NRC FORM 313M (9-81) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION **APPLICATION FOR MATERIALS LICENSE – MEDICAL**	Approved by OMB 3150-0041 Expires 9-30-83

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

Jerry L. Pettis Memorial Veterans' Hospital (115A)
11201 Benton St.
Loma Linda, CA 92354

TELEPHONE NO.: AREA CODE (714) 825 - 7084

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

Same as mailing

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Tom R. Bennett ext. 2701

TELEPHONE NO.: AREA CODE (714) 825-7084

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO. _____
c. ☒ RENEWAL OF LICENSE NO. 04-17862-01

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

See attached

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.)*

Tom R. Bennett

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	5mCi
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	4000mCi each
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	1000mCi

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	1.25 Curies

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
See attached			

13905

8512040011 851028
REG5 LIC30
04-17862-01 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. 1 Date: October 1980

7. MEDICAL ISOTOPES COMMITTEE	
X	Names and Specialties Attached; and
X	Duties as in Appendix B; or *(Check One)*
	Equivalent Duties Attached
8. TRAINING AND EXPERIENCE	
	Supplements A & B Attached for Each Individual User; and
X	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
	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
	Equivalent Procedures Attached
17. AREA SURVEY PROCEDURES *(Check One)*	
	Appendix I Procedures Followed; or
X	Equivalent Procedures Attached
18. WASTE DISPOSAL *(Check One)*	
	Appendix J Form Attached; or
X	Equivalent Information Attached
19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*	
X	Appendix K Procedures Followed; or
	Equivalent Procedures Attached
20. THERAPEUTIC USE OF SEALED SOURCES	
X	Detailed Information Attached; and
X	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
22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS	
X	Detailed Information Attached
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 or as determined
		TLD		necessary by the RSO
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	R. S. Landauer, Jr. & Co.	Monthly
		OTHER (Specify)		
c. WRIST	X	FILM	R. S. Landauer, Jr. & Co.	Monthly
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

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.

AUG 30 AM 8:02

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

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

(1) NAME *(Type or Print)*
for ANDREW MONTANC

(1) LICENSE FEE CATEGORY:

(2) TITLE
Hospital Director

(2) LICENSE FEE ENCLOSED: $

c. DATE
August 24, 1983

13905

NRC FORM 313M (9-81)

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 NRC Form 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.

INDIVIDUAL USERS

USERS:	GROUPS I, II, III, IV, AND V
W. Ross Adey, M.D.	^{99m}Tc, ^{45}Ca, ^{35}S, ^{3}H, ^{14}C; ^{140}La
David Baylink, M.D.	^{3}H, ^{14}C, ^{45}Ca, ^{47}Ca, ^{35}S, ^{125}I; ^{32}P for in vitro studies only
Tom R. Bennett, B.S., R.T.	^{99m}Tc, ^{14}C, ^{125}I, ^{45}Ca, ^{32}P, ^{35}S, ^{3}H, ^{140}La, ^{46}Sc, ^{141}Cer; ^{22}Na for in vitro studies
Anil Bharne, M.D.	All
John R. Farley, Ph.D.	^{14}C, ^{3}H, ^{125}I, ^{32}P, ^{45}Ca; ^{35}S for in vitro studies
Samuel Ing, M.D.	All
John Jennings, M.D.	^{3}H, ^{14}C, ^{35}S; ^{125}I for in vitro studies
Weldon Jolley, Ph.D.	^{14}C, ^{3}H; ^{125}I for in vitro studies
Gerald Kirk, M.D.	All
Josep G. Llaurado, M.D.	All
Lee A. Murphy, Ph.D.	^{3}H, ^{14}C, ^{35}S; ^{125}I for in vitro studies
Ved Prakash, M.D.	All
Eloy Schulz, M.D.	All
Harold Tinberg, Ph.D.	^{3}H, ^{125}I; ^{35}S for in vitro studies
David Mantik, M.D., Ph.D.	Therapy uses of Group VI 10 CFR 35.100
James M. Slater, M.D.	Therapy uses of Group VI 10 CFR 35.100
William J. Sparos, Jr., M.D.	Therapy uses of Group VI 10 CFR 35.100
Orval J. Swarm, M.D.	Therapy uses of Group VI 10 CFR 35.100

RADIOACTIVE MATERIAL

FORM	PURPOSE OF USE
	^{14}C
Any	Studies on transplantation immunology.
Glutamic acid	To measure brain uptake before, during, and following exposure to non-ionizing electromagnetic fields.
Inulin	To measure brain uptake before, during, and following exposure to non-ionizing electromagnetic fields.
Amino acids	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Sugar and sugar analogs	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Proline	To follow incorporation of proline into bone cells.
	^{45}Ca
$CaCl_2$	To examine efflux of metallic cations from cerebral tissue before, during, and following exposure to non-ionizing electromagnetic fields.
$CaCl_2$	Anesthetic effects on membranes with altered lipids.
$CaCl_2$	To label embroyonic bones.
$CaCl_2$	To establish an in vitro bone resorption-assay.
$CaCl_2$	To determine the effect of acid phosphatase on bone resorption.
$CaCl_2$	To determine uptake and release of cells in tissue culture.
	^{47}Ca
Oral solution	Determine calcium uptake in human bone cells.
	^{141}Ce
Inert 15 micron microspheres in physiological saline	Determine the source of nutrient blood flow in tumors.

RADIOACTIVE MATERIAL
(Continued)

FORM	PURPOSE OF USE
	^{51}Cr
Chromium chloride	Studies on transplantation immunology.
Chromium chloride	Characterization of cellular immune reactivity in human T-cell subpopulation.
Sodium chromate	To label lymphocytes or tumor cells.
	^{68}Ge
Cl	Chromatography
	^{3}H
Thymidine	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Proline	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Leucine	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Uridine	Test incorporation into macromolecules of cultured cells or tissue in vitro.
Adenosine	To measure endogenous biologically active parathyroid hormone.
N-Succinimidyl (2, 3-^{3}rl) proprionate	To label proteins with tritium.
2-deoxy-D-glucose	Determine osteoclast activity in ^{3}HDeoxyglucose uptake.
Naloxone	To bind opiate receptors in brain homogenates.
Thymidine	To determine the rate of DNA synthesis in chick calvarial cells.
Proline	To determine effects of bone acid phosphatase on bone formation
Thymidine	Studies on transplantation immunology.
Thymidine	Cellular immunity in URT and VAT cancers.

RADIOACTIVE MATERIAL
(Continued)

FORM	PURPOSE OF USE
	^{3}H
Proline	Resorption assay for bone in organ culture.
Proline	To test incorporation into cells in the presence and absence of mitrogens.
Thymidine	To test incorporation into cells in the presence and absence of mitrogens.
Thymidine	To follow incorporation of thymidine and proline into bone cells
Proline	To follow incorporation of thymidine and proline into bone cells.
Cholecalciferol	To study metabolism of cholecalciferol by cell cultures.
Amino acids	To determine level of protein synthesis.
Glutamic and GABA acid	To examine efflux of labeled amino acids from cerebral tissue before, during, and after exposure to non-ionizing electromagnetic fields.
Thymidine	Characterization of cellular immune reactivity.
Taurine	Measure brain uptake before, during, and after exposure to non-ionizing electromagnetic fields.
Proline	To label embryonic bones.
Thymidine	To estimate cell proliferation in monolayer culture for correlation with alkaline phosphatase activity in cells.
	^{123}I
Hexadecenoic acid	Quantitative myocardial imaging.
	^{125}I
NaI	To iodinate proteins for radioimmunoassay in determination of parathyroid hormone levels and characterization of protein isolated from adult human bones.
Tyrosin and albumin	Studies on transplantation immunology.

RADIOACTIVE MATERIAL
(Continued)

FORM	PURPOSE OF USE
	^{125}I
NaI	For radioimmunoassay, radioreceptor assay, and chromatography.
Labeled proteins	To assay receptors on cultured cells.
Labeled hormones	To assay receptors on cultured cells.
Uridine	For incorporation into cellular DNA.
NaI	To label tumor cells.
	^{131}I
Albumin, thyroxin, globulin	Studies on transplantation immunology.
	^{111}In
DTPA	Radioaerosol imaging.
	^{113m}In
Cl, DTPA, albumin	Cardiopulmonary investigations with radionuclides.
DTPA	Radioaerosol imaging.
	^{140}La
$LaCl_3$	To examine efflux of metallic cations from cerebral tissue before, during, and following exposure to non-ionizing electromagnetic fields.
	^{22}Na
NaCL	Effect of electromagnetic radionuclide on cell metabolism.
	^{95}NB
Inert microspheres in physiological saline	Determine the source of nutrient blood flow in tumors.

RADIOACTIVE MATERIAL
(Continued)

FORM	PURPOSE OF USE
	^{32}P
ATP	To examine physiological functions by acid phosphatase.
ATP	To measure endogenous biologically active parathyroid hormone.
ATP	Enzymatic phosphorylation of specific proteins.
Orthophosphate	To investigate activities in cells and extracts.
Orthophosporic acid	Treatment of tumors by vascular occlusion and Beta emitting radioisotope.
Nucleic acids	Studies on transplantation immunology.
	^{35}S
ATP	To determine level of protein synthesis.
Methionine	To label tumor cells.
$H_2{}^{35}SO_4$	Glycoprotein synthesis in cultured cells.
$H_2{}^{35}SO_4$	To test incorporation into macromolecules of cultured cells or tissue in vitro.
Methionine	Protein synthesis in cultured cells.
	^{46}SC
Inert 15 micron microspheres in physiological saline	Determine the source of nutrient blood flow in tumors.
	^{99m}Tc
HDP (oxidronate, sodium)	To determine bone uptake and retention in normal, Vitamin D deficient and calcium depleted-repleted rats.
Sulfur colloid	Control of gastric emptying in man.
DTPA	Radioaerosol imaging.
Sulfur colloid	Radioaerosol imaging.

RADIOACTIVE MATERIAL
(Continued)

FORM	PURPOSE OF USE
	^{127}Xe
Gas	Lung scanning agent.
	^{133}Xe
Liquid	Skin graft nutrient blood flow.

RADIONUCLIDES FOR ROUTINE HUMAN USE NOT LISTED
IN GROUPS I THROUGH VI AND FOR NONHUMAN USE

NO.	NUCLIDE	FORM	LIMIT
1.	^{46}Sc	Any	15mCi
2.	^{141}Ce	Any	15mCi
3.	^{35}S	Any	50mCi
4.	^{133}Xe	Any	1250 ~~500~~mCi
5.	^{127}X	Gas	500mCi
6.	^{123}I	Fatty Acid	200mCi
7.	^{99}Mo	$^{99m}Tc/^{99}Mo$ Generator	4000mCi
8.	^{99m}Tc	Any	4000mCi
9.	^{3}H	Any	500mCi
10.	^{14}C	Any	25mCi
11.	^{140}La	Any	1mCi
12.	^{125}I	Any	200mCi
13.	^{51}Cr	Any	20mCi
14.	^{32}P	Any	150 ~~75~~mCi
15.	^{47}Ca	Any	15mCi
16.	^{22}Na	Any	50mCi
17.	^{68}Ge	Any	20mCi
18.	^{153}Gd	Sealed Sources GL-1 Gulf Nuclear	2000mCi
19.	^{125}I	Norland Instrument Model # 178A591A	500mCi
20.	^{137}Ce	Needles/Tubes	1000mCi
21.	^{60}Co	Needles/Tubes	1000mCi
22.	^{198}Ag	Seeds	1000mCi
23.	^{192}Ir	Seeds in Ribbon	1000mCi
24.	^{226}Ra	Needles/Tubes	1000mCi
25.	^{222}Rn	Seeds	1000mCi
26.	^{90}Sr	Applicator	500mCi
27.	^{125}I	Seeds	1000mCi

Items 1-17 are to be used in medical research, diagnosis, and therapy in humans and tracer studies in animals.

Item # 18 is to be used in a bone mineral scanner.

Item # 19 is to be used in a bone mineral analyzer.

Items # 20-27 are to be used in medical research and therapy.

RADIATION SAFETY COMMITTEE MEMBERSHIP*

Josep G. Llaurado, M.D. — Chairman
Chief, Nuclear Medicine Service
Professor Radiology, Loma Linda University

Tom R. Bennett, B.S. — Alternate Chairman
Radiation Safety Officer

Anil Bharne, M.D. — Member
Assistant Chief, Nuclear Medicine Service

Vishvanath Date, M.D. — Member
ACOS/Ambulatory Care

Margaret Freeman, R.N. — Member
Critical Care Area Supervisor, Nursing Service

Albert E. Hirst, M.D. — Member
Chief, Laboratory Service
Professor Pathology, Loma Linda University

Gerald A. Kirk, M.D. — Member
Chief, Nuclear Medicine, Loma Linda University
Associate Professor Radiology, Loma Linda University

Irvin N. Kuhn, M.D. — Member
ACOS/Education
Associate Professor Medicine (Hematology and Oncology) Loma Linda University

Edwin Scheeline, A.A. — Member
Administrative Assistant to Chief of Staff

Beatriz Vasquez, Ph.D. — Member
Research Chemist, Research Service
Associate Research Professor, Department of Pharmacology, Loma Linda University

Florian W. Zielinski, Ph.D. — Member
Radiochemist/Radiopharmaceutical Scientist
Nuclear Medicine Service

*Unless otherwise indicated, appointment is with the Jerry L. Pettis Memorial Veterans' Hospital

#7 2-17-83

TRAINING AND EXPERIENCE OF
AUTHORIZED USERS

Authorized users will be named by the Radiation Safety Committee as specified by NRC Amendment #11, dated April 18, 1983, to our license.

RADIATION DETECTION INSTRUMENTS

DIAGNOSTIC INSTRUMENTS:

2 Scintillation Cameras, large field, GE Maxicamera II.

1 Norland Bone Mineral Analyzer.

1 Tomographic Scanner, Searle PhoCon.

1 Mobile Camera, Picker Dyna Mo.

1 Rectilinear Scanner, 5", Picker Magnascanner V.

1 Dual Probe Detector System, modular with 3" crystal detectors, Ortec.

1 Shielded Well Counting System, Ortec 4800 series.

1 Multichannel Analyzer, Tracor Northern TN-1706.

1 Gamma Automatic Counting System, Beckman Gamma 4000.

1 Thrombus Detector, Technical Associates FS-8M-SCAT.

1 Automatic Well Counter, Searle Model 1185.

1 Liquid Scintillation Counter, Searle Delta 3000.

CALIBRATION INSTRUMENTS (Clinical and Radiation Safety):

2 Dose Calibrators, Capintec CRC-10.

1 Dose Calibrator with Printer, Capintec CRC-20, used in patient dose area.

MONITORING AND SURVEY INSTRUMENTS (Clinic and Radiation Safety):

1 Ionization Chamber Detector (Cutie-Pie), Model 740F. Detection of alpha, beta, and gamma; window thickness under 500 ug/cm^2, dose range from 0-2.5 mr/hr to 250 R/hr.

1 Picker Model 655-186 GM Counter for low-level radiation detection.

2 Portable Monitors, Technical Associates PUG-1 series. Detection of beta and gamma, CPM ranges from 0 to 500-50,000. Assorted GM and gamma scintillation probes.

1 Liquid Scintillation Counter, Beckman LS-3150. Counting low-level, low-energy betas.

1 Multichannel Analyzer with Well, Tracor Northern TN-1706.

3 Room Monitors, Technical Associates SML-6 - 2AR, 0 to 500-50,000 cpm.

2 Room Monitors, Victoreen Vamp area monitors.

RADIATION DETECTION INSTRUMENTS
(Continued)

RESEARCH INSTRUMENTS:

1 Scintillation Camera, standard field, Searle.

3 Scintillation probes, 3" crystals, Technical Associates.

1 Scintillation probes, 2" crystals, Bicron.

3 Single Channel Spectrometers, ORTEC-550.

CALIBRATION OF INSTRUMENTS

1. DOSE CALIBRATORS:

   a. The CRC-20 used in assay of patient's doses is daily checked for constancy by a check with a known source of ^{57}Co, and a daily log is kept. Background radiation is checked before and after each constancy check and is also recorded.

   b. All calibrations are done in accordance with Appendix D, Sect. 2 of Reg. Guide 10.8, Rev. 1, Oct. 1980.

   c. The CRC-10s are constancy checked before each use.

2. SCINTILLATION PROBES, WELLS, AND SCANNERS:

   a. These are peaked with either ^{123}I, ^{125}I, or ^{57}Co before each use, depending on the isotope in question.

   b. A constancy check is done by comparison with past calibration readings.

3. SCINTILLATION CAMERAS:

   a. A daily flood field check with flood source of ^{57}Co with the collimator on along with a high resolution bar phantom is done. Logs are kept.

   b. Daily checks are made of pulse height analyzer peaking of radionuclides used.

4. TEST FOR GEOMETRICAL VARIATION:

   This was tested at installation using ^{99m}Tc October 26, 1978, and will be repeated should any instrument be changed following instructions as stated in Reg. Guide 10.8, Appendix D, Method of Calibration of Dose Calibrator.

5. INSTRUMENT ACCURACY:

   This is checked annually using Capintec Cr-486E set ^{57}Co, ^{137}Cs, ^{60}Co, ^{99m}Tc 10 mCi ± 1 as prescribed in RG 10.8.

6. LIQUID SCINTILLATION COUNTERS:

   These are calibrated against ^{14}C and ^{3}H standards and a set of quenching standards provided by manufacturers.

CALIBRATION OF SURVEY INSTRUMENTS

Check appropriate items.

X 1. Survey instruments will be calibrated at least annually and following repair.

X 2. Calibration will be performed at two points on each scale used for radiation protection purposes, i.e., at least up to 1 R/hr.

The two points will be approximately 1/3 and 2/3 of full scale. A survey instrument may be considered properly calibrated when the instrument readings are within ± 10 percent of the calculated or known values for each point checked. Readings within ± 20 percent are considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret readings to within ± 10 percent. Also, when higher scales are not checked or calibrated, an appropriate precautionary note will be posted on the instrument.

3. Survey instruments will be calibrated

_____ a. By the manufacturer

_____ b. At the licensee's facility

(1) Calibration source

Manufacturer's name _____
Model no. _____
Activity in millicuries _____
or
Exposure rate at a specified distance _____
Accuracy _____
Traceability to primary standard _____

_____ (2) The calibration procedures in Section I of Appendix D will be used
or
_____ (3) The step-by-step procedures, including radiation safety procedures, are attached.

X c. By a consultant or outside firm

(1) Name Certified Radiation Instruments

(2) Location 12926 Saticay North Hollywood, Ca. 91605

(3) Procedures and sources

_____ have been approved by NRC and are on file in License No. _____

X have been approved by an Agreement State; a copy of the Agreement State license, the procedures, and a description of the sources are attached, and the consultant's report will contain the information on

X the attached "Certificate of Instrument Calibration."
_____ the consultant's reporting form as attached.

_____ are described in the attachment, and the consultant's report will contain the information on

_____ the attached "Certificate of Instrument Calibration."
_____ the consultant's reporting form as attached.

CALIBRATION CERTIFICATE

To,

V. A. Loma Linda.

No: 9189

Date: 1-14-83

Instrument Model: VICT 740F Serial No: 2060

Range	Full Scale	Calib. at.	Exposure	Actual Reading	% Error	Exposure	Actual Reading	% Error	Source Used.
Rx1	25	15	5	5	±15	20	20	±15	Ram
Rx10	"	150	50	50	"	200	200	"	+ Co 6x
Rx100	"	1500	500	500	"	2,000	2,000	"	"
Rx1k	"	15,000	5,000	5,000	"	20,000	20,000	"	"
Rx10k									

Batteries:

Next Calibration Due:

All readings in mr/hr, including background of approximately 0.05 mr/hr.
Source used is traceable to National Bureau of Standards.

Comments:

The above instrument is calibrated by:

Certified Radiation Instruments Co

12926 SATICOY ST. UNIT # 5
NO. HOLLYWOOD, CA 91605
PHONE 765-3757

#10 p. 4 2-17-83

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY George Deukmejian, Governor

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
SACRAMENTO, CA 95814
(916) 445-0931

NOTICE OF RECEIPT OF APPLICATION FOR REVIEW

Certified Radiation Instruments Co.
Attn: Moe Naeem
12926 Saticoy St., Unit 5
N. Hollywood, CA 91605

Reference: Docket Number: 012083-2540

License Number: 1855

Application Dated: 01/17/83

The above captioned application has been docketed for review.

This application will be taken up in the order received. We are currently considering docket numbers received on: 11/18/82

Correspondence or other communication concerning the above referenced application should be submitted in duplicate and should make clear reference to your assigned docket number pertaining to this specific request. Future requests, not related to the above request, will be assigned a new docket number.

Thank you.

Radioactive Materials Licensing
Radiologic Health Branch

(d) For distribution of devices to persons generally licensed under Section 30192 (c).

