FORM NRC-313M (8-78) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR MATERIALS LICENSE – MEDICAL	Approved: GAO R0557

INSTRUCTIONS – *Complete Items 1 through 26 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 26 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to: Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Parts 19, 20 and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 26 and the appropriate fee enclosed.*

1.a. NAME AND MAILING ADDRESS OF APPLICANT *(Institution, firm, clinic, physician, etc.)* INCLUDE ZIP CODE

Veterans Administration Medical Center
Fifth & Fort Streets
Boise, Idaho 83702

TELEPHONE NO.: AREA CODE 208 | 336 5100

1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED *(If different from 1.a.)* INCLUDE ZIP CODE

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Lawrence L. Knight, M.D.

TELEPHONE NO.: AREA CODE 208 | 336 5100

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. XX ☐ RENEWAL OF LICENSE NO. 11-18311-01

4. INDIVIDUAL USERS *(Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)*

Lawrence L. Knight, M.D.
John B. Tweeten, M.D.

5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)*

Lawrence L. Knight, M.D.

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES	X	3 mCi H3-20 mCi
10 CFR 35.100, SCHEDULE A, GROUP I	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III	X	2000 mCi
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	X	100 mCi
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	325 mCi

6.b. RADIOACTIVE MATERIAL FOR USES NOT LISTED IN ITEM 6.a. *(Sealed sources up to 3 mCi used for calibration and reference standards are authorized under Section 35.14(d), 10 CFR Part 35, and NEED NOT BE LISTED.)*

ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES OF EACH FORM	DESCRIBE PURPOSE OF USE

8510240072 850830
REG4 LIC30 PDR
11-18311-01

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

For Items 7 through 23, check the appropriate box(es) and submit a detailed description of all the requested information. Begin each item on a separate sheet. Identify the item number and the date of the application in the lower right corner of each page. If you indicate that an appendix to the medical licensing guide will be followed, do not submit the pages, but specify the revision number and date of the referenced guide: Regulatory Guide 10.8 , Rev. _____ Date: _____

7. MEDICAL ISOTOPES COMMITTEE	**15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL** *(Check One)*
X Names and Specialties Attached; and	X Appendix G Rules Followed; or
X Duties as in Appendix B; or *(Check One)*	Equivalent Rules Attached
Equivalent Duties Attached	**16. EMERGENCY PROCEDURES** *(Check One)*
8. TRAINING AND EXPERIENCE	X Appendix H Procedures Followed; or
Supplements A & B Attached for Each Individual User; and	Equivalent Procedures Attached
Please see attachment 8 Supplement A Attached for RSO.	**17. AREA SURVEY PROCEDURES** *(Check One)*
9. INSTRUMENTATION *(Check One)*	X Appendix I Procedures Followed; or
Appendix C Form Attached; or	Equivalent Procedures Attached
X List by Name and Model Number	**18. WASTE DISPOSAL** *(Check One)*
10. CALIBRATION OF INSTRUMENTS	X Appendix J Form Attached; or
X Appendix D Procedures Followed for Survey Instruments; or *(Check One)*	Equivalent Information Attached
Equivalent Procedures Attached; and	**19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS** *(Check One)*
X Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*	X Appendix K Procedures Followed; or
Equivalent Procedures Attached	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT	**20. THERAPEUTIC USE OF SEALED SOURCES**
X Description and Diagram Attached	N/A Detailed Information Attached; and
12. PERSONNEL TRAINING PROGRAM	Appendix L Procedures Followed; or *(Check One)*
X Description of Training Attached	Equivalent Procedures Attached
13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL	**21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon – 133)**
X Detailed Information Attached	X Detailed Information Attached
14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*	**22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS**
	N/A Detailed Information Attached
X Appendix F Procedures Followed; or	**23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b**
Equivalent Procedures Attached	N/A Detailed Information Attached

25853

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY		FILM		
		TLD	Morrison Knudsen Company	Monthly
		OTHER (Specify)		
b. FINGER		FILM		
		TLD	Morrison Knudsen Company	Monthly
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL: N/A

MAILING ADDRESS:

CITY | STATE | ZIP CODE

b. ATTACH A COPY OF THE AGREEMENT LETTER SIGNED BY THE HOSPITAL ADMINISTRATOR.

c. WHEN REQUESTING THERAPY PROCEDURES, ATTACH A COPY OF RADIATION SAFETY PRECAUTIONS TO BE TAKEN AND LIST AVAILABLE RADIATION DETECTION INSTRUMENTS.

26. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 1a certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Parts 30 and 35, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

a. LICENSE FEE REQUIRED
(See Section 170.31, 10 CFR 170)

(1) LICENSE FEE CATEGORY:

(2) LICENSE FEE ENCLOSED: $

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

(1) NAME *(Type or Print)*: JAMES A. GOFF

(2) TITLE: MEDICAL CENTER DIRECTOR

c. DATE

83 SEP 15 A11:07

FORM NRC-313M (8-78)

VETERANS ADMINISTRATION MEDICAL CENTER
5th and Fort Streets
Boise, Idaho 83702

February 21, 1983

MEDICAL CENTER MEMORANDUM NO. 115-83-1

SUBJ: RADIATION SAFETY COMMITTEE

---

1. SUMMARY: This memorandum rescinds Medical Center Memorandum No. 11-80-23. The change is the revision of the "Membership" paragraph.

