Sent 9/14/79 DCS

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

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

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

St. Elizabeth Hosp. Medical Center
Belmont & Park Avenue
Youngstown, Ohio 44501

TELEPHONE NO.: AREA CODE 216 746 7211

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

SAME

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Clayton A. Hixson M.D.

TELEPHONE NO.: AREA CODE 216 746 7211

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 34-01131-01

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

Refer to attachment # 1

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.)*

Refer to attachment # 1

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES	x	3 mCi ea.
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	2 Ci ea.
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	100 mCi

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	x	as needed
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	x	as needed
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	x	as needed
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	x	as needed
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA	x	as needed
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	x	800 mCi

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

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

License Fee Information
NEXT PAGE
on Reverse Side

8506100021 850531
REG3 LIC30
34-01131-01 PDR

FORM NRC-313M (8-78)

COPIES SENT TO OFF. OF INSPECTION AND ENFORCEMENT

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

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

7. MEDICAL ISOTOPES COMMITTEE

X	Names and Specialties Attached; and
	Duties as in Appendix B; or *(Check One)*
X	Equivalent Duties Attached attachment # 2

8. TRAINING AND EXPERIENCE

X	Supplements A & B Attached for Each Individual User; and refer to attachment # 1
X	Supplemant A Attached for RSO. attach. # 3

9. INSTRUMENTATION *(Check One)*

X	Appendix C Form Attached; or attach # 4
	List by Name and Model Number

10. CALIBRATION OF INSTRUMENTS

	Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
X	Equivalent Procedures Attached; and attach # 5
	Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
X	Equivalent Procedures Attached attach. # 6

11. FACILITIES AND EQUIPMENT

X	Description and Diagram Attached attach # 7

12. PERSONNEL TRAINING PROGRAM

X	Description of Training Attached attach.#1,8&9

13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

X	Detailed Information Attached attach. # 1&10

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

	Appendix F Procedures Followed; or
X	Equivalent Procedures Attached attach. # 11

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

	Appendix G Rules Followed; or
X	Equivalent Rules Attached attachment # 12

16. EMERGENCY PROCEDURES *(Check One)*

	Appendix H Procedures Followed; or
X	Equivalent Procedures Attached attach. # 13

17. AREA SURVEY PROCEDURES *(Check One)*

	Appendix I Procedures Followed; or
X	Equivalent Procedures Attached attach. # 14

18. WASTE DISPOSAL *(Check One)*

	Appendix J Form Attached; or
X	Equivalent Information Attached attach. # 15

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

	Appendix K Procedures Followed; or
X	Equivalent Procedures Attached attach. # 16&17

20. THERAPEUTIC USE OF SEALED SOURCES

N/A	Detailed Information Attached; and attach. # 1
	Appendix L Procedures Followed; or *(Check One)*
	Equivalent Procedures Attached

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

X	Detailed Information Attached attach. # 18

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

N/A	Detailed Information Attached

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

N/A	Detailed Information Attached

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	R. S. Landauer Jr. & Company	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	R.S. Landauer Jr. & Company	Monthly
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

Applicant..18538.....
Check No..
Amount/Fee Category..$150(7B)
Type of Fee..Renewal
Date Check Rec'd..SEP 10 1979
Received By..Brown.....

RECEIVED BY LFMB
Date..SEP 10 1979
Log..SEPT P63 Renewal
By..Brown
Orig. To.....
Action Compl..9/11/79

S/B Reg III

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS
N/A

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)
Materials License 7B (sec. 170.31)

(1) LICENSE FEE CATEGORY:

(2) LICENSE FEE ENCLOSED: $ 150.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*
Sister M. Consolata

(1) NAME *(Type or Print)*
Sister M. Consolata

(2) TITLE
Executive Director

c. DATE
September 4, 1979

FORM NRC-313M (8-78)

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on Form NRC-313M. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30-36 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES** The information may be used: (a) to provide records to State health departments for their information and use; and (b) to provide information to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for a NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you. A copy of the license issued will routinely be placed in the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed.

5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

ATTACHMENT #1

Item #4

Clayton A. Hixson, M.D.
Jae J. Lee, M.D.
William R. Torok, M.D.
William L. Crawford, M.D.
Bertwin E. Einfalt, M.D.
Parviz E. Soleimani, M.D.
George L. Altman, M.D.

Item #5

Amrik S. Chhabra Ph.D.

Item #7

Clayton A. Hixson, M.D.
Radiologist-Nuclear Medicine Board Certified
Director Division of Nuclear Medicine

Amrik S. Chhabra, Ph.D.
Radiation Physicist
Radiation Safety Officer

Jack R. Repp
Radiologic Administrator

Duties as described in Appendix B of N.R.C. Regulatory Guide (Attachment #2)

Item #8

Refer to License Number 34-01131-01 for each individual user.

Radiation Safety Officer (Attachment #3)

Item #9

Refer to Appendix C of N.R.C. Regulatory Guide (Attachment #4)

Item #10

Attachment #5
Attachment #6

Item #11

Attachment #7

Item #12

All personnel who directly work with radioactive materials have completed an approved course in Nuclear Medicine Technology or are currently enrolled as students in the School of Nuclear Medicine Technology at this institution. Technical as well as non technical personnel within this division, upon employment, are instructed as to radiation safety and made aware of radiation hazards. Those non-technical personnel would include secretaries, nursing personnel within the department, and orderlies. These instructions are carried out by the Chief Nuclear Technologist and/or the Radiation Safety Officer.

Item #12 (Continued)
A list of radiation safety regulations, including procedures for spills on equipment and personnel, is placed in a conspicuous area. All personnel are obliged to be aware of their content. (Attachment #8) "Radioactive materials" and "Radiation area" signs are placed in their appropriate places and personnel are informed of their meaning. Personnel are informed verbally and in writting (Attachment #9) as to content of license, rules and regulations governed by the N.R.C. (10 CFR Parts 19 & 20) and right to be informed of radiation exposure. Continuing education in the concepts of radiation safety is provided by various in-service programs conducted by the Physician Director and/or the Radiation Safety Officer.

Item #13 The Chief Nuclear Medicine Technologist or his secretary will place all orders for radioactive material. The Chief Technologist will ensure that the requested materials and quantities are authorized by the license and possession limits are not exceeded.
During normal working hours, carriers are instructed to deliver packages directly to the Nuclear Medicine Department.
During off duty hours, x-ray personnel will accept delivery of radioactive packages in accordance with instructed procedures. (Attachment #10)

Item #14 Attachment #11

Item #15 Attachment #12

Item #16 Attachment #13

Item #17 Attachment #14

Item #18 Attachment #15

Item #19 Attachments #16 and 17

Item #20 N/A -refer to License # 34-01131-02

Item #21 Attachment # 18

Item #22 N/A

Item #23 N/A

ATTACHMENT #2

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 S 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.

ATTACHMENT #2
Continued

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.

ATTACHMENT #3

AMRICK S. CHHABRA, Ph.D.