(1) The applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling, proposed uses and conditions of use, and potential radiation hazards of each device to provide reasonable assurance that:

(A) the radioactive material contained in the device will not be lost;

(B) no individual will receive a radiation dose to the whole body or major portion thereof, head and trunk, lens of the eye, gonads, or active blood-forming organs in excess of 0.5 rem in a year under ordinary circumstances of use;

(C) the device can be safely operated by individuals not trained in radiation safety; and

(D) the radioactive material within the device would not be accessible to unauthorized individuals.

(2) The applicant submits a sample of the labels to be affixed to the device which include instructions and precautions for safe operation, and indicates the manner in which the labels will be affixed and their location on the device. Each such label shall bear the statement, "Removal of this label is prohibited".

(e) For use of sealed sources in non-medical radiography.

(1) The applicant demonstrates an adequate program for training radiographers and radiographers' assistants, specifying in detail:

(A) the nature and scope of initial training, on-the-job training, and refresher training;

(B) means of determining each individual radiographer's knowledge and understanding of and ability to comply with department regulations and license requirements, and the operating and emergency procedures of the applicant; and

(C) means of determining each individual radiographers' assistant's knowledge and understanding of and ability to comply with the operating and emergency procedures of the applicant.

(2) The applicant submits satisfactory operating and emergency procedures.

The applicant submits a description of its organizational structure pertinent to the radiography program, including specified delegations of authority and responsibility.

The applicant demonstrates an adequate system of controls to assure that radiographers and radiographers' assistants will comply with department regulations and license conditions and the applicant's operating and emergency procedures.

30196. Issuance of Specific Licenses. (a) Upon a determination that an application meets the requirements of Section 30194 and Section 30195, if applicable, the department will issue a specific license or amendment in such form and containing such conditions and limitations as are deemed necessary to effectuate the purposes of the Act and regulations thereunder.

(b) The department may incorporate in any license at any time, by appropriate regulation or order, such additional requirements and conditions with respect to licensed material as are deemed necessary in order to protect health, to minimize danger to life or property, or to prevent loss or theft of licensed material.

30197. Specific Terms and Conditions of Licenses. (a) Each license issued pursuant to this regulation shall be subject to all the provisions of the Act and to all regulations and orders of the department thereunder.

(b) No license or any right under a license shall be assigned or otherwise transferred unless approved in advance by the department in writing.

(c) Each licensee shall restrict his possession of licensed material to the locations and conditions of use authorized in the license.

History: 1. Amendment filed 11-16-67; effective thirtieth day thereafter (Register 67, No. 46).

30198. Expiration of Licenses. Each specific license issued by the department shall expire at the end of the day specified therein, except that, if an application for renewal has been filed in proper form with the department not less than 30 calendar days prior to the expiration date, the existing license shall not expire until the department has taken final action on the application for renewal.

30205. Modification, Revocation and Termination of Licenses. (a) All licenses shall be subject to modification, suspension, or revocation by regulations or orders issued by the department.

(b) Any license may be modified, suspended, or revoked by the department:

(1) for any material false statement in the application or in any required report;

(2) because of conditions revealed by any means which would warrant refusal to grant such a license on an original application; or

(3) for violation of any terms and conditions of the Act, of the license, or of any relevant regulation or order of the department.

(c) Prior to the institution of proceedings to modify, suspend, or revoke a license, facts or conduct which may warrant such action shall be called to the attention of the licensee in writing and the licensee shall be accorded reasonable opportunity to demonstrate or achieve

STATE OF [illegible]ORNIA
DEPARTMENT OF HEALTH

RADIOACTIVE MATERIAL LICENSE

Pursuant to the California Administrative Code, Title 17, Chapter 5, Subchapter 4, Group 2, Licensing of Radioactive Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, use, possess, transfer, or dispose of radioactive material listed below, and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Department of Health now or hereafter in effect and to any conditions specified in this license.

1. Licensee: Certified Radiation Instruments Co.	3. License no. 1855-70 is hereby amended in its entirety. Amendment no.
2. Address: 12926 Saticoy Street, Unit # 5 North Hollywood, CA 91605	4. Expiration date: February 14, 1983
Attention: Moe Naeem Radiation Safety Officer	5. Inspection agency: Los Angeles County Dept. of Health Services

6. Nuclide	7. Form	8. Possession limit
A. Plutonium 239	A. Eberline Instrument Corporation sources Model S9-4	A. Total not to exceed 0.6 microcuries.
B. Radium 226	B. Sealed sources	B. 4 sources not to exceed 25 milligrams each.
C. Cobalt 60	C. Sealed source (U.S. Nuclear Model 338)	C. 1 source not to exceed 1 curie.

9. Authorized use

A. - C. To be used for calibration of instruments as a customer service.

10. Radioactive material may be used only at the licensee's facilities at 12610 Raymer St., Van Nuys, California except as follows:

(a) Radioactive material described in Subitem A of this license may also be used at the licensee's facilities at 12926 Saticoy Street Unit #5, North Hollywood, California.

11. This license is subject to an annual fee of one hundred thirty (130) dollars due and payable on the anniversary of the date of issue of this license, February 14, 1969.

12. Radioactive material may be used by individuals as follows:

(a) Radioactive material described in Subitem A of this license may be used only by, or under the supervision of, Moe Naeem.

(b) Radioactive material described in Subitems B and C of this license may be used only by, or under the supervision and in the physical presence of, Moe Naeem.

(cont'd)

7cc 7/10/76

RADIOACTIVE MATERIAL LICENSE

13. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7 and 8 of this license in accordance with statements, representations and procedures contained in the following documents:

    (a) application dated January 14, 1976 signed by Moe Naeem and attachment thereto.

14. The radiation safety officer in this program shall be Moe Naeem.

15. The licensee shall comply with "California Radiation Control Regulations".

16. The licensee is authorized to calibrate radiation detection instruments as a customer service. Each calibration of a radiation detection instrument shall include not less than two points other than zero for each scale of the instrument certified as calibrated by the licensee.

17. In connection with tests for leakage, and/or contamination for sources possessed under this license, and as a customer service, the licensee is authorized to perform the following services:

    (a) Collection of wipe test samples from sealed sources and devices containing sealed sources.

    (b) Furnishing leak test kits Model LTC-1 for sealed sources and devices containing sealed sources to customers authorized to use such leak test kits.

    (c) Analysis of materials collected by the licensee as stated in (a) above and materials returned by customers from leak test kits listed in (b) above for amount of radioactivity. Reports to customers of analyses shall be in microcuries.

    (d) This authorization does not apply to any sealed source which: (1) contains Radium 226: and (2) also is used for medical purposes.

For the State Department of Health

Date June 28, 1976

by D. T. Pickler III

Radiologic Health Section
744 P Street, Sacramento, CA 95814

RH 2551 (12/74)

Certified Radiation Instruments Co.
14129 A. VANOWEN ST.
VAN NUYS, CALIFORNIA 91405
~~PHONE (213) 983-5038~~
765.3757

RADIATION SAFETY PROCEDURE

INSTRUMENT CALIBRATION

This procedure covers the radiation safety procedures to be followed during use of the Ra-226 and Co-60 sources for calibrating instruments.

1. Film badges and pocket dosimeters shall be worn at all times. Dosimeter results shall be recorded every day sources are used.

2. Place the instfument on the table in the proper position before removing the shielding plug from the storage container. For instruments having probes, the instrument case should be positioned outside the radiation beam so that adjusments may be made without exposure to the beam.

3. Remove the shielding plug carefully to minimize hand exposure.

4. Instruments may be raised and lowered using the hand crank, and absorbers may be inserted or retracted without installing the shielding plug, taking care to remain outside the radiation beam.

5. During use of the Co-60 source, all calibrations (adjustments to pots) shall be made with the shielding plug in place in the container, unless the equipment has a remote probe so that adjustments can be made away from the radiation beam.

6. During use of the Ra-226 source, if it is necessary to make adjustments with hands only in the beam, this may be done if the radiation levels do not exceed 25 mR/hr. Otherwise, adjustments should be made after inserting the sh ielding plug in the container.

7. At the conclusion of operations, insure that shielding plugs are in place, containers are properly locked, and by means of a survey, that radiation levels are as they were at the start of operations.

FACILITIES AND EQUIPMENT

The following paragraphs list specific rooms in this facility in which isotope work is conducted with isotope storage locations and major equipment noted.

1B-43 Radioactive material receiving room and waste storage room. Equipment includes one refrigerator, one freezer, a chemical fume hood, 1" lead L-Block, remote handling instruments, lead aprons, and lead-lined storage cabinet.

1B-49 ^{45}Ca and ^{125}I isotopes used in radioisotope hood.

2C-24 ^{125}I and ^{35}S isotopes are stored in the refrigerator and freezer in their original shipping containers. Major equipment in this room includes automatic cell harvestor, vacuum pump, temperature control bath and circulator, and duovac oven. This lab also has a chemical fume hood, ultra centrifuge, work benches, refrigerator, freezer, CO_2 incubator, and PH meter.

2C-25 ^{3}H and ^{45}Ca isotopes are stored in this room in the refrigerator. This lab has a radioactive cell harvestor, microwave generator, refrigerator, spectro Ph, incubator oven, PH meter, chemical fume hood, shaker bath, automatic chromatopac chromatograph, and two temperature control water baths.

3C-06 This is a multi-user counting room. ^{3}H and ^{14}C isotopes are stored in the freezer. Major equipment includes an infrared spectrophotometer ultra low freezer, freeze drier, immunodiffusion camera, two liquid scintillation counters, infusion pump, cell harvestor, gamma counter, spectrophotometer, and an auto titer.

3C-07 There is no storage in this room. There is a chemical fume hood, laminar flow hood, incubation oven, and two microscopes.

3C-09 ^{125}I isotopes are stored in the refrigerator. There is a germ-free bio flow chamber, PH meter, centrifuge, steam sterilizer, chemical fume hood, glucose analyzer, microscope, duovac oven, and an incubator oven.

3C-26 ^{3}H isotope is stored in freezer. There are two refrigerators with freezer, two gas chromatograph systems, laminar flow hood, chemical fume hood, air driven ultra centrifuge, two incubation ovens, and a centrifuge.

4C-02 (Rooms 3C-02 through 4C-07 are research labs.) ^{125}I and ^{45}Ca are stored in this room. There is a fume hood, gamma counter, and isotopes are stored in the labeled refrigerator and freezer.

4C-03 ^{3}H is used in this room. There is a vacuum wash system for treated cells, and waste vials and liquid waste are accumulated here in appropriate containers for pick-up.

4C-04 ^{3}H and ^{45}Ca isotopes are used here. Scintillation fluid is added to vials in fume hood; there is a scintillation counter and a freezer for storage.

FACILITIES AND EQUIPMENT
(Continued)

4C-05 ^{3}H isotopes are stored here. Equipment includes refrigerator for storage and an isotope work bench.

4C-07 ^{45}Ca and ^{3}H isotopes are stored in labeled refrigerator. Fume hood work area and two laminar flow hoods.

4C-22 No storage in this room. Equipment includes Searle gamma camera, digital voltmeter, two 3x2 image sodium iodide crystal probes, lead-lined storage cabinet, lead-lined refrigerator, respirator pump, Picker survey meter, mini computer, multi-channel analyzer (well counter), annealing oven, TLD reader, infusion pump respirometer, dose calibrator, three electronic nebulizers, centrifuge, 20x20x20 inch Pb storage area, radioisotope fume hood, area monitor with alarm, vacuum pump, flammable liquid storage area, liquid scintillation counter, and an automated gamma counter. Isotopes that are used in this room, but are not stored here, include: ^{67}Ga, ^{201}Tl, ^{99m}Tc, ^{131}I, ^{57}Co, ^{127}Xe, ^{133}Xe, and ^{111}In.

4C-25 Major equipment in this room includes a chemical fume hood, laminar flow hood, two centrifuges, two microscopes, temperature control water bath, incubation oven, refrigerator, PH meter; spectrophotometer.

4C-28 ^{3}H and ^{51}Cr isotopes are stored in freezer. Major equipment includes freezer, incubation oven, liquid scintillation counter, radio cell harvestor, temperature control water bath, scanning lensitometer, centrifuge, two freezers, chemical fume hood, microscope, PH meter, and a vacuum pump.

4E-28 Nuclear Medicine ^{133}Xe and aerosol room. Major equipment includes a 800 cfm radioisotope hood; G.E. Maxi II Scintillator Camera. This room is under negative pressure.

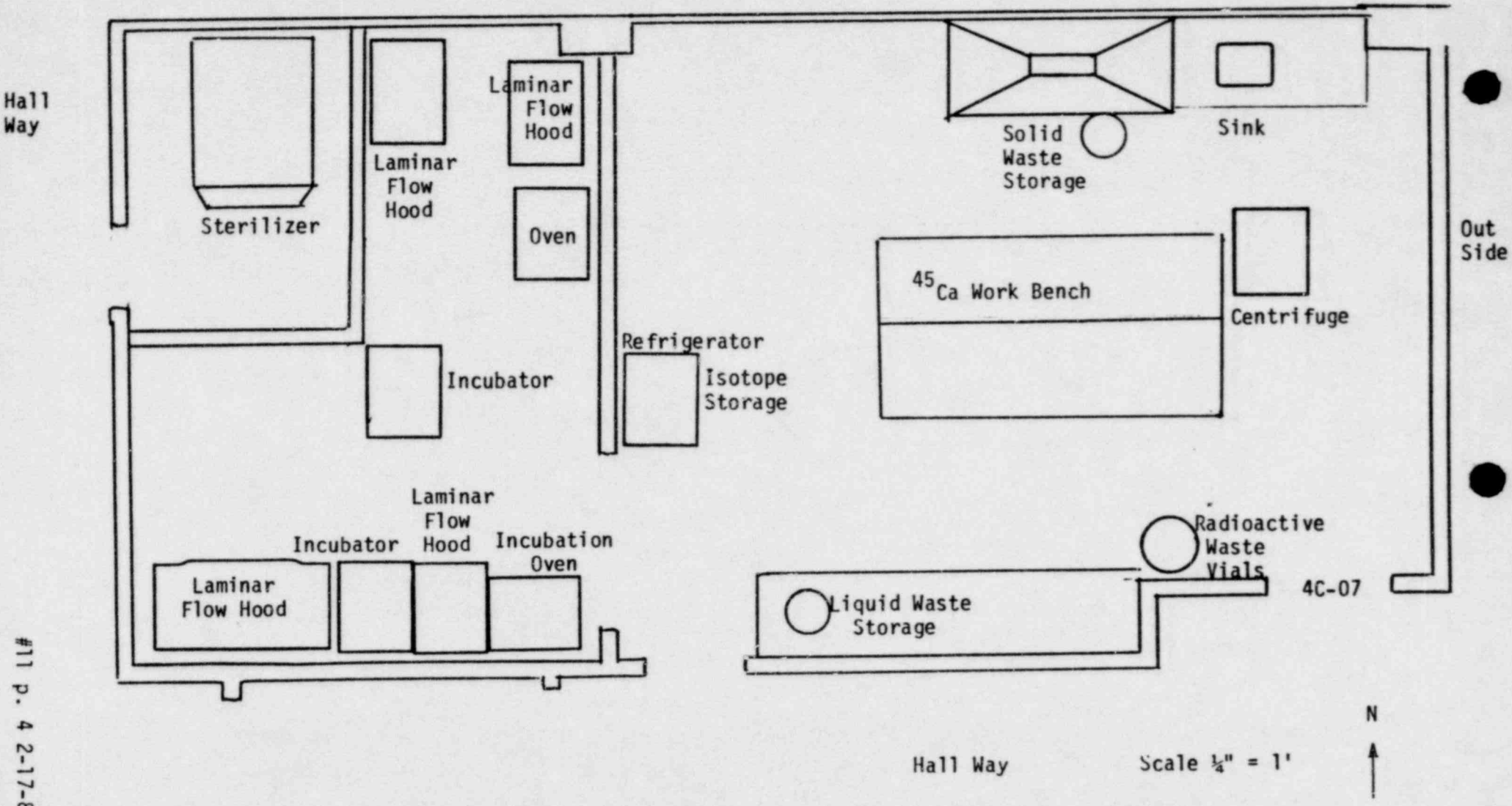
4E-29 Radioisotope Chemistry Lab. Major equipment includes 1" lead block, PH meter, drying oven, freeze dryer, laminar flow hood, multi-channel analyzer, and G.M. type area monitor.

4E-37 Radioisotope Preparation Room. Radioactive materials for human use are stored and prepared in this room. Major equipment includes a 800 cfm radioisotope hood, a 1" lead L Block, several lead storage containers, two lead brick storage enclosures, a CRC-20 dose calibrator; a refrigerator for the storage of isotopes and kits.

Nuclear Medicine clinic

Scale 1"= 15'