2. PURPOSE: To establish guidelines that ensure adequate safety from radiation for patients and employees.

3. POLICY:

a. Radiology - This Committee will review and evaluate the policies and procedures established by the Radiology Service to assure that all employees and patients are adequately protected from radiation.

b. Nuclear Medicine - The Committee will review policy and procedures established by the Nuclear Medicine Service to assure that all staff and patients are properly protected from the radiation effects of medical isotopes.

4. MEMBERSHIP:

Chief, Nuclear Medicine	Chairman
Associate Medical Center Director	Member
[redacted]	Member
Consulting Medical Physicist	Member
Staff Physician, Medicine	Member
Chief, Radiology	Member
[redacted]	Member
Chief, Nursing Service or designee	Member

5. RESPONSIBILITY: This Committee is responsible for establishing policy to assure radiation safety at this Medical Center and to see that it is enforced. The Committee will:

a. Meet on a Monday chosen by the Chairman during the second month of each quarter.

b. Be familiar with radiation hazards and all pertinent Nuclear Regulatory Commission regulations.

Item # 7
Sept. 15, 1983

c. Review at least annually the training and experience of all staff who participate in radiation or use radioactive materials.

d. Review educational activities that prepare the staff exposed to radiation or radioactive materials so that they may work in a safe environment.

e. Review and approve all requests for the use of radioactive materials within the Medical Center.

f. Develop guidelines for the proposed use of radioactive materials, such as requirements for bio-assays, physical examinations, and special monitoring procedures.

g. Review the radiation safety program at least annually to determine that all activities are conducted safely and in accordance with NRC regulations. This review will include examination of records, reports, results of inspections, and all written policies and procedures that reflect on radiation safety.

h. Submit minutes of meetings to the Clinical Executive Board for review and approval.

6. REFERENCES:

M-2, Pt. XX
Nuclear Regulatory Commission Regulations
Nuclear Regulatory Commission license

7. RESPONSIBLE OFFICIAL:

Chief, Nuclear Medicine Service

JAMES A. GOFF
Medical Center Director

DISTRIBUTION "A"
+ Committee Members

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

Training and Experience

LAWRENCE L. KNIGHT, M.D. - User and Radiation Safety Officer

Please refer to application dated September 19, 1978, leading to issuance of NRC license 11-18311-01.

JOHN B. TWEETEN, M.D. - User

Please refer to application dated December 3, 1979, and letters dated March 17, 1980, and October 26, 1981, NRC license 11-18311-01.

Item #8
September 15, 1983

In Reply Refer To:

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

1. Survey Meters

a. Manufacturer's name: Victoreen Cutie Pie
Manufacturer's model number: 740-F
Number of instruments: 1
Minimum range: 0 mR/hr to 25 mR/hr
Maximum range: 0 mR/hr to 25,000 mR/hr

b. Manufacturer's name: Victoreen GM Meter
Manufacturer's model number: 491-30
Number of instruments: 1
Range: .01 mR/hr to 100 mR/hr

c. Manufacturer's name: Victoreen Frisker Bench Top Monitor
Manufacturer's model number: 495 Probe 489-35
Number of instruments: 1
Ranges: 0-500 cpm
0-500,000 cpm
in 4 linear ranges

d. Manufacturer's name: Searle low level survey meter
Manufacturer's model number: 9120
Number of instruments: 1
Range: 0.02-200 mR/hr

2. Dose Calibrator

Manufacturer's Name: Squibb
Manufacturer's model number: CRC-17
Number of instruments: 1

3. Diagnostic Instruments

a. Type of instrument: Scintillation Gamma Camera
Manufacturer's Name: Ohio Nuclear
Manufacturer's model number: 410S

b. Type of instrument: Gamma Well Counter
Manufacturer's Name: Searle
Manufacturer's model number: 1197

c. Type of instrument: Liquid Scintillation Counter
Manufacturer's Name: Beckman
Manufacturer's model number: LS 100 C

d. Type of instrument: Liquid Scintillation Counter
Manufacturer's Name: Beckman
Manufacturer's model number: LS 7500 D.P.

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans
Administration

Facilities and Equipment

Nuclear Medicine Suite - Building 85 (Item 11-A)

This is the only one in which radionuclides are handled in millicurie quantities. The suite is below ground level: two sides are outside walls, while the remaining two abut on a hallway and the radiology file room. An ultrasound facility is included at one end of the nuclear medicine section. The hot lab and camera room, both restricted areas, are locked and posted when not in use. Counter tops are stainless steel, as is the sink. The floor is asphalt vinyl tile. The refrigerator has a 1/8" lead lining, and the storage/work area within the hood is lined with 2" lead bricks. A lead glass shield is utilized in the radiopharmaceutical preparation area immediately adjacent to the hood.

The storage and decay room is located in close proximity to the nuclear medicine suite (approximately 25 feet) and abuts on a hallway and the building mechanical space. The area is restricted, posted, and kept locked. Radionuclides stored for decay are appropriately shielded: specifically, used generators are stored behind 2" lead brick. This space shares ventilation with the nuclear medicine suite (both are isolated from the remainder of the building ventilation system) in a manner described in Items 11-D and 21.

Radioassay Laboratory - Building 85 (Item 11-B)

This area is part of the clinical laboratory. Radionuclide usage consists largely of I-125 in small quantities, typically 100 microcuries monthly throughput and less than 200 microcuries in storage at any given time. A posted refrigerator is used for storage, and a dedicated sink is used for disposal of microcurie quantities into the sanitary sewage system (institutional flow is approximately 176,000 gallons per day). Counter tops are laboratory grade composition, and floors are asphalt vinyl tile. A roof-vented fume hood is available within the area if needed. The work area is posted.