June, 1970	Certified American Board of Radiology in "Radiological Physics"
March, 1965	Ph.D (Physics); Bombay University, Bombay, India
May, 1950	MS c (Physics); Panjab University, Panjab, India
May, 1949	BSc (Hons)-Physics; Panjab University, Panjab, India

EXPERIENCE & POSITIONS HELD:

Chief Radiation Physicist & Associate Professor, Dept. of Radiology & Dept. of Biophysics, Loyola University Medical Center Hospital, Maywood, Ill., April 1970 to December 1971

Radiation Physicist & Assistant Professor, Dept. of Therapeutic Radiology, Tufts University, New England Medical Center Hospital, Boston, Mass. (May 1969 to April, 1971

Senior Post-Doctoral Fellow (Physics Dept), M.D. Anderson Hospital, Houston, Texas
August 1968 to May 1969

Department of Radiological Physics, Argonne National Lab., Argonne, Ill.
June 1960 to Nov. 1961

Senior Scientific Office, Dept. of Atomic Energy, Bombay, India
1950-1968

ATTACHMENT #4

INSTRUMENTATION

I. Survey meters

a. Manufacturer's name: Victoreen-Thyac III
Model number: 491
Number of instruments available: 2
Min. Range: 0 mr/hr to .2 mr/hr
Max. Range: 0 mr/hr to 200 mr/hr

b. Manufacturer's name: Victoreen
Model number: 444
Number of instruments available: 1
Min. Range: 0.3 mr/hr to 300 mr/hr
Max. Range: 0.3 mr/hr to 300 r/hr

II. Dose calibrator

Manufacturer's name: Capintec
Model numbers: CRC-10M and CRC-2N
Number of instruments available: 2

III. Diagnostic Instruments

	Type	Manufacturer's name	Model No.
1.	Large field camera	Searle	L.F.O.V.
2.	Standard field camera	Searle	Pho-gamma H.P.
3.	Standard field camera	Ohio Nuclear	Sigma 400
4.	Uptake probe and scaler	General Elec.	INS-15
5.	Gamma counter	Searle	Logic II 1185
6.	Well counter	Abbott	10011 A
7.	Volemitron	Ames	600

IV. Other:

1.	Wall monitor with audible alarm	Victoreen	808 D
2.	Portable gamma monitor with scaler	Amersham	9273-1
3.	Portable gamma monitor with rate meter	Eberline	499

ATTACHMENT # 5

CALIBRATION OF INSTRUMENTS

METHODS FOR CALIBRATION OF (X-AND GAMMA-RAY) SURVEY METERS, INCLUDING PROCEDURES, STANDARDS, AND FREQUENCY

A. Calibration of survey meters shall be performed with radionuclide sources.

1. The sources shall be approximate point sources.

2. The source activities shall be traceable within 5% accuracy to the U.S. National Bureau of Standards (NBS) calibrations.

3. The frequency shall be at least annually and after servicing.

4. Each scale of the instrument shall be calibrated at least at two points such that (a) one point is in each half of the scale and (b) the two points are separated by 35-50% of full scale.

5. The exposure rate measured by the instrument shall differ from the true exposure rate by less than 10% of full scale. Readings within $\pm$20% will be considered acceptable if a calibration chart or graph is prepared and attached to the instrument.

B. A reference check source of long half-life, e.g., Cs-137 or Ra D and E, shall also be read at the time of the above calibration. The readings shall be taken with the check source placed in specific geometry relative to the detector. A reading of this reference check source should be taken:

1. Before each use and also after each survey to ensure that the instrument was operational during the survey.

2. After each maintenance and/or battery change.

3. At least quarterly.

If any reading with the same geometry is not within $\pm$20% of the reading measured immediately after calibration, the instrument should be recalibrated (see item A).

C. The instrument must be calibrated at lower energies if its response is energy dependent and it is to be used to measure in the Xe-133 or Tc-99m energy ranges.

This calibration may be done either

1. As in item A above with calibrated standards of radionuclides at or near the desired energies or

C.

2. As a relative intercomparison with an energy-independent instrument and uncalibrated radionuclides.

D. Records of the above items A, B-2, B-3, and C must be maintained.

E. Use of Inverse Square Law and Radioactive Decay Law

1. A calibrated source will have a calibration certificate giving its output at a given distance measured on a specified date by the manufacturer or NBS.

a. The Inverse Square Law may be used with any point source to calculate the exposure rate at other distances.

b. The Radioactive Decay Law may be used to calculate the output at other times after the specified date.

ATTACHMENT #6

METHODS FOR CALIBRATION OF DOSE CALIBRATOR

A. Test for the following:

1. Instrument linearity (at installation and quarterly thereafter)

2. Geometrical variation (at installation)

3. Instrument accuracy (at installation and annually thereafter).

B. After repair or adjustment of the dose calibrator, repeat all the appropriate tests listed above (dependent upon the nature of the repairs).

C. Daily or before each use of the instrument:

1. Measure and record the activity of at least one reference source (e.g., 1-2 mCi of Co-57). This check should be repeated during the day whenever sample readings are not within 10% of the anticipated assay. Variation greater than 5% in this test will indicate the need for instrument repair, adjustment, or recalibration.

2. Measure and record the apparent activity of a long-lived standard radionuclide such as Cs-137 or Ra-226. Choose a source with activity in the 100 uCi range.

D. Inspect the instrument on a quarterly basis to ascertain that the measurement chamber liner is in place and that instrument zero is properly set (see manufacturer's instructions).

E. Test of Instrument Linearity

The linearity of a dose calibrator should be ascertained over the entire range of activities employed. This test will utilize a vial of Tc-99m whose activity is equivalent to the maximum anticipated activity to be assayed (e.g., the first elution from a new generator).

1. Assay the Tc-99m vial in the dose calibrator and subtract background level to obtain net activity in millicuries.

2. Repeat step 1 at time intervals of 6, 24, 30, and 48 hours after the initial assay.

E.

3. Using the 30-hour activity measurement as a starting point, calculate the predicted activities at 0, 6, 24, and 48 hours using the following table:

Assay Time (hr)	Correction Factor
0	32
6	16
24	2
30	1
48	0.125

Example: If the net activity measured at 30 hours was 15.625 mCi, the predicted activity for 6 and 48 hours would be 15.625 mCi x 16 = 250 mCi and 15.625 mCi x 0.125 = 1.95 mCi, respectively.

4. Plot the measured net activity for each time interval versus the predicted activity on log-log graph paper.

5. The activities plotted should be within ± 5% of the predicted curve if the instrument is linear and functioning properly. Errors greater than ± 5% indicate the need for repair or adjustment of the instrument.

6. If instrument linearity cannot be corrected, it will be necessary in routine assays to either assay an aliquot of the eluate that can be accurately measured or to use the graph constructed in step 4 to relate measured activities to true activities.

