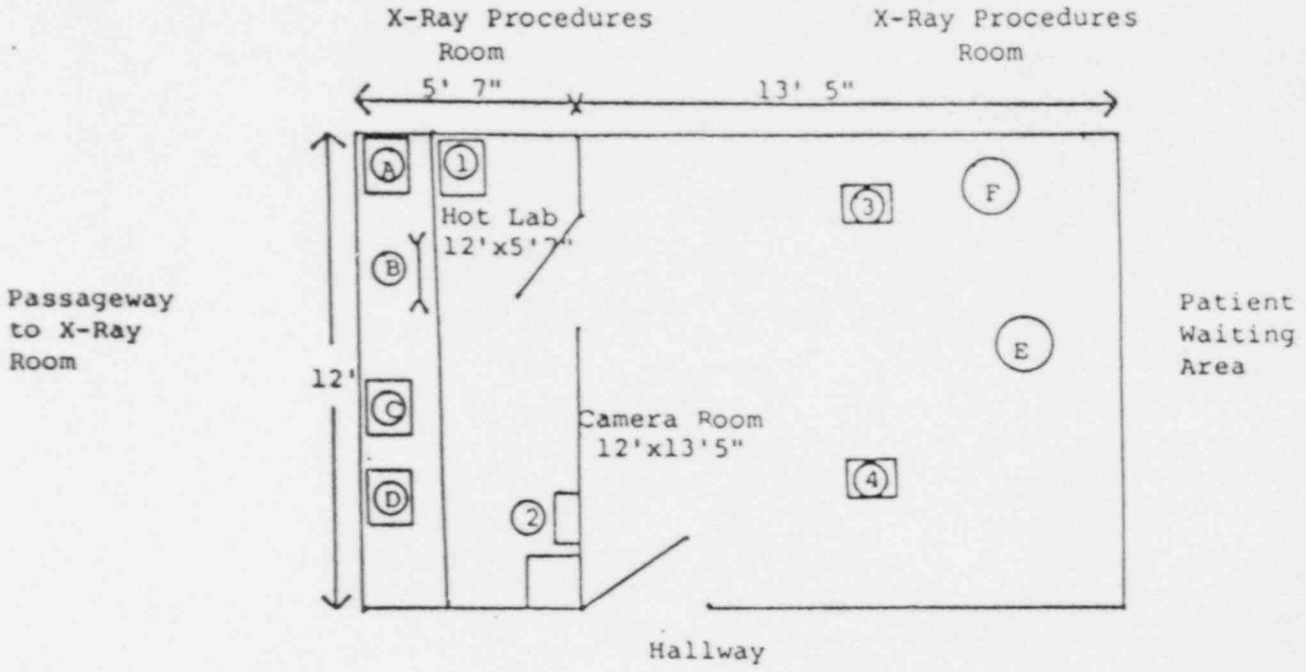
Housekeeping Personnel

Security Personnel, or other designated individuals, who are responsible for the off-duty hour receipt of radioactive materials.

Training will be in the form of lectures, demonstrations, slide presentations, or written instructions.

St. Mary's Hospital

Pierre, South Dakota 57501



Key:

A. Generator and radiation storage
B. Dose preparation area
C. Dose calibrator
D. Sink
E. Camera detector head
F. Camera console

Air Flow Key:

1. Hot Lab Exhaust, 100 cfm
2. Hot Lab Supply, 70 cfm
3. Camera Room Exhaust, 250 cfm
4. Camera Room Supply, 210 cfm

REF: NRC 313 ITEM 9.2

CALIBRATION OF SURVEY METERS

We will establish and implement the model procedure for calibrating survey instruments that was published in Appendix B to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 9.3

PROCEDURE FOR CALIBRATING DOSE CALIBRATOR

We shall follow the calibration methods and frequencies for dose calibrators as defined in the NRC Regulatory Guide 10.8, Revision 2, Appendix C.