Dr. Adey/Dr. Baylink
^{3}H, ^{45}Ca



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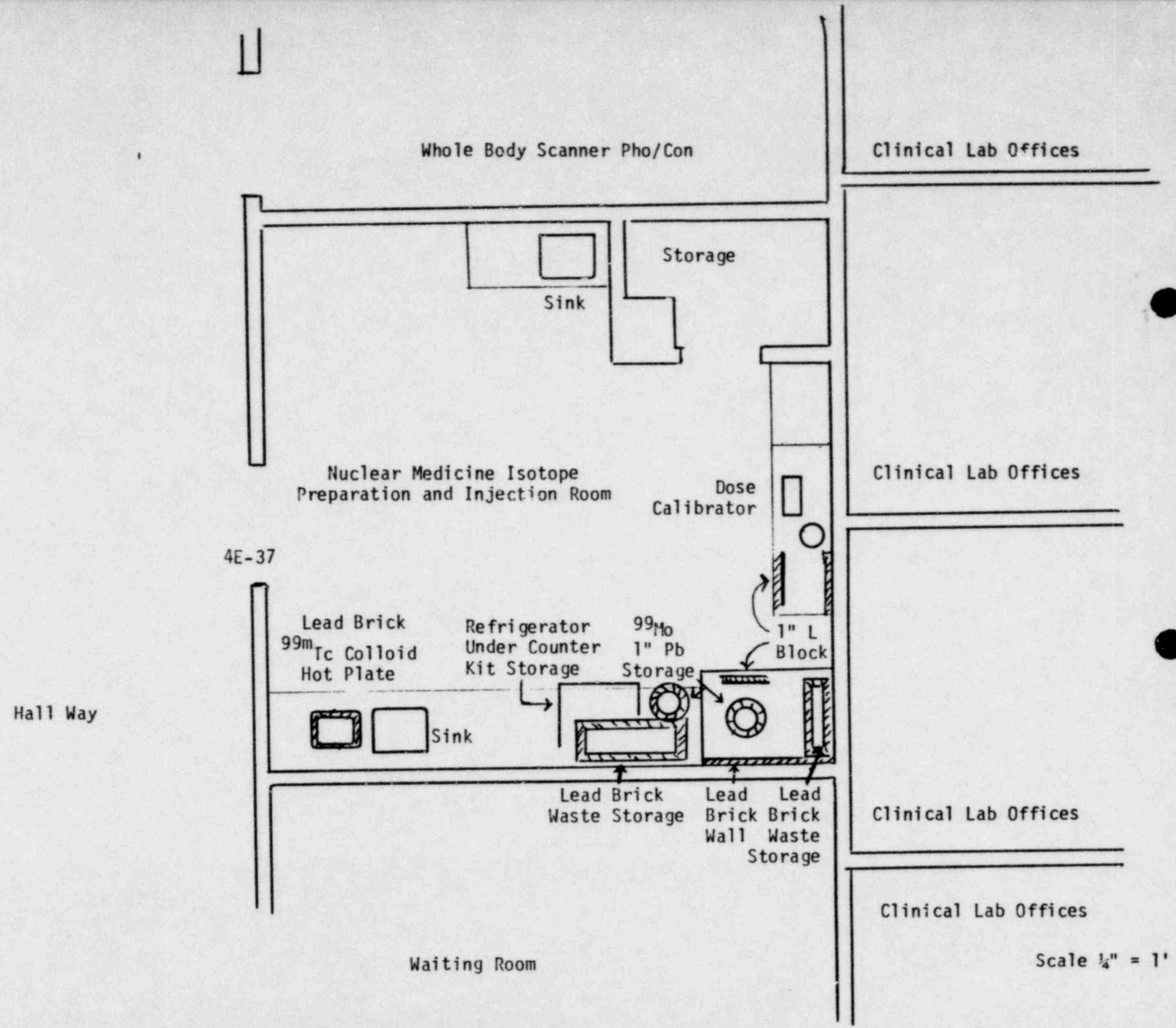
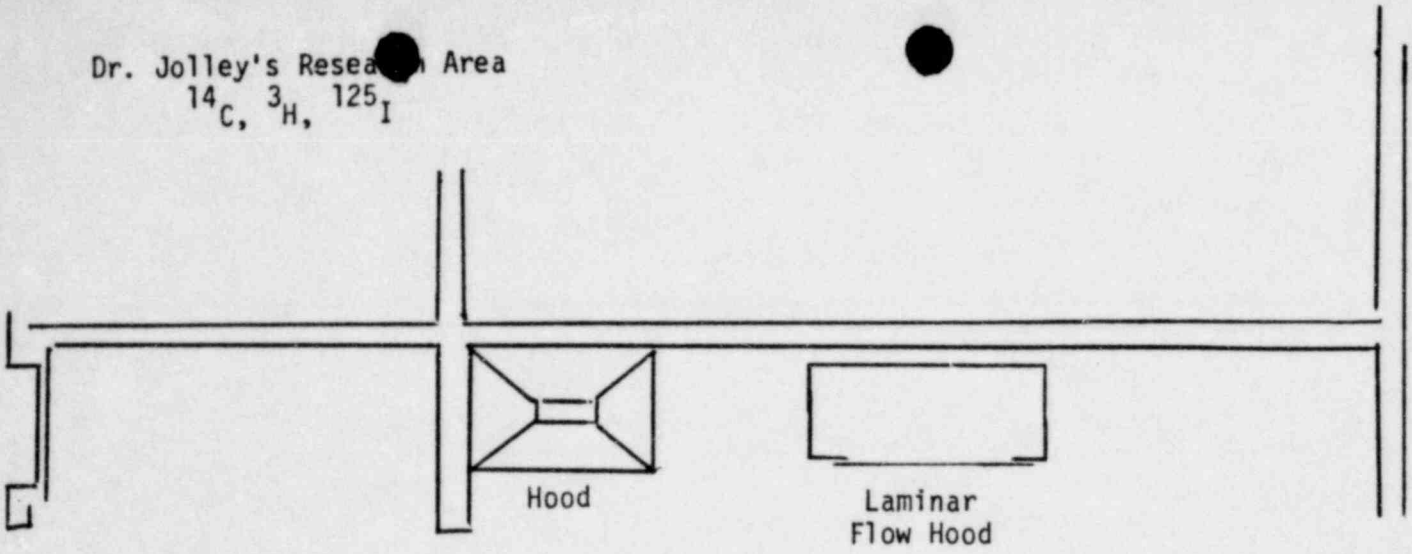
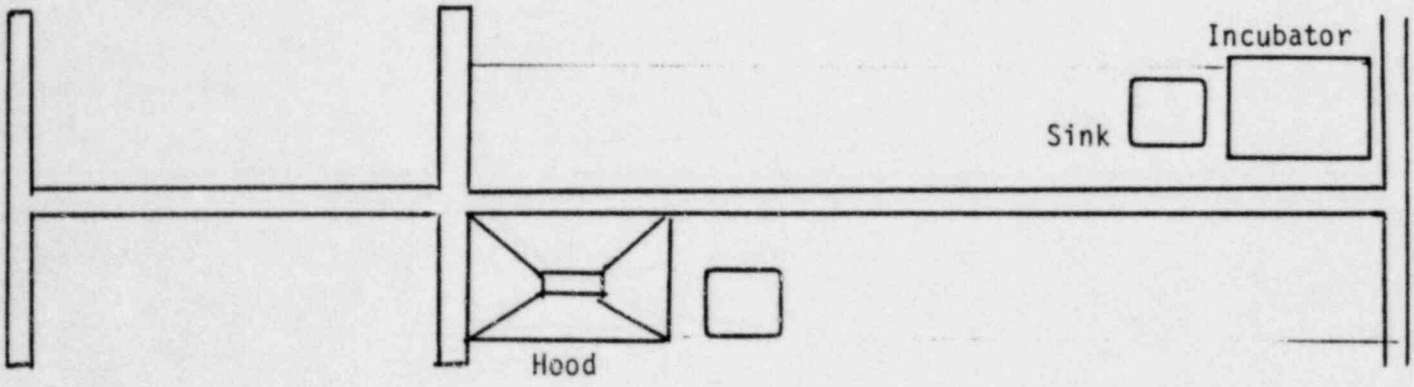

Whole Body Scanner Pho/Con
Clinical Lab Offices
Storage
Sink
Nuclear Medicine Isotope
Preparation and Injection Room
Dose
Calibrator
Clinical Lab Offices
4E-37
Lead Brick
99mTc Colloid
Hot Plate
Refrigerator
Under Counter
Kit Storage
99Mo
1" Pb
Storage
1" L
Block
Hall Way
Sink
Lead Brick
Waste Storage
Lead
Brick
Wall
Lead
Brick
Waste
Storage
Clinical Lab Offices
Clinical Lab Offices
Waiting Room
Scale ¼" = 1'

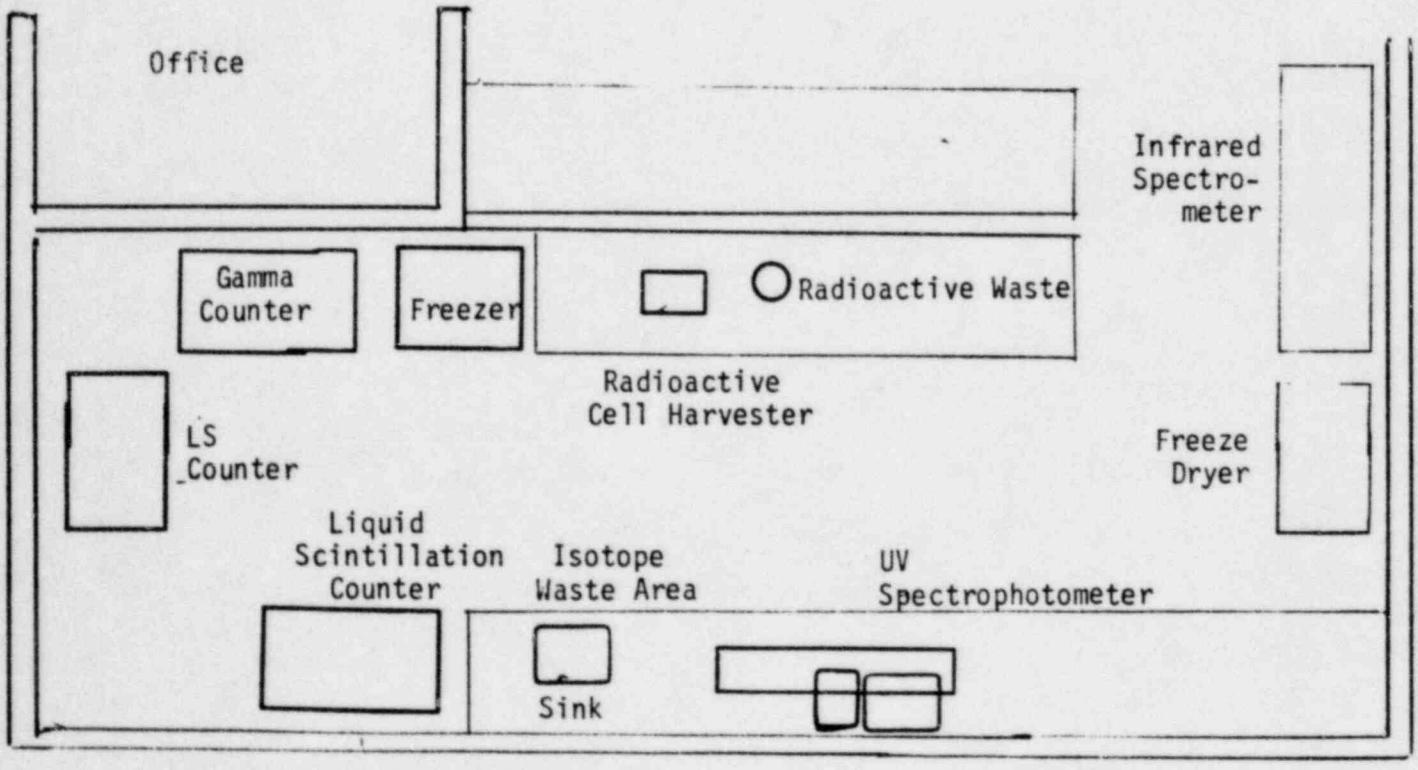
Dr. Jolley's Research Area
^{14}C, ^{3}H, ^{125}I



3C-07



3C-06

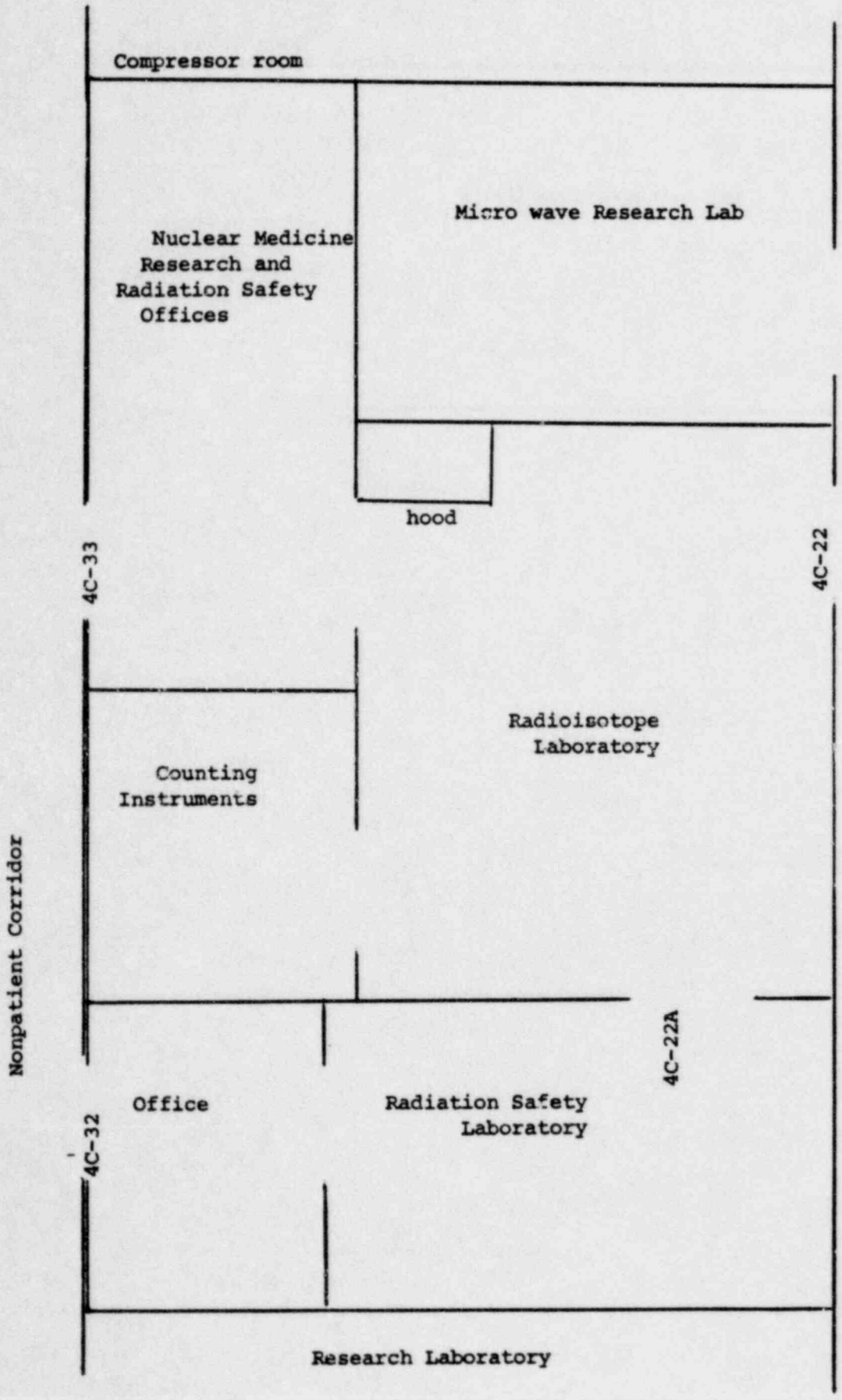


Scale ¼" = 1'

N

#11 p. 6 2-17-83

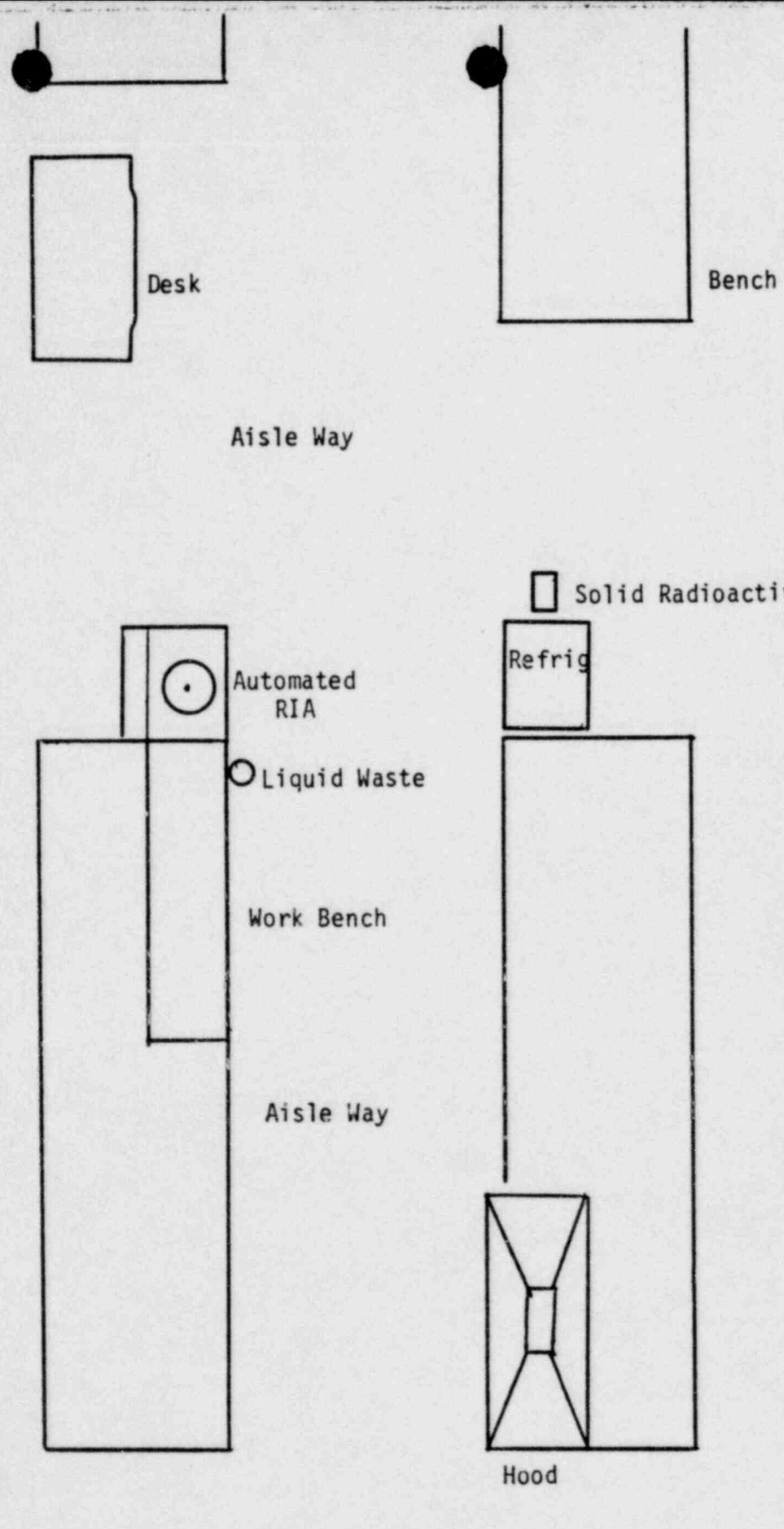
Nuclear Medicine Radioisotope Research Laboratories



Scale: 1"= 5'

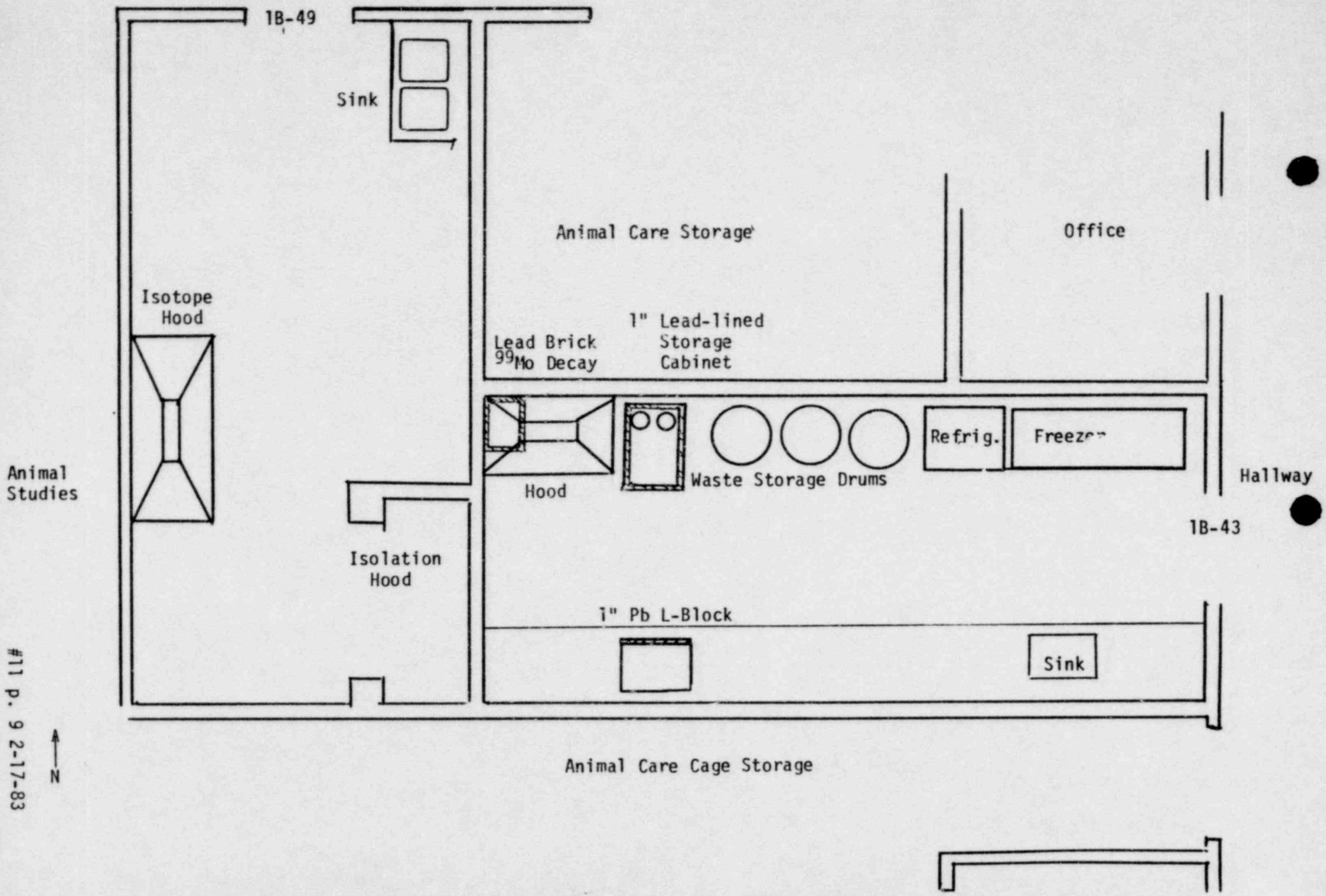
#11 p. 7 2-17-83

Details of Room 4F-19 Clinical Lab Chemistry. This area is used for RIA procedures and is equipped with an automated RIA unit. Surveys are done monthly by Lab personnel.