F. Test for Geometrical Variation

There may be significant geometrical variation in activity measured as a function of sample volume or configuration, depending on the volume and size of the ionization chamber used in the dose calibrator. The extent of geometrical variation should be ascertained for commonly used radionuclides and appropriate correction factors computed if variations are significant, i.e., greater than ± 2% (even though correction factors may be provided by the manufacturer, the accuracy of these should be checked).

To measure variation with volume of liquid, a 30-cc vial containing 2 mCi of Co-57 or other appropriate radionuclide in a volume of 1 ml will be used.

1. Assay vial at the appropriate instrument setting and subtract background level to obtain net activity.

F.

2. Increase the volume of liquid in the vial in steps to 2, 4, 8, 10, 20, and 25 ml by adding the appropriate amount of water or saline. After each addition, gently shake vial to mix contents and assay as in step 1.

3. Select one volume as a standard (such as the volume of reference standard used in performing the test for instrument accuracy), and calculate the ratio of measured activities for each volume to the reference volume activity. This represents the volume correction factor (CF).

   Example: If activities of 2.04, 2.02, and 2.00 mCi are measured for 4, 8, and 10 ml volumes and 10 ml is the reference volume selected,

   $$4 \text{ ml Volume CF} = \frac{2.00}{2.04} = 0.98$$

4. Plot the correction factors against the volume on linear graph paper. Use this graph to select the proper volume correction factors for routine assay of that radionuclide.

5. The true activity of a sample is calculated as follows:

   True Activity = Measured Activity x Correction Factor

   where the correction factor used is for the same volume and geometrical configuration as the sample measured.

6. Similarly, the same activity of Co-57 in a syringe may be compared with that of 10 ml in a 30-cc vial and a correction factor may be calculated.

7. It should be noted that differences of 200% in dose calibrator readings between glass and plastic syringes have been observed for lower-energy radionuclides such as I-125. Hence, adequate correction factors must be established for this type of syringe. An alternate to providing syringe calibration factors is to simply assay the stock vial before and after filling the syringe. The activity in the syringe is then the difference in the two readings (with a volume correction if significant).

G. Test for Instrument Accuracy

Check the accuracy of the dose calibrator for several radionuclides such as Cs-137, Co-57, and Ba-133 using appropriate reference standards whose activity is traceable to NBS. The activity levels of the reference sources used should approximate those levels normally encountered, giving adequate attention to source configuration. The lower-energy reference standards (Tc-99m, Xe-133, I-125) must be in vials with the same thickness of glass as the actual samples to be measured for best accuracy.

1. Assay the reference standard in the dose calibrator at the appropriate setting and subtract the background level to obtain the net activity.

2. Repeat step 1 for a total of 3 determinations, and average results.

3. The average activity determined in step 2 should agree with the certified activity of the reference source within $\pm$ 5% after decay corrections.

4. Repeat the above steps for other commonly used radionuclides for which adequate reference standards are available.

5. Keep a log of these calibration checks.

6. Calibration checks that do not agree within $\pm$ 5% indicate that the instrument should be repaired or adjusted. If this is not possible, a calibration factor should be calculated for use during routine assays of radionuclides.

7. At the same time the instrument is being initially calibrated with the NBS-traceable standards, place a long-lived source in the calibrator, set the instrument, in turn, at the various radionuclide settings used (Cs-137, I-131, Tc-99m, I-125, etc.), and record the readings. These values may later be used to check instrument calibration at each setting (after correcting for decay of the long-lived source) without requiring more NBS-traceable standards. Keep a log of these initial and subsequent readings.

H. Test for Instrument Constancy

Assay two reference sources such as Cs-137 and Co-57 using a reproducible geometry before each daily use of the instrument.

ATTACHMENT #6
Continued

H. 1. Assay each reference source using the appropriate instrument setting (i.e., Cs-137 setting for Cs-137).

2. Measure background level at same instrument setting.

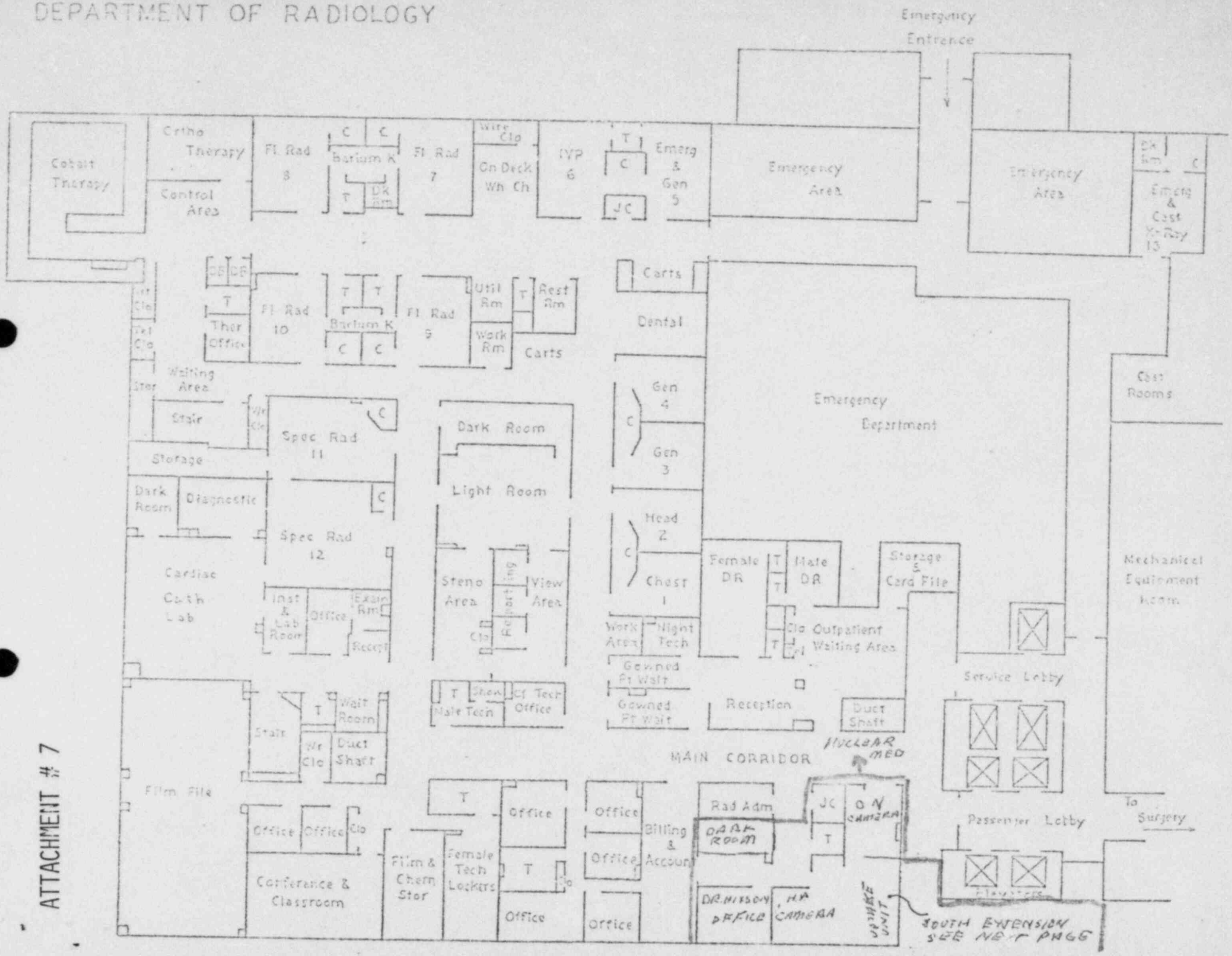
3. Calculate net activity of each source subtracting out background level.

