NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

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

APPLICATION FOR MATERIAL LICENSE

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

FEDERAL AGENCIES FILE APPLICATIONS WITH:

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

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

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

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

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

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

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

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

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

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

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER 2-113567-01

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

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

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
Dr. Michael Chopp

TELEPHONE NUMBER
(313) 652-5325

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

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

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

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

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES

8509120034 850903
REG3 LIC30
21-13562-01 PDR

10. RADIATION SAFETY PROGRAM.

11. WASTE MA

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*

FEE CATEGORY	AMOUNT ENCLOSED $

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

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

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

SIGNATURE–CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
Suzanne Ozuga	Suzanne Ozuga	Vice President	1/16/85

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

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

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

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial proprietary information furnished to the agency in confidence)*

- [ ] YES
- [ ] NO

RECEIVED
JAN 21 1985
REGION III

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
Renew	1 of 1	7C	CONTROL NO. 78142	CJ
AMOUNT RECEIVED	**CHECK NUMBER**			**DATE**
$500	04132			1/15/85

JAN 21 1985

PRIVACY ACT STATEMENT ON THE REVERSE

NRC FORM 313M
(9-81)
10 CFR 35

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIALS LICENSE – MEDICAL

Approved by OMB
3150-0041

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

Crittenton Hospital
1101 W. University Drive
Rochester, Michigan 48063

TELEPHONE NO.: AREA CODE (313) 652 5325

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

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Michael Chopp, Ph.D.

TELEPHONE NO.: AREA CODE (313) 652 5478

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 21-13562-01

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

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.)*

A. A. REIDINGER, M.D.

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
10 CFR 31.11 FOR IN VITRO STUDIES	X	3 of each byproduct material
10 CFR 35.100, SCHEDULE A, GROUP I	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III	X	2 curies of 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	1000 total

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	X	200
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	300

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

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: 80

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	
X	Supplements A & B Attached for Each Individual User; and Information attached
	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
X	Appendix C Form Attached; or
	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)*	
X	Appendix J Form Attached; or
	Equivalent Information Attached
19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*	
	Appendix K Procedures Followed; or
X	Equivalent Procedures Attached
20. THERAPEUTIC USE OF SEALED SOURCES	
	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 Glenwood, Illinois	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	" "	"
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS

CITY | STATE | ZIP CODE

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

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

26. CERTIFICATE

(This item must be completed by applicant)

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

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

(1) LICENSE FEE CATEGORY
Human Use of Byproduct Material
Specific License

(2) LICENSE FEE ENCLOSED: $ 580.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

(1) NAME *(Type or Print)*
Michael Chopp, Ph.D.,

(2) TITLE
Physicist

c. DATE
1/10/85

NRC FORM 313M (9-81)

Individual users are those individuals noted in Amendent 33, Condition 12, of our license as well as Dr. Hakimi. We are requesting that Dr. Hakimi be licensed for Group I in vitro studies.

ITEM 4

12/20/84

NRC FORM 313M SUPPLEMENT A (9-81) — U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER ~~OR RADIATION SAFETY OFFICER~~	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
Manijeh Hakimi, M. D.	Michigan

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
Anatomic and Clinical Pathology		5-26-74

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES *(Hours)* C	SUPERVISED LABORATORY EXPERIENCE *(Hours)* D
a. RADIATION PHYSICS AND INSTRUMENTATION	Henry Ford Hospital 1971 - 1973	Training during residency	
b. RADIATION PROTECTION	"	"	"
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY	"		
e. RADIOPHARMACEUTICAL CHEMISTRY			

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
I 125	8.5 μC	Crittenton Hospital	1973 - 1984	In vitro
Cobalt 57	2 μC	Crittenton Hospital	1973 - 1984	In vitro

NRC FORM 313M SUPPLEMENT B
(9-81)

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

Manijeh Hakimi, M. D.

STREET ADDRESS

Crittenton Hospital
1101 W. University Drive

CITY	STATE	ZIP CODE
Rochester	Michigan	48063

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION	over 1,000	
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME	approx. 100	
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES	all cases	B_{12} - cobalt 57
OTHER	I 125, digoxin, insulin, B subunit, Folic acid,		cortisol - all in vitro studies.
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

RECEPTOR STATEMENT *(Continued,*

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN *(Continued)*

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA		
	TREATMENT OF HYPERTHYROIDISM		
Au-198	INTRACAVITARY TREATMENT		
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT		
I-125 or Ir-192	INTERSTITIAL TREATMENT		
Co-60 or Cs-137	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

1973 - 1984 approximately 50 hours.