For the linearity test, we will use a vial of Tc-99m, whose activity is equivalent to the maximum anticipated activity to be assayed. For the accuracy test, Stan A. Huber Consultants, Inc., of New Lenox, IL, or other licensed calibration firm, will use the following sources under the authority of their NRC license #12-17503-01:

Model NES-356, 200 microcuries of Cs-137 (high energy)

Model NES-352, 1 millicurie of Co-57 (low energy)
(or other NRC approved Co-57 calibration sources of greater millicurie activity)

Model NES-358, 250 microcuries of Ba-133 (medium energy)

(the minimum activities used for dose calibrator accuracy checks are 100 uCi each for Cs-137 and Ba-133, and 1 mCi for Co-57

We use a NEN Model NES-356, Cs-137 standard, 100 - 300 uCi, or any approved similar standard for our day of use dose calibrator constancy checks. Records of all tests and checks will be maintained.

We request use of the "Calicheck" (Calcorp) system or "Lineator" (Atomic Products) system as an alternate method of performing dose calibrator quarterly linearity checks. The product certifications for these devices are on file with the NRC.

REF: NRC 313 ITEM 9.4

PERSONNEL MONITORING

We will establish and implement the model personnel external exposure monitoring program published in Appendix D to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.1

RADIATION SAFETY COMMITTEE

We will establish and implement the model procedures for establishing and operating a Radiation Safety Committee that was published in Appendix F to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.2

ALARA

We will establish and implement the model ALARA program that was published in Appendix G to Regulatory Guide 10.8, Revision 2.

REF: NRC 3'3 ITEM 10.3

LEAK TEST PROCEDURES

We will establish and implement the model procedure for leak testing sealed sources that was published in Appendix H to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.4

SAFE USE OF RADIOACTIVE PHARMACEUTICALS

We will establish and implement the model safety rules published in Appendix I to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.5

SPILL PROCEDURES

We will establish and implement the model spill procedures published in Appendix J to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.6

ORDERING AND RECEIVING OF RADIOACTIVE MATERIALS

We will establish and implement the model guidance for ordering and receiving radioactive material that was published in Appendix K to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.7

OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS

We will establish and implement the model procedure for opening packages that was published in Appendix L to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.8

M.1 RECORDS OF UNIT DOSAGE USE

We will establish and implement the model procedure for a unit dosage record system that was published in Appendix M.1 to Regulatory Guide 10.8, Revision 2.

M.2 RECORDS OF MULTIDOSE VIAL USE

We will establish and implement the model procedure for a multidose vial record system that was published in Appendix M.2 to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.10

MO-99 CONCENTRATION RECORDS

We will establish and implement the model procedure for measuring and recording molybdenum concentration that was published in Appendix M.3 to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.12

AREA SURVEY PROCEDURES

We have developed survey procedures for your review that are appended as ATT 10.12.

Ambient Exposure Rate Surveys

1. Survey Areas

   a. In radiopharmaceutical elution, preparation, and administration areas, survey at the end of each day of use with a low-range survey meter. If diagnostic administrations are occasionally made in patients' rooms and special care is taken to remove all paraphernalia, those rooms need not be surveyed.

   b. In laboratory areas where only small quantities of gamma-emitting radioactive material are processed (less than 200 microcuries at a time), survey monthly with a low-range survey meter.

   c. In radiopharmaceutical storage and radiopharmaceutical waste storage areas, survey weekly with a low-range survey meter.

   d. In sealed source and brachytherapy storage areas, survey quarterly with an ionization chamber survey meter.

2. Immediately notify the RSO if you find unexpectedly high or low levels.

Removable Contamination Surveys

1. Survey Areas

   a. In radiopharmaceutical elution, preparation, and administration areas, survey weekly for removable contamination. If diagnostic administrations are occasionally made in patients' rooms and special care is taken to remove all paraphernalia, those rooms need not be surveyed.

   b. In laboratory areas where only small quantities of gamma-emitting radioactive material are processed (less than 200 microcuries at a time), survey monthly for removable contamination.

   c. In radiopharmaceutical storage and radiopharmaceutical waste storage areas, survey weekly for removable contamination.

2. The wipe sample assay procedure should be sufficiently sensitive to detect the presence of 200 dpm/100 square cm of removable contamination. You must use a radioactive source with a known amount of activity to convert sample measurements (usually in counts per minute) to dpm.