4. Repeat the procedure used for the Cs-137 source for all the commonly used radionuclide settings.

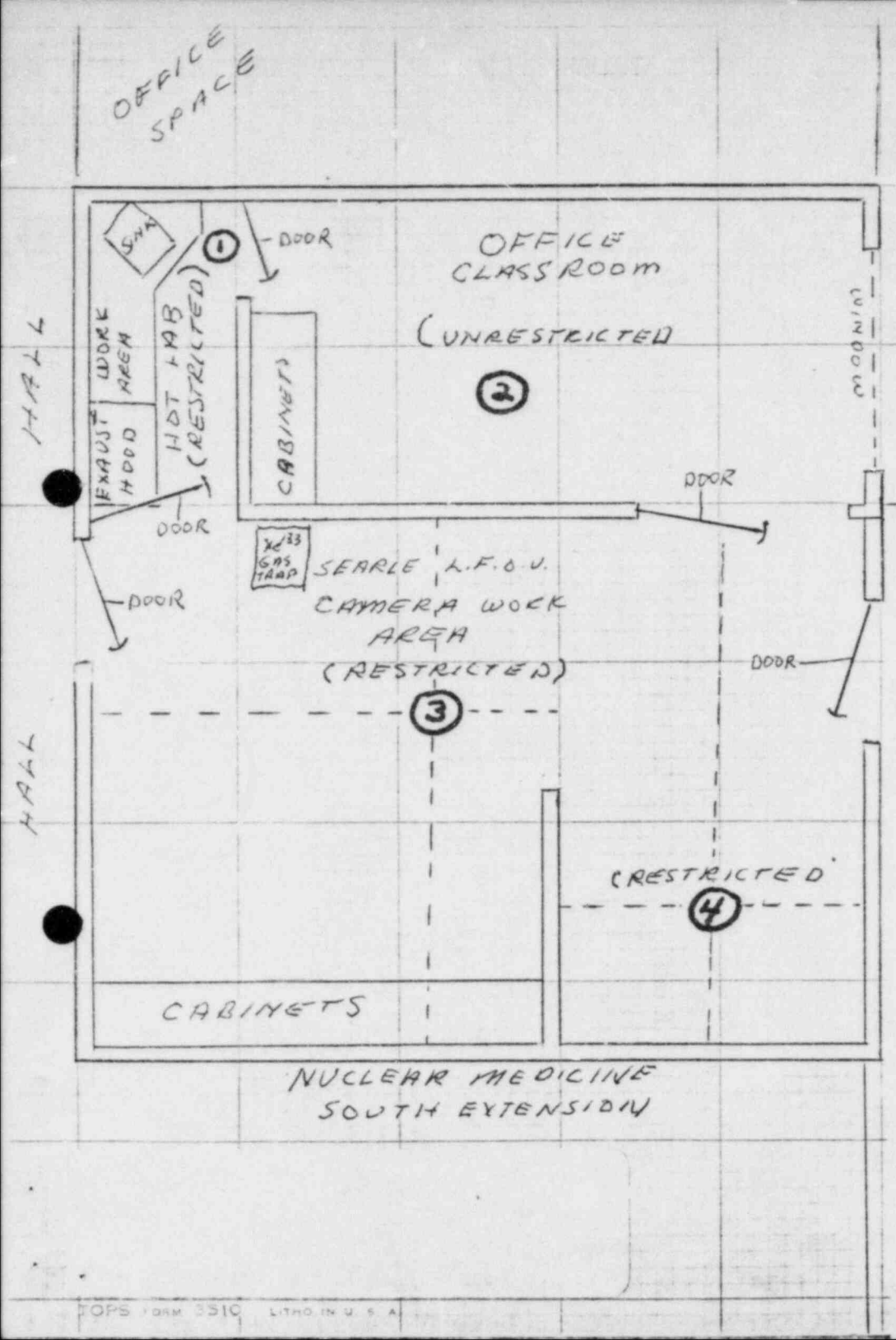
5. Variations greater than $\pm$5% from the predicted activity indicate the need for instrument repair or adjustment.

6. Investigate higher than normal background levels to determine their origin and to eliminate them if possible by decontamination, relocation, etc.