Research Laboratory - Building 67 (Item 11-C)

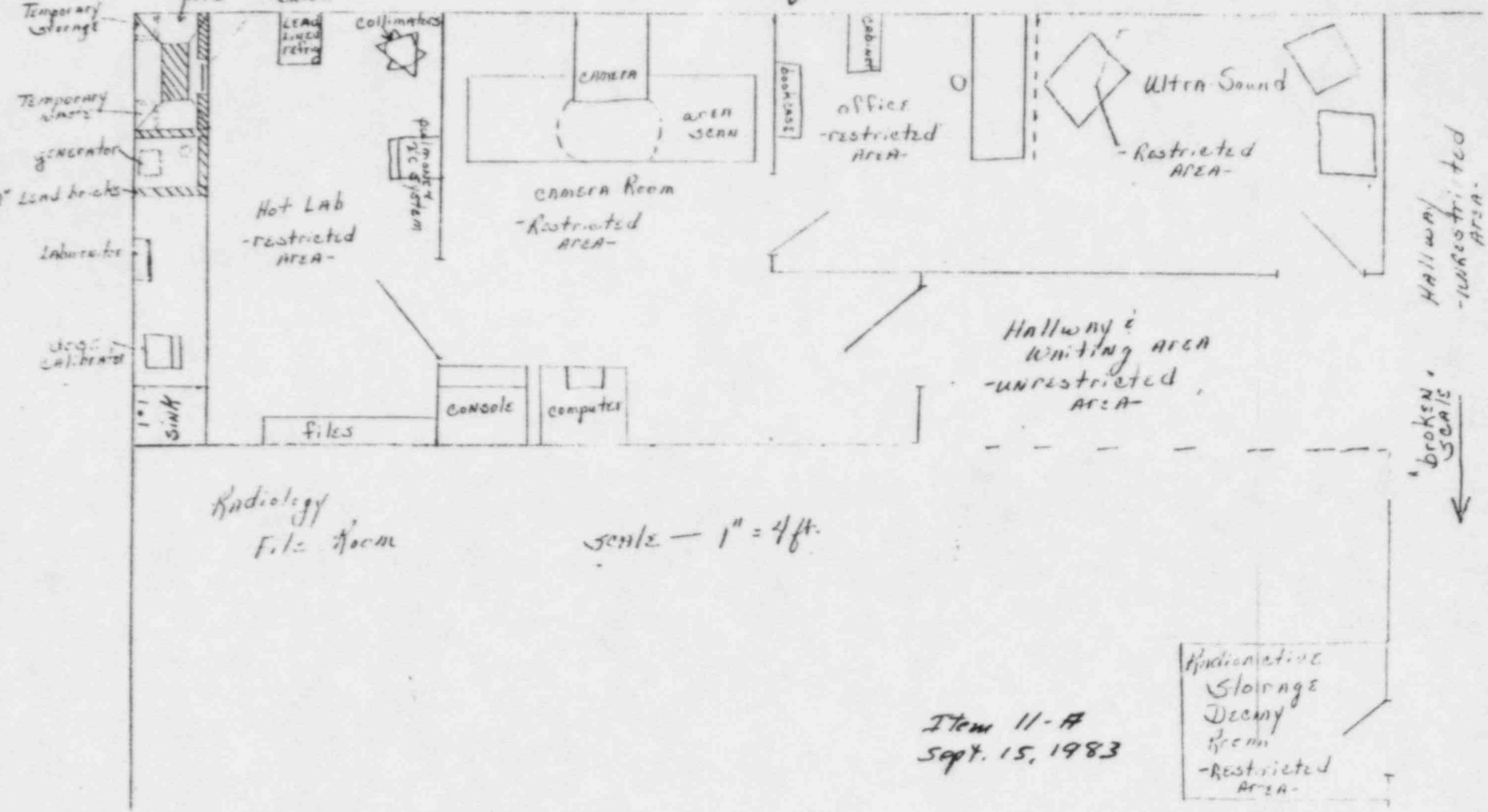
Radionuclide usage here consists of in vitro procedures, utilizing mainly H-3 and small quantities of I-125. Monthly throughput of H-3 is typically 5 millicuries, and will not exceed 10 millicuries. The work area is posted and features formica counters and asphalt vinyl flooring. A storage refrigerator is included within the work area, and a posted dedicated sink in the contiguous area allows disposal of microcurie quantities of waste into the sanitary sewer system. Workers using H-3 wear protective clothing and gloves, and use absorbent counter top pads which are changed each day of use. Bench, floor, and equipment surfaces are wipe tested weekly: permissable contamination levels, as assayed by liquid scintillating are less than 0.001 mCi/cm.