3. Immediately notify the RSO if you find unexpectedly high levels.

Records

1. Keep a record of exposure rate and contamination survey results. It must include the following information:

   a. The date, area surveyed, and equipment used.

b. The name or initials of the person who made the survey.

c. A drawing of the areas surveyed and contamination and exposure rate action levels as established by the RSO. (Recommended removable surface contamination action levels are published in Regulatory Guide 8.23, "Radiation Safety Surveys at Medical Institutions.")

d. Measured exposure rates in mR/hr or contamination levels in dpm/100 square cm, as appropriate.

e. Actions taken in the case of excessive exposure rates or contamination and follow-up survey information.

2. The RSO will review and initial the record at least monthly and also promptly in those cases in which action levels were exceeded.

Alternate method of assaying wipe test (smear test) samples in detecting surface contamination. Because of the relatively small quantities of radioactive materials used at our facility, we feel the following procedure is sufficient to detect surface contamination levels:

a. Wipe test samples will be assayed by holding the smear immediately adjacent to the open window of our low level g.m. survey meter. Care will be taken to avoid contamination of the probe.

b. The smear will be held adjacent to the probe for approximately 30 seconds to ensure that any contamination over normal background levels will be detectable

c. Normal background levels at our facility are approximately 0.05 mR/hr. Any wipe test reading over that level will indicate the need to decontaminate the tested area.

RE: NRC 313 ITEM 11.1

WASTE DISPOSAL

We will establish and implement the general guidance and model procedure for waste disposal that were published in Appendix R to Regulatory Guide 10.8, Revision 2.

REF: NRC 313 ITEM 10.13

AIR CONCENTRATION CONTROL

We have attached "Supporting Documentation for Use of Xe-133" for your review.

St. Mary's Hospital
803 East Dakota
Pierre, South Dakota 57501

Supporting Documentation for Use

of Xe-133

Date: June 1987

In support of our request to use Xe-133 for lung ventilation procedures, we submit the following information as outlined in Appendix M, "Procedures and Precautions for Use of Radioactive Gases", of Regulatory Guide 10.8.

1. Quantities to be used:

   a. (1) We anticipate the maximum annual number of Xe-133 patient studies to be 100 for an average weekly total of 2 patients.

   (2) At 20 mCi/patient, our average weekly utilization of Xe-133 would be 20 mCi.

   b. We request a possession limit of 200 mCi to provide for Xe-133 decaying in storage and for shipments whose calibration dates are several days after receipt.

2. Use and Storage Areas

   a. Attached is a facility sketch showing the areas in which we plan to use and store the Xe-133. Vent locations and planned air flow rates are shown on the sketch. Xe-133 shipments will be stored in the lead shielded hot lab area.

   b. Air flow rates of the vents will be as follows:

   (1) Fraction of air recirculated into other areas of the facility = 0%.

   (2) Exhaust: At least 350 cfm. This exhaust is direct to the outside and is at least 20 feet distant from the nearest hospital intake duct. No blocking objects will be placed in front of the exhaust vents.

   c. We confirm that total supply vent air at this location will be kept at least 10% below the total exhaust vent rates to ensure a negative pressure effect.

3. Procedures for routine use:

   a. NEN's "CALIDOSE" dispensing system or other NRC licensed system will be used to inject precalibrated single dose Xe-133 into the Xe-133 delivery unit.

b. We plan to use an Atomic Products Corporation Model 127-313 gas trap system or similar NRC approved Xe-133 system for these procedures.

c. Entrance doors to the nuclear medicine area will be closed during any use of Xe-133 gas. Since the Hot Lab and Camera rooms exhausts are used collectively for Xe-133 compliance calculations, we will leave the doors open between these rooms.

4. Emergency Procedures

In the event of an accidental release of Xe-133 into the room, we will temporarily evacuate the room(s) and reclose the entrance door for a period of 29.314 minutes (five room air exchanges). With a total exhaust rate of at least 350 cfm and a total room volume of approximately 2052 cubic feet, we estimate one room air turnover to be a maximum of 5.862 minutes.

We confirm that a low level survey meter will be used to survey the affected area to confirm normal background readings prior to permitting reoccupation of the room.