DEPARTMENT OF RADIOLOGY



ATTACHMENT # 7



AREA No 1. 5'X11'X 8' = 440 cu ft

AREA No 2. 15'X10'X 8' = 1200 cu ft

AREA No 3. 15'X12'X8' = 1440 cu ft

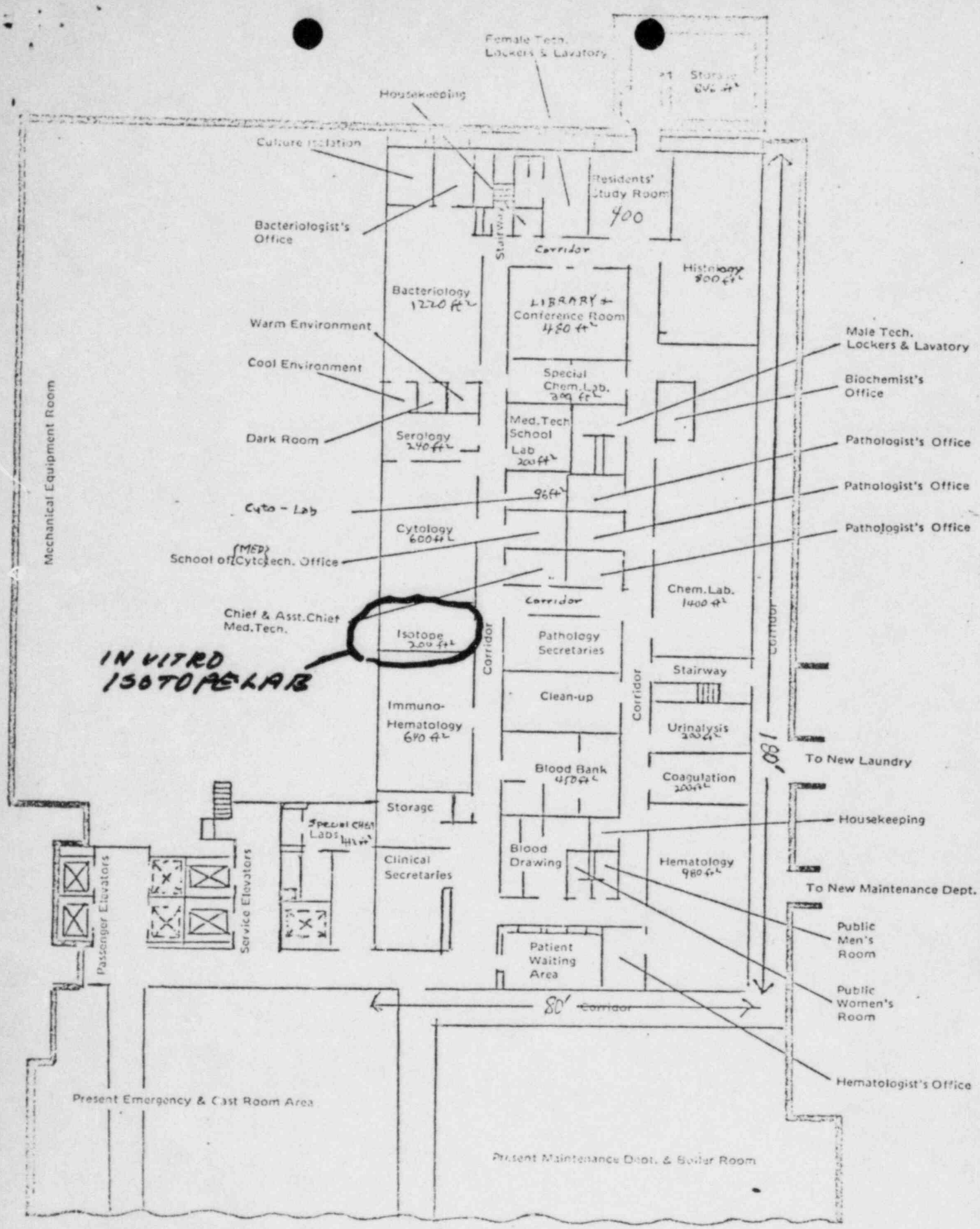
AREA No 4 7'X12'X 8' = 1232 cu ft

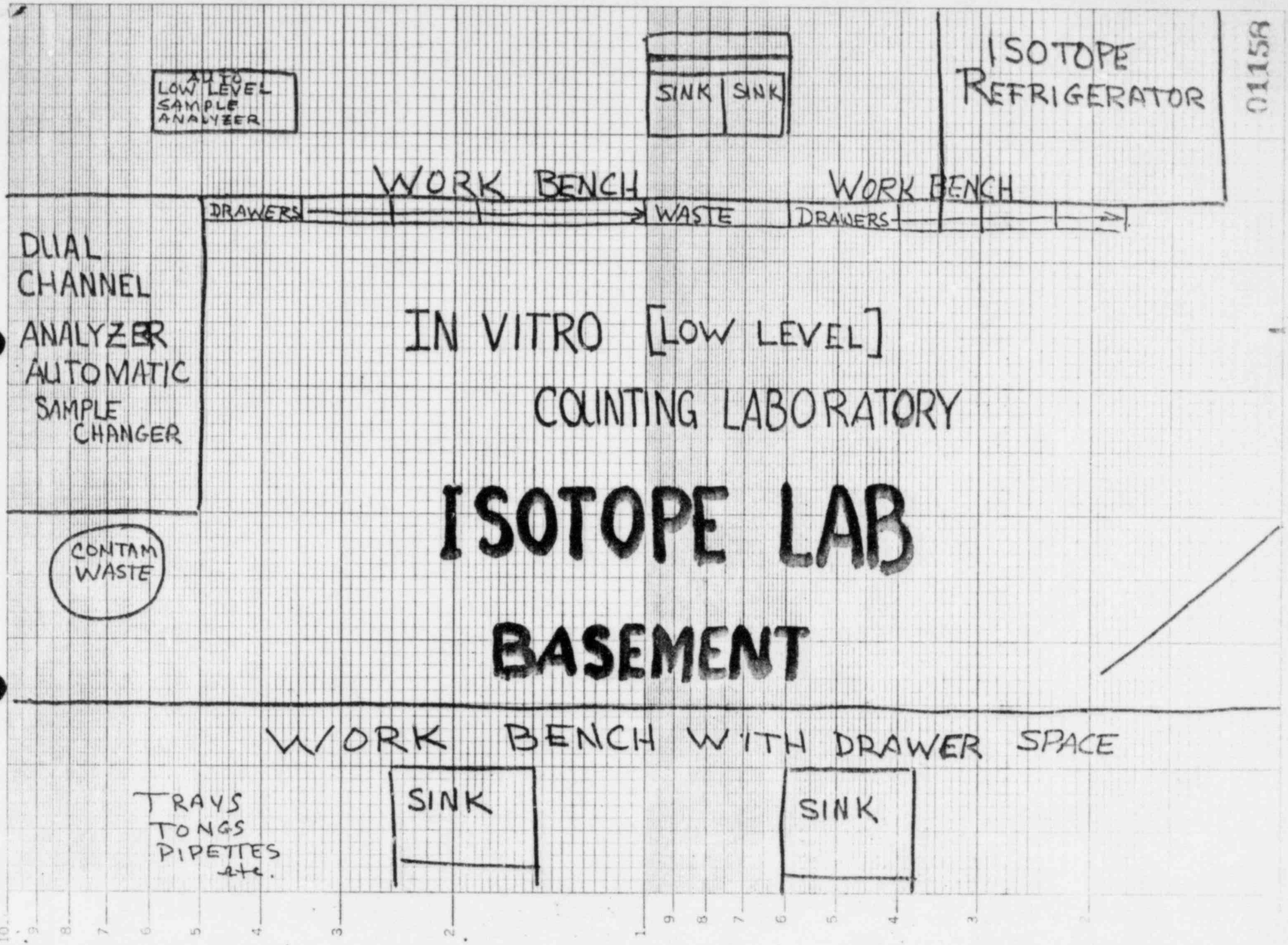
TOTAL AREA 4312 cu ft

TOTAL AREA RESTRICTED = 3112 cu ft

HOT LAB (AREA # 1) SHIELDING INCLUDES A BUILT IN LEAD LINED MODULAR CABINET WITH SLIDING LEAD BODY SHIELD, LEAD DRAWERS AND LEAD LINED REFRIGERATOR.

