FORM NRC-313M (5-78) 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 Material 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

Baystate Medical Center
759 Chestnut Street
Springfield, Mass. 01107

TELEPHONE NO.: AREA CODE( )

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

As in 1.a. and at
140 High Street
Springfield, Mass., 01105

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Suresh M. Brahmavar, Ph.D.

TELEPHONE NO.: AREA CODE( )

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 20-01412-05

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

A list of physicians approved for use of isotopes under our broad license is enclosed. Item #8

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.)*

Suresh M. Brahmavar, Ph.D.
Director
Medical Physics Service

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE See enclosed note

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES	X	60
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	7000
10 CFR 35.100, SCHEDULE A, GROUP IV	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI	X	2000

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	X	300
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	X	50
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	X	50
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	X	100
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA	X	500
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	2200

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
Cs-137	Sealed Source	100 (7-16-75)	Calibration of survey meters
Co-60	Sealed Source	15 (Dec. 1969)	Calibration of survey meters

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XA Copy Has Been Sent to PDR

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. 10-2 Date: Jan, 1979

NUREG-0338

7. MEDICAL ISOTOPES COMMITTEE

- [X] Names and Specialties Attached; and
- [X] Duties as in Appendix B; ~~or~~ and *(Check One)*
- [X] Equivalent Duties Attached

8. TRAINING AND EXPERIENCE See enclosed details

- [ ] Supplements A & B Attached for Each Individual User; and
- [ ] Supplement A Attached for RSO.

9. INSTRUMENTATION *(Check One)*

- [X] Appendix C Form Attached; or
- [X] List by Name and Model Number

10. CALIBRATION OF INSTRUMENTS

- [X] Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
- [ ] Equivalent Procedures Attached; and
- [X] Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
- [ ] Equivalent Procedures Attached

11. FACILITIES AND EQUIPMENT

- [X] Description and Diagram Attached

12. PERSONNEL TRAINING PROGRAM

- [X] Description of Training Attached

13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

- [X] Detailed Information Attached

14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*

- [X] Appendix F Procedures Followed; or
- [ ] Equivalent Procedures Attached

15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*

- [X] Appendix G Rules Followed; or
- [ ] Equivalent Rules Attached

16. EMERGENCY PROCEDURES *(Check One)*

- [X] Appendix H Procedures Followed; or
- [X] Equivalent Procedures Attached

17. AREA SURVEY PROCEDURES *(Check One)*

- [X] Appendix I Procedures Followed; or
- [ ] Equivalent Procedures Attached

18. WASTE DISPOSAL *(Check One)*

- [X] Appendix J Form Attached; ~~or~~ and
- [X] Equivalent Information Attached

19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*

- [ ] Appendix K Procedures Followed; or
- [X] Equivalent Procedures Attached

20. THERAPEUTIC USE OF SEALED SOURCES

- [X] Detailed Information Attached; and
- [ ] Appendix L Procedures Followed; or *(Check One)*
- [X] Equivalent Procedures Attached

21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon – 133)

- [X] Detailed Information Attached

22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS

- [ ] Detailed Information Attached Not applicable

23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b

- [X] Detailed Information Attached

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	R.S. Landauer, Jr., Co.	Monthly
		TLD	-	
	X	OTHER (Specify)	"VIP" Radiation Monitors (4) (Victoreen)	Instant digital read-out
b. FINGER		FILM	-	
		TLD	R.S. Landauer, Jr., Co.	Monthly
		OTHER (Specify)	-	
c. WRIST		FILM	-	
		TLD	-	
		OTHER (Specify)	-	

d. OTHER (Specify)

A TLD System will be obtained to monitor personnel radiation exposures and patient doses in special procedures involving diagnostic x-rays, teletherapy sources, radiopharmaceuticals and brachytherapy sources.

25. FOR PRIVATE PRACTICE APPLICANTS ONLY — Not applicable

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

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: Renewal of broad license

(2) LICENSE FEE ENCLOSED: $270.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)* Harry C.F. Gifford

(1) NAME *(Type or print)* Harry C.P. Gifford

(2) TITLE President, Baystate Medical Cen.

DATE April 26, 1979

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ITEM 5: RADIATION SAFETY OFFICER

Refer to our enclosed letters dated July 29, 1974 and August 28, 1978.

Refer to Item 5 in our original application for Broad License #20-01412-05 dated October 31, 1973.

Refer to our recent letter dated February 16, 1979 for amendment of our Broad License #20-01412-05.

Your Control #98824.

Item 5

Date: April 26, 1979

Item 6a: RADIOACTIVE MATERIAL FOR MEDICAL USE

a. list of isotopes and present limits of Broad License #20-01412-05

Item 6b: CALIBRATION SOURCES

a. arrangements for calibration laboratory

Item 6
Date: Arpil 26, 1979

ITEM 6.a.: RADIOACTIVE MATERIAL FOR MEDICAL USE

We would like to maintain present limits of possession for the following isotopes. The limits given are our present limits of Broad License #20-01412-05.

	Isotopes	Activity mC;	Amendment	Date
A.	Atomic Numbers 3 through 83	60	Number 5	8/25/76
B.	Hydrogen 3	50	Original	5/31/74
C.	Mo-99/Tc-99m Generator	7,000	7	3/16/77
D.	Tc-99m	7,000	7	3/16/77
E.	Iodine-131	800	7	3/16/77
F.	Xenon-133	2,200	6	9/15/76
*G.	Cesium 137	100	2	5/29/75
H.	Americium-241	1.0	5	8/25/76
I.	Californium-252	1.0	5	8/25/76
J.	Phosphorus-32	100	5	8/25/76
K.	Gold-198	100	5	8/25/76
L.	Group VI Sources	2,000	9	6/26/78

* This calibration standard source (tech/ops model 726) will be used for calibration of survey meters. At this time arrangements are being made to obtain nearly 172 square feet of space for calibration laboratory. This calibration laboratory will be located on

the ground floor of the main building (SH/WW Unit, 759 Chestnut St.) at Baystate Medical Center.

As soon as the calibration laboratory space is obtained, we intend to submit the following information:

Location and floor diagram of the calibration laboratory;

Identification of surrounding areas;

Safety precautions that will be followed during actual use of Cs-137;

Radiation levels in the surrounding areas during use of Cs-137;

Steps taken to reduce radiation levels to ALARA to protect the environs;

Survey meter calibration procedures.

In addition, arrangements are being made to obtain 180 square feet of space near the calibration laboratory for the Radiation Safety Officer when it is relocated from the present location.

Detailed descriptions of various areas alloted to radiation safety operations for use of isotopes of the broad license are given in supplementary information attached in support of Item 11: FACILITIES AND EQUIPMENT.

Item 6.a.

Date: April 26, 1979

Item 7: MEDICAL ISOTOPE COMMITTEE

a. names and specialties

b. duties as in Appendix B: section 1

c. equivalent duties: RSO: Section 2

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Item 7
Date: April 26, 1979

ITEM 7: MEDICAL ISOTOPE COMMITTEE

Names and Specialties

1. Said M. Zu'bi, M.D. (Chairman) - Nuclear Medicine
2. Won C. Park, M.D. ---------- Radiation Therapy
3. John Rousou, M.D. ---------- Cardiology
4. Paul Hetzel, M.D. ---------- Oncology
5. John Sullivan, M.D.---------- Pathology
6. Thomas Parker, M.D.---------- Radiology
7. James Polga, M.D.---------- Nuclear Medicine
8. Robert Stein, M.D.---------- Radiation Therapy
9. George Holsten, III, M.D.------- Pathology
10. John Turner, M.D. ---------- Nuclear Medicine
11. Suresh M. Brahmavar, Ph.D.
(Radiation Safety Officer)- Medical Physics

Item 7

Date: April 26, 1979

APPENDIX B

Section 1

MEDICAL ISOTOPES COMMITTEE

Responsibility:

The Committee is responsible for:

1. Ensuring that all individuals who work with or in the vicinity of radioactive material have sufficient training and experience to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.
2. Ensuring that all use of radioactive material is conducted in a safe manner and in accordance with NRC regulations and the conditions of the license.

Duties:

The Committee shall:

1. Be familiar with all pertinent NRC regulations, the terms of the license, and information submitted in support of the request for the license and its amendments.
2. Review the training and experience of any individual who uses radioactive material (including physicians, technologists, physicists, and pharmacists) and determine that the qualifications are sufficient to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.

3. Establish a program to ensure that all individuals whose duties may require them to work in the vicinity of radioactive material (e.g., nursing, security and housekeeping personnel) are properly instructed as required by Section 19.12, of 10 CFR Part 19.

4. Review and approve all requests for use of radioactive material within the institution.

5. Prescribe special conditions that will be required during a proposed use of radioactive material such as requirements for bioassays, physical examinations of users and special monitoring procedures.

6. Review the entire radiation safety program at least annually to determine that all activities are being conducted safely and in accordance with NRC regulations and the conditions of the license. The review shall include an examination of all records, reports from the radiation safety officer, results of NRC inspection, written safety procedures and management control system.

7. Recommend remedial action to correct any deficiencies identified in the radiation safety program.

8. Maintain written records of all committee meetings, actions, recommendations, and decisions.

9. Ensure that the byproduct material license is amended, when necessary, prior to any changes in facilities, equipment,

policies, procedures, and personnel.

Meeting Frequency:

The medical isotopes committee shall meet as often as necessary to conduct its business, but not less than once in each calendar quarter.

APPENDIX B

RADIATION SAFETY OFFICER

Section 2

RESPONSIBILITY

1. Administratively responsible for organization, development and implementation of Radiation Safety Program at Baystate Medical Center.
2. Administratively in charge of maintenance of the required documents, reports and records to be in compliance with the regulatory standards of local, state and federal agencies.
3. Administratively in charge of supervision and management of personnel involved in use of radiations and radioactive materials at Baystate Medical Center.
4. Administrative authority to suspend certain activities temporarily to avoid immediate danger to life and health due to unsafe conditions, operations or procedures in the use of radiations at Baystate Medical Center.
5. Provide administrative direction in planning or design of any new hospital facilities, equipment and procedures to ensure radiation safety and compliance with regulatory requirements.
6. Reports directly to the Chairman of the Department of Radiology and President of Baystate Medical Center to maintain effective channels of communications and correspondence with governmental agencies.

FUNCTIONS

1. To furnish consulting services to any potential user of radiations and advise him on radiation safety procedures.
2. To ensure that all license obligations and regulations from Nuclear Regulatory Commission, Department of Public Health and Joint Commission on A creditation of Hospitals are met.
3. To provide general surveillance of radiation safety activities, including assisting of all personnel in discharging their responsibilities.
4. To receive, control, transport and secure all radioactive material coming to or leaving the hospital.
5. To administer an effective and safe radioactive waste disposal program.
6. To supervise program of leak testing of sealed sources, radiation surveys, calibration of survey meters, measurement of output of radiation equipment, accurate assay of radioactive materials, quality assurance of counting systems and delivery of prescribed radiation doses.
7. To update and revise procedures and policies to meet compliance requirements of changing regulatory standards.
8. To supervise and assist in handling of radiation incidents or emergencies.
9. To instruct hospital personnel in radiation safety procedures.
10. To supervise radiation surveys of diagnostic and therapeutic

machines and generators.

11. To implement effective personnel radiation monitoring program at the Medical Center.

12. To supervise special surveys of patient rooms and patients with brachytherapy and radioisotope therapy.

13. To supervise selection and ordering of equipment and supplies.

14. To represent the Medical Center during inspections and discussions with government regulatory agencies.

15. To be responsible for overall day-to-day administration of radiation safety program and personnel management in the use of radiations at the Medical Center.

16. To organize and implement a centralized system of records and reports for the radiation safety operations.

17. To supervise the itemized functions given in APPENDIX B "Radiation Safety Tasks Involved In Keeping Occupational Exposures ALARA", U.S. Nuclear Regulatory Commission Document NUREG-0267 (December 1977).

Item 8: TRAINING AND EXPERIENCE

List of physicians approved for use of isotopes under Broad License #20-01412-05

a. catergory I: Diagnostic & Therapeutic Use of Isotopes.

b. catergory II: Therapeutic Use of Sealed Sources.

c. catergory III: Non-human Use & Research.

ITEM 8: TRAINING AND EXPERIENCE

The following physicians are authorized by the Medical Isotope Committee to use Isotope under our present Broad License #20-01412-05.

Category I - Diagnostic & Therapeutic Use of Isotopes

Said M. Zu'bi, M.D.

Robert A. Grugan, M.D.

John P. Sullivan, M.D.

Burritt L. Haag, M.D.

William M. Davis, M.D.

Robert A. Sears, M.D.

Leroy Shear, M.D.

Michael Geha, M.D.

William Sivitz, M.D.

Frederick Flatow, M.D.

Frederick E. Hampf, M.D.

Thomas H. Parker, M.D.

Eckart Sachsse, M.D.

Gerald N. Lapierre, M.D.

Edward I. Sweet, M.D.

J. Robert Kirkwood, M.D.

John W. Turner, M.D.

Kenneth L. McEwen, M.D.

James P. Polga, M.D.

George Holsten, M.D.

Ralph Otto, M.D.

Category II - Therapeutic Use of Sealed Sources

Robert A. Grugan, M.D.

Won C. Park, M.D.

Alan J. Stark, M.D.

Robert A. Stein, M.D.

David B. Ross, M.D.

Category III - Non-Human Use and Research

Suresh M. Brahmavar, Ph.D.

All Physicians of Category I and II.

Note: All present users will be required to update Supplements A and B for the renewal of this license. This data will be maintained for review.

Item 8

Date: April 26, 1979

ITEM 8: TRAINING AND EXPERIENCE

Supplement A for RSO

Refer to Item #8 of our renewal application for License #20-01412-03 dated March 25, 1979.

Your Control #99286.

Refer to our recent letter dated February 16, 1979 for amendment of our Broad License #20-01412-05.

Your Control #98824.

Item 8

Date: April 26, 1979

Item 9: INSTRUMENTATION

a. appendix C form for SH-WW Unit
WM Unit

b. list by name and model number for
SH-WW Unit
WM Unit

APPENDIX C SH-WW Unit

INSTRUMENTATION

1. Survey Meters:

a. Manufacturer's name EG & G

Manufacturer's model number 8004 (Thermoluminesvent Dosimeter Reader)

Number of instruments available ONE

Ranges MR/hr to rad/hr

Minimum range 0.1 mr/hr to 1.0 mr/hr

Maximum range 100 $\frac{2}{mr}$/hr to 1000 $\frac{2}{mr}$/hr

b. Manufacturer's name Victoreen

Manufacturer's model number Thyac III; Meter-490; Probe-489-11

Number of instruments available ONE

Ranges Cts/min and MR/hr

Minimum range 0.01 mr/hr to 2.0 mr/hr

Maximum range 2.0 mr/hr to 200 mr/hr

2. Dose Calibrator:

Manufacturer's name Capintec

Manufacturer's model number CRC-10

Number of instruments available ONE

3. Diagnostic Instruments:

Type of Instrument	Manufacturer's Name	Model No.
Gamma Camera Gamma Camera	Picker Searle	2C (Jan, 74) HP III (Sept, 72)
Xe133 Spirometer	Warren Collins	Xe-133 (Nov,72)
Rectinlinear Scanner	Picker	5" Dual (Aug,1969)
Spectrascaler Uptake Unit	Picker	Spectrascaler 4 (Sept, 1972)
Automatic Gamma Counting System	Searle	System 1185 (June, 1972)
DVT Counting System	Amersham Searle	9273 (Nov, 1977)

Note: A large field of view Gamma Camera and a Nuclear Medicine Computer system will be obtained in the next three months.