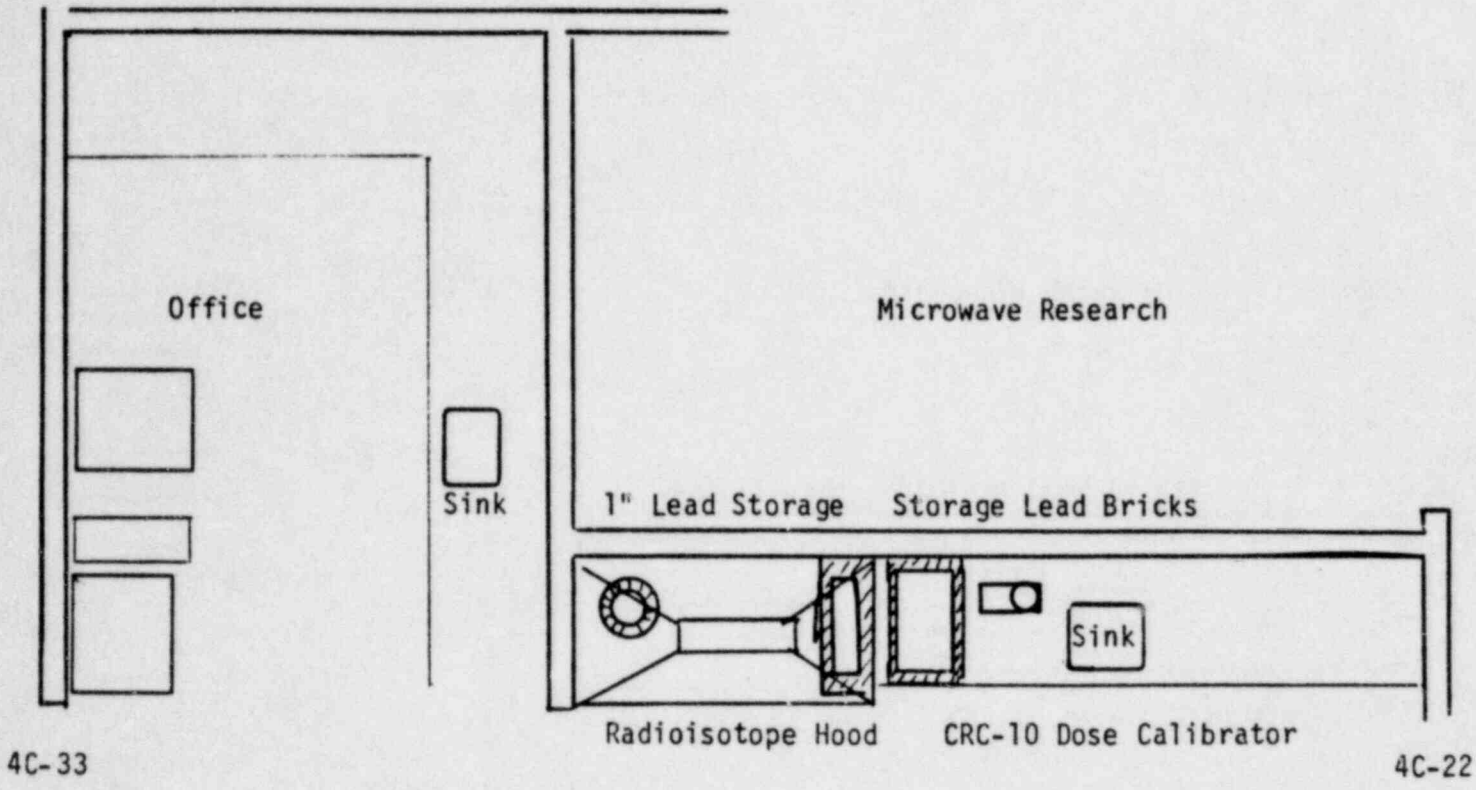


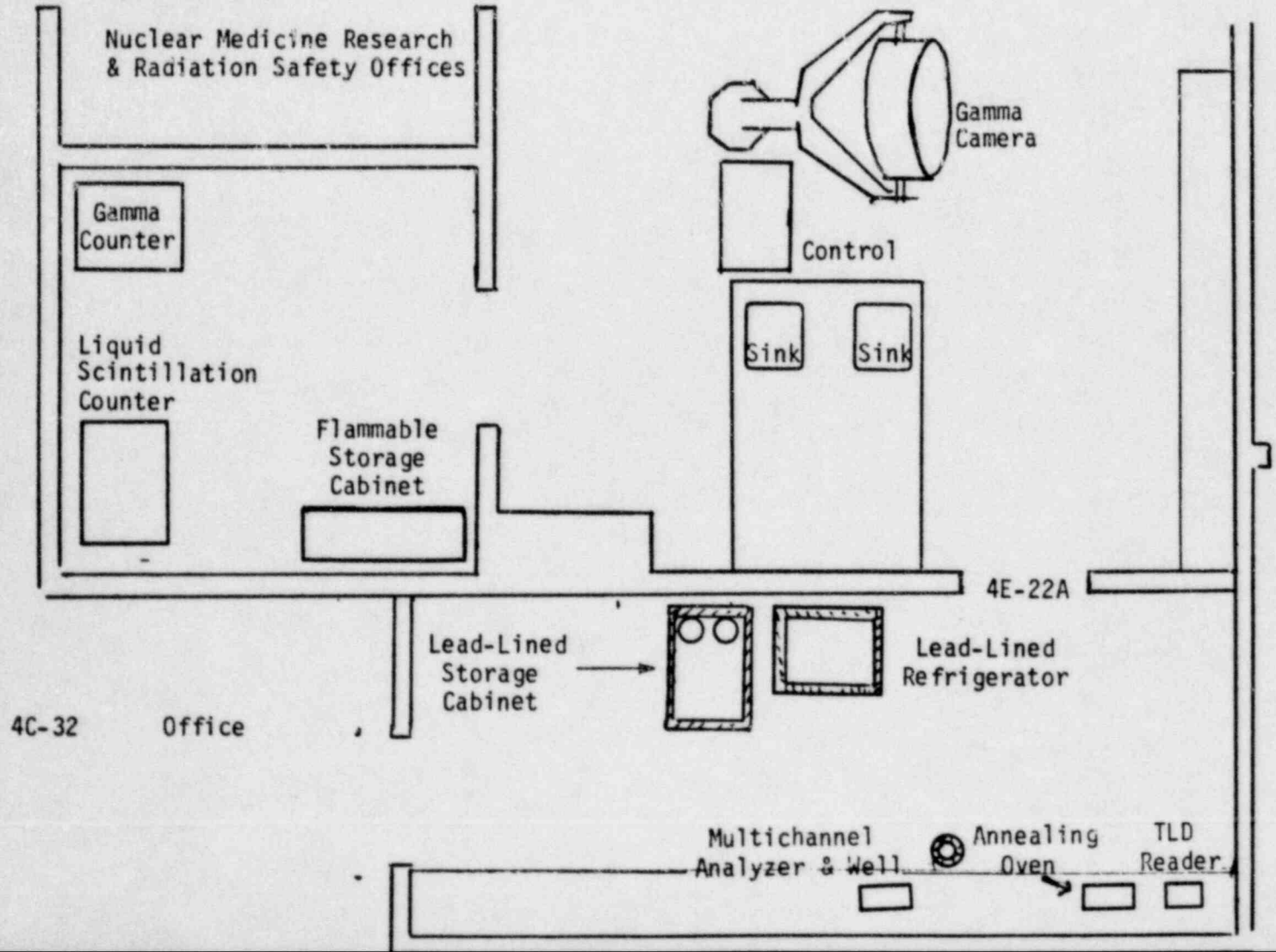
Scale ¼" = 1'

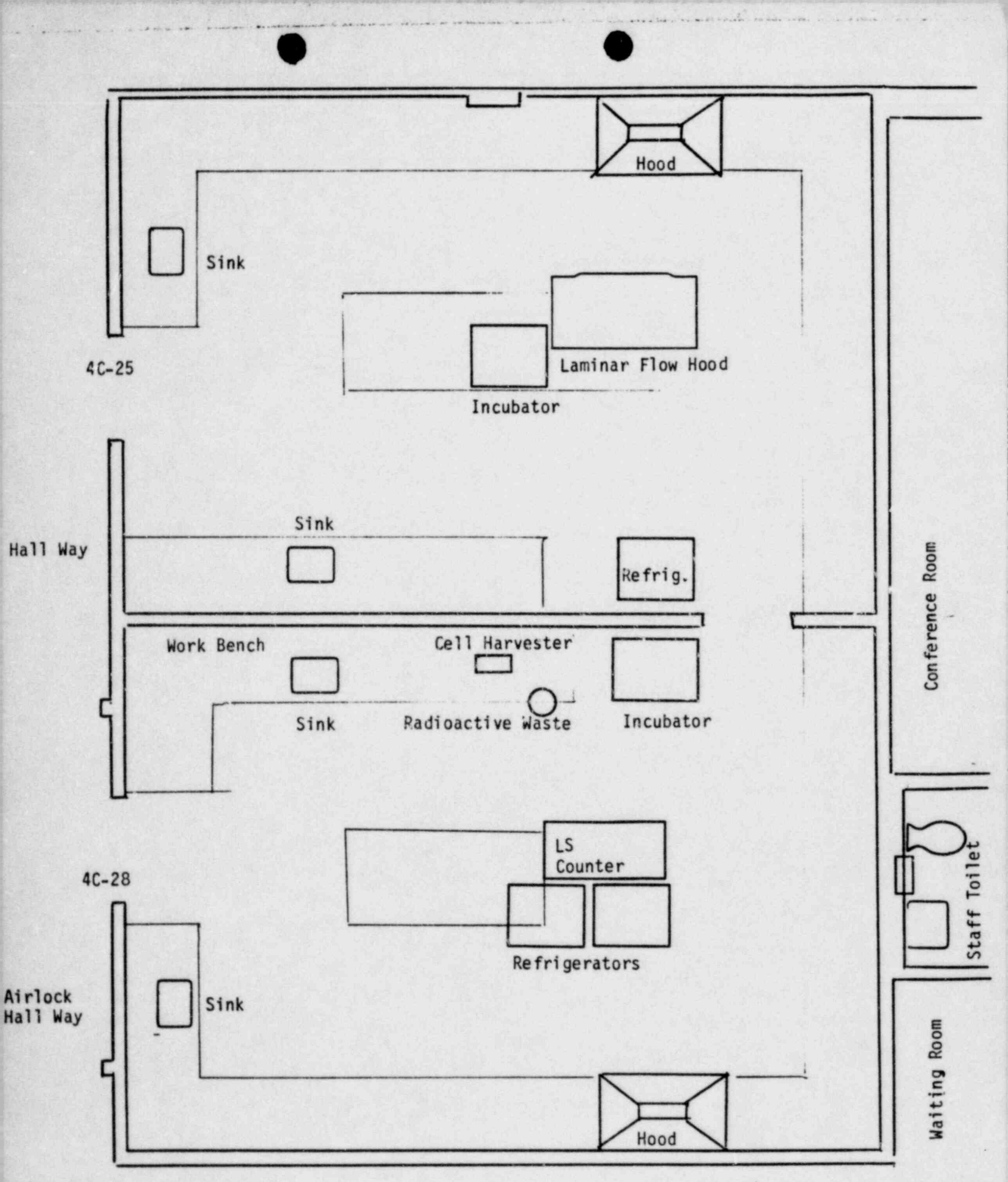
Scale ¼" = 1'

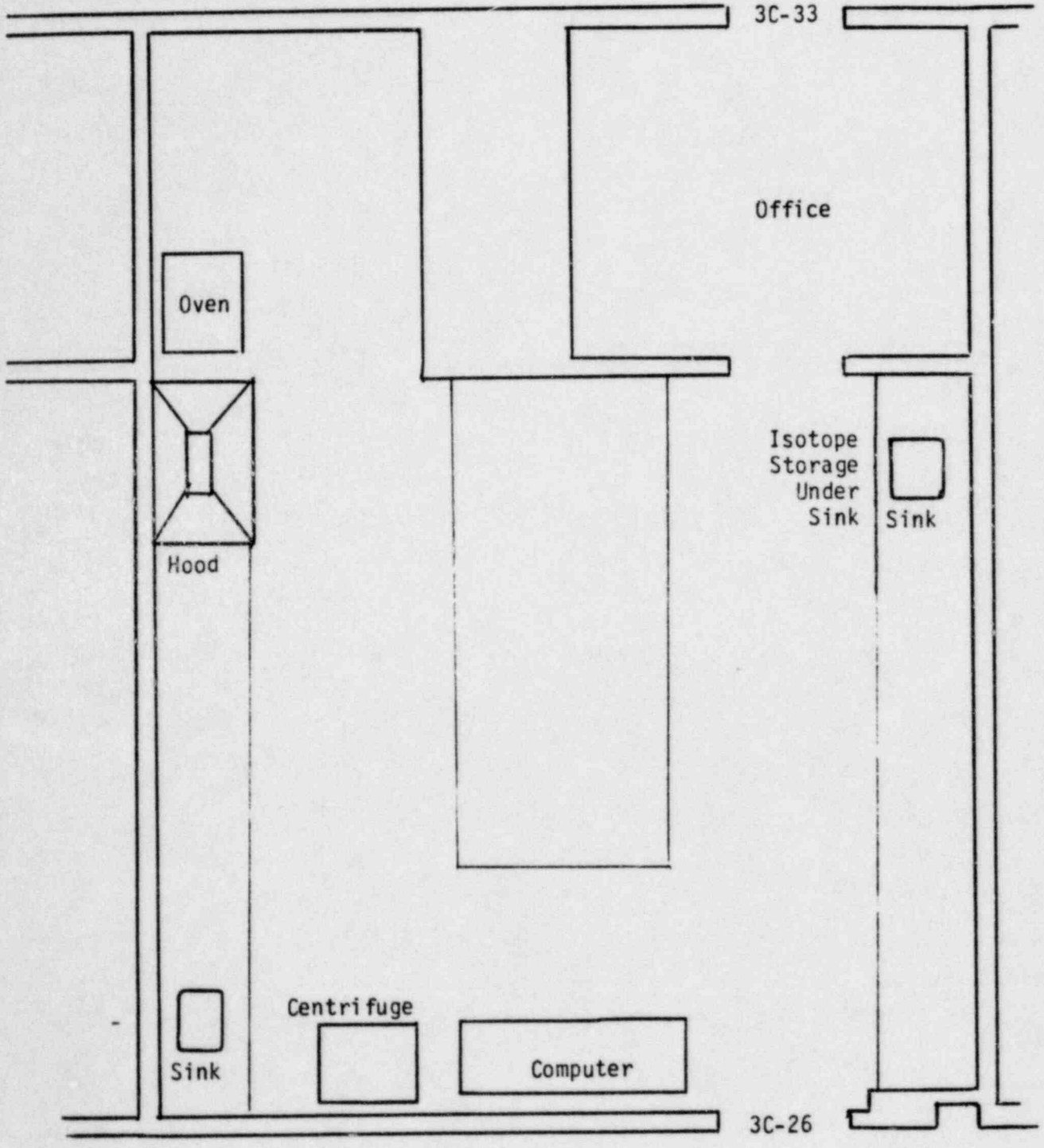


#11 p. 9 2-17-83


Office
Microwave Research
Sink
1" Lead Storage
Storage Lead Bricks
Sink
Radioisotope Hood
CRC-10 Dose Calibrator
4C-33
4C-22


Nuclear Medicine Research
& Radiation Safety Offices
Gamma
Camera
Gamma
Counter
Control
Sink
Sink
Liquid
Scintillation
Counter
Flammable
Storage
Cabinet
4E-22A
Lead-Lined
Storage
Cabinet
Lead-Lined
Refrigerator
4C-32
Office
Multichannel
Analyzer & Well
Annealing
Oven
TLD
Reader


Hood
Sink
4C-25
Laminar Flow Hood
Incubator
Hall Way
Sink
Refrig.
Work Bench
Cell Harvester
Sink
Radioactive Waste
Incubator
Conference Room
LS
Counter
4C-28
Refrigerators
Staff Toilet
Airlock
Hall Way
Sink
Hood
Waiting Room
Dr. Adey/Dr. Camacho
^{3}H
Hall Way
Scale ¼" = 1'
N
#11 p. 11 2-17-83



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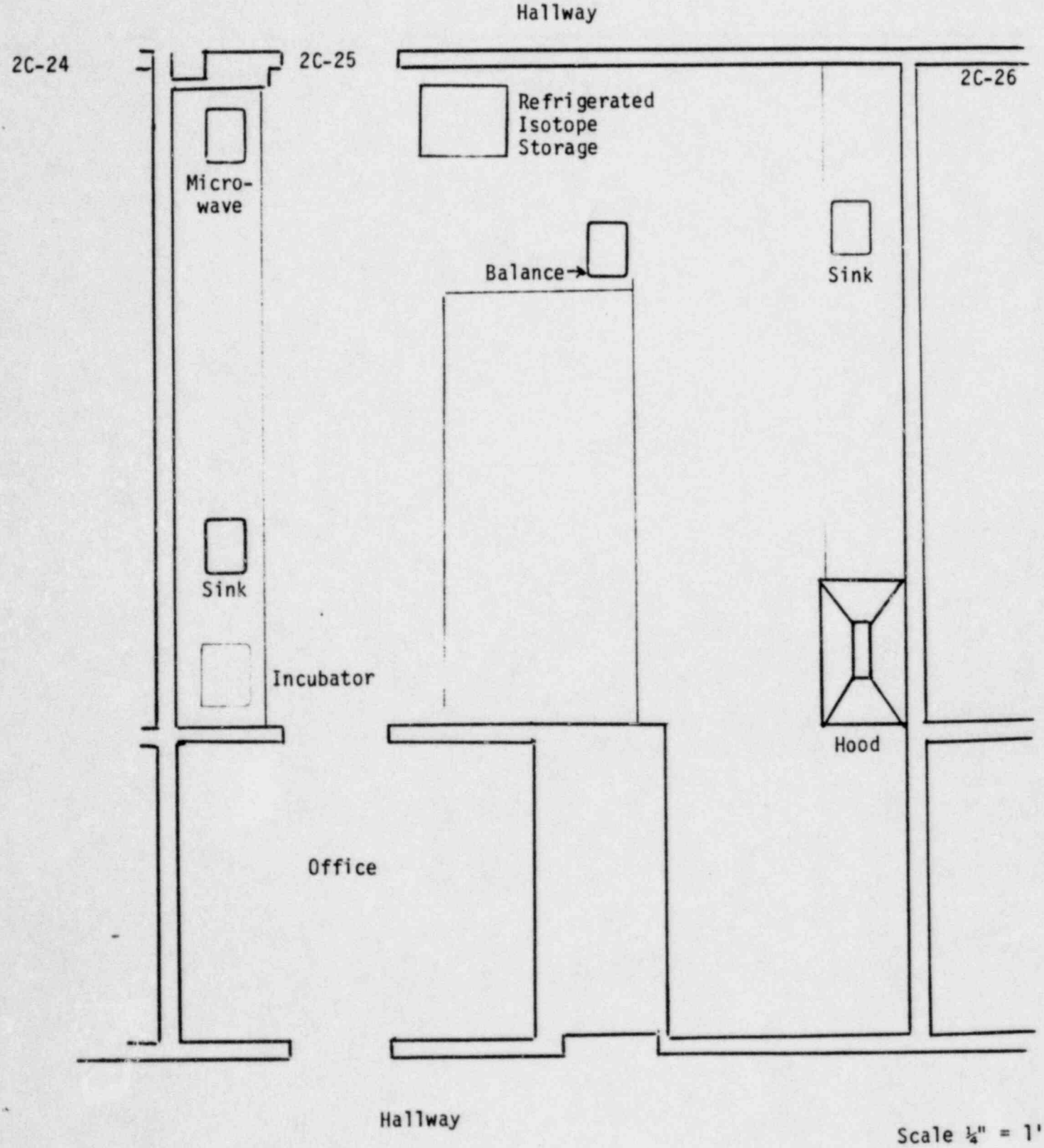
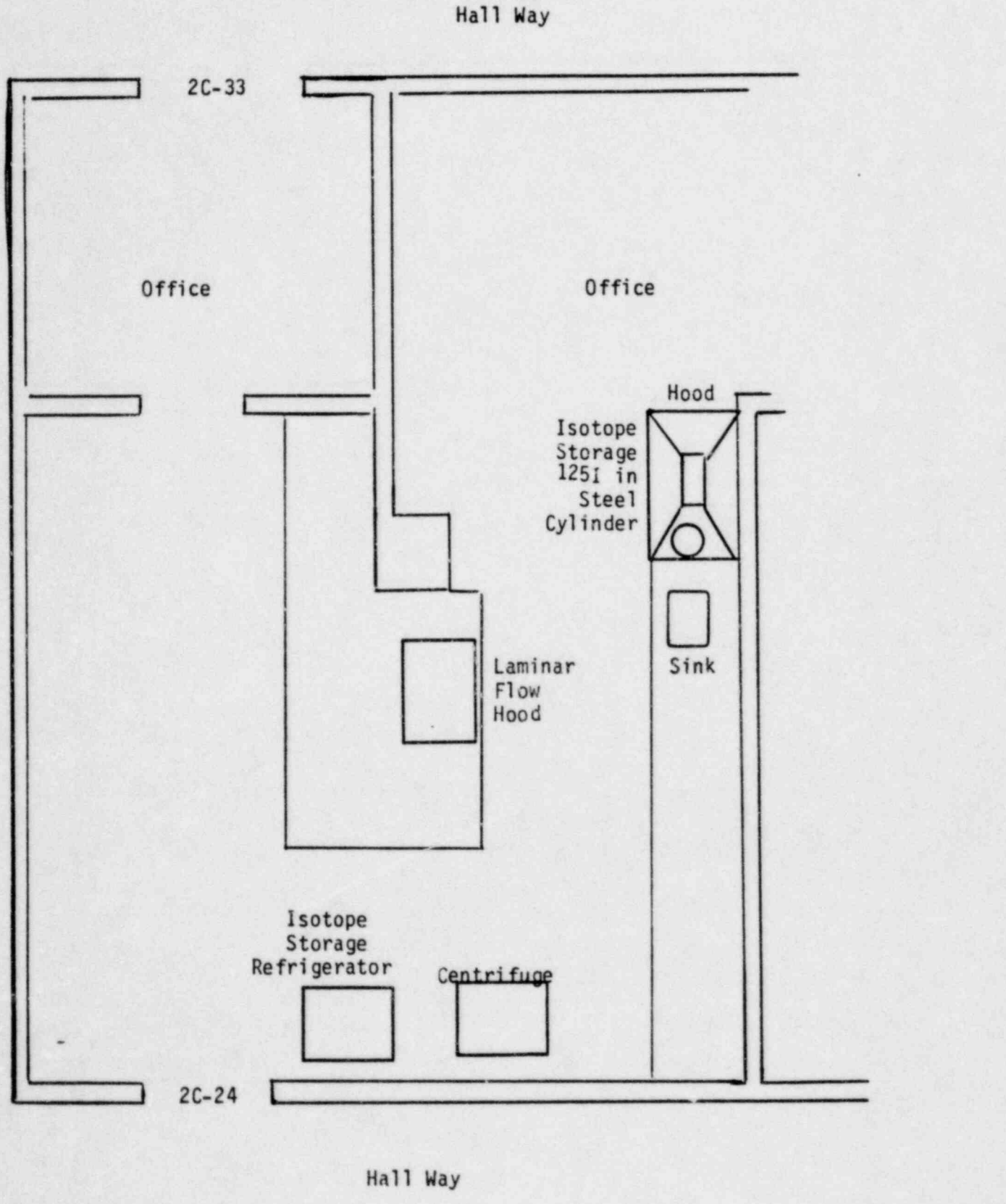
Dr. Adey's Research Area
using ^{45}Ca, ^{3}H