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

a. NAME OF SUPERVISOR
A. S. Ullmann, M. D.

b. NAME OF INSTITUTION
Crittenton Hospital

c. MAILING ADDRESS
1101 W. University Drive

d. CITY
Rochester, Michigan 48063

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE

Alexander S. Ullmann MD.

7. PRECEPTOR'S NAME *(Please type or print)*

Alexander S. Ullmann, M. D.

8. DATE

1-7-85

NRC FORM 313M SUPPLEMENT B
(9-81)

GPO 890-913

CRITTENTON HOSPITAL
ROCHESTER, MICHIGAN

RADIATION SAFETY COMMITTEE

Alan A. Reidinger, M.D.	Radiologist
Michael Chopp, Ph.D.	Physicist
Suzanne Ozinga, R.N.	Vice President, Crittenton Hospital
Donald Birch, M.D.	Oncologist
William MacIntosh,B.S.	Chief Technologist & Coordinator of Radiological Services
Jan Piasecki, R.N.	Nurse
Lawrence Michalski, M.S.	Clinical Laboratory Chemist, Chemistry Section
Barbara Lowe,R.N.M.T.	Nuclear Medicine Technologist
S. Amnuay,M.D.	Internal Medicine

ITEM 7
12/20/84

APPENDIX C

INSTRUMENTATION

1. Survey meters

   a. Manufacturer's name: Texas Nuclear

      Manufacturer's model number: 9112

      Number of instruments available: 1

      Minimum range: 0.02 mR/hr to 200 mR/hr

      Maximum range: 0.02 mR/hr to 200 mR/hr

   b. Manufacturer's name: Victoreen - Cutie Pie

      Manufacturer's model number: 7400

      Number of instruments available: 1

      Minimum range: 0 mR/hr to 25 mR/hr

      Maximum range: 0 mR/hr to 25,000 mR/hr

2. Dose calibrator

   Manufacturer's name: Capintec

   Manufacturer's model number: CRC-5R

   Number of instruments available: 1

3. Instruments used for diagnostic procedures

Type of Instrument	Manufacturer's Name	Model No.
Analyzer/Scalar	Nuclear Chicago	8725
Uptake & well counter Scintillation Detector	Nuclear Chicago	DS-200 (V)
Gamma Counter	Nuclear Chicago	PhoGamma HP w/ upgrade
Gamma Camera	General Electric	Maxicamera II

4. Other (e.g., liquid scintillation counter, area monitor, velometer)

ITEM 9
12/20/84

CALIBRATION OF DOSE CALIBRATOR

A. Sources Used for Linearity Test

(Check as appropriate)

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

or

_____ Other* (specify) _____

B. Sources Used for Instrument Accuracy and Constancy Tests

Radionuclide	Suggested Activity (mCi)	Activity (mCi)	Accuracy
Co-57	3-5	2.1	5%
Ba-133	0.1-0.5	.13	10%
Cs-137	0.1-0.2	.19	5%
~~Ra-226~~	~~1-2~~		

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

or

_____ Equivalent procedures are attached.

*For licensees who are not authorized for Mo-99/Tc-99m generators, activity must be equivalent to the highest activity used.