APPENDIX C WM Unit

INSTRUMENTATION

1. Survey Meters:

a. Manufacturer's name Victoreen

Manufacturer's model number Panoramic Meter

Number of instruments available ONE

Ranges mR/hr ; R/hr and Int. R

Minimum range 0.1 mr/hr to 3.0 mr/hr

Maximum range 1.0 ~~mr~~ γ/hr to 1000 ~~mr~~ γ/hr

b. Manufacturer's name Victoreen

Manufacturer's model number Thyae III, Meter-490; Probe-489

Number of instruments available ONE

Ranges Cts/min and MR/hr

Minimum range 0.01 mr/hr to 2.0 mr/hr

Maximum range 2.0 mr/hr to 200 mr/hr

2. Dose Calibrator:

Manufacturer's name Capintec

Manufacturer's model number CRC-10

Number of instruments available ONE

3. Diagnostic Instruments:

Type of Instrument	Manufacturer's Name	Model No.
Gamma Camera Gamma Camera	Searle Picker	6406-HP (Jan,74) 3C12 (Sept, 74)
Rectilinear Scanner (Probe used as uptake Unit)	Baird-Atomic	CS-500:3Inch (1973)
Computer	General Electric	Med II (May,1977)
Automatic Gamma Counting System	Baird Atomic	708 (1971)
Xe-133 Spirometer Charcoal Gas Trap	Warren-Collins Blount	X-133 (1976) (1976)
DVT Counting System	Jason & Sayles	I45A (1977)

Note: Gamma Camera (Searle) will be upgraded to HP-V in next three months. A new Xenon-133 gas trap system Nonex (NEN) has been ordered.

Item 10: CALIBRATION OF INSTRUMENTS

a. appendix D: section 1 followed.

b. appendix D: section 2 followed.

c. List of calibration sources for

SH-WW Unit
WM Unit

CALIBRATION OF DOSE CALIBRATOR

A. Sources Used for Linearity Test:

Check as appropriate

X First elution from new Mo-99/Tc-99m generator

or

____ other* (specify) _____

B. Sources Used for Instrument Accuracy and Constancy Tests:

Radionuclide	Activity (mCi)		Accuracy
57 Co	* 5.0	(10-21-75)	5%
133 Ba	0.271	(1-18-79)	10%
137 Cs	* 0.016	(3-1-68)	10%
Other	0.101uCi	(4-19-78)	10%

C. X The procedures described in Appendix D, Section 2, will be used for calibration of the dose calibrator

or

____ Equivalent procedures are attached.

* New sorces are on order.

*Must be equivalent to the highest activity used.

CALIBRATION OF DOSE CALIBRATOR WM Unit

A. Sources Used for Linearity Test:

Check as appropriate

X First elution from new Mo-99/Tc-99m generator

or

____ other* (specify) _____

B. Sources Used for Instrument Accuracy and Constancy Tests:

Radionuclide	Activity (mCi)		Accuracy
57 Co	20.1	(1-17-79)	5%
133 Ba	0.260	(11-22-78)	10%
137 Cs	0.222	(8-6-74)	10%
Other	0.055	(8-22-74)	10%

C. X The procedures described in Appendix D, Section 2, will be used for calibration of the dose calibrator

or

____ Equivalent procedures are attached.

*Must be equivalent to the highest activity used.

Item 11: FACILITIES AND EQUIPMENT

a. facilities of Nuclear Medicine Laboratories
SH-WW Unit
WM Unit

b. Facilities for radiation safety operations at
SH-WW Unit
WM Unit

c. Equipment listing used in Nuclear Medicine Laboratories at both units of BMC.

ITEM 11: FACILITIES AND EQUIPMENT

1. Nuclear Medicine Laboratories:

The facilities used in Clinical Studies involving licensed radioactive material under Broad License are shown in enclosed floor diagrams of Nuclear Medicine Laboratories located in SH/WW Unit and WM Unit of Baystate Medical Center. The space in Nuclear Medicine Laboratories used in Clinical Studies of the patients, although limited, is adequate at this time. However, addition of more imaging or nuclear medicine equipment is going to put severe strain on the present cramped quarters of Nuclear Medicine Laboratories, unless new space is allotted to new acquisition of equipment.

Radiation Safety Operations:

The facilities used for radiation safety operations are marked on enclosed diagrams. These facilities are at present used to operate the radiation safety program for two teletherapy licenses (#20-01412-03, #20-01412-06), one special nuclear material license (#SNM-1766) and present broad license (#20-01412-05). In 1976, the merger of three hospitals (Wesson Memorial Hospital, Springfield Hospital and Wesson Women's Hospital) brought about the retaining of a single broad license (#20-01412-05) for the entire Baystate Medical Center. The radiation safety operations previously under

under license (#20-01495-01) were assigned to radiation safety operations of broad license (#20-01412-05). The following data gives space allotments for radiation safety operations in August 1976 and in April 1979.

AREA IN SQUARE FEET FOR RADIATION SAFETY

Area (Square Feet)		August 1976		April 1979	
		WMU	SH/WWU	WMU	SH/WWU
#1	Radiation Safety Office (Also Chief Physicist's Office)	180	180	None	180
#2	Hot Laboratory (Nuclear Medicine)	48	90	48	90
#3	Sealed Sources Storage (Radiation Therapy)	60	30	60	30
#4	Calibration Laboratory	None	120	None	None
#5	Radioactive Waste Storage	30	None	30	None
#6	Assistant Physicist's Office	90	None	90	None
	Total Area (Square Feet)	408	420	228	300

Total Area for Radiation Safety Operations INCLUDING Medical Physics Services is:

As of August 1976 - 828 square feet
As of April 1979 - 528 square feet

As per NRC NUREG-0267 required total area for Radiation Safety Operations EXCLUDING Medical Physics Services is:

1,000 square feet

At the beginning of this year (1979) all radiation safety operations were centralized for Baystate Medical Center and radiation safety office was located at SH/WW Unit, 759 Chestnut Street, Springfield, Mass. (refer to our letter dated February 16, 1979 for amendment of Broad License #20-01412-05). We are committed to provide adequate space, instrumentation and personnel to carry out the obligations of our four (4) NRC licenses and recommendations of NUREG-0267. However, since August 1976 to the present time (April 1979) radiation safety operations have lost nearly 300 square feet of space from the committed total of 828 square feet when the single broad license was granted. Even at that time (August 1976) when the single broad license was obtained we were deficient by nearly 172 square feet of space of the required 1,000 square feet for radiation safety operations. Our radioactive materials handling in August 1976 was approximately 2.5 curies compared to approximately 5.0 curies at the present time (April 1979). The deficiency in total area is 472 square feet.

In summary, we are handling almost twice as much of radioactive material in half the recommended space.

Efforts are underway to bring the present space allotments to the previously committed space of 828 square feet as of August 1976. At this time, there is administrative commitment

to find only 172 square feet of space for a Calibration Laboratory on the Ground Floor of the Main Building at SH/WW Unit, 759 Chestnut Street, Springfield, Mass.

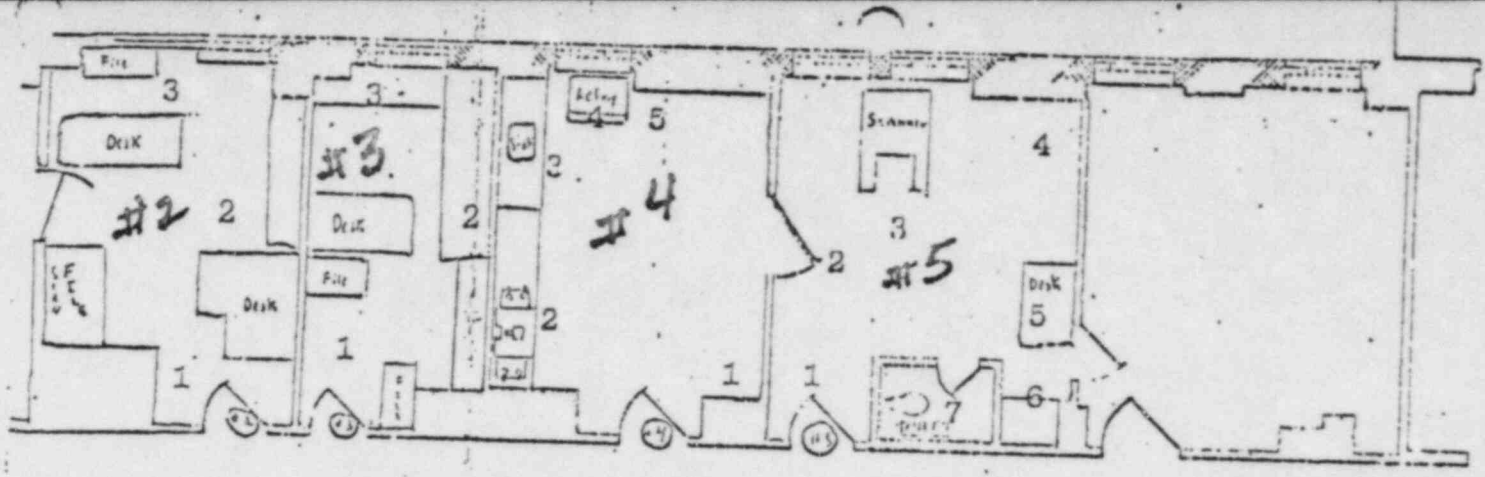
The programs of Medical Physics Services and Radiation Safety Operations are managed by 1.5 F.T.E. physicists at Baystate Medical Center. The required (NRC NUREG-0267) staffing for the medical institution of this size (over 950 beds) is 4 F.T.E. for radiation safety operations alone (not including the clinical radiological physics services).

2. Equipment:

Please refer to Item #9, Appendix C form of NRC-313M of this application.

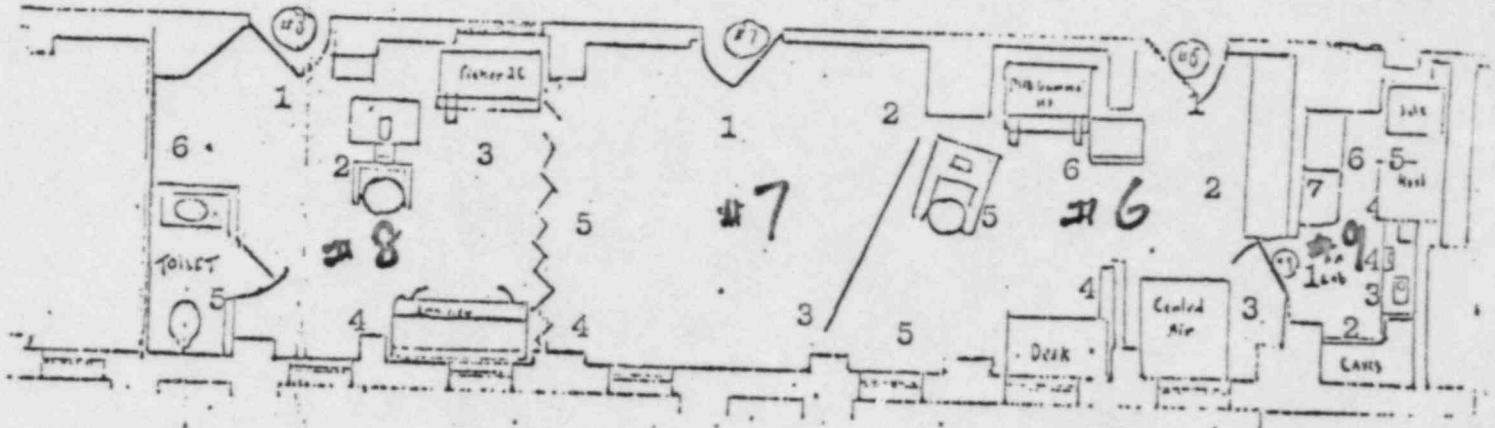
Item 11

Date: April 26, 1979



SH. WW Un

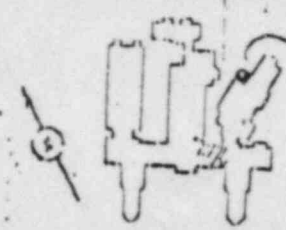
April, 197



Rm#2	Rm#3	Rm#4	Rm#5	Rm#6	Rm#7	Rm#8	Rm#9 Hot Lab
1. OFFICE	1. RSO	1. NML	1. NML	1.	1. NML	1. NML	1.
2.	2.	2.	2.	2. NML	2.	2.	2. HOT LAB
3.	3.	3.	3.	3.	3.	3.	3. (Nucl. M
		4.	4.	4.	4.	4.	4.
		5.	5.	5.	5.	5.	5.
			6.	6.		6.	6.
							7.

READINGS ARE IN ☐ mR/hr ☐ counts/min.

NUCLEAR MEDICINE DEPT.
DAY STATE MEDICAL CENTER
SPRINGFIELD_WESSON WOMEN'S DIV.