Scale ¼" = 1'

Dr. Adey/Stein Research
Area ^{125}I, ^{35}S



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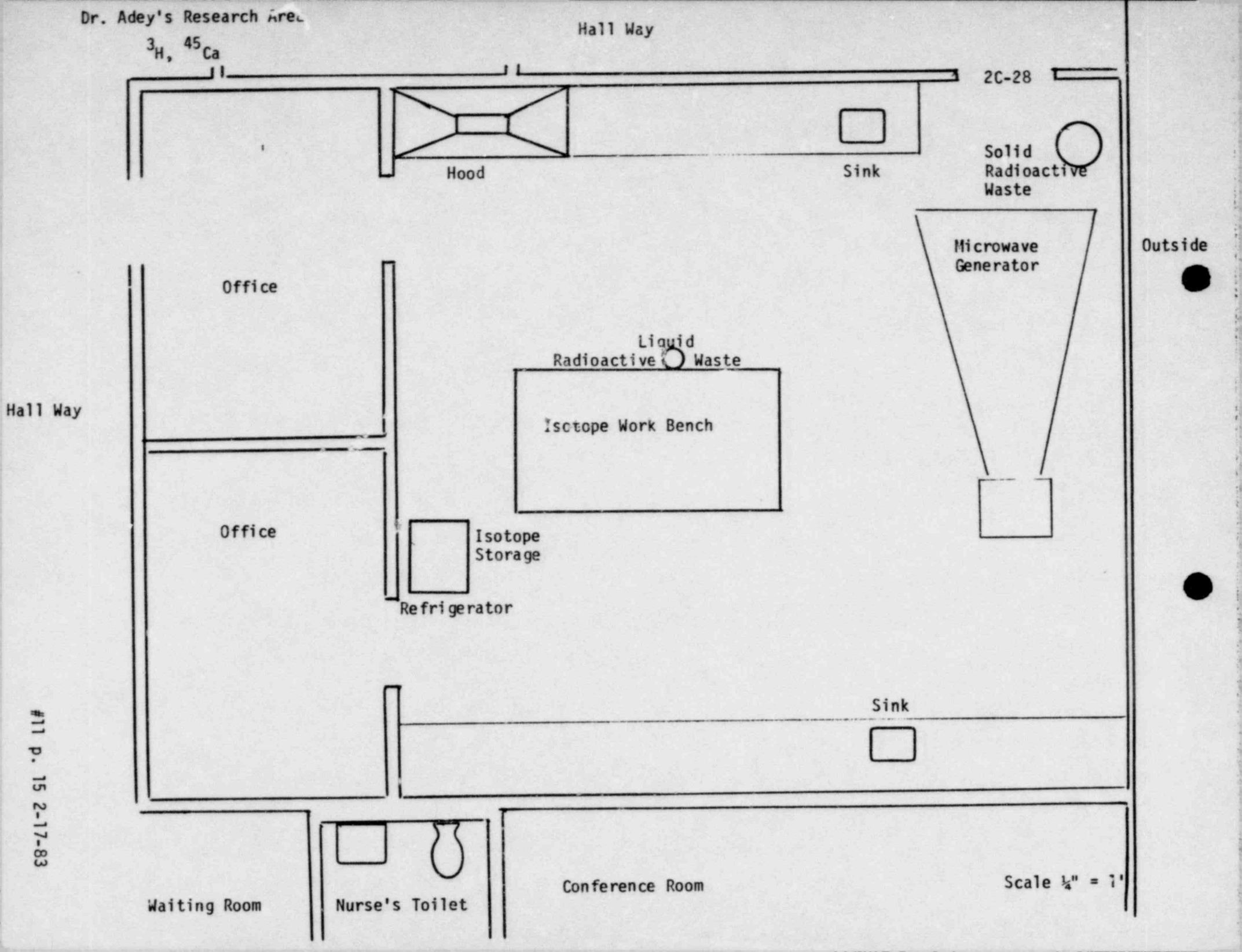
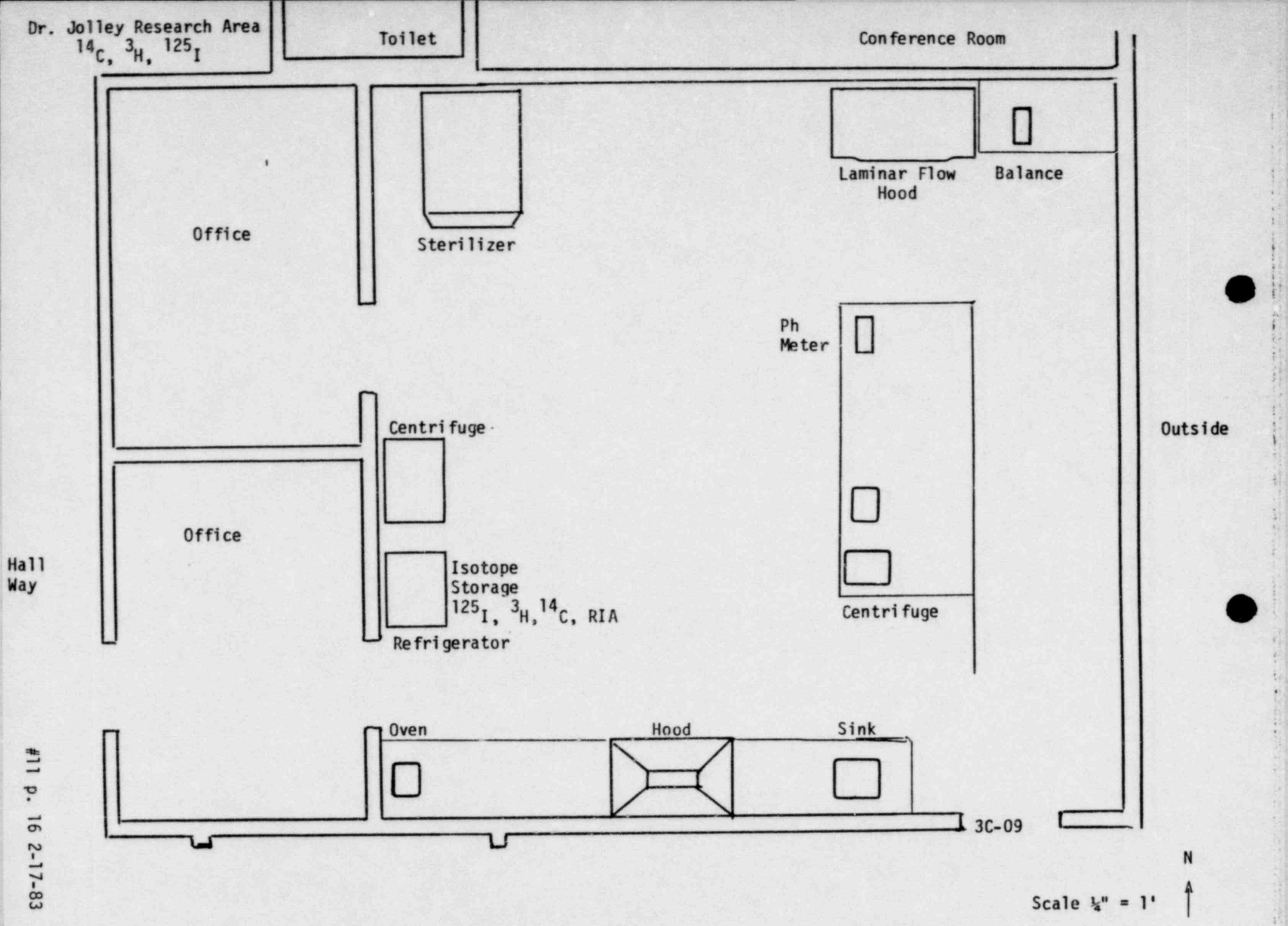
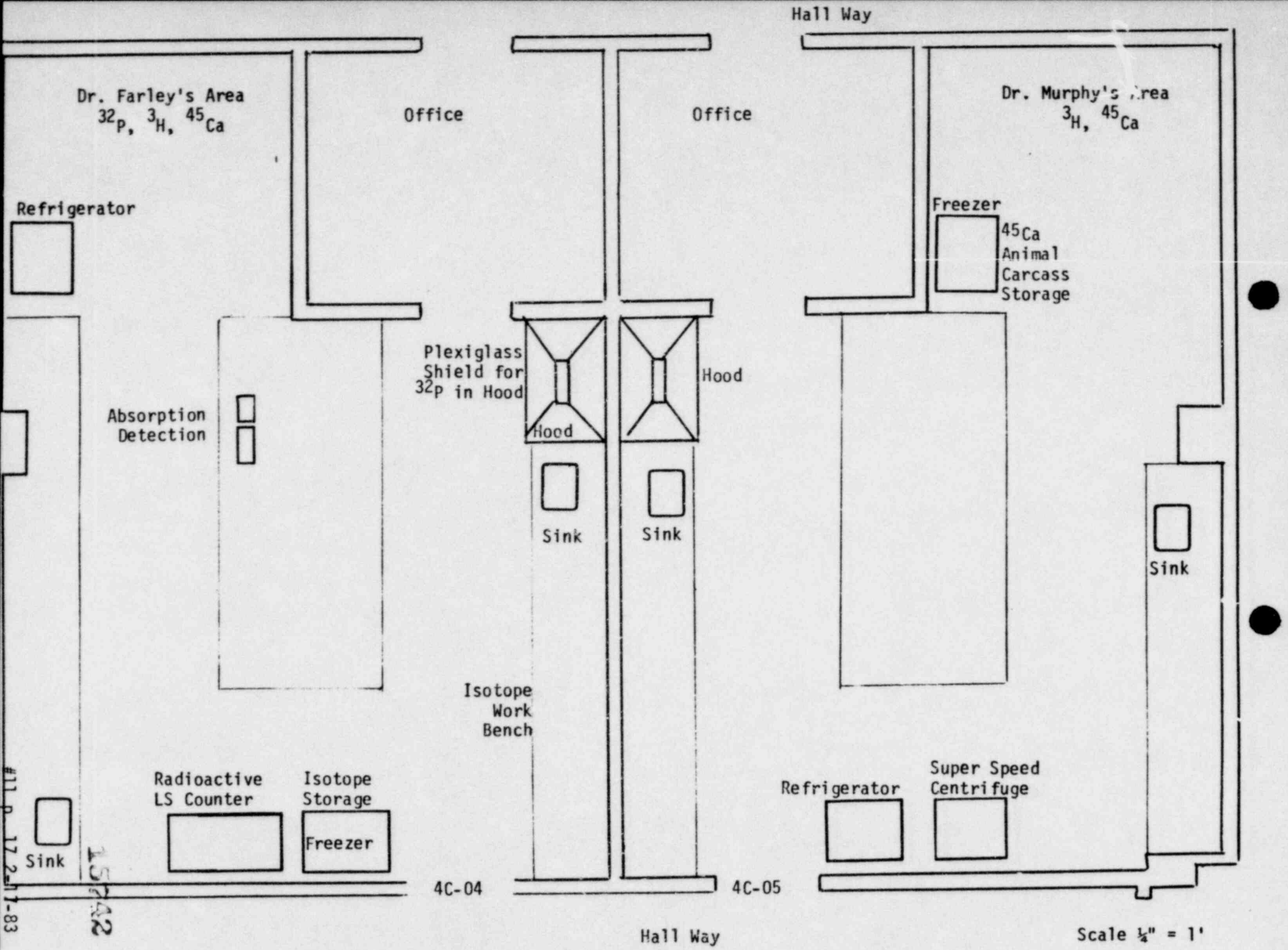

Dr. Adey's Research Area
^{3}H, ^{45}Ca
Hall Way
2C-28
Hood
Sink
Solid Radioactive Waste
Microwave Generator
Outside
Office
Liquid Radioactive Waste
Hall Way
Isotope Work Bench
Office
Isotope Storage
Refrigerator
Sink
Waiting Room
Nurse's Toilet
Conference Room
Scale ¼" = 1'

#11 p. 15 2-17-83


Dr. Jolley Research Area
^{14}C, ^{3}H, ^{125}I
Toilet
Conference Room
Office
Sterilizer
Laminar Flow Hood
Balance
Ph Meter
Centrifuge
Outside
Office
Hall Way
Isotope Storage
^{125}I, ^{3}H, ^{14}C, RIA
Refrigerator
Centrifuge
Oven
Hood
Sink
3C-09
N
Scale ¼" = 1'

#11 p. 16 2-17-83



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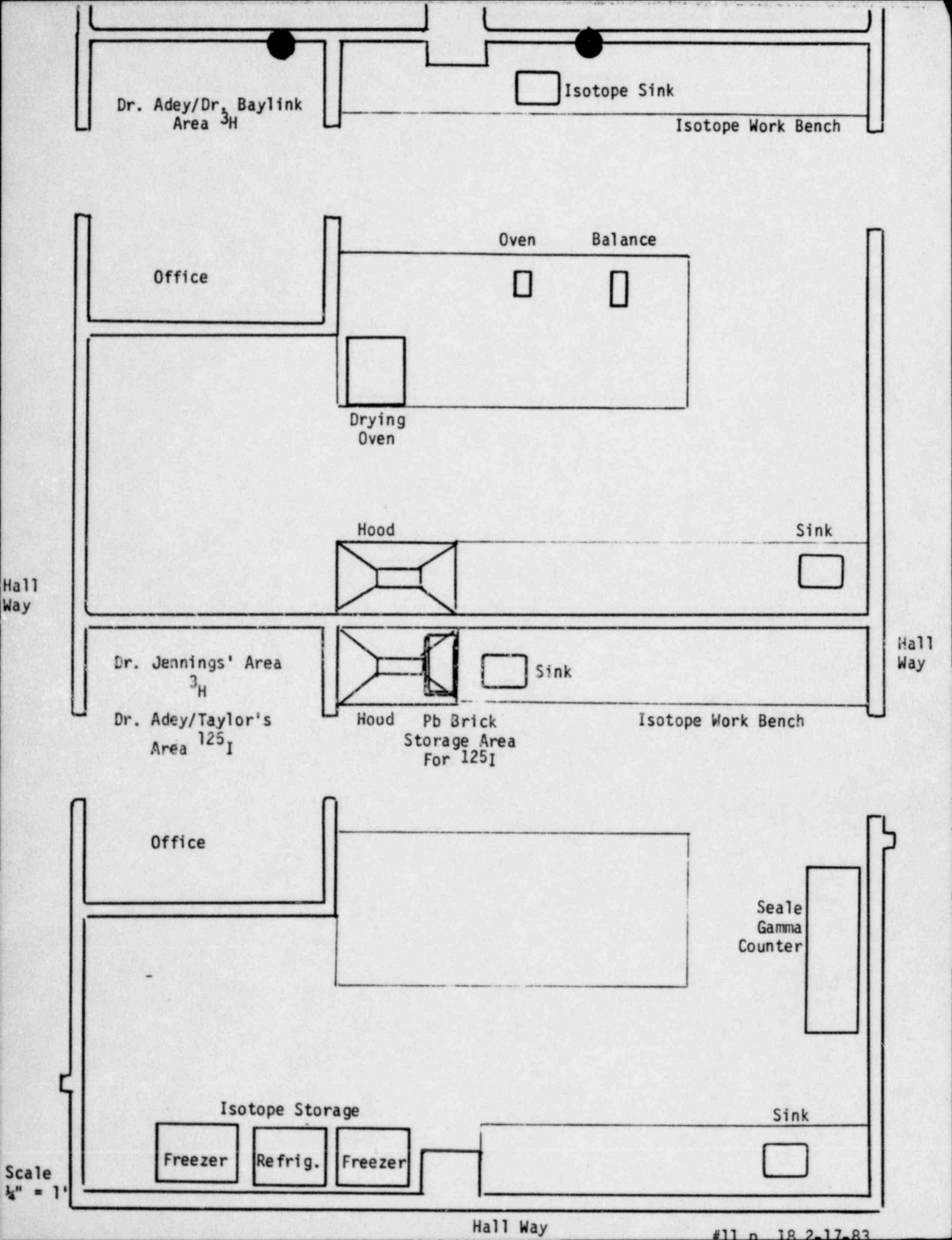

Dr. Adey/Dr. Baylink
Area ^{3}H
Isotope Sink
Isotope Work Bench
Office
Oven
Balance
Drying
Oven
Hood
Sink
Hall
Way
Dr. Jennings' Area
^{3}H
Dr. Adey/Taylor's
Area ^{125}I
Hood
Pb Brick
Storage Area
For ^{125}I
Sink
Isotope Work Bench
Hall
Way
Office
Seale
Gamma
Counter
Isotope Storage
Freezer
Refrig.
Freezer
Sink
Scale
¼" = 1'
Hall Way

#11 p. 18 2-17-83

^{133}Xenon

1. Quantities to be Used:

   a. Estimated 137 patient studies per year using 20 mCi ^{133}xenon/study.

   b. Possession limit - 500 mCi.

2. Use and Storage Areas:

   a. Three rooms with radioisotope fume hoods are available for use, storage, and waste disposal (Rooms 4E-28, 4E-37, and 4C-22 - see descriptions and diagrams under Item 13). One-eighth inch shielding will be used for storage, patient use, and waste disposal. The remaining hoods can be used for storage and waste disposal, if necessary.

   b. All rooms with radioisotope fume hoods are negative pressure rooms with complete non-recirculation of ventilation. The rooms are vented entirely through the continuously operating hood or by hood and a remotely controlled ceiling vent activated by a control on the hood. The hood exhaust in Room 4E-28 draws 800 CFM. (4E-37 draws 800 CFM and 4C-22 draws 1200 CFM.)

3. Procedure for Routine Use:

   a. Patients will be seated or lying in front of a scintillation camera placed adjacent to the fume hood. A trial study with air will be employed prior to actual use of ^{133}xenon. Any manipulation of the xenon container, syringe filling, etc., will be done in the hood.

   b. A single-dose commercial administration system (NEN Calidose dispensing system or MediPhysics Xenon Study System (VSS) or similar) will be used. These systems are basically unidirectional mouthpiece units with the xenon injected directly into the unit. Usually a single breath with washout study will be performed with the exhalant exhausted directly up the hood. If a rebreathing study is required, a 9-liter Collins spirometer will be used. In the event usage increases sufficiently to exceed approved ^{133}xenon disposal limits of this hood, exhalant will be trapped in shielded plastic bags and transported to other described hoods for disposal.

TRAINING

New personnel assigned to areas of radiation use are given an orientation to the work area by their respective supervisors, in compliance with 10 CFR:19 as specified in Reg. Guide 10:8, Rev. 1, Oct. 1980, Page 8, Item 12.