77 RCV

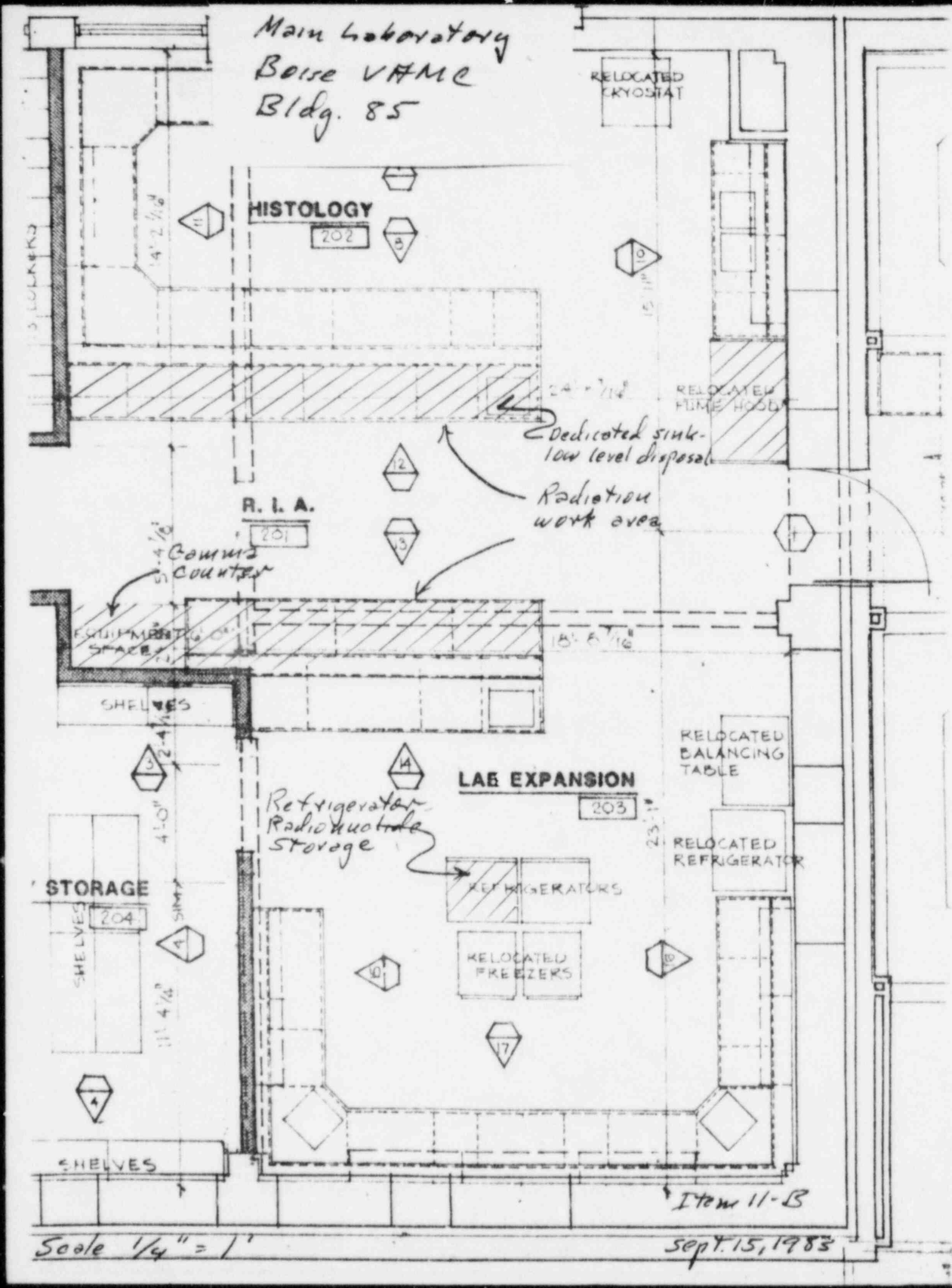
Item #11
September 15, 1983

15853

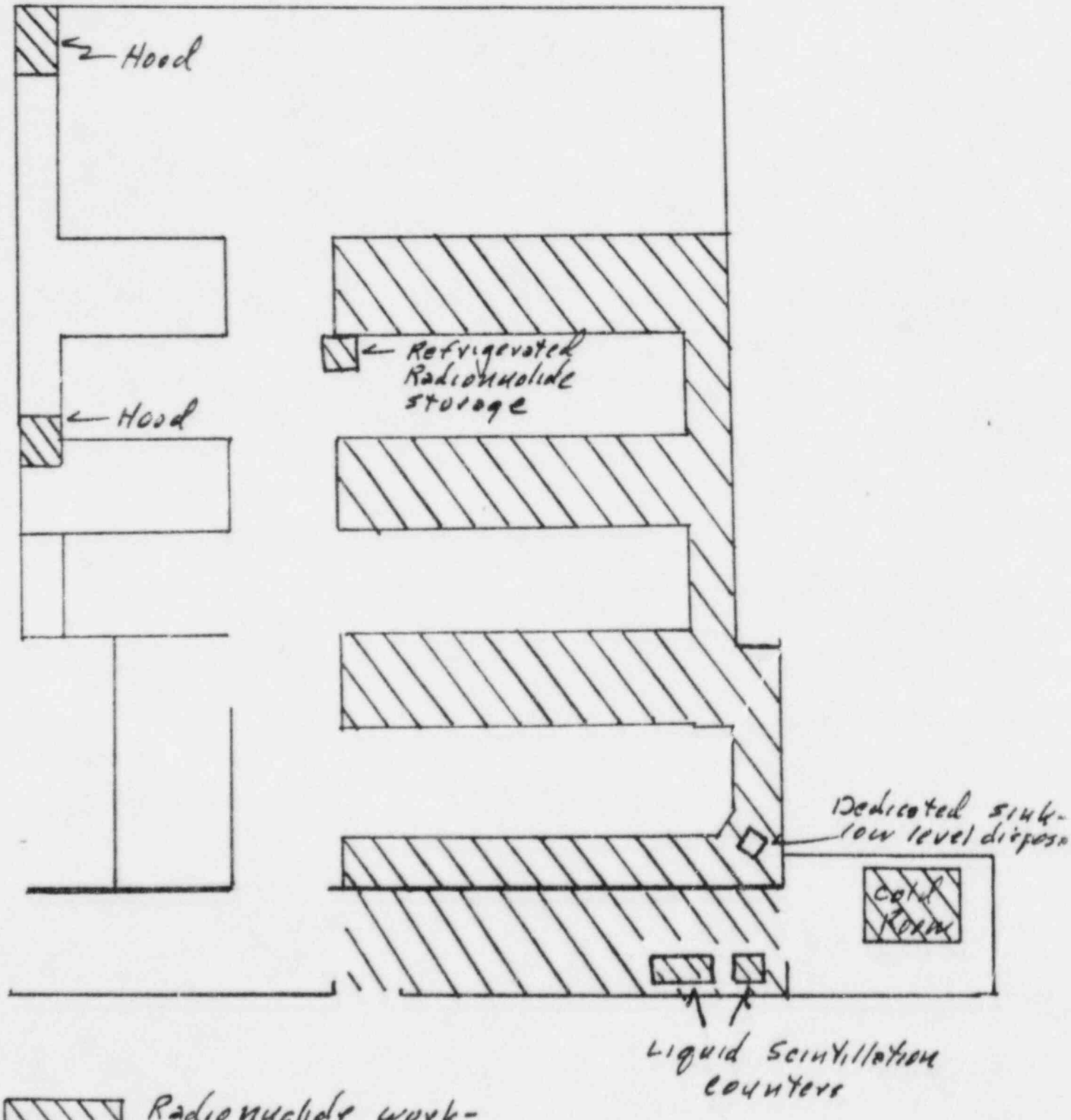
Nuclear Medicine Suite
Boise VAMC - Bldg 85