HOT LAB for Rad. Therapy

DATE: _____
SURVEY METER: _____
SURVEYOR: _____

Survey Okay
by

_____

Technologist Lounge

20 Ft.

Baird

CS 500

Work desk

Camera Console #1

32 Ft.

Radiology Corridor

Xe-133 Spirometer

Imaging Laboratory

WMU/BMC

Camera Detector #1

Sinks

Computer

Camera Console #2

Camera Detector #2

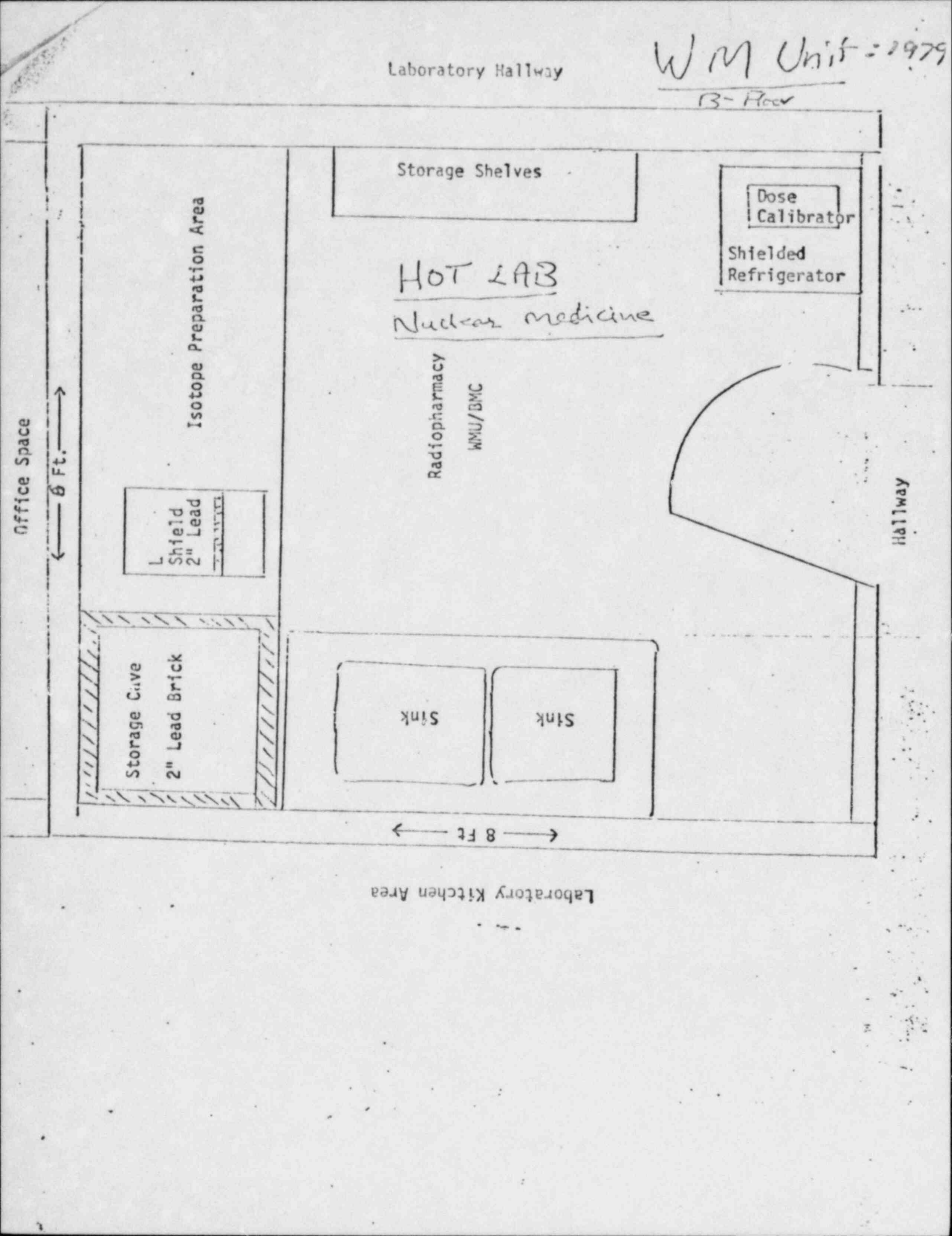
Assistant Physicist

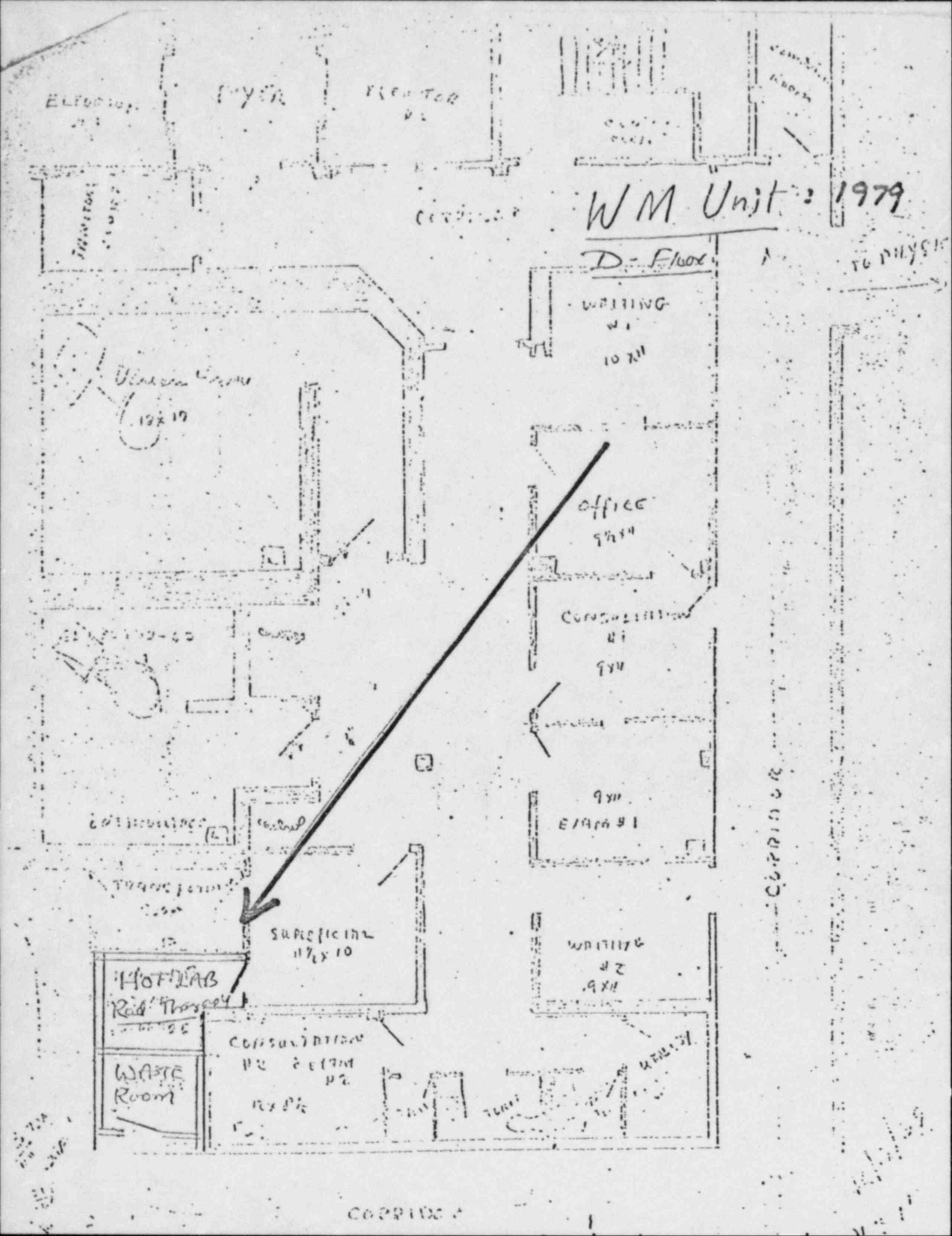
20 ft.

Thermography Room & Office

B-floor

Nuclear medicine Lab.


Laboratory Hallway
WM Unit - 1979
B-Floor
Storage Shelves
Dose Calibrator
Shielded Refrigerator
HOT LAB
Nuclear Medicine
Isotope Preparation Area
Radiopharmacy
WMU/BMC
Office Space
6 Ft.
L Shield 2" Lead
Hallway
Storage Cave
2" Lead Brick
Sink
Sink
8 Ft
Laboratory Kitchen Area


WM Unit: 1979
D-Floor
HOT LAB
WASTE Room

Item 12: PERSONNEL TRAINING PROGRAM

a. personnel training and duties in Nuclear Medicine

b. present staffing of section of Nuclear Medicine

ITEM 12: PERSONNEL TRAINING PROGRAM

The details of personnel involved in the use of isotopes are:

1. Nuclear Medicine Technologists

All nuclear medicine technologists are either certified by ARRT or ASCP or board eligible by experience or by formal training in nuclear medicine technology programs.

Duties

Perform and assist in clinical nuclear medicine procedures as required by nuclear medicine physicians. Report to unit supervisor of nuclear medicine.

2. Unit Supervisors of Nuclear Medicine Laboratories

Unit Supervisors shall be certified nuclear medicine technologists (ARRT or ASCP) with at least three (3) years clinical experience.

Duties

Planning, performing and supervision of nuclear medicine procedures and radiation safety procedures. Responsible for ordering, inventory control and proper use of isotopes and other supplies. Report to Technical Director of Nuclear Medicine and Radiation Safety Officer.

3. Technical Director of Nuclear Medicine

Technical Director shall be a graduate in physical sciences with at least five (5) years experience in technical aspects of instrumentation used in nuclear medicine. This position will

requires a thorough background in physics and electronics of nuclear medicine instrumentation with up to date knowledge of radiation safety rules and regulations.

Duties

Supervision and management of quality assurance programs and assist in radiation safety operations as required by Radiation Safety Officer and Director of Nuclear Medicine. Report to Radiation Safety Officer, Director of Nuclear Medicine and Radiology Administrator.

4. Radiation Safety Officer

The Radiation Safety Officer shall be a physicist with Ph.D. in physics with at least five (5) years experience in management of broad license issued by the Nuclear Regulatory Commission.

Duties

As given in Appendix B, Section 2 of Item 7 of this application.

5. Director of Nuclear Medicine

The Director of Nuclear Medicine shall be a licensed physician certified by ABNM with at least five (5) years clinical experience in the use of isotopes in diagnosis and treatment of patients.

Duties

In charge of Division of Medical Imaging which includes Nuclear Medicine. Report to Chairman of the Department of Radiology.

6. Other Personnel

All other personnel such as nursing staff, residents in training, physicians undergoing clinical experience in use of isotopes, students in nuclear medicine technology programs, paramedical personnel, are under direct supervision of Director of Nuclear Medicine and Radiation Safety Officer.

Duties

As assigned and required by the training programs or clinical procedures. Report to Director of Nuclear Medicine and Radiation Safety Officer.

These requirements of personnel training and experience are established as standards for safe use of licensed radioactive materials at Baystate Medical Center. The continuing medical education programs supplement and update the information given to all the personnel working in the Section of Nuclear Medicine. A hospital-wide radiation safety instruction program is given every year for the benefit of other hospital employees. (A copy of recent program is enclosed.)

The present staffing levels are:

1. Nuclear Medicine Technologists ..... 8.0 FTE
2. Unit Supervisors ..... 2.0 FTE
3. Technical Director ..... 1.0 FTE
4. Director ..... 1.0 FTE

5. Physicists and Radiation Safety Officer .. 1.5 FTE

6. Secretary ..... 1.0 FTE

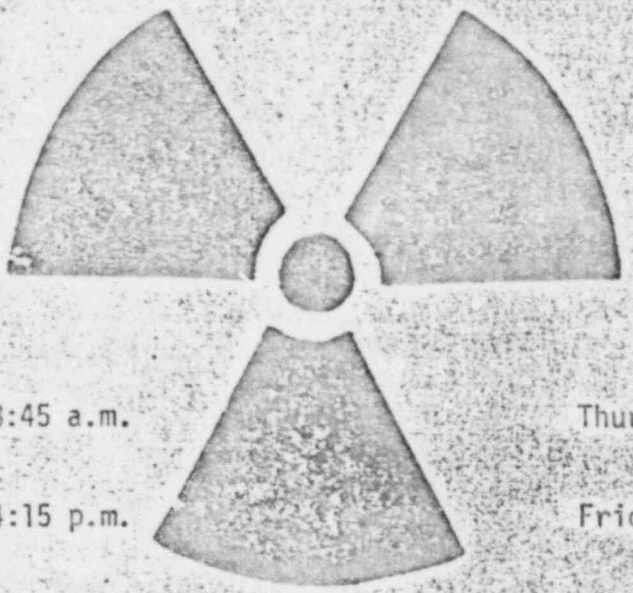
BAYSTATE MEDICAL CENTER

YOU ARE INVITED TO ATTEND A PROGRAM ON

CAUTION

RADIOACTIVE MATERIAL

RADIATION SAFETY



SHU

Monday, March 12th 8:00-8:45 a.m.
Auditorium I

Tuesday, March 13th 3:30-4:15 p.m.
Auditorium I

Wednesday, March 14th 9:30-10:15 a.m.
Auditorium I

WMU

Thursday, March 15th 10:30-11:15 a.m.
Carmichael B

Friday, March 16th 3:30-4:15 p.m.
Carmichael A

Presented by
Dr. Suresh M. Brahmavar
Ph.D. and Medical Physicist

The Program, this year, is the first one conducted for all Baystate Medical Center employees under a unified Radiation Safety Program. It is designed to meet the needs of both campuses.

The Program, based on the guidelines of the Nuclear Regulatory Commission, the Department of Public Health, O.S.H.A., J.C.A.H., is offered in compliance with the Mandatory Requirements of the State and Federal Regulatory Agencies.

FOR ALL HOSPITAL EMPLOYEES

PLEASE POST

Item 13: PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

a. During normal working hours.

b. During off-duty hours.

APPENDIX E

PROCEDURE FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

The Chief Nuclear Medicine Technologist will place all orders for radioactive material and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

1. During Normal Working Hours - 7:00 a.m. to 4:30 p.m.

   Monday through Friday, except Holidays

   a. All vendors and carriers be instructed to deliver radioactive packages directly to Nuclear Medicine Laboratory, Special Procedures Laboratory, Endocrinology Laboratory, Renal Laboratory or to the correct address given on the package.

   b. Verify the accuracy of shipment brought to your laboratory by carrier personnel before accepting the radioactive package. If the shipment is not on order from your laboratory, then DO NOT ACCEPT the radioactive shipment. If possible, direct the carrier personnel to the proper laboratory for correct delivery of radioactive shipment.

   c. If you are in receipt of a wrong package then immediately call the Radiation Safety Officer for further instructions. All interlaboratory transfers of shipment of radioactive materials will be carried out either by security personnel or by personnel authorized by the Radiation Safety Officer.

   d. After you receive radioactive package shipment (on order

from your laboratory), follow procedures for safely opening packages containing radioactive material. A copy of procedures is enclosed.

e. Complete "Radioactive Shipment Receipt Report" form (a copy attached) for each package received in your laboratory. Maintain records for inspection by the Radiation Safety Officer and by the U.S. Nuclear Regulatory Commission.

f. See instructions in Section 2, items g through j, given in this memorandum.

2. During Off-Duty Hours - 4:30 p.m. to 7:00 a.m. Saturday, Sunday, and Holidays

a. All vendors and carriers be instructed to deliver radioactive packages directly to Emergency Wards of Baystate Medical Center.

b. The personnel on duty at Emergency Ward shall accept delivery of the radioactive shipment.

c. Before accepting delivery and signing for receipt of radioactive packages, verify if the shipment is properly delivered to correct address on the package (e.g. 140 High Street or 759 Chestnut Street). If the carrier attempts to make a delivery at a wrong address, then DO NOT ACCEPT delivery. Direct carrier personnel to the correct address to complete delivery of package at Baystate Medical Center.

d. If the package is wet or appears to be damaged, immediately contact the Radiation Safety Officer. Ask the carrier to remain at the Emergency Ward until it can be determined that neither he nor the delivery vehicle is contaminated. This determination will be made by the Radiation Safety Officer or his authorized representative.

e. (1) At WM Unit:

After accepting delivery of radioactive package, immediately store the package in the "X-Ray Office" near Emergency Ward (C-floor) and lock the room. This package shall be under continuous surveillance of an x-ray technologist on duty or it shall be locked up in the "X-Ray Office" when the X-Ray Office is unattended by the x-ray technologist. Call the security guard to transfer this package to Nuclear Medicine Laboratory.

(2) At SH/WW Unit:

After accepting delivery of radioactive package, immediately store the package in the "Special Box" located in Emergency Ward and lock the box. After the radioactive package is received by Emergency Ward personnel, it shall either be under continuous surveillance of the E.W. personnel or it shall be locked up in the special box.

Call the security guard to transfer this package to Nuclear Medicine Laboratory.

f. Immediately on notification by Emergency Ward personnel the security guard shall remove this package stored at Emergency Ward and transfer it to Nuclear Medicine Laboratory. Unlock the door, place the package on top of the counter and relock the door of the Nuclear Medicine Laboratory.

g. During the first normal working hour the Nuclear Medicine technologist shall verify the delivery of the package by the security guard.

h. If the radioactive package delivered by the security guard belongs to Nuclear Medicine Laboratory then follow instructions given in Section 1, items d and e of this memorandum.

i. If the radioactive package DOES NOT BELONG to Nuclear Medicine Laboratory, then call security guard to transfer it to proper laboratory within the Unit of Baystate Medical Center.

j. If you cannot determine the correct destination of the package delivered by the security guard during off-duty hours, then hold the package in Nuclear Medicine Laboratory and call the Radiation Safety Officer for further instructions.

3. Receipt of Radioactive Packages at Materials Center,
380 Union Street, West Springfield, Mass.

NO RADIOACTIVE PACKAGES SHALL BE RECEIVED AT THE ABOVE ADDRESS

Our U.S. Nuclear Regulatory Commission license specifically requires that licensed materials shall be used only at

759 Chestnut Street, Springfield, Mass., and
140 High Street, Springfield, Mass.

All questions not specifically answered by these procedures shall be directed to:

Radiation Safety Officer: Suresh M. Brahmavar, Ph.D.

Office Phone:

Home Phone:

RADIOACTIVE SHIPMENT RECEIPT REPORT

1. P.O.#: _____ SURVEY DATE: _____ TIME: _____

   SHIPMENT #: _____ RECEIVED BY: _____ MANUFACTURER: _____

2. CONDITION OF PACKAGE:

   _____O.K. _____PUNCTURED _____STATUS _____WET

   _____CRUSHED _____OTHER

3. RADIATION UNITS OF LABEL: _____UNITS (mR/hr)

4. MEASURED RADIATION LEVELS: a. Package surface _____mR/hr

   b. 3' from surface _____mR/hr

5. DO PACKING SLIP AND VIAL CONTENTS AGREE?

   a. Radionuclide _____ yes _____ no _____ difference _____

   b. Amount _____ yes _____ no _____ difference _____

   c. Chem Form _____ yes _____ no _____ difference _____

6. WIPE RESULT FROM: a. Outer _____ CPM = _____DPM

   eff = ( )

   b. Final Source Container _____ CPM = _____DPM

   eff = ( )

   c. Background: _____CPM

7. SURVEY RESULTS OF PACKING MATERIAL AND CARTONS _____mR/hr, CPM

8. DISPOSITION OF PACKAGE AFTER INSPECTION: Held for Decay _____ Normal Waste: ____

9. IF NRC/CARRIER NOTIFICATION REQUIRED, GIVE TIME, DATE AND PERSONS NOTIFIED.

   PERSON: _____ TIME: _____ DATE: _____

10. Report Completed By: _____

Item 14: PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS

a. appendix F procedures followed

APPENDIX F

PROCEDURE FOR OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Visually inspect package for any sign of damage (e.g. wetness, crushed). If damage is noted stop procedure and notify Radiation Safety Officer.
2. Measure exposure rate at 3 feet from package surface -- record. If >10 mR/hr -- stop procedure and notify Radiation Safety Officer.
3. Measure surface exposure rate and record. If >200 mR/hr -- stop procedure and notify Radiation Safety Officer.
4. Put on gloves.
5. Open the outer package (following manufacturer's directions, if supplied) and remove packing slip. Open inner package to verify contents (compare requisition, packing slips, and label on bottle), check integrity of final source container (inspect for breakage of seals or vials, loss of liquid, discoloration of packing material). Check also that shipment does not exceed possession limits.
6. Wipe external surface of final source container with moistened cotton swab or filter paper held with forceps, assay and record.
7. Monitor the packing material and packages for contamination before discarding:
   a. If contaminated, treat as radioactive waste;
   b. If not, obliterate radiation labels before discarding in regular trash.