ITEM 10

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 Health Physics Assocates

(2) Location 3304 Commercial Ave, Northbrook Illinois 60062

(3) Procedures and sources

__X__ have been approved by NRC and are on file in License No. 12-09160-01

_____ have been approvsd 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

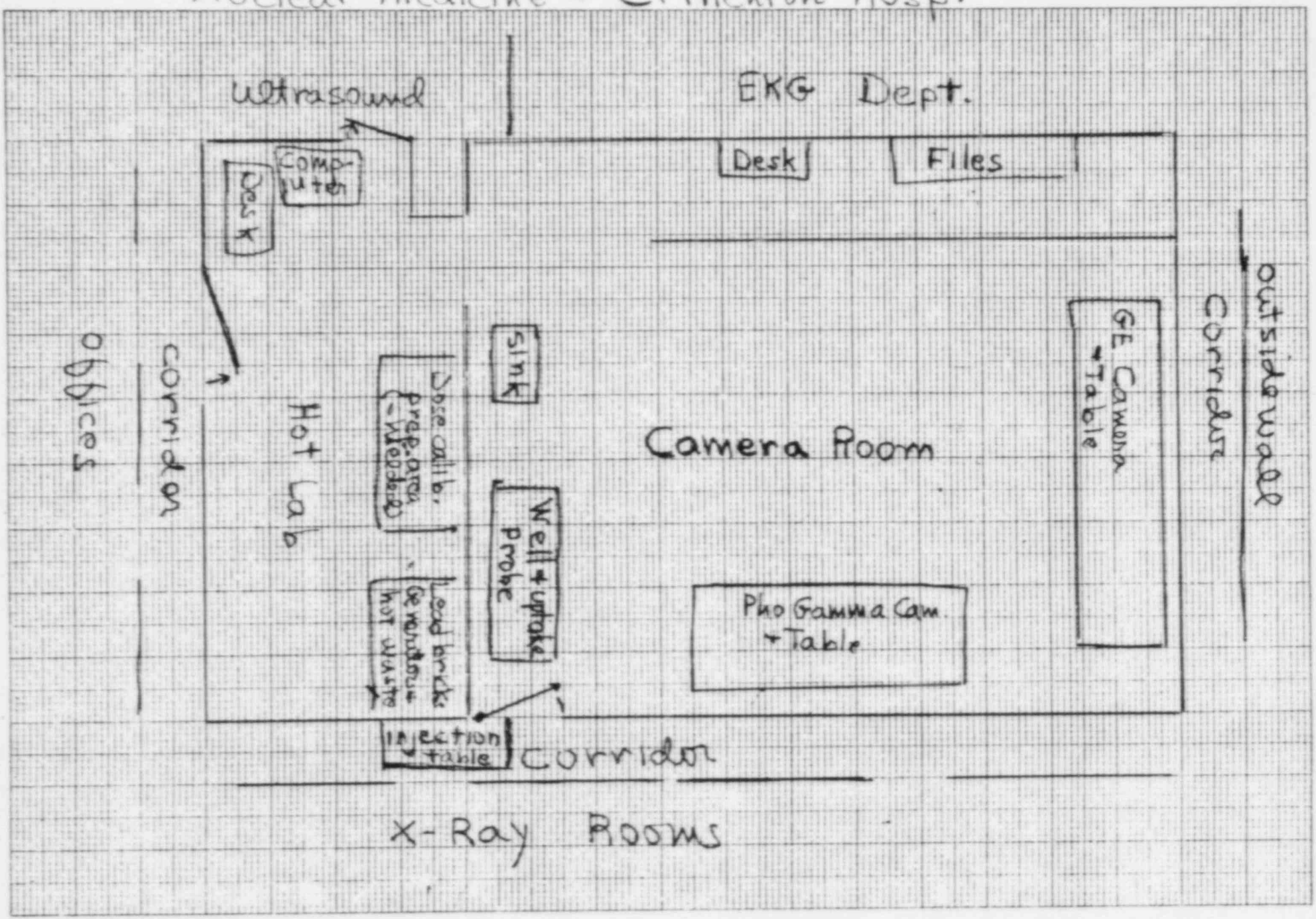
_____ the attached "Certificate of Instrument Calibration."
_____ the consultant's reporting form as attached.