Item 11-A
Sept. 15, 1983


Main Laboratory
Boise VAMC
Bldg. 85
RELOCATED CRYOSTAT
HISTOLOGY
202
R. I. A.
201
Counts Counter
Dedicated sink-low level disposal
Radiation work area
RELOCATED FUME HOOD
EQUIPMENT SPACE
SHELVES
LAB EXPANSION
203
RELOCATED BALANCING TABLE
RELOCATED REFRIGERATOR
Refrigerator Radioactive Storage
REFRIGERATORS
RELOCATED FREEZERS
STORAGE
204
SHELVES
SHELVES
Item 11-B
Scale 1/4" = 1'
Sept. 15, 1983

Research Laboratory
Boise VAMC
Bldg. 67



Approx. Scale 1/8" = 1'

Item 11-653
Sept 15, 1983

5853

UNITED STATES GOVERNMENT

Memorandum

DATE February 29, 1980

TO Acting Chief, Radiology Service (114)

FROM Chief, Engineering Service (138)

SUBJ Nuclear Medicine Exhaust System

1. The Nuclear Medicine Service at the Boise VA Medical Center occupies rooms G-15, G-15A and G-16 on the ground floor of Bldg. 85.

2. These rooms are served by a Barry model BVF Junior, belted ventilating fan and its associated ductwork system as indicated on the attached sketch.

3. The rooms are completely isolated from the building's recirculating air duct system. The discharge of the exhaust fan is on the rooftop level of the emergency generator room in Bldg. 85. This roof area is restricted from all personnel with the exception of maintenance personnel, who must occasionally work in the area. These personnel will be required to notify Nuclear Medicine Service prior to entering the roof area. Signs indicating this rule will be placed on all doors to the roof area.

4. The roof area has two windows on an adjacent building wall. These windows are within 10 feet of the fan discharge. The building is totally air-conditioned and the windows are kept closed at all times except for maintenance and washing. The windows are operable only with the use of a special key. The space is occupied less than 2 hours per day.

5. The exhaust system has been designed so that the rooms have a negative pressure with respect to the adjacent building spaces.

6. Engineering Service will perform a monthly inspection of the system to check air volumes, motor, and fan conditions as a part of their regular preventative maintenance program. Records of these results will be recorded on a data sheet prepared for this purpose and kept in the Nuclear Medicine area.

Jim Schiller

Attachment

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

...Medical Center
Boise, ID 83702

Veterans Administration

Personnel Training

The radiation safety officer (L. L. Knight, M. D.) will instruct personnel initially and at yearly intervals (instructions to workers in 10 CFR Part 19.12).

All individuals working in or frequenting any portion of a restricted area shall be kept informed of the storage, transfer, or use of radioactive materials or of radiation in such portions of the restricted area, shall be instructed in the health protection problems associated with exposure to such radioactive materials or radiation, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed; shall be instructed in, and instructed to observe, to the extent within the worker's control, the applicable provisions of Commission regulations and licenses for the protection of personnel from exposures to radiation or radioactive materials occurring in such areas; shall be instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation or to radioactive material; shall be instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material; and shall be advised as to the radiation exposure reports which workers may request pursuant to Part 19.13. The extent of these instructions shall be commensurate with potential radiological health protection problems in the restricted area. Notification and reports of individuals exposure date will be reported to each individual as defined in Part 19.13, Title 10, Chapter 1.

Other technical, security and housekeeping personnel with only casual contact with the Nuclear Medicine Department will receive at least one hour of basic instruction in radiation safety. Emphasis will be placed on area security, observance of posted radiation areas, use of protective clothing and gloves, avoidance of hand-to-mouth activities, and concepts of radiation controls as function of time distance and shielding. As necessary, further in-service training will be initiated and documented by the radiation protection officer.

The above instructions will be given to each new employee, and at yearly intervals thereafter. The Radiation Safety Officer will give the instructions.

...ply Refer To:

Item # 12
Sept. 15, 1983

PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIALS

Chief Nuclear Medicine Technologist will be responsible for ordering all radioactive materials and will ensure than the quantities on hand and requested materials do not exceed the possession limits of the license.