Item 15: GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

a. appendix G rules followed

APPENDIX G

LABORATORY RULES FOR THE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats, or other protective clothing at all times in areas where radioactive materials are used.
2. Wear disposable gloves at all times while handling radioactive materials.
3. Monitor hands and clothing for contamination after each procedure or before leaving the area.
4. Use syringe shields for preparation of patient doses and administration to patients except in circumstances, such as pediatric cases, where their use would compromise the patient's well-being.
5. Do not eat, drink, smoke or apply cosmetics in any area where radioactive material is stored or used.
6. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10%.
7. Wear personnel monitoring devices (Film badge or TLD) at all times while in areas where radioactive materials are used or stored. These should be worn at chest or waist level.
8. Wear TLD finger badges during elution of generator and preparation, assay, and injection of radiopharmaceuticals.

9. Dispose of radioactive waste only in specially designated receptacles.

10. Never pipette by mouth.

11. Survey generator, kit preparation, and injection areas for contamination after each procedure or at the end of the day. Decontaminate if necessary.

12. Confine radioactive solutions in covered containers plainly identified and labelled with name of compound, radionuclide, date, activity, and radiation level if applicable.

13. Always transport radioactive material in shielded containers.

Item 16: EMERGENCY PROCEDURES

a. appendix H procedures followed.

b. equivalent procedures for

emergency operation
cadavers
death of patient with radioactivity

APPENDIX H

EMERGENCY PROCEDURES

Minor Spills

1. NOTIFY: Notify persons in the area that a spill has occurred.
2. PREVENT THE SPREAD: Cover the spill with absorbent paper.
3. CLEAN UP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Include all other contaminated materials such as disposable gloves.
4. SURVEY: With a G.M. Survey Meter, check the area around the spill, your hands and clothing for contamination.
5. REPORT: Report incident to the Radiation Safety Officer.

Major Spills

1. CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.
2. PREVENT THE SPREAD: Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.
3. SHIELD THE SOURCE: If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. CLOSE THE ROOM: Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP: Notify the Radiation Safety Officer immediately.

6. PERSONNEL DECONTAMINATION: Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

RADIATION SAFETY OFFICER: SURESH M. BRAHMAVAR Ph.D.

OFFICE PHONE: _____

HOME PHONE: _____ _____

EMERGENCY OPERATION

The physician or resident must:

1. Inform the surgeon of
   - a) Date of Isotope Therapy;
   - b) Amount and kind of isotope;
   - c) Location of the isotope in the patient.
2. Inform the Radiation Safety Officer of
   - a) The above information;
   - b) Time and place of surgery.

   The Radiation Safety Officer will provide necessary monitoring and advice on exposure.

CADAVERS

If a patient who has received a therapeutic dose of any isotope dies in the hospital within a three week period after administration, the physician must:

1. Notify the Radiation Safety Officer, night or day. The Radiation Safety Officer is responsible for giving suitable instruction to the pathologist and funeral director.
2. Notify the pathologist, if an autopsy is to be performed, that the cadaver contains radioactive material and that the Radiation Safety Officer will provide necessary monitoring during autopsy.

DEATH OF PATIENT WITH RADIOACTIVITY

1. Death at Hospital

If a patient containing radioactivity dies, the responsibility for signing the death certificate may fall upon any member of the Medical Staff, depending upon the circumstances.

2. Implant Removal

If the implant is removable, it shall be extracted by the physician before the body leaves the nursing care unit and is taken from the ward. After implant extraction, a tag shall be attached to the patient's chart stating that the implant has been removed. If an implant is not removable, then a radioactive tag shall be attached to the body.

3. Other Sources of Radioactivity

If the deceased's radioactivity comes from a source other than an implant, the Radiation Safety Officer or his designate must monitor the body and display prominently the radioactive materials label on it, stating the activity on the surface and at 1 meter.

4. Report to Funeral Director

Whether an autopsy is planned or not, the staff member who pronounced death is responsible for calling the Radiation Safety Officer to monitor the body and specify on a form the amount of radioactivity in the deceased. This form signed by

the Radiation Safety Officer will be forwarded with the body to the funeral director. A copy of the form will be filed in the patient's chart.

REPORT OF RADIOACTIVITY TO FUNERAL DIRECTOR

This certifies that the remains of _____

have been examined this date by the Radiation Safety Officer or his deputy. Radioactivity close to the surface of the body, as determined by _____
(state instrument or method)

(is) (is not) below the rate of 30 mr/hr that is acceptable for embalmers during their work. The maximum permissible dose rate will not be exceeded, provided rubber gloves are worn, and further precautions are observed as listed below.

Further Precautions: _____

_____

_____

_____

Signed: _____
Radiation Safety Officer

Date: _____

5. Autopsy

If an autopsy is performed, it is the responsibility of the physician pronouncing the death to inform the pathologist of the remaining radioactivity in the body. The radioactive material label shall have been fixed to the body prior to its leaving the ward.

6. Measurement of Radioactivity

A patient who is radioactive will be wearing a tag. The pathologist can determine the extent of radioactivity as explained below and by reference to the form filled out by the Radiation Safety Officer. Further information may be obtained by referring to the patient's medical record chart and by consulting with the responsible physician.

7. Patients With Nonremovable Implants

When the implant is not removable, special precautions must be taken by the pathologist who performs the autopsy. The procedures to be followed will be given to the pathologist by the Radiation Safety Officer.

8. Estimating Remaining Radioactivity

An estimate of the radioactivity remaining in the body may be made from the values listed in Tables I and II.

TABLE I

Rate of Decay of Radioisotopes in Body

Number of days elapsed since treatment	Au-198 in injected cavity after 100 mCi injection	I-131 in thyroid after 100 mCi dose (normal gland)	I-131 in functioning metastases after 100 mCi therapy dose
1	77	30	20
2	60	26	18
3	46	24	16
4	35	22	14
6	21	18	12
8	13	14	9
10	8	10	7
15	2	6	4

TABLE II

Exposure Rates for Specified Radionuclides

Radionuclide	Specific gamma ray emission R/mCi-hr at 1 cm	mR/hr/100 mCi at 1 m
Iodine-131	2.2	22
Gold-198	2.3	23
Radium-226	8.3	83
Iridium-192	5.5	55

This gives an approximate estimate of the amount of activity remaining.

Example 1.

If 150 mCi of I-131 were given 10 days earlier in a patient with thyroid metastases, after 10 days the amount in the tumor would be about 10-1/2 mCi. Hence, special precautions should be taken. However, the total amount of material present, and therefore the hazard, is very much less than if death had occurred very soon after administration.

Example 2.

Assume an extreme case in which 200 mCi of Au-198 had been given about 8 hours earlier. Then about 140 mCi of gold will be on the peritoneal surfaces, and about 50 mCi will remain in the fluid. Therefore, first drain the fluid and save it for disposal. The remaining gold in the peritoneum provides a beta dose-rate of about 20 rem/hr, while the gamma ray dose-rate will be about 4 rem/hr. Double gloves will reduce the beta dose-rate to about 5 rem/hr. The viscera should be removed by working for preferably no longer than 5 minutes in the abdominal cavity. If the time required is longer than this, another pathologist should take over. (Approximately 1 rem will be received in 5 minutes from the beta and gamma radiation.)

Example 3.

If a large amount of I-131 has been administered some time before death, the body fluids should be removed first since urine and blood will be radioactive. If death occurred very shortly after administration, the urine in particular will be very radioactive. The thyroid gland will emit about 2 rem/min (beta dose) for each 10 mCi of I-131 administered and consequently should not be touched directly with the hand since a weekly tolerance dose would be delivered in 1 minute. Removal of the gland should be accomplished using rather long instruments. If necessary, the activity in the gland may be checked by the Radiation Safety Officer, who will determine the degree of precaution necessary. A gland containing 1 mCi of activity, for instance, is not a severe hazard.

If the pathologist is uncertain about the amount of radioactivity remaining, he may call the Radiation Safety Officer.

9. Death At Home

A responsible member of the family must be impressed that if the radioactive patient dies at home or in another hospital, the Radiation Therapist or Department of Medicine must be informed immediately. Since the embalmer is not considered to be a radiation worker, his maximum dose should not exceed 500 m rem per year. Based on levels established at the time the patient is discharged from this hospital, any patient who received I-131 or Au-198 one week previously can be safety released for embalming or preparation for burial or cremation, provided the body is not to be opened.

Item 17: AREA SURVEY PROCEDURES

a. appendix I procedures followed.

Item 18: WASTE DISPOSAL

a. appendix J form attached.

b. equivalent procedures for liquid disposal.

APPENDIX J

WASTE DISPOSAL PROCEDURES

Section I

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.

_X_ Other (specify) Refer to Appendix J, Section 2

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

(Check as appropriate)

_____ Returned to the manufacturer for disposal.

_____ 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 as normal trash. (Note: This method of disposal may not be practical for generators containing long-lived radioactive contaminants.)

_X_ 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.

X — Disposed of by commercial waste disposal service (see also No. 4 below).

____ — Other (specify) Refer to Appendix j, Section 2

4. The commercial waste disposal service used will be :

Interex Corp., 3 Strathmore Rd., Natik, Mass. 01766

(Name) (City, State)

NRC/Agreement State License No. 20-13082-01

APPENDIX J

METHODS OF WASTE DISPOSAL

Section 2

All radioisotopes and radioactive waste are to be disposed of by methods and procedures as follows:

1. General Methods of Radioactive Waste Disposal

All radioactive waste will be disposed of by sewerage, including sink or toilet, and decay in storage. Use rubber gloves when handling radioactive waste. If waste has appreciable activity label as to amount, date, and isotope (if known).

a. Decay in Storage

Outdated radiopharmaceuticals and contaminated materials, such as needles, syringes, used for injections are radioactive waste. All radioactive waste will be held for decay in storage to background levels. Radiopharmaceuticals will be assayed as to activity, transferred to the decay bin and the transfer recorded in the log book. They will be held for decay for a minimum of ten half-lives. Contaminated materials are to be placed in suitable container and held for decay to background levels as measured by a survey meter. Background levels will be considered as less than 0.1 mR/hr at contact with the material. These materials can then be considered as non-radioactive and disposed as normal trash. All labels indicating

radioactive material should be removed or defaced before disposal.

This method of disposal will be called Method A.

The decay bins, or caves, are located in the Nuclear Medicine Hot Lab and entrance is restricted to authorized personnel only. The room is labeled with radiation warning signs. One decay bin is located over the storage safe. This decay bin as well as the safe is used for outdated radiopharmaceuticals. These decay bins are to be cleaned out periodically by assaying activities and disposing of the liquid radioisotopes which have decayed sufficiently through sewerage methods as outlined in that section. The activity at time of disposal and disposal method will be noted in the log book. Sewerage disposal will be called Method B.

The other decay bin is located in the Hot Lab and is used for contaminated waste, such as needles, syringes, rubber gloves, absorbent pads and Tc99m eluates. This decay bin will also be cleaned out periodically by determining activity at contact with survey meter as outlined in Method A.

b. Sewerage

This method is governed by N.R.C. regulations in 10 CFR 20.303 which states:

No licensee shall discharge licensed material into a sanitary sewerage system unless

(1) It is readily soluble or dispersible in water; and

(2) The quantity does exceed the larger of

(a) ten times the amounts listed in Appendix C. Some of these values are

Tc99m - 10 microcuries
Cr-51 - 500 "
P-32 - 100 "
I-131 - 100 "
Co-57 - 500 "

or

(b) the quantity that if diluted by the average daily or monthly quantity of sewerage release into the sewer will not result in an average concentration equal to the limits specified in Appendix B, table 1, column 2 of 10 CFR 20

or

(c) One curie per year of total radioactive material.

Only the hot sink in the Wet Lab or the Hot Lab will be used for disposal and this should be accompanied by discharge of large amounts of water. Allow the water to run for at least 15 minutes at a fast rate. The sewerage method is called Method B.

Excreta of individuals undergoing diagnosis or therapy is exempt from these provisions.

2. Specific Methods of Disposal

a. Used needles and syringes: After use, cap tightly and transfer to the appropriate "hot trash" box. For Tc 99m, a leaded box is located next to the Tc 99m daily eluates. This box is replaced when full and transferred to the Hot Lab decay bin for decay to background and disposal by container in Hot Lab by Method A.

b. Contaminated disposal items such as paper, absorbent pads, wipes, gloves, cotton swabs, etc.: Place in appropriate trash (hot) receptacle in Hot Lab. These are labeled Tc 99m and 'other isotopes'. "Other isotopes" are to be wrapped, labeled as to date and isotope and assay.

c. Daily Tc 99m Eluates: Label and store in lead containers provided and remove from container only for assay. Previous day eluates are placed in Hot Lab in lead containers for decay if not used in morning.

d. All Tc 99m Labeled Preparations: HAM, sulfur colloid, etc. from previous day to be placed in lead storage bin marked A. On Saturday morning bin B is emptied, monitored for residual activity and if at background level, disposed as non-radioactive trash. Then, contents of lead storage bin A are transferred to lead storage bin B for another

week's decay. The Tc 99m elution vials from previous week will be placed in lead storage bin A.

e. Tc 99m Generators: The old generator is placed under the sink in the Hot Lab for decay. After eight (8) weeks (20 half-lives) of decay, the generators are monitored for activity and returned to solid waste holding area for disposal by commercial company.

f. Unused Doses: Do not reintroduce into radiopharmaceutical vial. Inject into unused vial, label as to date, activity, and isotope, and place in decay bin A in Hot Lab.

g. Wet Lab Procedures: T_3, T_4 and RIA tests contain less than 1.0 mCi of activity and the residues or wastes may be discarded via the Hot sink using large amounts of water. The sponges or resin should be surveyed for appreciable activity. If above background they must be placed in decay bin for decay. Otherwise, disposal is as non-radioactive trash.

h. Urine from Schilling's Test: It will be disposed of via the hot sink using copious quantities of water in accordance with limitations in Method B. Activity should not exceed 0.5 mCi Co-57. The container should be rinsed three times.

i. Pipettes: Glass pipettes will be rinsed with large amounts of water and then soaked in water in hot sink in Wet Lab.

Detergent will be added to the water. The water should be changed once a week. The use of disposable pipettes is recommended.

j. DO NOT INCINERATE OR BURN ANY LICENSED RADIOACTIVE MATERIAL.

Item 19: THERAPEUTIC USE OF RADIOPHARMACEUTICALS

a. equivalent procedures of appendix K attached.

b. radiation survey form attached.

APPENDIX K

PROCEDURES FOR USE OF GROUPS IV AND V RADIOPHARMACEUTICALS

FOR TREATMENT OF PATIENTS

1. All patients treated with iodine-131 or gold-198 will be placed in a private room with a toilet.
2. The patient's room will be properly posted in accordance with Section 20.203, 10 CFR Part 20.
3. Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after administration of the treatment dose. Exposure rates will be measured at the patient's bedside, three feet away and the entrance to the room. The Radiation Safety Officer or his designate will then determine how long a person may remain at these positions and will post these times in the patient's chart and on his door. The results of daily surveys will be used to recalculate permitted times which will be posted on the patient's chart.
4. The form "Nursing Instructions & Radiation Surveys: Permanent Implants & Isotope Therapy" will be completed immediately after administration of the treatment dose. A copy will be posted in the patient's chart.
5. Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20.
6. All linens will be surveyed for contamination before being

removed from the patient's room and will, if necessary, be held for decay.

7. Disposable plates, cups, eating utensils, tissue, surgical dressings, and other similar waste items will be placed in a specially designated container. The material will be collected daily by the Radiation Safety Officer (or his disignate), checked for contamination, and disposed of as normal or radioactive waste, as appropriate.

8. Nondisposable items used for these patients will be held in plastic bags in the patient's room, and checked for contamination by the Radiation Safety Officer or his designate. Items may be returned for normal use, held for decay or decontaminated, as appropriate.