THE WORK AREA FOR PREPARATION OF RADIOPHARMACEUTICALS AND DRAWING OF PATIENT DOSES IS COVERED WITH ABSORBANT PAPER


Female Tech. Lockers & Lavatory
Housekeeping
Culture Isolation
Residents' Study Room 400
Bacteriologist's Office
Corridor
Histology 800 ft²
Bacteriology 1220 ft²
LIBRARY + Conference Room 450 ft²
Warm Environment
Cool Environment
Male Tech. Lockers & Lavatory
Special Chem. Lab. 300 ft²
Biochemist's Office
Dark Room
Serology 240 ft²
Med. Tech School Lab 200 ft²
Pathologist's Office
96 ft²
Cyto - Lab
Pathologist's Office
Cytology 600 ft²
School of (MED) Cytotech. Office
Pathologist's Office
Chief & Asst. Chief Med. Tech.
Isotope 200 ft²
Corridor
Pathology Secretaries
Chem. Lab. 1400 ft²
Corridor
IN VITRO ISOTOPE LAB
Stairway
Clean-up
Immuno-Hematology 640 ft²
Urinalysis 200 ft²
Corridor
180'
To New Laundry
Blood Bank 450 ft²
Coagulation 200 ft²
Storage
Special Chem. Labs
Housekeeping
Blood Drawing
Clinical Secretaries
Hematology 980 ft²
To New Maintenance Dept.
Mechanical Equipment Room
Passenger Elevators
Service Elevators
Public Men's Room
Patient Waiting Area
Public Women's Room
80' Corridor
Hematologist's Office
Present Emergency & Cast Room Area
Present Maintenance Dept. & Boiler Room


APTO
LOW LEVEL
SAMPLE
ANALYZER
SINK
SINK
ISOTOPE
REFRIGERATOR
01158
WORK BENCH
WORK BENCH
DRAWERS
WASTE
DRAWERS
DUAL
CHANNEL
ANALYZER
AUTOMATIC
SAMPLE
CHANGER
IN VITRO [LOW LEVEL]
COUNTING LABORATORY
ISOTOPE LAB
CONTAM
WASTE
BASEMENT
WORK BENCH WITH DRAWER SPACE
TRAYS
TONGS
PIPETTES
etc.
SINK
SINK

HOT LAB PROCEDURE CHECK LIST

1. CALIBRATION: DONE DAILY AND RECORDED

   A. Dose calibrators
   B. Wall monitor
   C. Survey meter

2. DAILY GENERATOR AND KIT PREPARATION

   A. Generators
      1. Elution-recorded
      2. Mo^{99} check-recorded-μCi/mCi
      3. Lot No. of generator recorded each elution
      4. Appropriate information in disposition log
   B. Kit Preparation
      1. Lot No. of kit recorded-disposition log
      2. Chromatography-recorded
      3. Appropriate information in disposition log

3. MONITORING

   A. Daily survey of work area recorded
   B. Survey of all radioactive material received recorded at surface and one meter
   C. Total area monotoring done weekly recorded
   D. Wipe test done by area weekly recorded
   E. Xe-133 gas trap check weekly recorded

4. HOT TRASH DISPOSAL AND MONITORING
   (Refer to radioactive material disposal procedure)

5. INVENTORY;DAILY

   A. Kits
   B. Radio pharmaceuticals
   C. Disposables
      1. Syringes
      2. Needles
      3. Chromatography kit
      4. Saline
      5. Vacuum vials
      6. Stop cocks etc.

6. CLEANING:

1. Daily
   A. Change absorbant paper
   B. Sink area
2. Weekly
   A. Needle box
   B. Entire area

NOTE: WILL BE RESPONSIBLE FOR ALL HOT LAB PROCEDURES

ATTACHMENT #3

Radiation Safety Regulations

for

Nuclear Medicine Personnel

1. "Good Housekeeping" will be maintained at all times. Laboratory will be kept neat; glassware will be washed regularly; waste or contaminated materials will not be allowed to accumulate.

2. No food will be allowed to be eaten or stored in the radioisotope unit.

3. No smoking will be allowed while handling radioactivity.

4. Protective outer garments, such as laboratory coats and rubber gloves, should be worn while handling radioactivity.

5. All possible setups will be made on easily cleanable trays.

6. All trays and all other work surfaces will be covered with disposable absorbant paper.

7. All containers of radioactive material will be labeled at all times, stating kind, quantity of isotope, and date of assay and bearing radiation symbol.

8. Film badges should always be worn by occupational personnel while working in the unit. Personnel eluting generators will wear some form of wrist or finger monitoring device in addition to a whole-body monitoring device. A film badge clasped to the wrist is satisfactory for this purpose; however TLD (thermoluminescent dosimetry) finger badges are more accurate and more practical.

9. All work areas will be monitored regularly and results of survey recorded.

10. Syringe shields should be used on all dose preparations and injections. (Injections when feasable)

11. All patient doses will be assayed using a dose calibrator.

12. All personnel eluting generators, synthesizing compounds, drawing or administering doses, or in any way handling radioactive sources will wear both wrist or finger and whole-body film or TLD badges.

13. Areas used for elution of generators, preparation of radiopharmaceuticals, and preparation of patient doses will be surveyed for contamination at the end of each working day.

14. In the case of contamination of table tops or counter tops, these will be decontaminated to BKG at contact with a GM survey meter.

15. In case of contamination of the floor, it will be decontaminated to BKG at contact with a GM survey meter. The area will be covered and marked off if radiation levels warrant (more than 2.0 mr/hr at contact)

15. In case of contamination of the floor, it will be decontaminated to BKG at contact with a GM survey meter. The area will be covered and marked off if radiation levels warrant (more than 2.0 mr/hr at surface).

16. Hands will be totally decontaminated to background levels measured at contact with a GM survey meter.

17. Contaminated linen will be stored in an appropriately delineated storage area for ten half-lives or until decayed to BKG on contact with a GM survey meter.

18. Contaminated paper will be stored until decayed to background level measured on contact with a GM survey meter. It may then be sent to the hospital incinerator for disposal.

19. Camera systems will be checked with uniform flood fields each day of use.

20. Dose calibrators will be checked each day for constancy and range linearity.

LIQUID SPILLS ON PERSONNEL

ATT:- # 8 CONT.

1. If the spill is liquid, and the hands are protected, right the container.

2. If the spill is liquid, and the hands are not protected, put protective gloves on immediately.

3. Drop absorbent paper on spill.

4. If the spill is on the skin, wash thoroughly.
   a. Wash for not less than two minutes with a mild pure soap in tepid water with a good lather, covering the entire affected area thoroughly.
   b. Give special attention to areas between the fingers and around the fingernails.
   c. Apply lanolin or hand cream to prevent chapping.

5. If the spill is on clothing, discard outer or protective clothing at once.

6. Spills or excretion on bedding and patient clothing must be removed, area cleaned with decontaminant and monitored to insure that background levels are attained. Bedding and clothing are to be stored in plastic bags in hot trash area until these levels are reached.

7. Monitor all persons involved in the spill and cleaning to determine adequacy of decontamination.

8. For low activity, less than 1,000 counts per minute, ordinary laundary is sufficient.

9. Rubber gloves and other rubber goods usually decontamination readily. Such items should first be washed with plenty of suds and hot water.

10. Notify the radiological safety officer (health physicist) as soon as possible.

11. Prepare a complete history of the accident and subsequent activity related thereto for the laboratory records.

12. Permit no person to resume work in the area until a survey is made and approval of the radiological safety officer (health physicist) is secured.