5. Xe-133 Concentrations in Restricted Areas:

20.103 of 10 CFR 20 requires that Xe-133 concentrations, averaged over a 40 hour week for a calendar quarter do not exceed 1 x E-5 uCi.

a. The estimated weekly utilization (A) of Xe-133 in our facilities will be 20 mCi (see Item 1,a,(2) of this application).

b. The estimated fraction of Xe-133 lost (f) during these procedures and during storage is 0.20 (or 20%).

c. The minimum amount of air flow (V) necessary per week to dilute the Xe-133 to less than 1 x E-5 uCi/ml is calculated as follows:

$$A/V \times f \leq 1 \times E\text{-}5 \text{ uCi/ml}$$

or

$$V \geq \frac{A \times f}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq \frac{20 \text{ mCi} \times 1000 \text{ uCi/mCi} \times .20}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq \frac{4 \times E4 \text{ uCi}}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq 4 \times E9 \text{ ml/week}$$

Since 1 cfm = 6.797 x E7 ml/40 hr week, this translates to a required air flow rate of 5.884 cfm.

$$V \geq \frac{4 \times E9 \text{ ml/week}}{6.797 \times E7 \text{ ml/40 hr week/cfm}}$$

$$V \geq 5.884 \text{ cfm}$$

We confirm that the ventilation rate will be well over 5.884 cfm to maintain air concentrations of Xe-133 as low as reasonably achievable. These rates will be checked semi-annually to verify compliance with NRC limits.

6. Xe-133 Concentrations in Unrestricted Areas:

a. We will use a charcoal gas trap as our primary means of disposing of Xe-133. Since Xe-133 gas traps are not 100% efficient for trapping Xe-133, we use the following method to ensure that Xe-133 concentrations will not exceed the 10 CFR 20.106 limit of 3 x E-7 uCi/ml, averaged over 1 year.

(1) As calculated in item 5,c., of this application, the estimated fraction of Xe-133 lost during use and storage is 4 x E4 uCi/week.

(2) This can be expressed in uCi/year as follows:

4 x E4 uCi/week x 52 weeks/year = 208000 uCi/year

(3) 10 CFR 20.106 requires that $C = A/V \leq 3 \times E\text{-}7$ uCi/ml

The required ventilation rate (V) to maintain concentrations below this level is therefore:

$$V \geq \frac{A}{3 \times E\text{-}7 \text{ uCi ml}}$$

$$V \geq \frac{208000 \text{ uCi/year}}{3 \times E\text{-}7 \text{ uCi/ml}}$$

$$V \geq 6.933E+11$$

(4) This rate can then be translated to cfm as follows:

$$V \geq \frac{6.933E+11 \text{ ml/year}}{1.484 \times E10 \text{ ml/year/cfm}}$$

$$V \geq 46.720 \text{ cfm}$$

We confirm the ventilation rate will be greater than 46.720 cfm to maintain Xe-133 levels in unrestricted areas as low as reasonably achievable. The air flow rates will be remeasured semi-annually to verify compliance with NRC limits.

b. To monitor our Xe-133 gas trap exhaust (to ensure trapping efficiency) we will use either a commercially available trap monitor (such as an Atomic Products, Model 136-250 Xenalarm) or we will collect Xe-133 gas trap exhaust in a plastic bag and assay the Xe-133 content with our gamma camera.

If we obtain a trap monitor, we confirm we will follow the manufacturer's instructions for use and calibration frequency of the instrument (at least annually).

The bag method will involve:

(1) Determining camera detection efficiency using a known source of Tc-99m, Co-57, Xe-133, or other low energy radionuclide. Configuration of the source will be in the form of a flood phantom rather than a point source to approximate the geometry of the bag.

(2) Assaying a Xe-133 exhaust bag and calculating the quantity (activity) of Xe-133 leakage. The frequency of this check will be initially and at least monthly, or more frequently, if more than thirty Xe-133 studies are performed in a given month.

(3) Calculating whether or not the trap is at least 95% efficient by dividing trap leakage by administered activity.