9. Urine and vomitus, from iodine-131 therapy patients will be stored for decay (if considered hazardous by Radiation Safety Officer) in our radioactive waste storage area. When it has reached background levels as measured with a low-level survey meter, it will be released to the sanitary sewer system.

10. Before a therapy patient's room is reassigned to another patient, the room will be surveyed for contamination (and decontaminated if necessary) and all radioactive waste and waste containers will be removed.

11. Nursing Instructions:

    a. Nurses should spend only that amount of time near the

patient required for ordinary nursing care. Special restrictions may be noted on the precaution sheet in the patient's chart. Nurses should read these instructions before administering to the patients. Call the Radiation Safety Officer if you have any questions about the care of these patients.

b. Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precautions sheet in the patient's chart.

c. Patients must remain in bed while visitors are in the room and visitors should remain at least three feet from the patient.

d. Radioactive patients are to be confined to their rooms except for special medical or nursing purposes approved by the physician or by the Radiation Safety Officer.

e. No nurse, visitor or attendant who is pregnant should be permitted in the room of a patient who has received a therapeutic amount of radioactivity until the patient no longer presents a radiation hazard. Female visitors should be asked whether they are pregnant.

f. Attending personnel must wear rubber or disposable plastic gloves when handling urinals, bedpans, emesis basins or other containers having any material obtained from the

body of the patient. Wash gloves before removing and then wash hands. The gloves must be left in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

g. Disposable items should be used in the care of these patients, whenever possible. These items should be placed in the designated waste container. Contact the Radiation Safety Officer for proper disposal of the contents of the designated waste container.

h. All clothes and bed linens used by the patient should be placed in the laundry bag provided and left in the patient's room to be checked by the Radiation Safety Officer or his designate.

i. All nondisposable items should be placed in a plastic bag and left in the patient's room to be checked by the Radiation Safety Officer or his designate.

j. Surgical dressings should be changed only as directed by physician. Gold-198 leaking from a puncture wound will stain the dressings dark red or purple. Such dressings should not be discarded but should be collected in plastic bags and turned over to the Radiation Safety Officer. Handle these dressings only with tongs or tweezers. Wear disposable gloves.

k. For iodine-131 patients:

(1) Urine from iodine-131 patients will be collected in special containers provided by the Nuclear Medicine Department. The patient should be encouraged to collect his own urine in the container. If the patient is bedridden, a separate urinal or bed pan should be provided. The urinal or bed pan should be flushed several times with hot soapy water after use.

(2) If the nurse helps to collect the excreta, she should wear disposable gloves. Afterwards she should wash her hands with the gloves on and again after the gloves are removed. The gloves should be placed in the designated waste container for disposal by the Nuclear Medicine Department.

(3) When necessary, disposable plates, cups, and eating utensils will be used by patients who are treated with iodine-131.

(4) Vomiting within 24 hours after oral administration, urinary incontinence, or excessive sweating within the first 48 hours may result in contamination of linen and/or floor. In any such situations or if radioactive urine and/or feces is spilled during

collection, call the Radiation Safety Officer. Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination.

(5) All vomitus must also be kept in the patient's room for disposal by the Nuclear Medicine Department. Feces need not be routinely saved, unless ordered on the chart. The same toilet should be used by the patient at all times and it should be well flushed (3 times).

l. Utmost precautions must be taken to see that no urine or vomitus, is spilled on the floor or the bed. If any part of the patient's room is suspected to be contaminated, notify the Radiation Safety Officer.

m. If a nurse, attendant or anyone else knows or suspects that his skin, or clothing, including shoes, is contaminated, notify the Radiation Safety Officer immediately. This person should remain in the patient's room and not walk about the hospital. If the hands become contaminated, wash immediately with soap and water.

n. If a therapy patient should need emergency surgery or should die, notify the Radiation Safety Officer immediately.

o. When the patient is discharged call the Radiation Safety Officer and request that the room be surveyed for contamination before remaking the room.

_____Springfield Hospital Unit _____Wesson Women's Unit _____Wesson Memorial Unit

Patient's Name:_____ Physician's Name:_____ Isotope:_____

Total Activity:_____ Date of Assay:_____ Time of Assay:_____

Therapy Started: Date:_____ Time:_____ Room #:_____

I. N U R S I N G I N S T R U C T I O N S: Comply with all checked (✓) items.

_____Patient must have private room and may not leave room.

_____Visitors, employees and other personnel under 18 years are not permitted.

_____Pregnant visitors, employees and other personnel are not permitted.

_____Visiting time permitted: _____minutes.

_____Visitors must remain: _____feet from patient.

_____Place laundry in linen bag and save.

_____Retain all disposable items used by patient.

_____Radiation monitors must be worn.

_____Housekeeping may not enter the room.

_____A dismissal radiation monitoring must be done before patient is discharged.

_____All items must remain in the room until OK'd by Radiation Safety Officer.

_____Disposable gloves must be worn during patient care.

_____Do not exceed the occupancy times at each locations given on the reverse.

_____Phlebotomy work must be deferred at least for 48 hours.

_____Patient shall be discharged only when activity is less than _____.

_____Phlebotomy technicians should call RSO for instructions.

_____Other instructions:_____.

NOTE: 1. Follow all the routine radiation precautions in nursing care of radioactive patient.

2. When the patient is discharged from hospital, physician or his assistant must complete the details of Item III on the reverse.

3. After the patient is discharged from unit, please return the completed form to:

Suresh M. Brahmavar, Ph.D.
Director, Medical Physics Service
Radiation Safety Officer

INITIAL RADIATION SURVEY:

Date:_____ Time:_____ Room #:_____ Survey By:_____

USE AND COMPLETE THE FOLLOWING TAGS:

_____Door _____Chart _____Bed _____Other

Survey Meter:_____ Date of Calibration:_____

LOCATION	BEDSIDE	3 FEET	6 FEET	ENTRANCE DOOR	ADJACENT ROOM #	
					PATIENT SITE	OTHER
mR/hr						
OCCUPANCY TIME (100mR/wk)						

III. RADIATION MONITORING & PATIENT DISCHARGE:

ISOTOPE ASSAY	DATE					
ACTIVITY IN PATIENT	mR/hr at 1 m					
	mCi					

ACTIVITY AT DISCHARGE SHALL BE LESS THAN:_____mCi.

Activity at Discharge:_____ Isotope:_____ Date:_____ Time:_____

_____Radiation monitoring of room and patients items indicated no significant radiation levels present in the room.

_____Discharge instructions were given to the patient regarding household members.

Radiation Monitoring By:_____ Patient Discharge By:_____

IV. RADIATION SAFETY OFFICE:

Radiation Safety Officer Inspection: Date:_____

Items of Non-Compliance: I, II, III, None

Corrective Action:_____

Item 20: THERAPEUTIC USE OF SEALED SOURCES

a. detailed information attached.

b. equivalent procedures attached.

c. radiation survey form attached.

Baystate Medical Center

(131)

TO: Radiation Therapy Staff
Radiation Therapy Service
Dept. of Radiology

FROM: Suresh M. Brahmavar, Ph.D.
Director, Medical Physics Service
Radiation Safety Officer

DATE: December 11, 1978

SUBJECT: Centralization of Brachytherapy Services at Baystate Medical Center

The brachytherapy procedures within the radiation therapy service are centralized as follows:

1. Temporary implant with Cesium-137 sources at SH-WW Unit.

2. Temporary implants with Radium-226 sources at WM Unit.

3. Temporary implants with Iridium-192 sources and permanent implants with Radon-222, Iodine-125 and Gold-198 seeds at both units of Baystate Medical Center. The details of this centralization are enclosed.

The procedures to be followed in handling all the available brachytherapy sources are written to comply with the existing nuclear regulatory requirements and other license conditions. A copy of these procedures is enclosed for your use.

To meet the requirements of proper documentation of inventory control, radiation safety, security of licenced material and nursing instruction, a special form has been developed for use during brachytherapy with temporary implants using after-loading techniques. A copy of this form is enclosed for your information. A similar form will be developed for use in brachytherapy with removable direct implants and permanent implants. The first page and items I and II of this form will be completed by a member of the Medical Physics Staff as soon as the radiation sources are loaded in the patient's applicator. Item III of this form will be completed by a Radiation Therapist when the radiation sources are removed from the patient.

It is essential that the radiation sources be returned to the designated lead-safe in the "hot-lab" and locked immediately after their removal from the patient. The return of the sources to the lead-safe and completion of the source return inventory in the log-book maintained in the "hot-lab" are the responsibilities of the staff responsible for removal of radiation sources from the patient after brachytherapy.

Assistance in pre-loading of the inserts in the "hot-lab" or permanent implants with prescribed radiation sources will be made available to the therapists. A schedule of rotation of personnel is given when such assistance in pre-loading in "hot-lab" or in permanent implant therapy is desired by the therapist. A copy of schedule of rotation for the period of December 1978 to August 1979 is enclosed.

A check-list of procedures in the form of flow chart is enclosed so that effective communciation can be maintained to provide the efficient brachytherapy services at Baystate Medical Center.

FOR 001501 V04

In order to make the entire system of brachytherapy services work efficiently and remain in full regulatory compliance it is desirable that every member of the radiation therapy and medical physics staff cooperate fully and make every effort to follow the procedures.

Thank you.

Approved for Implementation: Effective Date: December 15, 1978

Robert A. Grugan, M.D.
Chairman
Department of Radiology

Won C. Park, M.D.
Director
Radiation Therapy Service

William M. Cloud, M.D.
Director
Diagnostic Radiology Service

Suresh M. Brahmavar, Ph.D.
Director, Medical Physics Service
Radiation Safety Officer

Encl. 1. Centralization of Brachytherapy Sources
2. Procedures for use of Brachytherapy Sources
3. Nursing Instructions and Radiation Surveys: Temporary Implant
4. Rotation Schedule of Personnel
5. Check-List of Procedures

cc: Alan J. Stark, M.D.
Robert A. Stein, M.D.
David Ross, M.D.
Alison Cochrane
Raymond Bicknell
Ronald P. Hanc
Michael R. Young
Harry C. F. Gifford
Gerald A. Kerrigan, M.D.
Said M. Zu'bi, M.D.
Eve Keenan
Beverly Briggs
Jane Cullinan
Linda Ray

AT

BAYSTATE MEDICAL CENTER

I. - INTRODUCTION AND SOURCE INVENTORY:

The brachytherapy services in the vision of Radiation Oncology within the Department of Radiology at Baysta Medical Center, include the following radiation sources:

Radium-226	:	Capsules
Cesium-137	:	Tubes and Needles
Iridium-192	:	Seeds, Pins and Hairpins
Radon-222	:	Seeds
Iodine-125	:	Seeds
Gold-198	:	Seeds

The temporary implants using after-loading techniques with Radium-226 capsules are centralized at Wesson Memorial Unit of Baystate Medical Center. At present we have a total of 190 mg of Radium-226 capsules, and they are stored in the lead safe in the "hot-lab" at Wesson Memorial Unit. The following are the specifications of our Radium-226 inventory at Baystate Medical Center.

Radium-226 Inventory: 190 mg

Capsule (mg)	Actual Length (mm)	Active Length	Total Number	Color Code
5	21.7 x 2.65 x 1.0	15 mm	2	Quarter Gold
10	21.7 x 2.8 x 1.0	15 mm	8	Silver
15	22.5 x 2.9 x 1.0	15 mm	4	Half Gold
20	22.5 x 3.25 x 1.0	15 mm	2	Gold

(Total Number of Capsules: 16)

The lead-safe container holding the capsules is clearly marked with "mg-numbers." Special care must be taken to return the capsule to its designated slot. This will minimize the confusion during handling of these high intensity sources. When these capsules are not in the patient, they shall be stored and locked in the lead-safe to meet the regulatory requirements of compliance.

The temporary implants using after-loading techniques (OB-GYN cases only) with Cesium-137 tubes is centralized at Wesson Women's Unit of the Baystate Medical Center. All other techniques using direct temporary implants with Cesium-137 needles are centralized at Springfield Hospital Unit of Baystate Medical Center. At present we have a total of 333 mg radium equivalent (832.5 mCi) Cesium-137 in the form of tubes and needles, and they are stored in the lead-safe in the "hot-lab" at Springfield Hospital Unit. The following are the specifications of our

Cesium-137 inventory at Baystate Medical Center.

Cesium-137 Tubes: 295 mg Ra Eq (737.5 mCi)

(Total Number of Tubes: 22)

Tube (mg Ra)	Actual Length (mm)	Active Length	Total Number	Color Code
5	20 x 3.1 x 0.5	14 mm	3	Blue
10	20 x 3.1 x 0.5	14 mm	6	Green
15	20 x 3.1 x 0.5	14 mm	9	Yellow
20	20 x 3.1 x 0.5	14 mm	3	Orange
25	20 x 3.1 x 0.5	14 mm	1	Red

Cesium-137 Needles: 38 mg Ra Eq (95 mCi)

(Total Number of Needles: 22)

Needle (mg Ra)	Actual Length (mm)	Active Length	Total Number	Letter Code
1.0	42 x 1.65 x 0.5	30 mm	8	LCH
2.0	42 x 1.65 x 0.5	30 mm	6	LCF
1.5	57 x 1.65 x 0.5	45 mm	4	LDH
3.0	57 x 1.65 x 0.5	45 mm	4	LDF

The lead-safe containers holding the tubes and needles are clearly marked with "color-codes" and "letter-codes." Special care must be taken to return the sources to their designated slots. This will minimize the confusion during handling of these high intensity sources. When these radiation sources are not in the patient, they shall be stored and locked in the lead-safe to meet the regulatory requirements of compliance.

The temporary implants using direct implant techniques with Ir-192 sources and permanent implants with Radon-222, I-125, and Au-198 radiation sources can be done at Wesson Memorial Unit and Springfield Hospital Unit of the Baystate Medical Center. These sources with short half-life are not stored at Baystate Medical Center. To order these special sources for brachytherapy, contact the Radiation Safety Officer at Baystate Medical Center.

Baystate Medical Center
Springfield Hospital Wesson Memorial Hospital Wesson Womens Hospital

PROCEDURES FOR USE OF BRACHYTHERAPY SOURCES

AT BAYSTATE MEDICAL CENTER

1. All brachytherapy sources shall be stored in designated lead-safes and locked when they are not in the patient. The "hot-lab" storage room shall remain locked at all times when not in use for brachytherapy work.

2. The portable lead container and carrier are for transport only within the hospital.

Brachytherapy applicators loaded with brachytherapy sources shall not be stored in these lead containers and left on the carrier in the "hot-lab" storage room.

3. Loading of brachytherapy applicators shall not be assigned to a single individual. If requested by the therapist assistance in loading of the applicators will be given by Ms. Alison Cochrane, Mr. Raymond Bicknell, and Mr. Ron Hanc. A schedule of rotation for the coming year will be drawn up by Ms. Alison Cochrane.

4. Use of proper tools and L-shield block during loading of brachytherapy sources in applicators is mandatory to minimize the exposure during handling. Use the audible radiation moniter during loading operations.

5. All loading of brachytherapy sources shall be done in the designated area (L-shield block) in the "hot-lab" storage room.

6. A visual inspection of the storage container in the lead-safe will indicate (total # of empty holes) the total number of brachytherapy sources removed from the lead-safe to fill the brachytherapy prescription.

7. Complete the check-out inventory sheet in the logbook. This will confirm the brachytherapy sources that will be in use. This shall be done before the sources are taken out of the "hot-lab" storage room.

8. At the termination of brachytherapy treatment the brachytherapy sources shall be returned to the lead-safe in the "hot-lab" storage room. Follow the color-codes to return the sources to their proper source strength slots. Complete the source return inventory in the logbook. Make a visual inspection of the source container in the lead-safe before you lock the safe. If all sources are in the safe there will be no empty holes.

9. Within twenty-four (24) hours after the termination of the brachytherapy treatment of the patient, brachytherapy source custodian (Mr. Ronald Hanc) will take inventory and log-in his findings in the log-book maintained in the "hot-lab". Radiation Safety Officer will conduct radiation safety inspections at regular periodic intervals.

All incidents of non-compliance of procedures will be reported (with a written report) to Director, Radiation Therapy and Chairman, Department of Radiology for corrective action.