ATT. # 8 CONT.

SPILLS ON EQUIPMENT

1. All metal tools employed should be surveyed to detect possible contamination.

2. Detergents should be used first to attempt decontamination.

3. Equipment that is found to be contaminated after the initial treatment shall be stored in an isolated location, until more thorough decontamination procedures may be applied.

4. Contaminated equipment shall not be released from control of the laboratory for repair, or any other purpose, until the level of activity has been reduced to a safe limit.

ATTACHMENT # 9

ST. ELIZABETH HOSPITAL
DEPARTMENT OF RADIOLOGY
1044 BELMONT AVENUE
YOUNGSTOWN, OHIO 44505

DIAGNOSTIC RADIOLOGY
& NUCLEAR MEDICINE
R. J. SCHEETZ, M.D.
G. L. ALTMAN, M.D.
W. R. TOROK, M.D.
C. A. HIXSON, M.D.
B. E. EINFALT, M.D.
J. J. LEE, M.D.
W. L. CRAWFORD, M.D.

THERAPEUTIC RADIOLOGY
P. K. SOLEIMANI, M.D.

RADIATION PHYSICS
A. S. CHHABRA, PHD.

TO ALL PERSONNEL

Part nineteen (19) and part twenty (20) of the United States Nuclear Regulatory Commission Rules and Regulations, title ten (10) chapter one (1), Code of Federal Regulations entitled, "Notices, Instructions, and Reports to Workers; Inspections" (Part 19) and "Standards for Protection Against Radiation" (part 20), may be found in the Nuclear Medicine office file under Nuclear Regulatory Commission Reports and Notices. You will find, in addition, our N.R.C. License and amendments, procedure book and other pertinent information.

You are encouraged, if not demanded, to read and be aware of their content.

C. A. Hixson, M.D.

C. A. Hixson

Director
Division of Nuclear Medicine

ATTACHMENT #10

MEMORANDUM FOR: Radiologic Night Supervisor

FROM: R. DeKatch-Chief Nuclear Technologist

SUBJECT: RECEIPT OF PACKAGES CONTAINING RADIOACTIVE MATERIAL

Any packages containing radioactive material that arrive between 5:00 p.m. and 7 a.m. or on Sundays shall be signed for by the Night Supervisor on duty and taken immediately to the Nuclear Medicine Department. Unlock the door, place the package on top of the table immediately to the right of the door, and relock the door.

If the package is wet or appears to be damaged, immediately contact me. Ask the carrier to remain at the hospital until it can be determined that neither he nor the delivery vehicle is contaminated.

CHIEF NUCLEAR MEDICINE TECHNOLOGIST: Randall C. DeKatch

OFFICE PHONE: 216-746-7211-Ext. 3754

HOME PHONE: 216 788 2726

ATTACHMENT #11

PROCEDURES FOR SAFELY 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 and 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 slip, and label on bottle), and check integrity of final source container (inspecting for breakage of seals or vials, loss of liquid, discoloration of packaging material). Check also that shipment does not exceed possession limits.

6. Monitor the packing material and packages for contamination before discarding.

   a. If contaminated, treat as radioactive waste.

   b. If not contaminated, obliterate radiation labels before discarding in regular trash.

7. Stamp appropriate disposition log as to:

   a. Opened wearing gloves

   b. Opened over padding.

   c. Empty box levels.

ATTACHMENT #12

GENERAL RULES FOR THE SAFE 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 when 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 devices 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 at the end of the day.

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

13. Always transport radioactive material in shielding containers.

ATTACHMENT #13

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. Also insert into the plastic bag all other contaminated materials such as disposable gloves.

4. SURVEY: With a low-range, thin-window G-M survey meter, check the area around the spill, 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:	Dr. A. Chhabra
OFFICE PHONE:	746 7211 Ext. 3158
HOME PHONE:	792 1630

ALTERNATE NAMES AND TELEPHONE NUMBERS DESIGNATED BY RSO:

	R. DeKatch
OFFICE PHONE:	746 7211 Ext. 3131
HOME PHONE:	788 2726

ATTACHMENT # 14

AREA SURVEY PROCEDURES

1. All elution, preparation, and injection areas will be surveyed daily with a low-range thin-window G-M survey meter and decontaminated if necessary.

2. Laboratory areas where only small quantities of radioactive material are used (less than 100 uCi) will be surveyed monthly.

3. All other laboratory areas will be surveyed weekly.

4. The weekly and monthly survey will consist of:

   a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mRem/hr.

   b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 100 dpm per 100 cm^2 for the contaminant involved.

5. A permanent record will be kept of all survey results, including negative results. The record will include:

   a. Location and date.

   b. Initials of person conducting the survey.

   c. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.

   d. Measured exposure rates, keyed to location on the drawing (point out rates that require corrective action).

   e. Detected contamination levels, keyed to locations on drawing.

   f. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rates after corrective action, and any appropriate comments.

6. Area will be cleaned if the contamination level exceeds 100 dpm/100 cm^2.

NOTE:

For daily surveys where no abnormal exposures are found, only the date, the identification of the person performing the survey, and the survey reports will be recorded.

ATTACHMENT # 15

PROCEDURE FOR DISPOSAL OF RADIOACTIVE WASTE

Contents

I. Introduction

II. Kit preparations, working stock and exhausted long lived radionuclides.

III. Non-exhausted long lived radionuclides.

IV. Generators

V. Final disposal to regular hospital trash or sanitary sewer system.

I. Introduction

The following procedures apply to the disposal of all radioactive materials within the Department of Nuclear Medicine.

These procedures have been established so this institution can best meet the requiremtnts of the Nuclear Regulatory Commission pertaining to the disposal of radioactive substances.

It is imperative that all personnel working within this department be familiar with these procedures and adhere strictly to them.

II. Kit preparations, working stock and exhausted long lived radionuclides.

A. Kit preparations and working stock

1. At the beginning of each working day, all kit preparations and stock bottles prepared and used the previous day will be removed from their lead containers and disposed of into the hot lab temporary trash storage.

2. The date disposed is recorded on the receipt disposition sheet for each radiopharmaceutical in it's respective log book. The space for recording the date is provided by the proper stamp which is located in the hot lab.

3. On Friday of each week, the large plastic bag containing that week's hot trash is replaced. The entire bag and all it's contents are removed from the hot lab and placed in an area which has a reading of background. The bag is monitored at 1 meter with a GM counter. The reading is recorded in the disposal log with the date and initials of the person doing the survey. This date must be placed on receipt disposition sheets for each container that was placed into that log during the week.

4. The bag is then placed into long term storage for an undetermined time until the activity is decayed to a safe level. The bag is monitored and if it does not exceed background, it is then disposed of via regular hospital trash procedures. The date is placed on each bag as it is placed into long term storage. Also, several "Caution Radioactive Materials" signs are placed on each bag.