During working hours carriers will be instructied to deliver all radioactive packages to the Nuclear Medicine Department.

During off duty hours security personnel will accept delivery of radioactive packages in accordance with the attacked memo.

Item # 13
Sept. 15, 1983

VETERANS ADMINISTRATION MEDICAL CENTER
5th & Fort Streets
Boise, ID 83702

December 2, 1982

MEDICAL CENTER MEMORANDUM NO. 115-82-2

SUBJ: RECEIPT OF RADIOISOTOPES

---

1. SUMMARY: Clinical Services Memorandum 113-80-8, dated May 8, 1980, is rescinded. Changes include a different delivery site after duty hours, a re-routing of delivery receipt documents, and a change in "Responsible Official".

2. PURPOSE: To establish procedures for the receipt of radioisotopes which will afford maximum safety to patients and personnel.

3. POLICY: Handling of radioisotopes will be carried out in conformance with current Nuclear Regulatory Commission requirements.

4. PROCEDURES:

a. Packages containing radioisotopes will be plainly marked as such on delivery. The usual markings include a purple "orchid" on yellow-background, and a "Caution: Radioactive Materials" label.

b. Radioisotopes arriving during normal duty hours should not be received by Supply Service, but should be delivered directly to Nuclear Medicine, Room G-15, Bldg. 85. The technician on duty will inspect, receipt, and store the shipment in the Nuclear Medicine Lab.

c. Radioisotopes arriving outside normal duty hours will be delivered to the M.A.A. desk in Bldg. 85. The M.A.A. on duty will immediately notify the security guard on duty, who will inspect and sign for the shipment: he will then place the package in the Nuclear Medicine Lab and lock the door. If the package shows evidence of leakage or damage at the time of receipt, the guard should not handle the box, but should immediately contact the VA Radiation Safety Officer. The carrier should be asked to remain until it can be determined that neither he nor the delivery vehicle is contaminated. Copies of reports of such incidents will be provided to Supply Service as soon as possible for preparation of OS&D (Over, Short and Damage Report) to establish claims against the shipper or carrier, as appropriate.

d. All receipt documents will be forwarded to Supply Service for use in certification of invoices for payment.

MEDICAL CENTER MEMORANDUM NO. 115-82-2

December 2, 1982

4. RESPONSIBLE OFFICIAL:

Chief, Nuclear Medicine

JAMES A. GOFF
Medical Center Director

DISTRIBUTION "D"
00
113
134
115 (10)

BOISE VAMC
NUCLEAR MEDICINE DEPARTMENT

WASTE DISPOSAL PROCEDURES

1. Liquid Waste will be disposed of

   Check as appropriate

   _____ By commercial waste disposal service (See also No. 4 below)

   __X__ In the sanitary sewer system in accordance with Section 20.303 of 10 CFR Part 20.

   _____ Other (specify): _____

2. Mo-99/Tc-99m generators will be:

   (Check as appropriate)

   _____ Returned to the manufacturer for disposal

   __X__ Held for decay until radiation levels as measured with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated and the generators disposed of asnormal trash. (Note: this method of disposal may not be practical for generators containing long-lived radioactive contaminants)

   _____ Disposed of by commercial waste disposal service (See also No. 4 below)

   _____ Other (specify): _____

3. Other Solid Waste will be:

   (Check as appropriate)

   __X__ Held for decay until radiation levels as measured with a low-level survey meter and with all shielding removed) have reached background levels. All radiation labels will be removed or obliterated and the waste will be disposed of in normal trash.

Item # 18
Sept. 15, 1983

_____ Disposed of by commerical waste disposal service (See also No. 4 below)

_____ Other (Specify): _____

_____

4. The commerical waste disposal service used will be: _____

_____
(Name) (City, State)

NRC/Agreement State License No. _____

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

The Veterans Administration Medical Center in Boise, Idaho would like to apply for 325 mCi possession limit on Xenon-133 gas. The purpose of this gas is to do pulmonary ventilation studies.

Dosage Employed:	Average patient dose - 15 mCi. Higher doses will be used only when professional medical judgement indicates it to be necessary.
Patient Load:	Estimate: A maximum of 5 per week, 260 patients per year.
Source of Radiopharmaceutical:	New England Nuclear Corporation, Diagnostic Division, 601 Treble Cove Road, No. Billerica, MA 01862. Two catalog numbers NRP-186, Gas Calidose dispenser, and NRP-127 Xenon-133 gas in unit dose vials. NDA approved, package insert enclosed.
Imaging Equipment:	Ohio-Nuclear Serial #588, Gamma Camera Model #410.
Special Equipment:	a. Delivery System - Pulmonex Xenon system manufactured by Atomic Products Corporation Center, Moriches, New York 11934. Product literature enclosed. b. Disposal System - Pulmonex System has its own built-in gas trap. See product literature.
Dose Calibration:	All doses for patient use will be checked immediately prior to administration with a Squibb Dose Calibrator Model No. CRC-17. Product literature enclosed.
Personnel Safety:	All personnel working in the department will use whole body TLD badges as well as TLD finger badges.