10. Follow all the radiation safety procedures when handling brachytherapy sources. Wear film-badge monitors and minimize the time of handling by careful planning. Use of audible radiation monitor is recommended when working with brachytherapy sources. If at any time (day or night) you find the inventory is incomplete, call the Radiation Safety Officer and report your findings.

YOUR COOPERATION IS REQUESTED TO KEEP OCCUPATIONAL EXPOSURES "ALARA" TO BE IN COMPLIANCE WITH LICENSE CONDITIONS AND NRC REGULATIONS

Approved for Implementation: Effective Date - December 15, 1978

Robert A. Grugan, M.D.
Chairman,
Department of Radiology

Won.C. Park, M.D.
Director,
Radiation Therapy Service

William M. Cloud, M
Director
Diagnostic Radiolog
Service

Suresh M. Brahmavar, Ph.D.
Director, Medical Physics
Radiation Safety Officer
Baystate Medical Center

date: April 26, 1979

review: (13)

Baystate Medical Center
Springfield Hospital Wesson Memorial Hospital Wesson Women's Hospital

Rotation Schedule of Personnel: Dec. 1978-Aug. 1979

Period (months)	Temporary Implants in Hot-Lab, etc.	Permanent Implants in O.R., etc.
Dec. 1978 Jan. 1979 Feb. 1979	Raymond Bicknell	Raymond Bicknell
March 1979 April 1979 May 1979	Ronald Hanc	Ronald Hanc
June 1979 July 1979 Aug. 1979	Alison Cochrane	Suresh M. Brahmavar

NOTE: a. In case of absence of staff on schedule due to illness or unexpected emergencies, the next person on schedule of rotation will fill in for that particular day.

b. The covering for the absence of staff on schedule during vacation, off-time, conference-meeting, etc. shall be pre-arranged by mutual agreement with any member of the staff on schedule of rotation.

c. If no member of staff on schedule of rotation is available then Dr. Brahmavar will fill in.

Approved for Implementation:

Effective Date: December 15, 1978

Robert A. Grugan, M.D.
Chairman
Department of Radiology

Won C. Park, M.D.
Director
Radiation Therapy

Suresh M. Brahmavar, Ph.D.
Director,
Medical Physics Service
Radiation Therapy Officer

39651

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Check-list of Procedures for Brachytherapy

Therapist or Secretary	When a patient is booked for Brachytherapy inform Radiation Safety Officer about the nature (temporary, permanent, isotope, etc) of Brachytherapy.
Therapist or Secretary	A day or two before the actual day of brachytherapy inform staff on schedule of rotation if assistance is needed in pre-loading. Give details of source-load plan.
Staff on Schedule of Rotation or Therapist	Prepare the loading as prescribed and inform the Therapist its readiness at least two hours before scheduled after-loading or implant in patient. Complete the source "check-out" inventory in the log-book.
Therapist or Secretary	After the sources are loaded inform the Medical Physics Staff to conduct patient survey. Give room number, unit location, etc. Inform the Dosimetrist to complete dose calculation.
Dosimetrist or Medical Physicist	Obtain the required x-ray films for dosimetry and discuss with Therapist the dose calculations. Complete all aspects of Dosimetry within two days.
Radiation Surveyor	Complete the Nursing Instruction and Radiation Survey form. Leave it with the nursing supervisor and explain the procedures to follow. Complete door and chart tags.
Therapist or Source Remover	After the sources are removed from the patient complete item III of the survey form used by nursing supervisor. Return all sources to lead-safe in hot-lab. Complete source check-in in the log-book in "hot-lab".
Source Custodian	Complete the verification of source-return to the lead-safe. In the event of non-compliance contact source remover and inform RSO.
RSO	Conduct radiation safety inspection and do the source inventory. Complete Item IV of the survey form received from the nursing staff.

APPENDIX L

PROCEDURES FOR USE OF GROUP VI SOURCES

FOR TREATMENT OF PATIENTS

1. All patients treated with brachytherapy sources will be placed in a private room with toilet.
2. The patient's room will be properly posted in accordance with Section 20.203, 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 the patient's bedside, three feet away and at the entrance to the room. The Radiation Safety Officer or his designate will then determine how long a person may remain at these positions and will post these times in the patient's chart.
4. The form "Nursing Instructions & Radiation Surveys: Temporary Implants" will be completed immediately after sources are implanted and placed in the patient's chart.
5. Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20.
6. Nurses caring for brachytherapy patients will be assigned film badges as per Section 20.202(a) (1), 10 CFR Part 20.
7. At the conclusion of treatment, a radiation monitoring will be performed to ensure that all sources have been removed from

the patient and that no sources remain in the patient's room or any other area occupied by the patient. At the same time all radiation signs will be removed.

8. Instructions to Nurses:

a. Special restrictions may be noted on the precaution sheet in the patient's chart. Nurses should read these instructions before administering to the patient. Call the Radiation Therapy Division if you have any questions about the care of these patients.

b. Nurses should spend only the minimum necessary time near a patient for routine nursing care. Safe time and safe distance values are given on the instruction sheet posted on the chart.

c. When a nurse receives an assignment to a therapy patient the nursing instruction and radiation survey form should be checked for specific instructions. If a film badge is issued it shall be worn only by the nurse to whom it is issued and shall not be exchanged between 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 the Radiation Therapist or Radiation Safety Officer 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 by a radiologist, and MAY NOT BE DISCARDED until directed by the radiation therapist. Dressings should be kept in a basin until checked by the radiation therapist.

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, utensils or bedding unless specifically ordered.

j. These patients must stay in bed unless orders to the contrary are written.

k. Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precaution sheet in the patient's chart.

l. Visitors should sit at least six feet from the patient and should remain no longer than the times specified on the form posted on the patient's chart.

m. 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.

n. 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 the Radiation Therapist -

Phone No. (Days) (SH/WWU)
(WMU)

(Nights) (SH/WWU)
(WMU)

o. At the conclusion of treatment, the Radiation Therapist or the Radiation Safety Officer will carry out the radiation monitoring of the patient and room to be sure all radioactive sources have been removed.

_____ Springfield Hospital Unit _____ Wesson Women's Unit _____ Wesson Memorial Unit

Patient's Name: _____ Physician's Name: _____ Room #: _____

Isotope: _____ Total Activity: _____ Total Number of Sources: _____

Brachytherapy Started: Date: _____ Time: _____

Sources to be Removed: Date: _____ Time: _____

I. NURSING INSTRUCTIONS: Comply with all checked (✓) items.

_____ Patient must have private room.

_____ Patient may not leave room.

_____ Visitors, employees and other personnel under 18 years are not permitted.

_____ Pregnant visitors, employees and other personnel are not permitted.

_____ Visiting time permitted: _____ minutes.

_____ Visitors must remain: _____ feet from patient.

_____ Place laundry in linen bag and save.

_____ Radiation monitors must be worn.

_____ Housekeeping may not enter the room.

_____ A dismissal radiation monitoring must be done before patient is discharged.

_____ All items must remain in the room until OK'd by Radiation Safety Officer.

_____ Do not release the room to Admitting until OK'd by Radiation Safety Officer.

_____ Do not exceed the occupancy times at each location given on the reverse.

_____ Phlebotomy work must be deferred until the end of therapy.

_____ Other Instructions: _____

NOTE: 1. Follow all the routine radiation precautions in nursing care of radioactive patient.

2. When radiation sources are removed from the patient, physician or his assistant must complete the details of Item III on the reverse.

3. After patient is discharged from the unit, please return the completed form to:

Suresh M. Brahmavar, Ph.D.
Director, Medical Physics Service
Radiation Safety Officer

Date: _____ Time: _____ Survey By: _____

Use and complete the following tags:

_____ Door _____ Chart _____ Bed _____ Other

Survey Meter: _____ Date of Calibration: _____

LOCATION	BEDSIDE	3 FEET	6 FEET	ENTRANCE DOOR	ADJACENT ROOM #	
					PATIENT SITE	OTHER
mR/hr						
OCCUPANCY TIME (100mR/wk)						

III. SOURCE REMOVAL & RADIATION MONITORING:

Total Activity: _____ Number of Sources: _____ Isotope: _____

Date of Removal: _____ Time of Removal: _____

_____ Radiation sources were returned to the storage-safe in "hot-lab."

_____ Radiation monitoring indicated that no sealed sources remained in the patient.

_____ Radiation monitoring of room and patient items indicated no significant radiation levels present in the room.

_____ Discharge instructions were given to patient and nursing staff.

Radiation source removal and monitoring by: _____

IV. RADIATION SAFETY OFFICE:

Radiation Safety Officer Inspection: Date: _____

Items of Non-Compliance: I, II, III, None

Corrective Action: _____

Item 21: PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES Xenon-133

a. Detailed information attached.

b. Quantities used.

c. Use and storage areas.

d. Procedures for routine use.

e. Emergency procedures.

f. Air concentration of Xe-133 in restricted areas.

g. Air concentrations of Xe-133 in un-restricted areas.

h. Disposal of Xenon-133

Item 21: PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES: Xe-133

The following information is submitted in support of our use of Xe-133 gas in Lung Ventilation Studies done at both units of Baystate Medical Center. The information is common to both units. Changes are appropriately identified by the unit.

1. Quantities to be used:

   a. Patient Information

      1) No. of patients per week: 15
      2) Average activity per patient: 15 mCi

   b. 2200 mCi: Refer to item 6a of NRC-313M of this application.

2. Use and Storage Areas:

   a. The Xe-133 gas will be stored in hot laboratories at both units of Baystate Medical Center. The patient studies will be done in Nuclear Medicine Laboratories at both units. These facilities are shown in diagrams attached to information given in item #11 of this NRC-313M application for renewal. The Hot Laboratories are designed to contain the radiation levels in the surrounding areas to be well within MPD limits. The radiation levels are measured on monthly basis.

   b. The Hot Laboratory at SH-WW Unit has a fume hood with special exhaust fan and high efficiency filter. This fume hood with the special exhaust fan is vented directly to the outside from the rooftop of the seventh floor of the Main Building of medical center. This special exhaust is a stand alone system without any connection to the primary ventilation of the medical center. The exhaust release point is isolated with no access to it by the general public. Only maintenance personnel use the area while carrying out the routine repairs. The nearest unrestricted area is approximately 15 ft. below on the sixth floor.

   The Hot Laboratory at WM Unit has only exhaust vent with no fume hood.

   The Nuclear Medicine Laboratories are on the general ventilation system of the hospital with special attention to maintain rapid exhaust rates.

   At SH-WW Unit:

   The airflow rate in Hot Lab (fume hood): 2896 ft^3/min
   The airflow rate in NML (#6,#7,#8): 3000 ft^3/min
   No recirculation of air in Hot Laboratory
   The fraction of air recirculated in NML is: 35%

At WM Unit

The airflow rate in Hot Lab: 275ft^3/min
The airflow rate in NML:1900 ft^3/min
No recirculation of air in Hot Laboratory
The fraction of air recirculated in NML is None

c. All filter systems and exhaust systems are maintained by Engineering Department at Baystate Medical Center. Any changes in airflow rates will be communicated to the radiation safety officer.

3. Procedures for Routine Use:

a. The administration of Xe-133 gas is done by using Xenon Spirometer (X-133) supplied by Warren E. Collins, Inc., Braintree, Mass., and NEN's Xe-133 Calidose gas dispensing system. Xe-133 vials are obtained from NEN. All procedures of radiation safety are observed during use of Xe-133 gas. See enclosure pertaining to this item.

b. The exhaled Xe-133 is pumped through a closed hose-system to the fume hood in the Hot Laboratory (SH-WW Unit) which is continuously exhausting the Xe-133 gas directly to the atmosphere. At WM Unit, the exhaled gas is trapped in the charcoal trap (Blount Charcoal Trap) and stored for decay before disposal. The Blount Charcoal Trap is being replaced by NONEX Gas Trap made by NEN. See enclosures pertaining to this item.

c. Nose clamps and repeated mock demonstrations to the patient before actual administration of Xe-133 are carried out to reduce leakage.

4. Emergency Procedures:

General procedures for handling air-borne contamination and actions to be taken are given in our radiation safety manual. A copy of this entire manual is in your file. This was submitted as a part of our original application for Broad License #20-01412-05 dated, October 31, 1973. The ventilation in restricted area is well above the required ventilation airflow rate of 110ft^3/min for a estimated loss of 25% due to accidental release of Xe-133. Refer to the calculations given in item #5 and airflow rate information is given in item #2(b).

5. Air Concentration of Xe-133 in Restriced Areas:

The following calculations are given for air concentrations in nuclear medicine laboratories of the Baystate Medical Center.

a. Restricted Area: Nuclear Medicine Laboratories

(Both Units of BMC)

NRC Limit for $C < 1 \times 10^{-5}$ uCi/ml: 10CFR; 20·103

Number of Patients: 15 per week
Maximum Activity per Patient: 20 millicuries
Total Maximum Activity: 15 X 30

$= 300 \times 10^3$ microcuries/wk
$= 3 \times 10^5$ microcuries/wk

Loss Rate of 25% (f)

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

$$= \frac{3 \times 10^5 \times 0.25}{1 \times 10^{-5}} \text{ ml/wk}$$

$$= 0.75 \times 10^{10} \text{ ml/wk}$$

Ventilation Rate: $\frac{0.75 \times 10^{10}}{40 \times 1.7 \times 10^6}$ ft^3/min

$= 110$ ft^3/min

Ventilation Rate (SH-WW Unit) = 3000 ft^3/min
Ventilation Rate (WM Unit) = 1900 ft^3/min

Therefore, air concentrations in restricted areas are far below the NRC limit.

b. Restricted Area: HOT LABORATORIES
(Both Units of BMC)

NRC Limits for $C < 1 \times 10^{-5}$ uCi/ml: 10CFR; 20·103

Maximum Activity Stored: 500 millicuries per week
Leakage in Storage: 5.0%
(Note: NEN claims maximum leakage of 2.5%)

$$V = \frac{500 \times 10^3 \times 0.05}{1 \times 10^{-5}} \text{ ml/wk}$$

$$= 25 \times 10^8 \text{ ml/wk}$$

Ventilation Rate: $\frac{25 \times 10^8}{40 \times 1.7 \times 10^6}$ ft^3/min

$= 37$ ft^3/min

Ventilation Rate (SH-WW Unit) = 2896 ft^3/min (with fume hood)
Ventilation Rate (WM Unit) = 275 ft^3/min (without fume hood)

Therefore, air concentrations in restricted areas are far below the NRC limit.

6. Methods of Xenon-133 Disposal:

a. The method of disposal of exhaled Xe-133 gas at WM Unit is by the use of Charcoal Trap and storing the saturated filters in the radioactive waste room for decay and later disposal by commercial company. The enclosure describes the Charcoal Trap used for such disposal. The present ventilation rates in nuclear medicine laboratory far exceeds the required ventilation rate for leakage of Xe-133 from the Charcoal Trap. The Charcoal Traps are monitored by collecting the exhaust in a large plastic bag and by comparing the count rate to that of a known quantity of Xe-133 in an identical bag.

b. The method of disposal of exhaled Xe-133 gas at SH-WW Unit is via a closed, isolated, stand-alone pipe system to the fume hood in the Hot Lab. This fume hood has a special exhaust system with a high efficiency filter. The fume hood ventilates directly to outside atmosphere on the seventh floor at the main building. This exhaust system is completely isolated from the hospital general ventilation system. The nearest unrestricted area from the point of release of Xe-133 to the atmosphere is 15 ft. below on the sixth floor. The seventh floor of the main building is machinery storage area for the engineering department of the medical center. The high efficiency filter is changed once a year. The exhaust filters are changed every two weeks to keep the entire exhaust system at peak of performance. A diagram of the closed pipe system from nuclear medicine laboratory to the fume hood in the Hot Laboratory is enclosed. The entire pipe system is in the ceiling of the Laboratory. It has three one way outlets at different points to connect the Xenon Spirometer System for exhaust. The radiation level near the pipe during Xe-133 exhaust is 0.5 MR/hr.