Training is given to radiation workers and ancillary workers who come in contact with radioactive material work areas:

1. Before they assume duties in that area;

2. During annual refresher training;

3. Whenever there is a significant change.

ORDERING AND RECEIVING RADIOACTIVE MATERIAL

Requests for any radioactive materials must be submitted on appropriate forms through the Radiation Safety Office. Upon approval of the Radiation Safety Officer or his designee, the request will be forwarded to the Supply Service. This procedure is applicable to the acquisition of any amount of radioisotope from any source. No shipments of radioactive material are allowed into this institution without prior approval by the Radiation Safety Office. Under no circumstances can an individual investigator place a telephone or telegram order for the procurement of radioactive material. An unauthorized order can be regarded as radioactive waste at the discretion of the RSO. The RSO will issue an Order File Number to each order and stamp it:

Each order for radioactive material is reviewed for:

1. User authorization for that particular isotope.
2. Authorization for the amount of that particular isotope for the user.
3. Effect of the order on the amount of the isotope presently in this facility as it relates to our license limits.

Upon arrival of the shipment, Supply Service is to notify the Radiation Safety Office immediately. Unless instructed otherwise, delivery is to be directed by the receiving clerk to the Hot Laboratory (Room 1B-43) where the Radiation Safety Officer or his designee will check in the shipment. Personnel in Supply Service should not physically handle radioactive parcels. (If such contact is necessary, prior instruction on safety precautions must be given by the Radiation Safety Officer.) After hours deliveries will be directed by the Inpatient Pharmacy to the Hot Laboratory. The Pharmacy representative shall see that the package is deposited on a designated table, or placed in refrigerator or freezer as indicated, and the receipts are duly recorded. For deliveries made on Friday or Saturday night, it is the responsibility of the Pharmacy to notify the Radiation Safety Officer the following morning.

Radioactive materials are secured at all times against unauthorized removal.

Packages will be examined by the Radiation Safety Officer or his designee for external leakage, contamination, damage, and radiation level as soon as practical on the day of receipt or on the first work day after receipt of off hours shipments. The user shall be contacted to pick up the parcel. It is the responsibility of the user to determine the extent of contamination, if any, and the accuracy of the content. It is also the responsibility of the user to keep a continuous log of the disposition of the isotope. Packaging material will not be regarded as radioactive waste, unless contamination is detected.

Before any radioactive material shipping container can be disposed of in regular trash, all DOT Radioactive Shipping Labels must be removed or defaced.

ORDERING AND RECEIVING RADIOACTIVE MATERIAL
(Continued)

Acquisition of radioisotopes from other institutions is governed by state and federal regulations, therefore, all arrangements for such transfers shall be made in advance in cooperation with the Radiation Safety Office. Transfer of radioisotopes to other institutions will also require the approval of the Radiation Safety Officer.

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

A. PROCEDURES FOR OBTAINING PERMISSION TO USE RADIOACTIVE MATERIAL:

The procedure for obtaining permission to use radioactive material in this hospital is initiated by the proposed user completing the Application for General Use of Radioactive Material. This along with a copy of the Training and Experience form for each individual involved in the project is then submitted to the Radiation Safety Officer for:

1. A check to see if the user is already NRC licensed and authorized to have the isotope requested.

2. Will this request (if granted) exceed the hospital limit for that isotope?

3. Has the applicant addressed each question on the application?

    a. Specific nature and purpose of use.
    b. Waste disposal.
    c. Facilities to be used and equipment list.
    d. Safety evaluations.
    e. Sketch of the laboratory noting work area.

After the Radiation Safety Officer has completed his review of the application and the user's training and experience, then the project is presented to the Radiation Safety Committee members for their evaluation. (The Radiation Safety Committee members are listed under Question #7.) The Radiation Safety Committee quorum consists of seven members, one of which must be the Radiation Safety Officer or his designee, and applications are approved by a majority. Projects are usually approved for a one-year duration subject to review and renewal by oral request at that time. Committee actions are documented in the minutes of the committee meetings.

H. PERSONNEL MONITORING DEVICES:

Monitoring is done by body film badges routinely worn by all personnel using radionuclides. TLD rings and/or wrist badges are worn by persons handling large amounts of radioisotopes where there is a possibility of high extremity exposure. These devices are obtained through the Radiation Safety Office, Room 4C-33, Ext. 2701. The RSO provides each user service with monitoring devices on the first of each month. It is the user services' responsibility to return the previous month's devices to the Radiation Safety Office promptly. This also facilitates the radioisotope user in assessing his work habits and encourages proper handling techniques. Currently, this service is being provided by R. S. Landauer, Jr., and Company of Glenwood, Illinois.

I. WASTE DISPOSAL PROCEDURES:

All radioactive wastes are disposed of in accordance with NRC License Condition 19, Amendment 09, approved May 18, 1982.

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL
(Continued)

Each user in his/her application for use of radioisotopes must address the procedure for waste disposal for each isotope to be used. This is reviewed by the RSO prior to evaluation by the Radiation Safety Committee to insure that the user is informed as to the hospital's policies regarding waste disposal of radioisotopes.

All wastes will be disposed of by the Radiation Safety Officer, unless specifically approved otherwise by the Radiation Safety Officer.

All liquid wastes with a half-life of more than 65 days are solidified and packaged as solids for transport to a nuclear waste burial site.

Gases will be held for decay in a radioisotope hood. If they cannot be held for decay in a radioisotope hood, the Radiation Safety Officer must authorize the release of any amount of radioactive gas into the environment. No radioactive material can be released from this institution without prior approval of the RSO.

Waste with a long half-life is packed to DOT specifications and shipped to a nuclear waste burial site.

MEDICAL & ACADEMIC POSTED POLICIES FOR
LABORATORIES USING RADIOACTIVE MATERIALS

GOOD LABORATORY PROCEDURES REQUIRE THAT:

Each Person

1. Confine work to as small an area as possible.
2. Wear a personal monitor when required in the authorization.
3. Wear protective clothing over street clothes.
4. Wear rubber gloves.
5. Use remote pipetter when pipetting (mouth pipetting is prohibited).
6. Use remote handling devices (tweezers, etc.) when source activity is greater than 1.0 mCi.
7. Perform all procedures over absorbent paper, preferably with non-absorbent backing.
8. Wash hands and exposed areas carefully before leaving lab.
9. Do NOT eat, drink, or apply cosmetics when in the laboratory.
10. Do NOT leave contaminated or work area unattended unless it is labeled appropriately.

General Practice

1. Where the possibility of a large-volume spill exists, work must be performed in a non-breakable tray large enough to contain a spill.
2. Where the possibility of aerosols exists, work must be performed in a fume hood.
3. Where the possibility of dust exists, work must be performed in a gloved box.
4. Food must not be stored in a refrigerator or other areas used for radioactive material storage.
5. Label contaminated glassware and equipment until it has been decontaminated.
6. Label all radioactive samples and stored isotopes.
7. Use shielding for storage and during work when necessary to maintain safe radiation levels as outlined in the Radiation Safety Manual.

Waste Disposal

1. Separate different types of waste (dry solid, liquid, scintillation vials, biological).
2. When possible, use separate containers for wastes with different half lives (< 1 day, 1-9 days, 9-15 days, 15-65 days, > 65 days).
3. Place radioactive waste in properly covered containers with the "Radioactive Material" symbol and the words "Janitor - Do NOT empty" prominently displayed.
4. When containers are full, call the Radiation Safety Office for instructions.
5. For disposal of radioactive animals or feces that will decay if stored, call the Radiation Safety Office for instructions. Radiation Safety provides a freezer for this type of disposal.
6. Disposal by sewer is limited to washings only.
7. Remove or destroy all "Radioactive Material" labels from non-radioactive waste before placing with the regular trash.

MEDICAL & ACADEMIC POSTED POLICIES FOR
LABORATORIES USING RADIOACTIVE MATERIALS
(Continued)

Monitoring

1. Must be performed by an appropriate method routinely or whenever contamination is suspected; if in doubt, contact the Radiation Safety Office.
2. Contact the Radiation Safety Office for assistance with major spills or when a question arises.

Records

1. Must be kept of each receipt, use, and disposal of radioactive material.
2. Must be kept of lab monitoring.
3. Must be kept of contamination levels on radioactive shipments when appropriate.

Ordering

1. Submit VA Form 90-2237 to the Radiation Safety Officer for approval.

FOR MORE COMPLETE INSTRUCTIONS, CONTACT THE RADIATION SAFETY OFFICE, EXT. 2701.

Employees Working with Ionizing Radiation: Please Note

Copies of appropriate sections of the Federal Regulations and the Radioactive Materials License are available at Room 4C-33. Please call Ext. 2701.

EMERGENCY INSTRUCTIONS
(Posted in Academic Laboratories)

FOR NON-AIRBORNE RADIOACTIVE CONTAMINATION:

The Radiation Safety Office must be notified immediately of any accidents involving:

1. Possible body contamination of personnel.
2. Ingestion of radioactivity by personnel.
3. Over-exposure of personnel to radiation.
4. Severe contamination of equipment.
5. Spread of, or difficulty in cleaning a contaminated area.
6. In the event of the loss of radioactive materials or machines.
7. Sealed source rupture or spill involving radioactive powder, volatile liquid, or gas.
8. Major spills.*

SPECIAL INSTRUCTIONS:

Radioactive Liquid Spill -

The following procedures will be followed, unless the radioactive liquid is volatile, in which case use the procedure for "Airborne Contamination".

1. Minor Spills -

   a. Notify all persons in the room immediately.
   b. Permit only the minimum number of persons in the area necessary to deal with the spill.
   c. Confine the spill immediately.
   d. Put on protective gloves and drop absorbent paper on a liquid spill.
   e. Decontaminate, using a monitor to check the progress of the work.
   f. Monitor all persons involved in the spill and subsequent decontamination.

2. Major Spills -*

   a. Notify all persons not involved in the spill to leave the room at once.
   b. When feasible use reasonable effort to confine contamination.
   c. If the spill is on clothing, discard outer clothing at once.
   d. Vacate the room.
   e. Call the Radiation Safety Office for assistance.
   f. Take immediate steps to decontaminate involved personnel.

*For further assistance, contact the Radiation Safety Office, Ext. 2701.

FOR AIRBORNE RADIOACTIVE CONTAMINATION:

Spill Involving Radioactive Powder, Gas, Volatile Liquid, or Sealed Source Rupture.

1. No immediate attempt should be made to clean up the spill.

EMERGENCY INSTRUCTIONS
(Posted in Academic Laboratories)
(Continued)

2. All windows should be closed, fans and air-conditioners shut off or vents sealed, and everyone leave the room.

3. All persons leave the room to an area just outside the contaminated area where they should remain until assistance arrives.

4. All doors should be closed and locked.

5. Call the Radiation Safety Office for assistance, Extension 2701.

6. Doors and other openings leading into the room should be sealed with wide tape and heavy wrapping paper.

7. Restrict entrance to contaminated area or place a warning sign at each entrance.

8. To control the spread of radioactive contamination, potentially contaminated persons must remain near but outside the contaminated area until they have been monitored and decontaminated, if necessary. A person is considered contaminated until properly monitored.

For more complete instructions, contact the Radiation Safety Office, Ext. 2701.

MEDICAL
EMERGENCY INSTRUCTIONS
(Nuclear Medicine Protocol Manual)

RADIATION - CONTAMINATION:

1. Purpose: To establish policy and procedures for handling radiation accidents within the hospital.

2. Procedures: IN ALL CASES, NOTIFY THE RADIATION SAFETY OFFICER PROMPTLY:

   a. Area Contamination:

      (1) Minor spills (e.g., single dose of radiopharmaceutical)

         (a) Notify nearby personnel to leave the area.

         (b) After donning proper protective attire, restrict spread of contamination.

         (c) Decontaminate area using approved procedures as directed by Radiation Safety Officer.

         (d) Monitor area and any involved personnel for residual contamination.

         (e) Leave contaminated clothing in room.

         (f) Notify supervisor.

      (2) Major spills (e.g., entire contents of generator elution, ^{131}I compounds, volatile compounds, sealed sources)

         (a) If spill is volatile, airborne, gaseous, or dust forming, call Extension 2889 immediately and request area ventilation be turned off at once. Give room number and location.

         (b) Notify nearby personnel to evacuate area.

         (c) Barricade area and place warning signs.

         (d) Remove contaminated clothing; leave in room where spill occurred.

         (e) Immediately notify supervisor as well as Radiation Safety Officer.

   b. Personal Contamination:

      (1) External:

         (a) Remove contaminated clothing; leave in room where contamination occurred.

(b) Wash contaminated skin areas with soap and water for two minutes. Monitor and repeat no more than three times if contamination persists.

(c) Notify supervisor.

(2) Contaminated Wounds:

(a) Immediately wash wound with stream of cold water.

(b) For very toxic materials, apply loose tourniquet.

(c) After notifying Radiation Safety Officer, report to Personnel Health Physician.

(3) Ingestion of Radioactivity:

(a) For large ingestions or ingestions of especially toxic materials, treat as for acute poisoning by inducing vomiting.

(b) Immediately notify Radiation Safety Officer and report to Personnel Health Physician.

(4) Inhalation of Radioactivity:

Immediately notify the Radiation Safety Officer and report to the Personnel Health Physician.

3. Unavailability of Radiation Safety Officer or His Designee:

In any situation where the Radiation Safety Officer or his designee is not available, contact the Chief, Nuclear Medicine Service, or another staff physician on that service.

4. Emergency Procedures:

Accidental release of xenon in designated rooms would pose no problem as they are negative pressure rooms with large capacity, non-recirculating exhaust ventilation systems. In the event of exhaust failure, Building Systems Emergency Service can by computer control shut off the normal ventilating operation in the contaminated area.

AREA SURVEY PROCEDURES

1. Appendix I of RG 10.8, Rev. 1, Oct. 1980 procedure will be followed with the exception of Item #1. The injection areas will be surveyed daily with an appropriate low-level survey meter. The preparation area and the elution area will be surveyed weekly or as deemed necessary.

2. Each active user of radioactive material is required to do an area wipe test survey at least every month. A record of the results of this test is kept with a written copy sent to the Radiation Safety Office for review to insure compliance. The Radiation Safety Officer does unscheduled inspections of all radioisotope work areas at random intervals based on the lab's activity, possession limits, and hazardous materials being used.

WASTE DISPOSAL

All radioactive wastes are disposed through the Radiation Safety Officer (RSO) or with specific permission from the RSO in accordance with NRC License Condition 19, Amendment 09, approved May 18, 1982.

SEWER SYSTEM:

No user other than the Radiation Safety Officer will dispose of any radioactive material in the sewer system. All sewer disposals by the RSO will be in accordance with 20:303 of 10 CFR, Part 20.

RELEASE TO THE AIR:

All release to the air must have RSO authorization to insure conformance with 10 CFR, Part 20.106 limits.

WASTE SHIPMENT TO BURIAL SITES:

Transfer of radioactive waste to burial sites is done by Thomas Gray and Associates licensed under California State License #2105-30.

THERAPEUTIC USE OF RADIOPHARMACEUTICALS

1. RADIATION SAFETY PROCEDURES DIRECTLY INVOLVED WITH CARE OF THERAPY PATIENTS:

Receipt of the radiopharmaceuticals will be handled in the same manner as are all radioactive shipments. Treatment dose will be assayed by our dose calibrator and results will be verified by the Nuclear Medicine physician before administration.

Before administering any therapeutic treatment, the Nuclear Medicine physician must alert the Nursing Service concerning the special measures that will be required (see Instruction to Nurses). A single room with toilet will be needed after the treatment. Arrangements will be made for the safe handling of the radioactive material.

a. ^{131}I therapy patients are assigned to a private room usually at the end of the nursing unit away from the main flow of staff and patients. The bed is moved to the center of the room, if necessary, as indicated by a survey of the patient, the patient's room, and the adjacent rooms with the therapy patient lying in his bed.

b. The room for the ^{131}I therapy patient is prepared by placing protective covering over areas likely to be in contact with the patient, floor, night stand, tray table, sink handles, toilet; rest room floors. Disposable trays, dishes, and utensils are used.

After the administration of therapeutic treatments, the Nuclear Medicine physician will make a detailed report in the patient's records. VA Form 10 1079 will be inserted into the patient's chart. The following labels or ones with similar information will be used.

Label for Cover of Patient's Chart

_____ HOSPITAL

PATIENT'S NAME_____ UNIT NUMBER_____

CAUTION

PATIENT CONTAINS RADIOACTIVE MATERIAL

DO NOT REMOVE THIS LABEL UNTIL

1) Radioactive material is removed from patient, or
2) Removal is authorized by Radiation Protection Supervisor (Ext._____).

VISITORS MUST CHECK WITH NURSING STATION BEFORE GOING TO PATIENT.

Date_____ Signature_____

RADIATION PROTECTION SUPERVISOR

09-484 Nuclear Associates, Carle Place, N.Y. Printed in U.S.A.

Lebels for Cover of Patient's Chart

_____ HOSPITAL

PATIENT'S NAME_____ UNIT NUMBER_____

CAUTION

RADIOACTIVE MATERIAL

PERMANENT IMPLANT OR INTERNAL DOSE

Radionuclide_____ mCi _____

Administered_____
(DATE)

Initial Exposure Rate at 1 Meter_____ mR/h

(SIGNATURE) _____

INSTRUCTIONS:

Patient must remain in hospital until_____
(DATE)

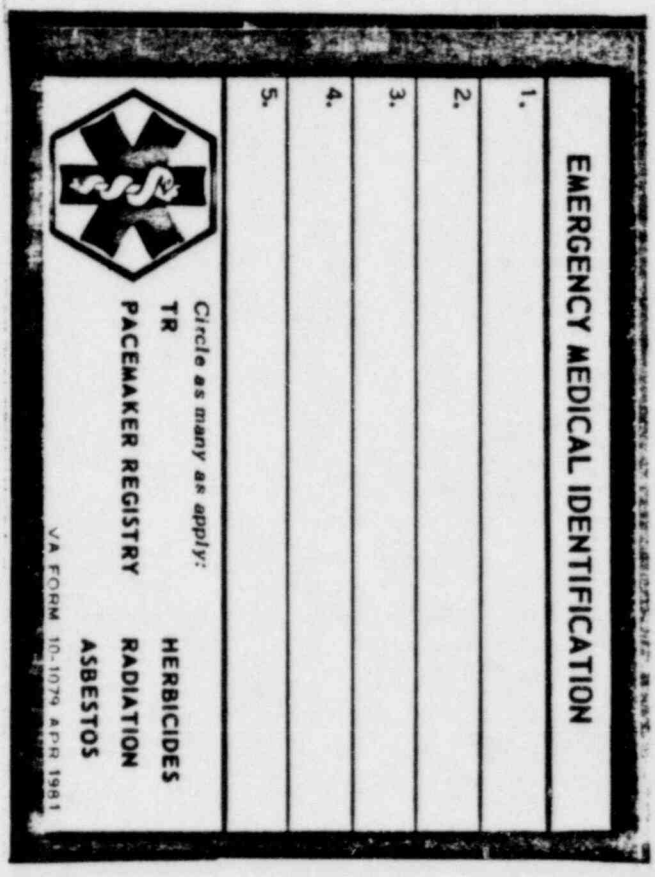
"Radioactivity Precautions" tag may be removed_____
(DATE)

The Radiation Protection Office (Ext._____) must be notified before discharge or removal of patient.

For further information call Radiation Protection Office. In case of an emergency, the telephone operator has a call list for use when the Radiation Protection Office is not open.

Date_____ Signature_____
RADIATION PROTECTION SUPERVISOR

09-488 Nuclear Associates, Carle Place, N.Y. Printed in U.S.A.



The wrist badge warning attached to the patient will consist of both medical alert sign and warning on radioactivity. The bed card warning sign will also be installed.

Bed Card Warning Sign

Nuclear Medicine Service shall immediately survey exposure rate at the patient's bedside, three feet away, and ten feet away (or entrance of the room).

Prior to the release of the patient, permission must be obtained from the Nuclear Medicine Service. The forms, "Radiation Safety Check List for Discharged Patients Containing Radionuclides" and "Instructions for Family of Released Patient" will be completed. One copy will be given to the patient and one copy be placed in the patient's record. These will be prescribed according to NCRP Report #37 "Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides". Before releasing the patient or room, contamination will be checked for.

The attending physician will review the clinical chart prior to referral of the patient to pathology, mortuary, or surgery. He will place the emergency symbol (VA Form 10-1079) on top of the record folder so that it will be seen instantly. Surgery will proceed with the same precautions as outlined in "Safe Handling of Radioactive Cadavers". In all cases, Nuclear Medicine Service must be contacted for special instructions.

2. NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH IODINE-131:

   a. A single room, with toilet and with warning sing on door ("Radioactive, Caution"), will be needed after therapy treatment.

   b. Heed special instructions given by Nuclear Medicine Service.

   c. Ward personnel should limit close contact with patient. Working three feet or more from patient and for short periods of time will minimize possible radiation hazard.

d. If patient is unable to care for himself, then waterproof gowns and gloves must be worn by personnel.

e. Visitors should stay at least six feet from patient. Persons under eighteen years of age or pregnant are not allowed.

f. Utensils, all disposable items, and waste material will be kept in the room until the Nuclear Medicine Service has monitored for contamination and issued instructions on disposal.

g. Isolate linen contaminated with urine or emesis in plastic bags in the patient's room. Record time if patient vomits.

h. Patient should use toilet, but must flush twice after use.

i. Do not release patient or room until approved by Nuclear Medicine Service. Room will be surveyed and reassigned only if free of contamination.

3. SAFE HANDLING OF RADIOACTIVE CADAVERS:

a. General:

If a patient dies shortly after receiving a large therapeutic dose of radioisotope, the handling of the body may pose problems of radiation exposure for the pathologist and for the embalmer. While members of these groups are rather rarely exposed to radioactivity, it is important for them to recognize the existence of this problem and to know how to meet it.

The patient who is radioactive will have VA Form 10-1079, the emergency medical identification symbol and label, within his clinical record folder and a small emergency medical identification label will have been inserted in the patient's plastic identification bracelet and on an additional label attached to the patient's bed card. Mortuary personnel should be alerted by the emergency medical identification label on the patient's plastic bracelet. This bracelet should be examined before any extensive handling of the body. In all cases, Nuclear Medicine Service should be contacted for special instructions.

b. General Precautions to be Followed:

(1) No special precautions are required for a cadaver containing less than 5 mCi of activity.

(2) Should the cadaver contain more than 5 mCi, autopsy should be done only with the advice of the Nuclear Medicine Service, and the "Report of Radioactivity to Funeral Director" should be filled out.

(3) If the activity is more than 5 mCi and less than 30 mCi, the body may be released for embalming only after consulting with the Nuclear Medicine Service.

(4) When the activity is greater than 30 mCi, the Nuclear Medicine Service will recommend precautions to the funeral director.

(5) Autopsy and embalming procedures shall follow those available from the Nuclear Medicine Service.

(6) In General:

(a) Film badges and gloves should be worn, if advised by the Nuclear Medicine Service.

(b) The body should be surveyed to establish maximum working times, need for working in relays, need for goggles, and/or double gloves (for intense beta emitters), and need for storage and disposal of highly active body fluids and organs.

(c) Following autopsy or embalming, instruments, clothing, and the room should be monitored. Contaminated laundry should be turned over to the Nuclear Medicine Service for storage for a suitable decay period before washing. Instruments should be soaked in detergent and rinsed in running water. Before instruments are re-used they are to be checked by the Nuclear Medicine Service. All radioactive liquid wastes should be flushed down the sewer.

(d) Special care should be taken to prevent contamination of autopsy room floor and the spread of contamination to other parts of the hospital.

(e) Any solid radioactive wastes should be saved for disposal in plastic bags. Consult with the Nuclear Medicine Service for handling of these items.

(f) In general, all body fluids should be flushed or aspirated directly into a sewer.

(g) If the pathologist/embalmer is injured during autopsy or embalming, work should be halted, gloves removed, and the wound flushed with running water. All wounds should be checked for residual contamination, with washing and checking repeated if necessary. Any injury should be immediately reported to the Nuclear Medicine Service.

(h) Survey instruments and personnel monitoring equipment will be provided by the Nuclear Medicine Service with instructions for use.

c. Special Precautions for Pathologists to Follow:

(1) ^{131}I in large amounts usually indicates thyroid therapy or thyroid cancer therapy. When an autopsy is performed on such a cadaver, it is advisable to remove iodine concentrating tissue first.

Dissections must be performed with long-handled forceps and scissors. The removed tissue should be stored in an out-of-the-way place, carefully labeled as to its origin, date, and approximate amount of radioisotope contained.

(2) ^{32}P administered will not exceed 5 mCi. Therefore, only the general precautions outlined above are necessary.

d. Special Precautions for Morticians to Follow:

(1) All patients who received therapeutic doses of radioisotopes within 60 days of death should be considered a possible hazard. If the Nuclear Medicine Service determines that radiation dose rate is less than 30 mR/hour at body surface, embalming can proceed. All body fluids removed should be transferred directly down a suitable sink drain, with no splashing or spillage. Embalming personnel should always wear rubber gloves and protective gowns when handling radioactive cadavers.

(2) Cremation presents no problem unless the body contains more than 30 mCi. If this is the case, it may be necessary to store the cadaver for a period of time prior to cremation.

(3) Always consult "Report of Radioactivity to Funeral Director" for possible additional instructions.

THE JERRY L. [redacted]TIS MEMORIAL VETERANS MEDICAL [redacted]NTER

REPORT OF RADIOACTIVITY TO FUNERAL DIRECTOR

It is hereby certified that the body of _____

has been examined this date with the following result:

(CHECK ONE)

( ) The body contains less than 30 mCi of radioactive material and requires no special precautions if standard embalming procedures are employed.

( ) The body contains more than 30 mCi of radioactive material, and the following precautions are recommended:

_____

_____

_____

_____

_____

_____

Signed: _____

Title: _____

Date: _____

THE JERRY L. PETTIS MEMORIAL VETERANS MEDICAL CENTER

INSTRUCTIONS FOR FAMILY OF RELEASED PATIENT

Name of Patient _____

Name of Hospital _____ Address _____ Tel. No. _____

For further information contact _____ Tel. No. _____

Please show this form to every physician consulted concerning the patient until _____ (date).

_____ was treated on _____, 19___ with _____

millicuries of _____ in the form of _____.

NO SPECIAL RADIATION SAFETY PRECAUTIONS ARE NECESSARY AFTER _____ (date)

Until that date:

Persons under 45 years of age should not remain closer than the following distances from the patient, for the time period indicated:

(a) _____ (date) to _____ (date)

Permissible distance _____ feet or more, for _____ hours per week.
(At other times, remain farther than 6 feet)

(b) _____ (date) to _____ (date)

Permissible distance _____ feet or more, for _____ hours per week.
(at other times, remain farther than 6 feet)

Note: During the above times brief periods of closer contact (for example, while shaking hands or kissing the patient) are permissible.

SPECIAL PRECAUTIONS:

(a) Spouse or other person caring for patient: _____

(b) Children or pregnant women: _____

(c) Sleeping arrangments: _____

IF THE PATIENT IS TO BE HOSPITALIZED, OR IF DEATH SHOULD OCCUR, NOTIFY THE FOLLOWING INDIVIDUALS IMMEDIATELY: _____

THE JERRY L. P[redacted]IS MEMORIAL VE[redacted]ERANS MEDICAL C[redacted]ER

RADIATION SAFETY CHECK LIST FOR DISCHARGED PATIENTS

CONTAINING RADIONUCLIDES

Name of Patient:_____ Age:_____

Social Security Number:_____

Address;_____ Telephone Number:_____

Name of Person Interviewed:_____

Description of Dwelling:_____

In multifamily buildings, possible proximity of neighbors._____

Household: Names, relationship, ages:_____

_____

Regular visitors to dwelling:_____

_____

Persons regularly visited by patient outside dwelling:_____

_____

Matters discussed:

_____Handling extruded source

_____Importance of separate beds

_____Importance of distance

_____Importance of special care in regard to young persons

_____Procedure in case of hospitalization or death

Film badges issued:_____

Identification card, or wristband issued:_____

Date:_____ _____
Physician or Radiation Safety Office

RADIATION SAFETY OFFICE
Department of Nuclear Medicine
Loma Linda VA Hospital
Loma Linda, California 92357
Phone 714-825-7084 Ex.2701

Date_____

Hour_____

Radiation Monitoring Record

Patient's Name_____Hospital #_____Ward_____Room #_____

Radioactive Isotope_____ Activity_____mCi

Type of Isotope administration (implant) or (injection). Site of administration_____

Survey Instrument Used, Make_____ Model # _____

Map of area

Site and Radiation measurment

A. 1 meter from source/Patient_____

b. At the bed side _____

C. 2.5 MR/HR line _____Feet

D. entery way _____

E. next to wall outside of room
West _____mR/hr room #_____
East _____mR/hr room #_____

F. Center of adjacent Rooms

West _____mR/hr room #_____

East _____mR/hr room #_____

Monitoring Device (Film Badge) (Pocket Dose Chamber)

FOR NURSES----------TIME AT BEDSIDE PER SHIFT; _____ Minutes

FOR VISITORS-------- TIME PER DAY AT THE DOOR; _____ Minutes

Remarks:_____

SURVEYOR:_____

Radioisotope Monitoring Record

Loma Linda VA Hospital
Loma Linda, Calif. 92357

DATE_____

PATIENT'S Name_____ Hospital #_____

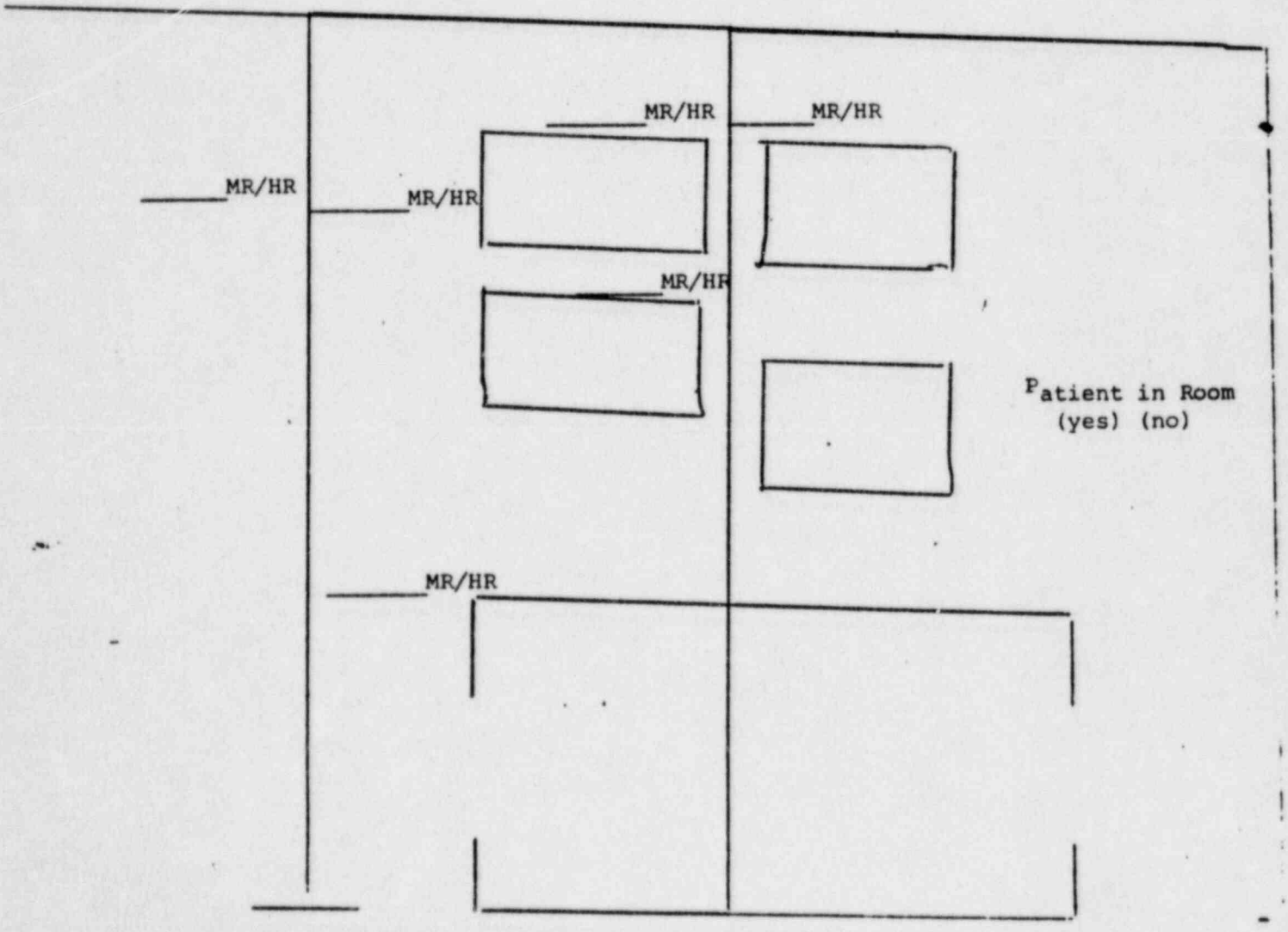
Location:_____ Hour_____

Isotope Used:_____ Activity:_____(mCi)

Type of Isotope Used, (implant) (injection)

Survey Instrument used: Make_____ Model #_____ Surveyor:_____

Instructions: NO PREGNANT NURSES



4. GENERAL CARE OF PATIENTS RECEIVING THERAPEUTIC DOSES OF RADIOACTIVE MATERIALS:

a. Purpose:

(1) To provide safe and effective nursing care for the patient.
(2) To inform nursing personnel of the safe limits of exposure which are recommended by the Radiation Safety Office.
(3) To assist the doctor in the uses of radioactive material.

b. Types of Therapy:

Therapy with solutions of radioactive iodine and phosphorus.

c. Radiation Facts:

(1) Good nursing care should not be abrogated because a patient is treated with a radioactive material.
(2) Safe limits of exposure and safe working time for personnel in the vicinity of the patient are determined by the Radiation Safety Office. These limits mean that an individual receiving up to that amount of radiation would not be expected to experience harmful results to the body.
(3) There is justification for concern about radiation and its effects on the human body and reproductive organs. However, by following the precautions of the safety rules established by the Radiation Safety Office, the possibility of serious threat to personal health or progeny will be minimized.

d. Standing Orders-Preparation and Procedures:

(1) Mental Preparation:

(a) The doctor will inform the patient of:

(i) The purpose, effects to expect, and mode of administration.
(ii) The necessity for limited nursing care during the treatment, and the activities a patient can perform for himself.

(b) It is the responsibility of the nurse to obtain adequate knowledge in order to answer questions about visitors and about doctor's instructions. She must be able to allay the patient's fears about the treatment he is receiving.

e. Physical Preparation:

(1) The nursing unit is notified when a patient is being admitted for radiation therapy.
(2) A single room away from the main flow of traffic, at the end of the corridor, for example, is to be selected.
(3) Orders will be written by the doctor as to medications and withholding diet before treatment.
(4) It is the responsibility of the doctor on Nuclear Medicine or the Radiation Oncology staff to obtain written permission from the patient or nearest relative for the treatment.

(5) Prepare room for return of patient.

(a) Place bed away from the wall adjoining the next room.
(b) When a patient is to receive phosphorus-32 of iodine-131, place a plastic sheet on the bed in an appropriate area to protect the mattress from drainage.
(c) Place the bedside table, and all necessary equipment, so that the patient may reach them easily. (Including emesis basin and bedpan.)
(d) The Radiation Safety Office will recommend or provide a container for contaminated linen. After linen has been monitored and considered safe, it may be placed with other soiled lined.

(6) Special cards and signs.

(a) A sign provided by the Radiation Safety Office will be placed on the door of the patient's room to indicate that he is receiving radioisotope therapy. The purpose of this card is to prevent other patients and visitors from entering the room.
(b) A special bedside safety card must accompany the patient as long as there is any hazard from the radioactive material.
(c) Should the patient die during therapy, the bedside tag is to be placed around his ankle and the Radiation Safety Office notified immediately (Ext. 2701 or after hours, call the hospital operator and have the Radiation Safety Officer called at home).

(7) Patient care and instruction.

(a) Because only limited care can be given the patient, it is most important that personnel work toward preventing a feeling of neglect and isolation by the patient. Someone should be assigned to go to the patient's door, or to the limit of the safety zone, at least once every one to two hours, if only to speak to the patient.
(b) RUBBER GLOVES WILL BE WORN BY ALL PERSONS HANDLING THE PATIENT, linen, utensils, etc. Also for handling urine, sputum, feces, and dressings. They are to be washed and dried thoroughly before being removed.

(8) Waste disposal.
(a) Dressings soiled with drainage should be carefully placed in a plastic bag. The bag is to be retained in the patient's room for the Radiation Safety personnel to monitor.
(b) Triple flush bedpan and sterilize after each use if pan is reuseable. All utensils should be disposible and should be held for monitoring by the Radiation Safety Office personnel.

(9) Day calls.

Nuclear Medicine . . . 2669
Radiation Safety . . . 2701 or Pager 383
After regular duty horus: call the hospital operator and ask her to call the Radiation Safety Officer on call.

5. RADIATION SAFETY PROCEDURES INVOLVED WITH ALL OTHER ASPECTS OF THERAPY PROCEDURES:

a. Radioisotope hoods with a flow rate of 800 cfm will be used whenever possible for the preparation of the therapy dose. Remote handling equipment is to be used as much as possible, and all work is to be done behind a lead L-Block. All precautions are to be taken to lessen the possibility of contamination (absorbent paper is to be used on the surfaces).

b. Bioassay of Nuclear Medicine personnel is not done routinely as the number of ^{131}I therapy patients is approximately four per year, and the exposure to the dose and the patient is very limited. However, we are equipped to do thyroid scanning on iodine exposed personnel. Bioassay is currently done at the request of the individual or the Nuclear Medicine physicians.

c. Surveys are done of the administration tray of each therapy dose to insure no contamination occurs. If contamination does occur, the absorbent paper (plastic backed) is removed to radioactive waste and a new covering applied. Should contamination be found on a non-protected area, that area is corded off and decontaminated with decontamination solution. It is then resurveyed. If the decontamination attempts fail to produce the desired results, the area is shielded with lead sheeting or the room closed for decay, depending upon the size of the area involved and the need to use the area and the difficulty in controlling the radiation level.

RADIATION THERAPY PROGRAM

Group VI users of material listed in Schedule A, Section 35:100 of 10 CFR (Radiation Therapy Uses) as approved in Amendment #11 of our NRC License dated April 18, 1983, will be followed.

USE OF RADIOACTIVE GASES AND AEROSOLS
(Answers to Appendix M)

1. QUANTITIES TO BE USED:

   a. The number of studies expected per week are between three and five with an average activity per patient of either 3-5 ML of ^{99m}Tc DTPA or 10-20 ML of ^{133}Xe.

   b. Our possession limit for ^{99m}Tc should be 2000 mCi as this is only one of its many uses.

      The proposed possession limit for ^{137}Xe is 500 mCi.

2. USE AND STORAGE AREAS:

   The ^{133}Xe will be used and stored in Room 4E-28 in the radioisotope hood with a calibrated air flow of 800 cfm (see drawing).

3. PROCEDURES FOR ROUTINE USE:

   See attached.

4. EMERGENCY PROCEDURES:

   Because the area is under negative pressure, the isotope is stored in an isotope hood (dedicated out flow line with Hepa filter), and the ventilation studies are done directly in the opening in the hood, an accidental release can be controlled by closing the doors to 4E-28 - 4E-30. The ventilation system is such that it can handle the exhaustion of any accidental release.

5. AIR CONCENTRATIONS OF ^{133}Xe IN RESTRICTED AREAS:

   ^{133}Xe is stored in a fume hood so that leakages are vented through the hood. The exhaust from the rebreathing apparatus and collection systems are also vented through this hood.

   a. Assuming: Maximum activity/week $^{(A)}$ for 3-5 patients at 10 mCi/patient

      $A = 50 \text{ mCi} = 5 \times 10^4 \ \mu\text{Ci/wk}$

   b. Assuming a 20% loss rate (f)

   c. Measured airflow rate and volume of air available per week (V):
      Measured airflow rate = 705 ft 3/minutes. Restriction 10 CFR 20:103 requires $\frac{A}{V} \times f \leq 1 \times 10^{-5} \ \mu\text{Cu/ml}$. $V = \frac{A \times f}{1 \times 10^{-5} \ \mu\text{Ci/ml}} =$

      $\frac{5 \times 10^4 \ \mu\text{Ci/wk} \times .20}{1 \times 10^{-5} \ \mu\text{Ci/ml}} = 1.0 \times 10^9 \text{ ml/wk}$ The required vent rate =

      $\frac{1.0 \times 10^9 \text{ ml/wk}}{40 \text{ hr/wk}} \div \frac{1.7 \times 10^6 \text{ ml/hr}}{\text{ft 3/min}} = 14.7 \text{ ft 3/min.}$

The actual flow rate (705 ft 3/min) far exceeds the required safety limit in 10 CFR 20:103.

6. AIR CONCENTRATIONS OF ^{133}Xe IN UNRESTRICTED AREAS:

a. 10 CFR 20:106 requires concentrations averaged over a period of one year shall not exceed 3×10^{-7} µCi/ml.

(1) Maximum amount ^{133}Xe released/year (A): Assuming all xenon is released through the hood including patient exhaust, collection bags, and leakage.