Description of Storage Area (Hot Lab):

The Xenon-133 gas will be stored in its 1/8 inch thick lead shipping contain within the storage cave, under fume hood, until required. A description of

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

the hot lab cave is enclosed in this application (facilities and equipment). The radiation monitoring equipment and radiological safety procedures are the same when Xenon-133 is to be used as previously described. In addition, a fume hood has been installed over the storage cave and its associated work area. This hood will operate on a continual basis with an air flow volume of 300 cfm. (see enclosed drawing). The total volume of the nuclear medicine hot lab is 1350 cubic feet. Air can enter the suite through ceiling vents, and doors. All air leaving the suite is through exhaust vents or the fume hood which also keeps the suite at a slight negative pressure relative to the environ. The maximum concentration of Xenon-133 over forty hours in seven consecutive days for this restricted area has been calculated on the following basis:

a. Maximum amount of Xenon-133 activity per week is 325 mCi. (Xenon-133 traps will be stored in this area when not in use, (Storage of new and used also here).

b. Estimated escape fraction (maximum Xenon-133 activity lost due to leakage and inadvertent release) is 0.25.

c. Air flow volume will be 300 cfm.

Therefore using the above data and appropriate conversion factors C can be calculated.

$$C = \frac{A}{V} \times f = \frac{(325\ mCi)\ (1 \times 10^3)}{(300\ cfm)\ (6.797 \times 10^7)} \times 0.25$$

$$= 4.0 \times 10^{-6}\ mCi/ml\ per\ 40\ hr.\ week$$

This verifies that the MPC of 1×10^{-5} mCi/ml as stated in section 20.103 CFR part 20 and schedule B, Table 1 of part 20 will not be exceeded by at least a factor of 2.

In the event of an accidental release of the Xenon-133 in this area, the following procedure will be implemented:

The whole nuclear medicine suite (three rooms) will be immediately evacuated of any patients and nuclear medicine personnel. The area will be sealed (doors closed) off from re-entry for a period of 60 minutes. This will allow for 13 complete air changes (see attached memo and diagram from chief of maintenance). Upon re-entry the room will be surveyed with the Low-Level survey meter to insure the radiati levels have returned to normal for the area.

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

The 60 minute period will ensure thirteen changes of the air based upon the following calculation:

Air Volume rate = 300 cfm

Room Volume = 1350 c.f.

$$\frac{\text{(Air volume rate)}\ \ \text{(60 min.)}}{\text{(Room volume)}} = \frac{(300)\ \ (60)}{1350\ \text{c.f.}} = 13.33 \text{ changes}$$

The air which is exhausted from this room is released directly into an unrestricted area located directly above the nuclear medicine suite. This roof area will be checked for any maintenance personnel and evacuated for a period of two hours in the event of an accidental release of Xenon-133. This release point is isolated from all air intakes and adjacent buildings by a distance exceeding 5 feet (building), (air intake 150 ft.). The calculations for the unrestricted area are presented at the end of the utilization discussion.

Description of Procedure:

The Xenon-133 gas will be used in the following manner. Xenon will be stored inside its lead container (manufacturer supplied), behind 2 inch lead bricks under the fume hood. When needed for patient use, the Xenon-133 vial will be removed from the lead shielding, utilizing rubber gloves, and long forceps placed in the dose calibrator for calibration, and returned to fume hood. The patient wi'l be instructed on the details of the procedure with special emphasis on the areas where his/her cooperati is needed. Just prior to the study, one or more practice runs will be done before the Xenon-133 gas is used. Utilizing rubber gloves and long forceps and working behind a lead glass shield in the fume hood, the unit dose vial will be loaded into the shielded calidose dispenser furnished by New England Nuclear. It will then be taken to the imaging area where the lung ventilation procedure will be done. The dispenser will then be affixed to the Pulmonex lung breathing apparatus. The Xenon-133 gas will be administered to the patient via this unit. The patient will have the mouthpiece from the Pulmonex system in his mouth, nose clamps will be used to prevent the patient from exhaling the Xenon-133 into the room. The pati will then be instructed to take a deep breath in and hold it, then to breat naturally into the pulmonex system as the technician operates the remote control switch of the unit. The patient will be allowed to breath only thro the Pulmonex system until all Xenon-133 is cleared from the lungs. (approx. 4 minutes).

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

Description of Imaging Room (utilization area):

All Xenon-133 lung ventilation procedures will be performed in the camera room as shown on the enclosed diagram. Air will enter this room through the door and two ceiling vents. The air can only leave the nuclear medicine suite via a ceiling vent which has a measured air volume rate of 190 CFM. This vent is connected to the exhaust duct of the fume hood in the hot lab. This room has a slight negative pressure at all times. The maximum concentration of Xenon-133 for this restricted area is calculated below:

a. Maximum amount of Xenon-133 per week 75 mCi. Estimate based on patient use noted above.

b. Estimated escape fraction (maxiumum Xenon-133 activity lost due to leakage and inadvertent release(is 0.25.

c. Air flow volume is 190 cfm in this room.

Therefore using these values and appropriate conversion factors, C can be calculated.

$$C = \frac{A}{V} \times f = \frac{(75\ \text{mCi})\ (1 \times 10^{3})}{(190\ \text{cfm})\ (6.797 \times 10^{7}} \quad 0.25$$

$$= 1.4 \times 10^{-6}\ \text{mCi/ml per 40 hr. week}$$

This verifies that the MPC of 1×10^{-5} mCi/ml as stated in Section 20.103 CFR part 20 and Schedule B, Table 1 of Part 20 will not be exceeded.

The maximum concentration of Xenon-133 for the unrestricted area, the roof exhaust, is calculated below:

a. Maximum amount of Xenon-133 released per year is based upon 325 mCi per week times the escape fraction of 0.25.

$$(324\ \tfrac{\text{mCi}}{\text{week}})\quad (0.25)\quad (52\ \tfrac{\text{weeks}}{\text{year}}) = 4.2 \times 10^{3}\ \tfrac{\text{mCi}}{\text{year}}$$

b. Total air volume from all areas equal 1030 cfm. (Hot lab + storage area + mechanical room + imaging room). These are added together becau they are dumping into the same exhaust duct which leads to the roof.