The following calculation gives the concentration in Unrestricted Area. NRC Limit: 3×10^{-7} μCi/ml: 10CFR, 20·106

Airflow Rate: 405 ft/min
Fume Hood Opening: 7.15 ft^2
Number of Patients per week: 15 (average)
Dose per Patient: 15 millicures

$A = 15 \times 15 \times 10^3 \times 52$ microcures/year
$= 11.7 \times 10^6$ microcures/year

$V = 405 \times 7.15 \times 1.49 \times 10^{10}$ microcuries/ml
$= 4.3 \times 10^{13}$ microcuries/ml

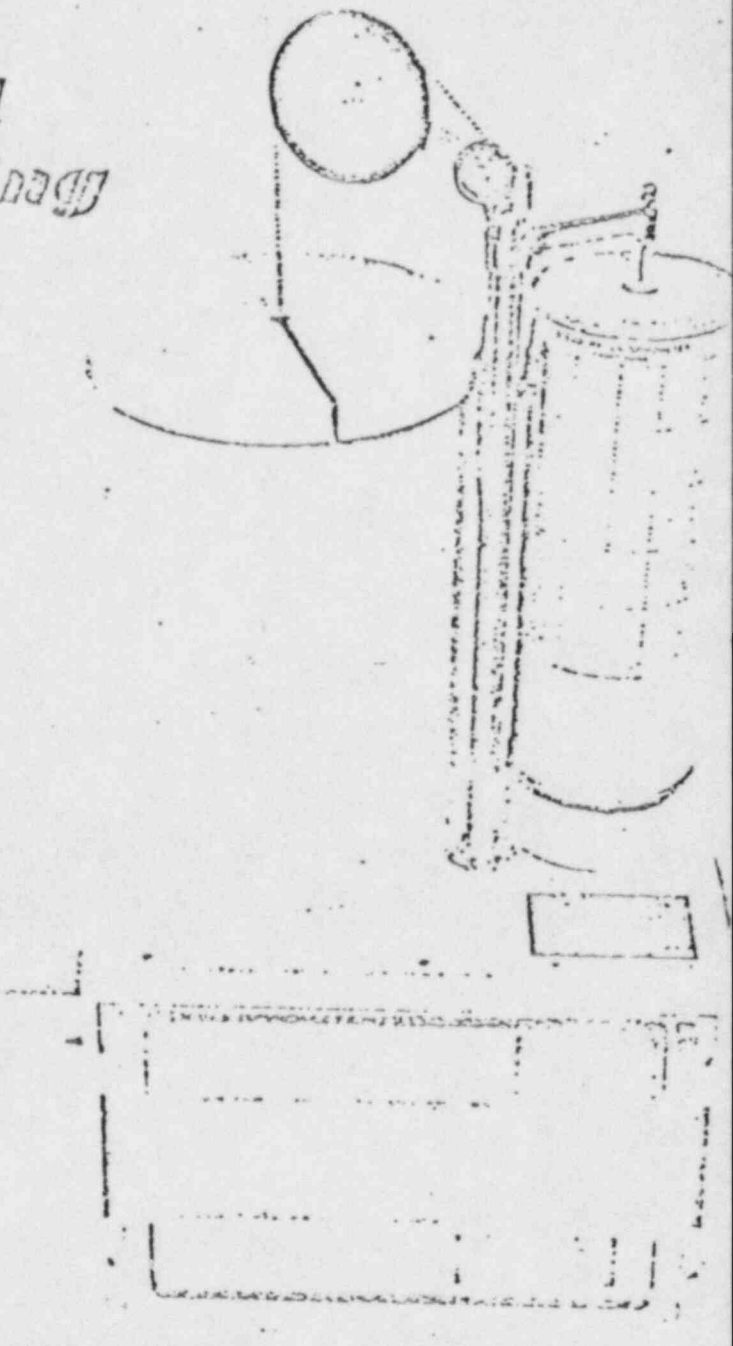
Concentration C: $\frac{A}{V} = \frac{11.7 \times 10^6}{4.3 \times 10^{13}}$ microcuries/ml $= 2.7 \times 10^{-7}$ μCi/ml

Therefore, air concentrations in Unrestricted Areas are far below the NRC Limit.

X-133

Spirometer

A Spirometer designed specifically for collecting and dispensing radioactive gases used in pulmonary studies!



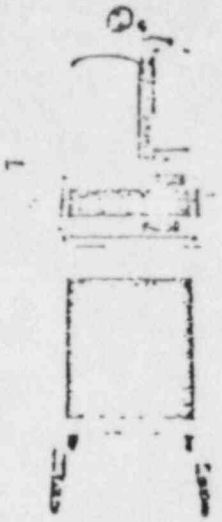
erator safety, extraneous radiation ording, and ease of admitting Xenon just a few of the problems and nsiderations when Xenon pulmonary dies are contemplated.

lins offers a Spirometer designed lly and specifically for the use enon or other radioactive gases in monary function studies. Single ath ventilation, perfusion, and steady te ventilation studies are easily and ly performed on the X-133 rometer.

WARREN E. COLLINS, INC
BRAINTREE, MASS. 021

A combination of important safety and operational features make the X-133 Spirometer unique in its field:

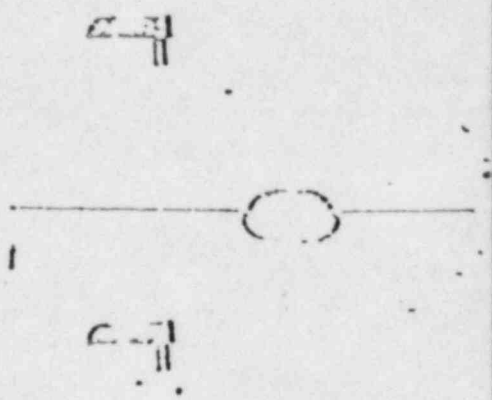
- Lead shielding to Underwriters Laboratories, Inc. subject 544 requirements.
- Less than .2 MLR/Hr at a distance of 5 cm. with a 2.0 MLC/Liter concentration.
- Petcock for admitting radioactive gas by syringe.
- Motor blower for complete mixing.
- Solenoid operated valve for safety and ease of operation.
- Permits patient and spirometer flushing.
- Safety alarm signals upper limit of spirometer bell.

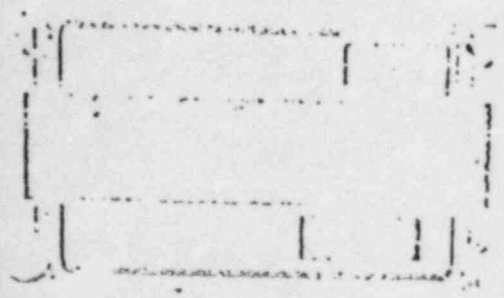


- Easy to clean and sterilize.
- CO^2 Absorber
- Optional digital display volume readout.
- Foot controls for both solenoid operated valve and kymograph operation.
- 7 liter capacity spirometer.
- Internally occluded for minimum gas requirements.

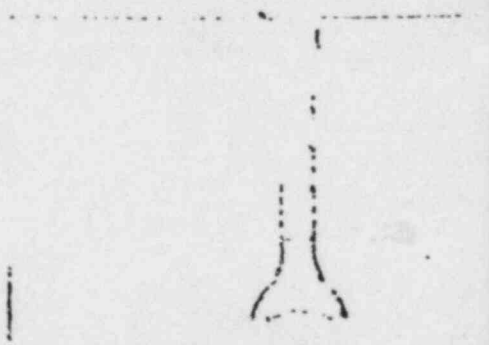
Following the Modular Concept of [illegible] ins equipment, these standard 19" rack panels readily display all controls in a logical format. A push button switch actuates the solenoid operated breathing valve to insure safety and ease of operation. An audible alarm system signals the upper limit of bell travel to eliminate room air contamination. This is backed by a "test" button which allows checking proper operation of the alarm system. A telephone jack is provided for the addition of an external recorder. The optional digital display in the lower panel provides extreme accuracy (±1.0% of reading) for the most exacting procedures.

The completely lead shielded [illegible] facilitates using either a horizo mouthpiece for a sitting patient (sh in top photo) or an extended ver mouthpiece for prone patients (sh in lower photo). This extended tub completely lead shielded.



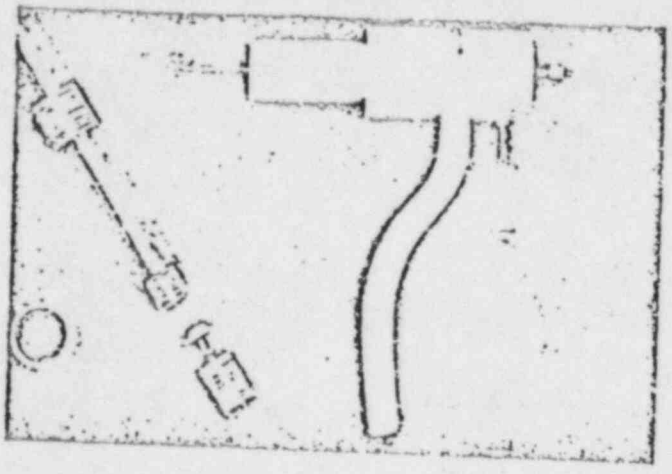


A foot control for the solenoid operated breathing valve is provided as standard equipment. This allows the technician to operate the scintillation camera and the breathing valve simultaneously. A second foot operated control (not shown) turns the kymograph on and off.



Xenon-133 gas

- Easy and accurate dispensing of unit doses
- Exceptional safety—unique shielding
- Sizes for single or multi-breath procedures
- Specifically designed for pulmonary function studies



Specifically designed for pulmonary function studies, NEN's Xenon-133 CALIDOSE™ Gas Dispensing System provides a convenient, accurate and safe method of administering xenon-133 gas.

The system consists of a dispenser which is loaded with a vial containing a calibrated dose of xenon-133 gas.

Vials containing 10-100mCi of xenon-133 gas are shipped in a lead tube and loaded into the dispenser as needed. The variety of sizes available permits either single or multi-breath procedures.

OPERATION

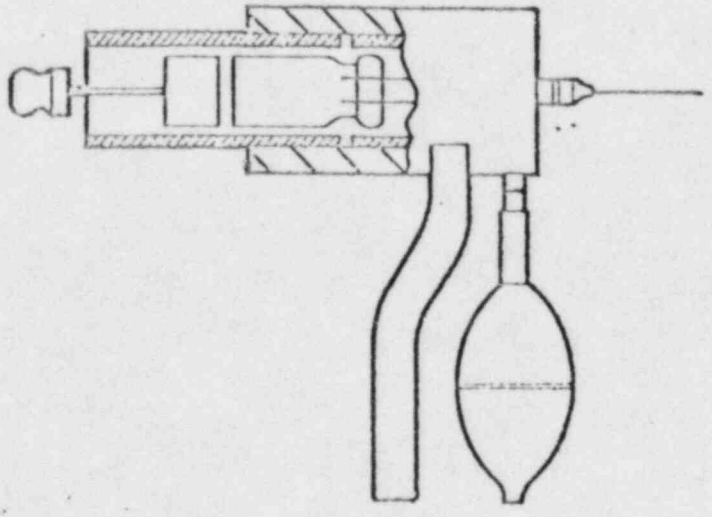
Operation of the unit is simple. After the dispenser is loaded, affix the dispenser to the breathing apparatus with a needle or other connector; push the plunger at the rear of the dispenser (puncturing the septum of the loaded vial by inner needles); and squeeze the rubber bulb.

Caution: Contents to be used *only* for inhalation.

ORDERING INFORMATION

NRP-186 CALIDOSE Gas Dispenser
Supplied at no charge during the term of an order.

NRP-127 Xenon-133 Gas CALIDOSE refills, in unit dose vials.



Nuclear Medicine Accessories

XENON GAS TRAP

- Removes radioactive gases from exhaled air
- Ideal alternative to costly external vent systems
- Fully shielded, self-contained, mobile
- Digital timer for fast check of remaining useful life of cartridge pack
- U.L. listed
- Outlasts single cartridge traps

The efficient removal and containment of radioactive gases from exhaled air used in nuclear medical studies is facilitated through the use of the Xenon Gas Trap.

The trap is designed specifically to adsorb inert radioactive gases such as ^{133}Xe. It yields an effluent ^{133}Xe concentration less than 1×10^{-5} $\mu Ci/cm^3$* throughout the useful life of its disposable filter cartridges.

Exhaled air is drawn by a vacuum pump through five fixed charcoal-filter cartridges. The ^{133}Xe remains in the cartridges and decays. The digital timer indicates when the cartridge pack should be replaced, prior to saturation. With typical five-minute washouts, the cartridge pack can be expected to last through 500 patient studies.

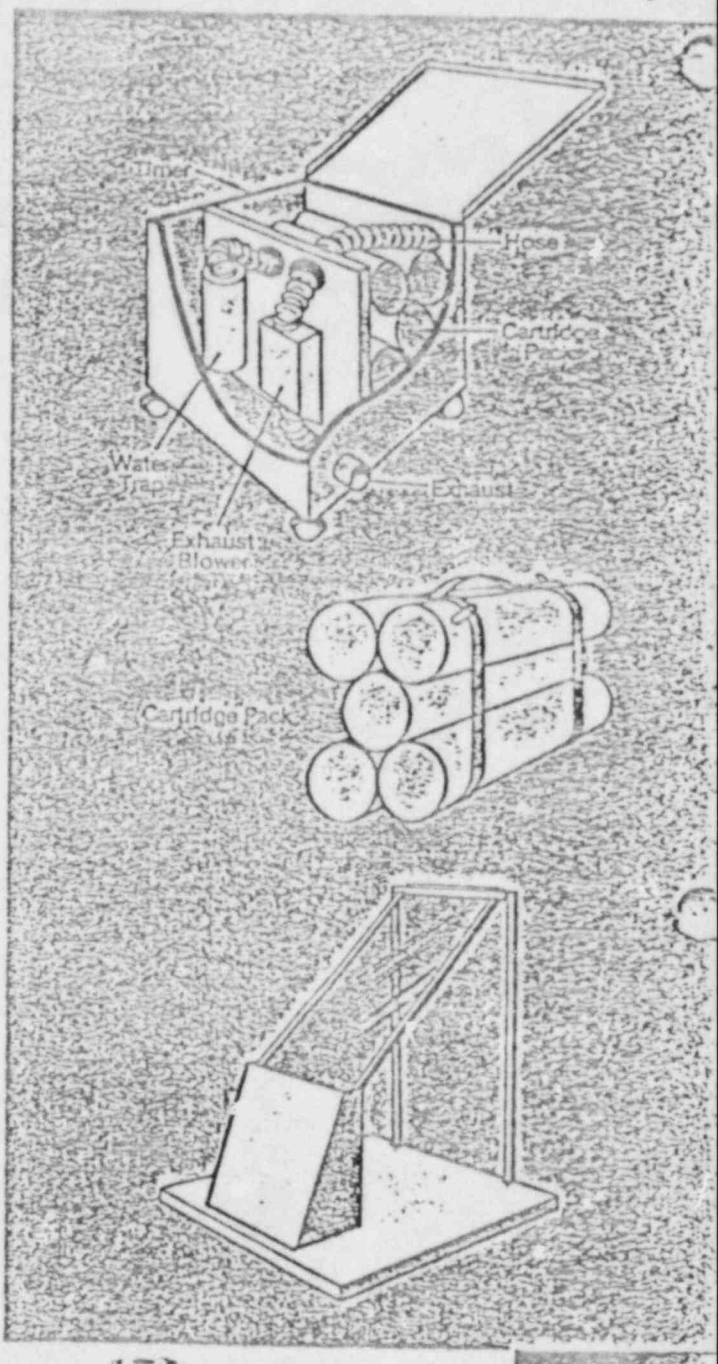
This self-contained mobile trap can be integrated into any ^{133}Xe delivery system or may be used independently as a patient exhalation unit with the use of a disposable face mask.

Low cost, simple operation, and high efficiency make this product an ideal alternative to costly exhaust systems.

Mounted on casters for easy, silent mobility. Includes on-off switch, water trap, 5-liter/minute vacuum pump, and 5 cartridges. 115V, 60Hz. 38cm L x 38cm W x 39cm H. Net weight 48kg.

*Maximum permissible concentration in a controlled area, per Title 10 CFR 20, Appendix B, Table 1, Column 1.