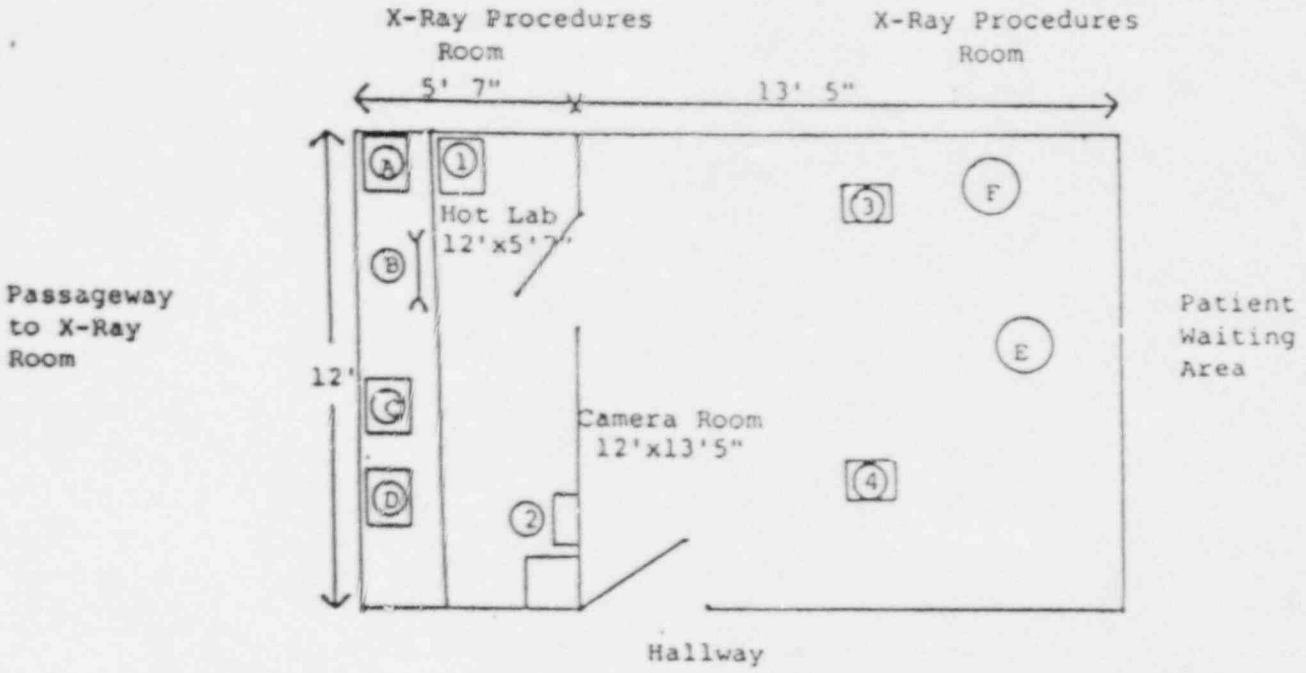
(4) Manufacturers specify that charcoal traps are at least 98% efficient for trapping Xe-133. Therefore, we feel that 95% is a reasonable action level at which point the charcoal filters would need replacement.

(5) The saturated filter will be removed and the portals will be tightly capped with rubber stoppers. In this manner, the cartridge will not leak since air is not flowing through the unit. The surface readings of the lead shielded "saturated" cartridge should not exceed normal background levels, as determined with a low level survey meter, or additional lead foil (1/8" thick) will be wrapped around the cartridge until this background reading is achieved. The unit will be stored in the hot lab storage area and allowed to decay. The attached sketches, descriptions of shielding, and previously defined calculations of average concentrations in air should serve to also cover this final phase of Xe-133 handling procedures.

We also confirm that all disposal items are to be surveyed with a low level g.m. survey meter to confirm exposure rates of normal background (less than 0.05 mr/hr) prior to disposal.

St. Mary's Hospital

Pierre, South Dakota 57501



Key:

A. Generator and radiation storage
B. Dose preparation area
C. Dose calibrator
D. Sink
E. Camera detector head
F. Camera console

Air Flow Key:

1. Hot Lab Exhaust, 100 cfm
2. Hot Lab Supply, 70 cfm
3. Camera Room Exhaust, 250 cfm
4. Camera Room Supply, 210 cfm