In Reply Refer To:

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

Therefore using the preceding values and appropriate conversion factors, C can be calculated.

$$C = \frac{A}{V}$$

$$= \frac{(4.2 \times 10^{3})\ \ 1 \times 10^{3})}{(1030\ \text{cfm})\ \ (1.484 \times 10^{10}\ \text{ml/yr})}$$

$$= 2.7 \times 10^{-7}\ \text{mCi/ml}$$

NOTE:		
	Hot Lab	300 cfm
	Camera Room	190 cfm
	Storage Area	50 cfm
	Mechanical Room	490 cfm
	TOTAL	1030 cfm

This verifies that the MPC of 3×10^{-7} mCi per ml as stated in Section 10.106 10 CFR, Part 20 and Schedule B, Table 2 of Part 20 will not be exceeded, and that Section 20.1 (c) of 10 CFR Part 20 is being complied with.

In the event that there is an accidental release of Xenon-133 in the camera room, the following emergency procedure will be implemented. The whole nuclear medicine suite (3 rooms) will be immediately evacuated of any patients and nuclear medicine personnel. The total area will be sealed (doors closed) off from re-entry for a period of 60 minutes. This will allow for six complete air changes (see enclosed memo from Chief of Engineering). Upon re-entry, the rooms will be surveyed with the low level survey meter to insure the radiation levels have returned to normal for these rooms.

The sixty minutes will insure six changes of air in these rooms based upon the following calculations:

$$\frac{\text{Volume}}{\text{air flow volume per min}} = \frac{1850}{190} = 9.74\ \text{min.}$$

$$\frac{60\ \text{minute}}{9.74} = 6\ \text{changes}$$

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

The Disposal Phase:

The disposal of the Xenon-133 gas will be done by trapping the Xenon 133 gas in the Pulmonex system. The method used is that of absorption of the Xenon-133 gas into a charcoal trap. This is enclosed in its own lead casing which is inside the lead lined Pulmonex system. To check if the system is leaking, we will attach a Xenalarm, Xenon-133 trap monitor to the Pulmonex system. Should the area concentrations exceed 1×10^{-2} mCi/ml, then a warning light will come on and a buzzer will sound. Appropriate action will be taken to lower the Xenon-133 levels. The Xenalarm system will be calibrated by the Atomic Products Company before shipping and instructions for calibration will be included, and these instructions will be followed. Periodic checks and records will be maintained.

When the Pulmonex system is not in use, it will be stored in the hot lab next to the fume hood. Weekly, after the last Xenon-133 lung ventilation study each week, a physical sample of the trapped effluent will be counted. This procedure consists of filling a polyethylene bag with air out of the Pulmonex trap system. The bag will be sealed and placed in front of the gamma camera and counted for one minute on the appropriate settings. The counts per minute will be recorded in a record log and compared with previous readings. A replacement filter will be installed whenever there is a significant increase in the weekly CPM. The saturated filter will be placed in a plastic bag, using rubber gloves and tongs, then into a radiation waste barrel in the hot lab. When a survey shows no activity above background, it will be disposed of in the normal trash.

We have considered temperature inversions in our area and conclude that they will not have any effect upon the dispersion rate of the Xenon-133 gas as it exits from the stack.

Equipment Operation and Monitoring for Leakage:

a. The Calidose Dispenser Delivery System will be checked prior to use to insure proper operation. The manufacturer's operating instructions will be followed:

b. The Pulmonex lung unit will be checked weekly for leaks by filling with oxygen and checking for leakage. Its operation will be checked during the practice runs prior to administration of the Xenon-133 gas. The manufacturer's operating instructions will be followed.

Medical Center

5th and Fort Streets
Boise, ID 83702

Veterans Administration

c. The Xenon trap will be monitored with the Xenalarm. The Xenon trap will be checked prior to each ventilation procedure to insure that is is securely connected to the unit.

d. All exhaust vents will be checked monthly to confirm their continued efficiency. In addition, they will be checked whenever structural changes ARE made that could AFFECT their efficiency. The air flow will be checked with a volumetric air balance flow hood. A record of the monthly checks will be maintained in the nuclear medicine department.
Short Ridge Instruments
Model No. CFM-78
Serial No. 397

Facilities and Equipment:

The nuclear medicine suite is located below ground level and two walls are outside walls while the other wall is adjacent to the radiology department. The ultrasound room houses the nuclear medicine technician office as well as ultrasound equipment. The camera room and hot lab room make up the rest of the nuclear medicine suite. In addition, a storage room for spent generator decay, etc. is located down the hall from the nuclear medicine suite. These areas are all classified as restricted areas. The halls adjacent are unrestricted areas.

All counter tops ARE stainless steel with a stainless steel sink and fume hood. The floor is asphalt vinyl tile. The refrigerator has a 1/8 inch thick lead lining. The storage and work area under the fume hood will be lined with 2 inch lead bricks. A lead glass insert will be installed to facilitate work in the hot lab. The used generators will be stored in the storage room behind 2 inch lead bricks.

Access to the nuclear medicine suite and storage room will be closely controlled and the door will be locked and posted with proper signs when not in use.

A bulletin board is located in the technician office area. Pertinent notices to employees, etc. will be posted there.

Access to the nuclear medicine suite and storage room is closely controlled and the door is locked and posted with proper signs when not in use.

A bulletin board is located in the technician office area. Pertinent notices to employees, etc. are posted there.