A = max. act./wk x 52 wks/yr
= 50 mCi/wk x 52 wks/yr
= 2600 mCi/yr = 2.6×10^6 µCi/yr

(2) Vent rate of exhaust system = 705 ft 3/min measured by

(3) Airflow/yr (V) = 705 ft 3/min x $1.49 \times 10^{10} \frac{\text{ml/yr}}{\text{ft 3/min}}$ =

1.05×10^{13} ml/yr

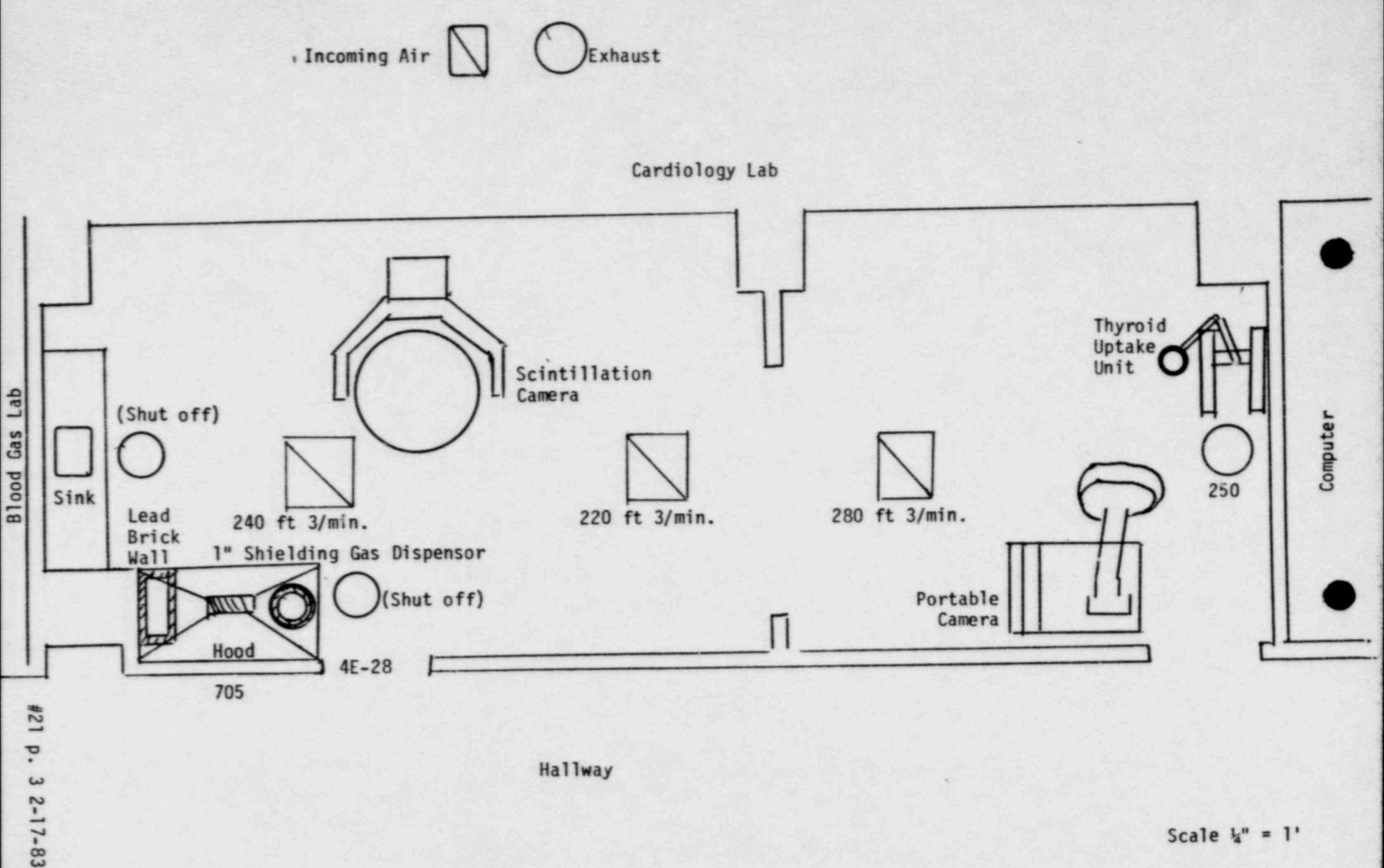
(4) Average concentration for unrestricted area (C):

$$C = \frac{A}{V} = \frac{5.2 \times 10^6 \text{ µCi/yr}}{1.05 \times 10^{13} \text{ ml/yr}} = 2.47 \times 10^{-7} \text{ µCi/ml}$$

C is less than the 10 CFR 20:106 restriction of 3×10^{-7} µCi/ml.

By interpolation, the maximum amount of ^{133}Xe that can be released per week without exceeding the average concentration of 3×10^{-7} µCi/ml for an exhaust rate of 705 ft 3/min is: 60.3 mCi. This requirement is met, since the maximum release of ^{133}Xe from our facility is 50 mCi.

b. Absorption of ^{133}Xe onto charcoal traps is not used at this facility.


Incoming Air
Exhaust
Cardiology Lab
Blood Gas Lab
Scintillation Camera
Thyroid Uptake Unit
(Shut off)
Sink
Lead Brick Wall
240 ft 3/min.
220 ft 3/min.
280 ft 3/min.
250
Computer
1" Shielding Gas Dispensor
(Shut off)
Portable Camera
Hood
4E-28
705
Hallway
Scale ¼" = 1'

#21 p. 3 2-17-83

ADMINISTRATION OF XENON-133

1. Attach noseclip and place mouthpiece so that its flared end is between the patient's lips and teeth and forming a tight air-seal.

2. Instruct the patient to exhale and then after turning the brown, T-shaped stopcock so that the arrow points toward the reservoir bags, to take a deep breath and hold it for the time required for a 100K image.

   The following images should be obtained:

Breath-holding	100K
Initial Rebreathing	100K
1, 2, 3-minute Rebreathing	100K

   Washout images every 30 seconds to three minutes
   (0-30, 30-60, 60-90, 90-120, 120-150, 150-180 seconds)

   An optimal ventilation study should consist of 11 images.

XENON VENTILATION PROTOCOL

The purpose of this procedure is to assess regional lung ventilation in acute (e.g., PE, asthma) or chronic (e.g., empnysema, CA, COPD) disorders. This assessment is obtained by evaluating the regional distribution of inhaled xenon gas.

Due to superior imaging resolution, decreased patient dose and technical superiority, xenon-127 is to be used when available, rather than xenon-133.

Prior to Administration:

1. Assemble apparatus as in photograph. Individual component parts are in labeled containers on the shelf.

2. Peak camera with xenon-127.

3. Explain procedure to patient. If the patient appears apprehensive regarding the procedure, have him go through a partial trial run without using radioactive material. (Don't tire him out practing the procedure!)

4. Open stopcock and fill one of the 3-liter bags with 100% oxygen through the extension tube coming from the carbon dioxide absorber. Close stopcock.

5. Open stopcock and inject 10mCi ^{127}Xe-gas through the extension tube. Close stopcock.

6. Position patient in front of camera. (The staff physician will determine the desired view based on information from perfusion images.)

7. Sign on the computer, if necessary, and go into the acquisition menu. Obtain 100K technetium image, then switch to xenon window.

8. Still in the acquisition menu, type in the prefix VT for the predefined acquisition sequence for ventilation studies.

9. Obtain a 1-minute Compton image on the xenon peak. Hit "Control S" after acquisition is finished. The computer will automatically set up for the ventilation study. Hit "Control B" to start acquisition at the same time the patient begins to breathe xenon.

Administration:

1. Attach noseclip and place mouthpiece so that its flared end is between the patient's lips and teeth and forming a tight air-seal.

2. Instruct the patient to exhale. Then, after turning the brown, T-shaped stopcock so that the arrow points toward the reservoir bags, have the patient take a deep breath and hold it for 15 seconds. Start the computer ("Control B") when the patient begins to inhale. Image 1 will thus be produced on the computer.

3. The patient rebreathes for 3 minutes, which will be images 2 thru 13.

4. Turn stopcock up for washout, which lasts 3 minutes 45 seconds (images 14 thru 28). Type "Control S" to stop acquisition.

Note: The computer will be acquiring images every 15 seconds. The technologist must note the times to begin rebreathing and washout. If the patient is uncooperative, then the study may be shortened. To stop computer acquisition, hit "Control S" and the computer will stop at the finish of the frame it is acquiring.

Note also that 32 frames are available for acquisition. If washout needs to be lengthened, simply keep acquiring. The computer will automatically stop after frame #32.

Processing:

1. Use the predefined sequence for ventilation processing (VP) on the analysis menu for processing.

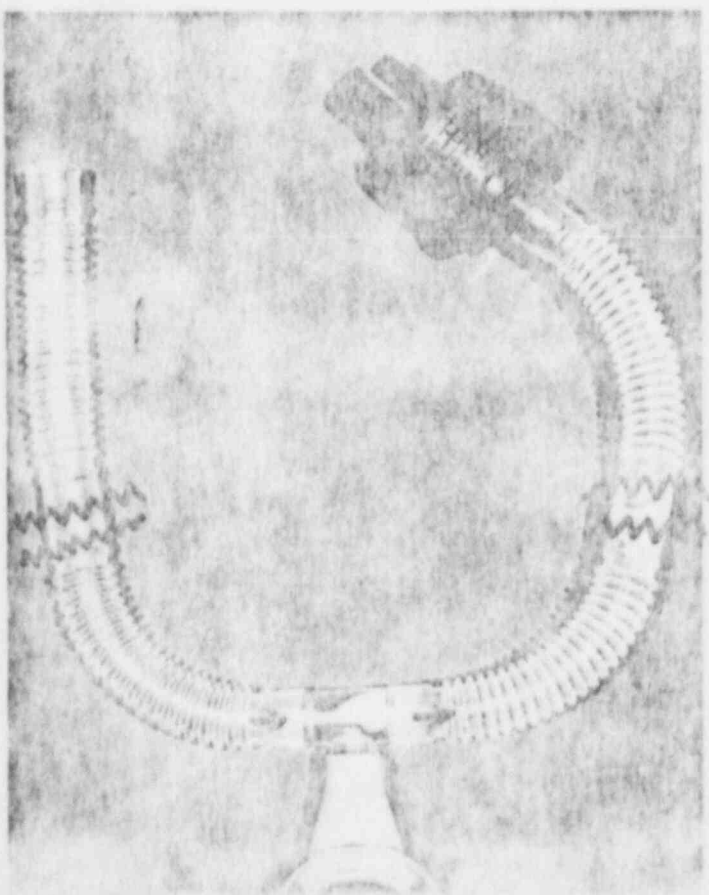
2. Images are taken off the Dunn camera, taking the perfusion study in the same view first, before using static image display (setting multiple views to four) for the ventilation study. Remove text for the pictures.

Views on the Dunn camera should be changed in the sequence 1, 2, 3, 4 to position the images correctly.

Assemble as in Photographs

Disposable Parts

After Each Patient



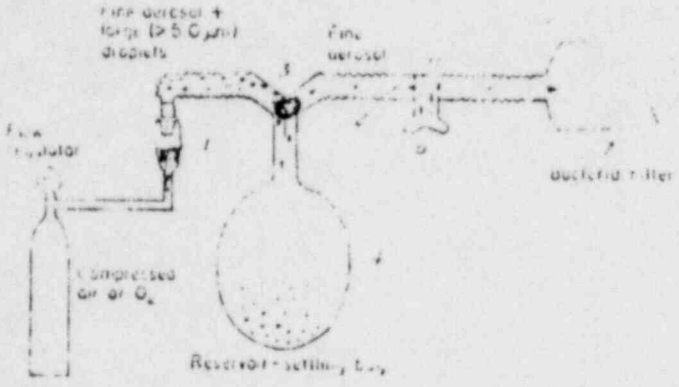
Monthly

Wednesday (2-23)
week of 17th

LOMA LINDA VA AEROSOL INHALATION APPARATUS AND PROCEDURE

(Dennis Elam, M.S. and Anil Bharne, M.D.)

DIAGRAM-ADMINISTRATION SYSTEM



LIST OF COMPONENTS

1) Positive Pressure Nebulizer (driven by compressed air or oxygen at a flow rate of 15 liters/minute). Includes internal baffle.

2) Disposable tubing.

3) One-way inlet valve.

4) Reservoir-Settling bag (removes aerosol droplets >2.0 μm by sedimentation, impaction and turbulance).

5) Two-way breathing valve.

6) Mouthpiece.

7) Bacteria Filter (traps any aerosol leaving the system from patient's exhaled air).

ADMINISTRATION PROCEDURE

1) Assemble system as shown in diagram and shield nebulizer behind 1/8 inch lead. Rinse the reservoir-settling bag (4) with 2 ML saline. (This wetting of the bag decreases the amount of aerosol that will stick to it.)

2) Explain the procedure to the patient.

3) Fill the nebulizer with high specific activity ^{99m}Tc-DTPA (10-20 mCi/ml, 2 ml total).

4) Clamp the tubing between the bag and the two-way breathing valve with a hemostat. (See (2) in diagram.)

5) Turn the O_2 on to a flow rate of 15 liters/minute and fill the bag with aerosol.

6) When the bag is full, turn the O_2 off.

7) Attach nose clip to patient. (Be certain that no air can pass in or out of his nose.)

8) Simultaneously, place the mouthpiece between the patient's lips and teeth and unclamp the hemostat.

9) Instruct the patient to relax and to breathe as normally as possible.

10) Inhale the patient until the count rate over the posterior chest is 3-5 times that after a perfusion image.

11) Turn O_2 back on any time the bag appears about ½ full. (Occasionally, the O_2 is left on throughout the inhalation procedure.)

If after explaining the procedure (Step 2) to the patient, he still seems apprehensive, run through the entire procedure using saline in the nebulizer instead of Tc-DTPA.

The extremely ill patient may need frequent interruptions during the inhalation procedure. Interruptions after every 30 seconds of inhalation are quite possible without jeopardizing the quality of the examination. (Be sure to turn O_2 off and clamp tubing with hemostat to prevent radioactive contamination.)

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS

A project using radioisotopes in animals is so noted by the Radiation Safety Committee when the applicant applies for use of radioactive material.

At that time, specific instructions are given in his project approval as to what precautions and procedures are to be followed during the animal's use.

These special instructions will depend on the isotope used, the proposed use, and foreseen hazards (will the body excreta be contaminated and if so, how; urine, aerosols, or contaminated bedding only).

The housing of the animal will be determined by the Animal Research Veterinarian as appropriate for the species and with the required safety precautions as prescribed by the Radiation Safety Committee, e.g., such as mice and rats to be housed in an isolated hood and all bedding will be collected for disposal by the Radiation Safety Office (see attached). Cages will be checked after use for contamination before being returned to normal service.

Specific instructions are given to the Animal Research facility staff for each specific Animal Research project using radioisotopes as they all differ as to the type of animals used, required care, along with the type and hazards of the different isotopes.

All animal rooms containing radioactive animals are access limited to persons participating in the project, if the hazards so dictate.

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

I. SEALED SOURCES:

Leak tests are done biannually (every six months) on all sealed sources.

II. BIOASSAY PROGRAM FOR RADIOACTIVE ISOTOPE USERS:

Bioassay is not required by users using less than 1 mCi of ^{125}I or ^{3}H per month or at any one time in a sealed form. For persons exceeding 1 mCi of ^{125}I or ^{3}H per month or in open form, the NRC guidelines Requirement for Tritium (Oct. 19, 1977) and Reg. Guide 8:20 (Sept. 1979) bioassay for ^{125}I-^{131}I will be followed.

A. Policy: To protect the users of radioactive isotopes, the following will be performed:

1. Urine bioassays:

a. Tritium users:

(1) Perform baseline, quarterly and post-operational, on individuals utilizing 10 mCi ^{3}H compounds or 1 mCi $^{3}TdR_{H}$ at any one time.

(2) Repeat any positives (5 µCi/l) within 48 hours.

(3) Perform assays yearly on all personnel using more than 10 mCi ^{3}H per year.

b. ^{125}I or ^{131}I users:

(1) Perform baseline, quarterly and post-operational, on individuals utilizing these isotopes in open form in laboratory experiments in excess of 1 mCi per experiment.

(2) Perform assays at 24 hours on individuals doing radioiodinations using 1 mCi or more.

(3) Assay as needed if process on open bench could lead to volatilization and individual exposure to levels of 0.1 mCi.

2. Perform external thyroid monitoring on individuals referenced in Item 1.a.(2). Action points are 0.12 µCi ^{125}I in thyroid and 0.04 µCi ^{131}I in thyroid.

B. Procedures:

1. Tritium:

a. We do not utilize HTO and labeled compounds or nucleotide percursors in open room processes in excess of 100 mCi or 10 mCi, respectively. We do not use other forms indicated

in the other right hand columns of the NRC tritium bioassay guide. The above-referenced levels are utilized in radioisotope fume hoods, as a matter of precaution.

b. We perform baseline urine bioassays on individuals utilizing 10% of the above figures. We also require routine quarterly bioassays on these persons. Post-operational bioassays are performed. Bioassays are repeated within 48 hours if urinary excretion of monitored personnel exceeds 5 µCi/l. This is also our action point for corrective measures.

2. ^{125}I and ^{131}I:

a. We perform baseline bioassays on all employees before using these radionuclides, at the levels referenced in the following Paragraph c. Post-operational bioassays are also performed.

b. Routine bioassays are performed between 24 and 72 hours of exposure to isotopes and levels referenced in Paragraph c.

c. Activity levels above which bioassay for ^{125}I or ^{131}I is required:

	Activity Levels	
	Volatile	Bound or Nonvolatile
Process in open room or bench with possible escape of iodine	0.1 mCi	1.0 mCi
Process with possible escape of iodine, in fumehood of adequate design & performance	1.0 mCi	10.0 mCi

Processes requiring the use of glove boxes, at levels referenced in NRC Guide 8.20, are not ordinarily encountered at this institution. Should the need arise, this equipment will be added.

d. Action points are:

^{125}I thyroid burden = 0.12 µCi
^{131}I thyroid burden = 0.04 µCi

C. Action Levels and Actions to be Implemented:

1. An investigation of the operations involved, including surveys, should be carried out to determine the causes of exposure and to evaluate the potential for further exposures.

PROCEDURES AND PRECAUTIONS FOR USE OF
RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b
(Continued)

2. If the investigation indicates that further work in the area might result in exposure of a worker to concentrations that would cause the limiting intakes established in § 20.103 of 10 CFR Part 20 to be exceeded, the licensee should restrict the worker from further exposure until the source of exposure is discovered and corrected.

   a. Corrective actions that will eliminate or lower the potential for further exposures should be implemented.

   b. A repeat bioassay should be taken within two weeks of the previous measurement and should be evaluated within 24 hours after measurement in order to confirm the presence of internal radioiodine and to obtain an estimate of its effective half-life for use in estimating dose commitment.

3. If the thyroid burden at any time exceeds 0.5 μCi of ^{125}I or 0.14 μCi of ^{131}I, the following actions should be taken:

   a. Carry out all steps described above, and

   b. As soon as possible, refer the case to appropriate medical consultation for recommendations regarding therapeutic procedures that may be carried out to accelerate removal of radioactive iodine from the body. This should be done within 2-3 hours after exposure when the time of exposure is known so that any prescribed thyroid blocking agent would be effective.

   c. Carry out repeated measurements at approximately one week intervals at least until the thyroid burden is less than 0.12 μCi of ^{125}I or 0.04 μCi of ^{131}I. If there is a possibility of longer-term compartments containing ^{125}I or ^{131}I that require evaluation, continue measurements as long as necessary to ensure that appreciable exposures to these other compartments do not go undetected.

III. PROCEDURE FOR RADIOACTIVE ^{32}P USE:

A. Phosphorous-32 emits a beta particle with a maximum energy of 1.71 millions electron volts and with a range in air of 18-20 feet. Local shielding, such as a low density shielding material (Plexiglass), should be used.

B. Guidelines for Use of ^{32}P:

1. Use remote-handling tools whenever practical.

PROCEDURES AND PRECAUTIONS FOR USE OF
RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b
(Continued)

2. Employ a low density shield near the source and a high density shield between the user and the low density shield to stop any Bremsstrahlung radiation produced.

3. Persons using 10 millicuries or more of ^{32}P must wear safety glasses for eye protection.

4. Gloves should be worn at all times to avoid skin contact with the isotope.

5. A film badge is to be work by all ^{32}P users. Anyone using two millicuries or more of ^{32}P in an open form is also required to wear a film ring badge.

6. A survey is required after <u>each</u> use using a Geiger-Muller tube. If radiation is detected, a wipe test is required.

C. <u>Emergency Procedures</u>:

If skin becomes contaminated, wash promptly with soft soap and plenty of water <u>and</u> contact Radiation Safety Office at Extension 2701.

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PERSONNEL MONITORING DEVICES

Refer to 15 H.