5. The final value obtained before disposal must also be recorded and dated in the hot trash disposal log.

B. Exhausted long lived radionuclides

1. Includes I-131 (hippuran, and rose bengal), Yb-169 DTPA, and Se-75 selenomethionine.

2. Vials containing these radionuclides should contain 0 mls. of volume to be considered exhausted. It is possible for a container to have some residual radioactivity even though there is no detectable volume. For this reason, the vial is to be counted in the dose calibrator. The activity should be recorded and dated.

3. After this information is recorded, the vial can then be placed into the hot lab temporary trash container for later disposal.

4. Do not forget to stamp the receipt disposition sheet and record the correct date.

III. Non - exhausted long-lived radionuclides.

1. Included in this section are those radiopharmaceuticals listed in Section II including I-131 capsules that do contain measurable volume.

2. At the expiration date or time when a radionuclide becomes unsuitable for use, it's activity will exceed the levels considered residue.

3. These materials are not placed into temporary storage but are transferred directly to long term storage.

4. This is done by first stamping the receipt-disposition sheet with the disposal stamp and filling in only the bottom date.

5. A reading is taken at surface with a GM counter and this reading is entered in the hot lab trash disposal log with the date and person's initials.

6. The material is then placed into the special container labeled "Long Term Storage", located in the long term storage area. This does not apply to I-131 diagnostic capsules.

7. Materials in this area will remain here until such a time when they are monitored and determined safe.

IV. Generators

1. The procedure for the disposal of ^{99}Mo-^{99}Tc generators will be the same as for the long-lived radionuclides described in Section III with the following additions.

2. All generators will be stored for a period of 20 physical half-lives of ^{99}Mo (about 60 days).

3. The generators are then broken open and the parent cores are removed. The plastic container and lead shield are monitored to check for possible contamination.

4. Take a reading near the core. If it is essentially background, the core can be disposed of into regular trash. If it is above background, place the core into the special container marked for long term storage until it decays to background.

5. Record all readings in the hot trash disposal log on the page provided for generators.

V. Final disposal to regular hospital trash or sanitary sewer systems.

1. The large plastic bags containing kit preparations, working stock and exhausted long lived radionuclides may be disposed into regular hospital trash after a final monitoring that determines activity to be background.

2. Non-exhausted long lived radionuclides are individually monitored and the readings recorded. If levels are

background, the label is defaced and the container and contents are placed in a plastic bag and disposed of into regular trash.

3. A special case of non-exhausted long lived radionuclides are I-131 diagnostic capsules.a) The capsules are used and disposed of according to the lots.b) When a lot of capsules is expired, all remaining capsules are placed in the dose calibrator and the total activity is determined. This value is recorded on the I-131 capsules sheet in the disposal log.c) The capsules are returned to their original container and placed in storage for a period of ten physical half-lives (about 80 days).d) At the end of this time, the capsules are again counted, the value is recorded with the date and the capsules are flushed into the sanitary sewer system using triple flushing.

4. When the generators are open, all parts are monitored and their radioactivity levels are determined. If uncontaminated, the outside plastic casing is defaced and placed in a plastic bag for regular trash disposal. When determined safe, the lead shielding is turned over to a commercial scrap handler. If the core's activity is not above background, they too are placed in a plastic bag and disposed into regular hospital trash. If core activity exceeds background, they are returned to storage for further decay.

ATTACHMENT #16

THERAPEUTIC USE OF RADIOPHARMACEUTICALS

1. All patients treated with iodine-131 or gold-198 will be placed in a private room with a toilet. The room and toilet areas more likely to be contaminated will be covered with protective material as appropriate to the amounts of contamination to be expected. Particular attention should be given to objects likely to be touched by the patient, e.g., telephones, doorknobs, and other items that would be difficult to decontaminate.

2. The patient's room will be properly posted in accordance with S20.203 of 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, 3 feet (or 1 meter) away, and at the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times on 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 and on his door.

4. The form, Nursing Instructions for Patients Treated with Phosphorus-32, Gold-198, or Iodine-131, will be completed immediately after administration of the treatment dose. A copy will be posted on the patient's chart.

5. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraph 20.105(b) of 10 CFR Part 20.

6. All linens will be surveyed for contamination before being removed from the patient's room and, if necessary, will 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 designee, 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 will be checked for contamination by the Radiation Safety Officer or his designee. 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 in the radioactive waste storage area. When it has reached background levels, as measured with a low-level survey meter, it may 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 on the patient's chart. Nurses should read these restrictions before administering to the patients. Call the Nuclear Medicine Department with 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 precaution sheet on the patient's chart.

c. Patients must remain in bed while visitors are in the room and visitors should remain at least 3 feet from the patient.

d. Patients containing radioactive materials are to be confined to their rooms except for special medical or nursing purposes approved by the Nuclear Medicine Department.

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 should 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 should 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 or his designee 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 should be left in the patient's room to be checked by the Radiation Safety Officer or his designee.

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

j. Surgical dressings should be changed only as directed by the 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 or his designee. 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 Radiation Safety Officer or his designee. 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, disposable gloves should be worn. Afterwards, hands should be washed 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 Radiation Safety Officer or his designee.

(3) 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 floor. In any such situations or if radioactive urine and/or feces is spilled during collection, call the Radiation Safety Officer or his designee, Ext. 3754. 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 Radiation Safety Officer or his designee. 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 or his designee.

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

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

o. When the patient is discharged, call the Radiation Safety Officer or his designee or the Nuclear Medicine Department, and request that the room be surveyed for contamination before remaking the room.

ATTACHMENT # 17

Date: _____

NURSING INSTRUCTIONS FOR PATIENTS TREATED
WITH PHOSPHORUS-32, GOLD-198, OR IODINE-131

Patient's Name: _____

Room No.: _____ Physician's Name: _____

Radioisotope Administered: _____

Date and Time of Administration: _____

Dose Received: _____ Method of Administration: _____

Exposure Rates in mRem/hr

Date	3 feet from bed	10 feet from bed

(Comply with all checked items.)

_____ 1. Visiting time permitted: _____

_____ 2. Visitors must remain _____ from patient.

_____ 3. Patient may not leave room.

_____ 4. Visitors under 18 are not permitted.

_____ 5. Pregnant visitors are not permitted.

_____ 6. Film badges must be worn.

_____ 7. Tag the following objects and fill out the tag:

- _____ door
- _____ bed
- _____ chart
- _____ wrist

_____ 8. Gloves must be worn while attending patient.

_____ 9. Patient must use disposable utensils.

_____ 10. All items must remain in room until approved by the Radiation Safety Officer or his designee.

_____ 11. Smoking is not permitted.

_____ 12. Room is not to be released to Admitting Office until approved by the Radiation Safety Officer or his designee.

_____ 13. Other instructions.

In case of an emergency contact:

RSO _____ _____

Name on-duty/off-duty Telephone Nos.

NOTE:

ATTACHMENT # 18 IS THE ORIGINAL APPLICATION
FOR THE USE OF XENON - 133.
ALL OF THE CONTENTS ADHERED TO.