NES-840	Xenon Gas Trap	$950
NES-842	Replacement Cartridge Pack (5 cartridges)	$325



PROTECTIVE LEAD BARRIER

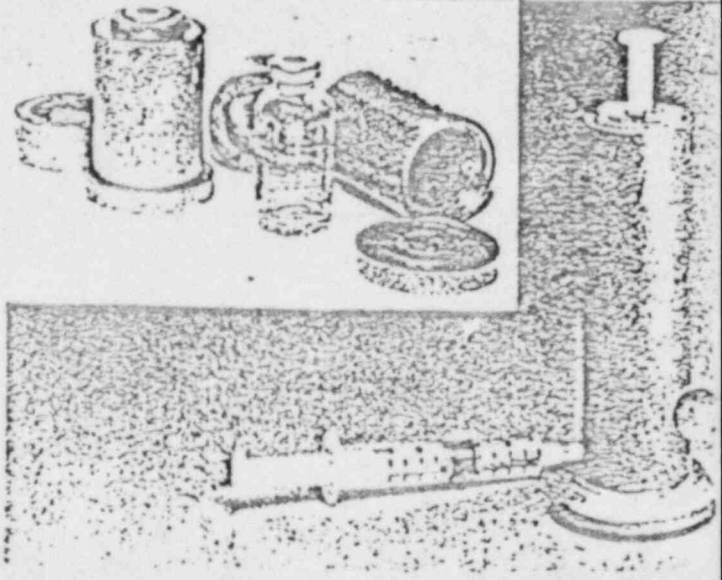
An appropriate way to reduce exposure to the body or face when eluting ^{99m}Tc or other radionuclide generators or when handling high radiation levels of any radionuclide. The lead portion of the protective barrier is 30 x 30 x 1.2cm thick. The lead glass has a density of 4.2 grams/cc and is 30 x 50cm. The shield section is mounted on a heavy duty 60 x 60cm base. Weight: 30kg.

NES-876	Protective Lead Barrier	$385

ELUTION SHIELD

This custom lead shield completely encloses 27ml or 10ml vials to reduce transmitted radiation to 0.01% for technetium-99m. It consists of three parts—cylinder body, screw base, lift-off top. Plastic inserts for 10ml vials supplied on request.

NRP-428	Elution Shield	$35



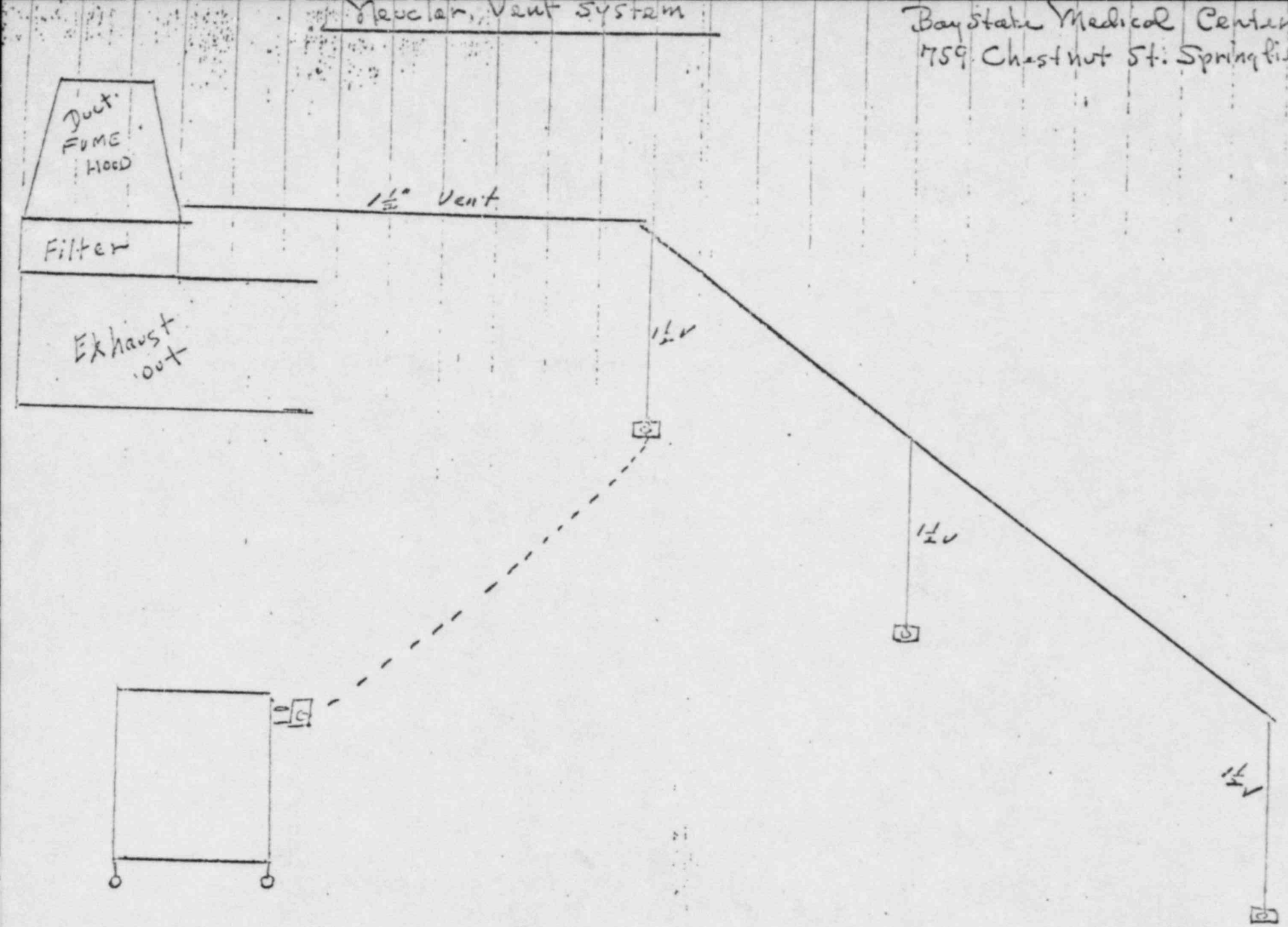
SYRINGE HOLDER

This holder provides a safe means for transporting syringes that contain radionuclides. It has a 9.5mm lead wall with a 22mm I.D. and 137mm inside depth and a rugged supporting base. It weighs only 1.8kg.

NES-860	Syringe Holder	$29

Baystate Medical Center
759 Chestnut St. Springfield Mass

Nuclear Vent System



Installed 7-1-78
John Reidy
Plumbing Supervisor

Fig. 1

Instructions FOR MODELS 360 AND 375 INLETS

Fig. 2

TO BE USED WITH NUTONE CENTRAL CLEANING SYSTEM

WALL INLET (Model 360)

Wall inlets should not be installed until after walls have been finished. Remove plaster guard from wall mounting bracket.

For some dry wall or panel construction plaster frame will extend beyond finished wall and should be removed from mounting bracket by removing two mounting screws. (Fig. 1)

Connect 2-conductor low voltage wire to terminal screws on back of wall inlet. (Fig. 2) Guide excess wire back through hole in inlet bracket, moisten inlet seal (or neck of inlet cover) and insert inlet cover in place with a slight twisting motion. Secure inlet in place with 2 screws provided. (Fig. 3)

DO NOT CEMENT INLET TO FLANGED FITTING.

NOTE: When wall inlets are installed in ¼" to ½" thick walls the tube of the wall inlet may extend into elbow area of flanged fitting and cause blockage. Tube of wall inlet should be shortened to prevent this condition. (Fig. 4)

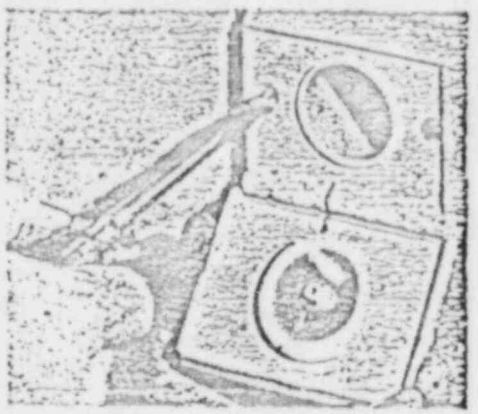


Fig. 3

UTILITY INLET (Model 375)

For those areas where tubing and flanged fitting cannot be installed in the wall the model 375 utility inlet should be used. The utility inlet can be used with any of the flanged fitting and attach to the fitting the same as the model 360 inlet.

FINAL SYSTEM CHECK

Check each wall inlet to be sure contacts activate power unit when hose is inserted. A short piece of wire can be used to short contacts in wall inlet together to activate power unit.

Check each wall inlet and tubing connection for air leaks. Check power unit for leaks around inlet tube and dirt receptacle.

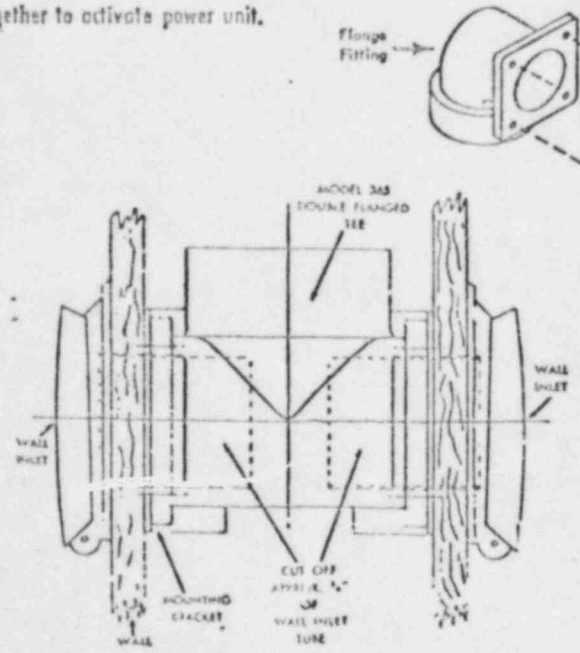


Fig. 4

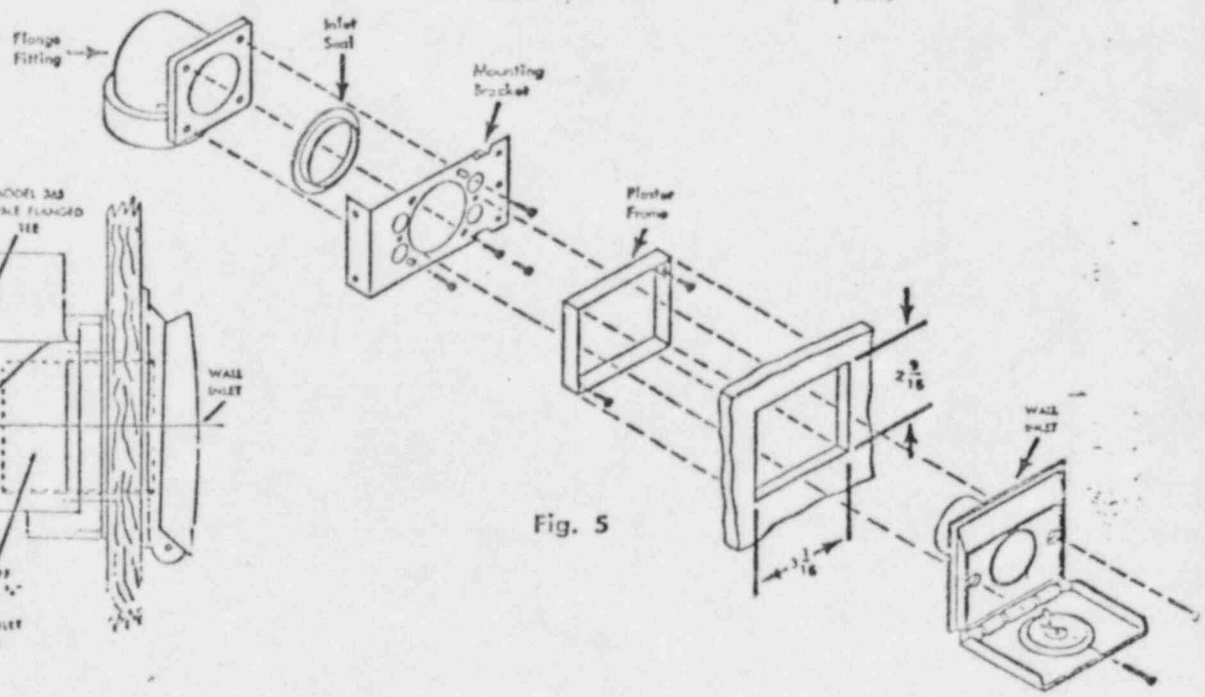


Fig. 5

NuTone Division

Madison and Red Bank Rds., Cincinnati, O. 45227

Item 22: PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS

a. not applicable

Item 23: PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6b

a. Detailed infromation attached.

Item 23
Date: April 26, 1979

ITEM 23: PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b.

1. Sealed Sources and Calibration of Survey Meters:

At the present time arrangements are being made* to obtain nearly 172 square feet of space for a Calibration Laboratory for use of radioactive material listed in Item 6.b. This Calibration Laboratory will be located on the Ground Floor of the Main Building (SH/WW Unit, 759 Chestnut Street, Springfield, Mass. 01107) of Baystate Medical Center. As soon as the Calibration Laboratory space becomes available, we intend to submit the following information:

- Location and floor diagram of the Calibration Laboratory;
- Identification of surrounding areas;
- Safety precautions that will be followed during actual use of Cs-137 source;
- Radiation levels in the surrounding areas during actual use of Cs-137 source;
- Steps taken to reduce radiation levels to ALARA to protect the environs;
- Survey meter calibration procedures.

* As stated, during telephone conversation on April 16, 1979 by Mr. George Verdon, Division of Planning & Program Development. These instructions obtained by Mr. George Verdon from Office

of Medical Affairs, Baystate Medical Center.

2. Bioassay Tests:

Our Bioassay Program includes the physical check-up of all nuclear medicine technologists before they start work in the department. Initial blood count is included as a part of the physical by the Health Service. Initial thyroid uptake count will be done on new technologists employed in the Division of Nuclear Medicine.

The Thyroid Uptake Bioassay Test will be done on individual technologists who handle millicurie quantities of liquid Iodine-131 or Iodine-125.

The thyroid uptake bioassay test will be done between 24-30 hours after handling of liquid I-131 or I-125. Thyroid uptake counts will be compared with the background leg counts. All records will be maintained for periodic review by the Radiation Safety Officer and by the Director of Nuclear Medicine Services.

Urine bioassay tests will be done on technologists involved in tritiated isotope studies.

If any of the above bioassay studies are positive on any individual, then the individual will be placed under direct supervision of a physician for clinical management of the internal radiation exposure.

3. The Handling of Sodium Iodide Solutions:

In any formulation of sodium iodide solution the potential exists for the oxidation of the iodide into volatile I_2 form. When the container cap is removed the volatile iodine will leave the bottle and excape in the atmosphere. The following precautions shall be taken in handling liquid iodide containers.

a. Store the iodine solution bottle in the refrigerator or in fume hood in the lead shipping shield immediately upon receipt. The refrigerator should be maintained at 35° to 40° F. Keep the bottle in that shield at all times.

b. Always wear rubber or plastic gloves when handling iodine solution in the fume hood.

c. Always remove the iodine solution bottle cap at arm's length so that if any iodine escapes upon opening, inhalation of the iodine will be minimized.

d. If a fume hood is not used, do not open bottle in an area where there is a draft. Volatilized iodine is a heavy vapor and will not rise very far under static air conditions.

e. Always transfer the iodine solution with a bulb (or similar device) aspirated pipet. Never mouth aspirate the pipet.

f. Always use a pipet with the smallest diameter at the tip consistent with the volume to be aspirated. The smaller the volume of the pipet itself, the smaller the volume of air displaced from the bottle.

g. If transferring iodine solution to another closable container, cap both containers immediately after making the transfer.

h. If transferring iodine solution to an open container such as a waxed cup or water glass, discharge the pipet at the surface of the water used for dose administration. The water should be chilled, but contain no ice.

i. If the entire contents of the iodine solution bottle are used, make the transfer as in step h. Do not pour the solution into the administration container.

j. For administration of large therapy doses, use the entire lead container without making any transfers.

k. Large therapy dose containers shall be opened ahead of actual therapy of patient and kept under fume hood to remove oxidized volatile iodine. Cap them before transfer to therapy room.

l. All items used in administration of large therapy doses shall be held for monitoring and later disposal.

m. Obtain thyroid uptake bioassay test on technologists handling liquid iodine within 24-30 hours.

n. Monitor for contamination of clothing and personal items.

Item 23

Date: April 26, 1979