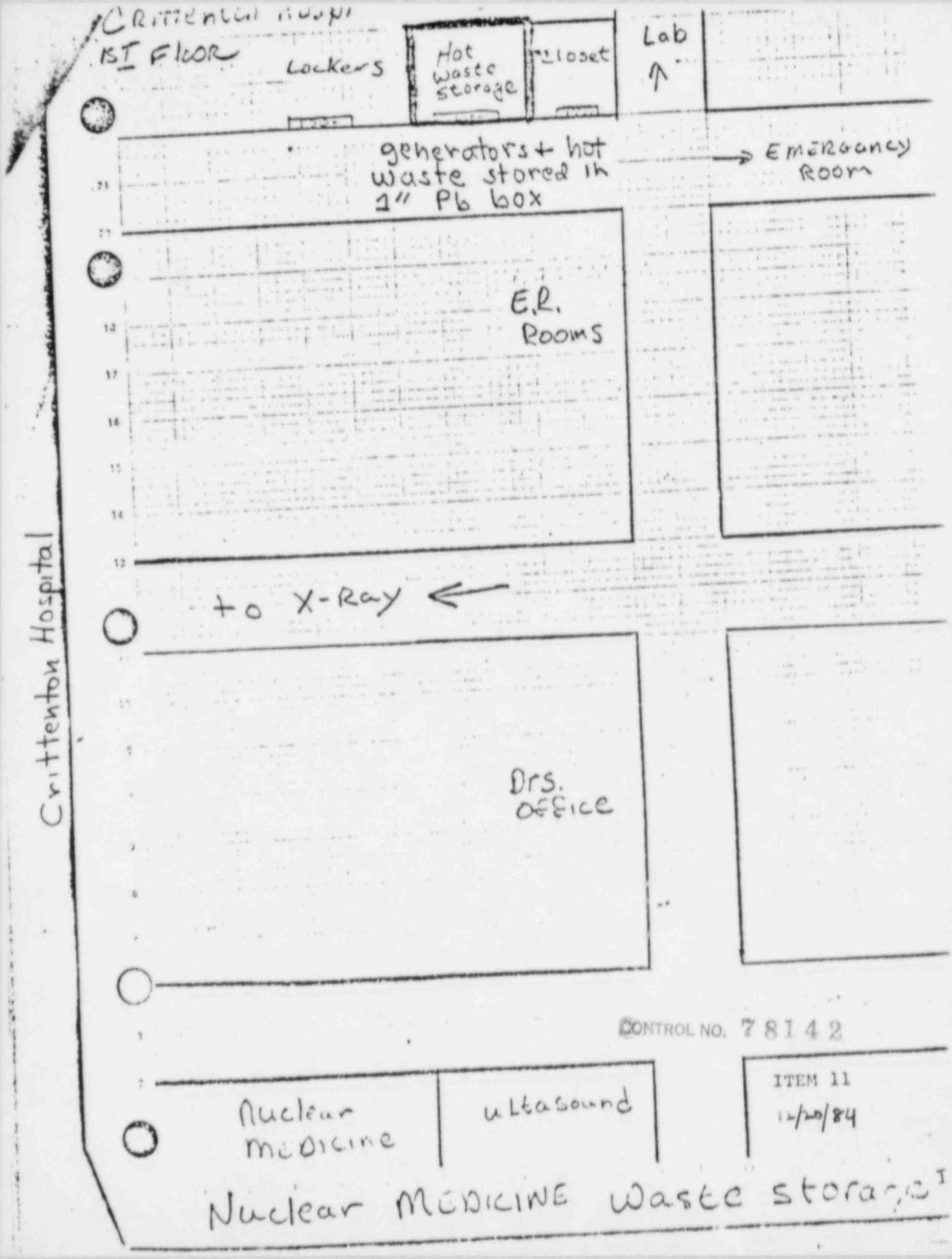
_____ are described in the attachment, and the consultant's report will contain the information on

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

ITEM 10

Nuclear Medicine - Crittenton Hosp.




Critenton Hospital
Critical room
1st Floor
Lockers
Hot waste storage
Closet
Lab
generators + hot waste stored in 1" Pb box
Emergency Room
E.R. Rooms
to X-Ray
Drs. office
Nuclear Medicine
ultasound
CONTROL NO. 78142
ITEM 11
12/20/84
Nuclear Medicine Waste storage

Nuclear Medicine Technicians (2-1/2 Technicians) are all registered and have received extensive training in the handling and hazards of radioisotopes and NRC regulations. They work very closely with the medical physicist and receive ongoing training in all aspects of radiation safety.

Ancillary personnel (e.g. housekeeping, security) are informed about radiation hazards and appropriate precautions.

ITEM 12

12/20/84

Procedures for ordering and receiving radioactive material are identical to those specified in our present license.

Area Survey procedures are identical to those specified in our current license.

ITEM 17

12/20/84

APPENDIX J

WASTE DISPOSAL

Note: In view of the recent problems with shallow-land burial sites used by commercial waste disposal firms, NRC is encouraging its licensees to reduce the volume of wastes sent to these facilities. Important steps in volume reduction are to segregate radioactive from nonradioactive waste, to hold short-lived radioactive waste for decay in storage, and to release certain materials in the sanitary sewer in accordance with § 20.303 of 10 CFR Part 20.

1. Liquid waste will be disposed of (check as appropriate)

_____ In the sanitary sewer system in accordance with § 20.303 of 10 CFR Part 20.

X By commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

2. Mo-99/Tc-99m generators will be (check as appropriate)

_____ Returned to the manufacturer for disposal.

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

* Be sure that waste storage areas were described in Item 11 and that they are surveyed periodically (Item 17).

** These generators may contain long-lived radioisotopic contaminants. Therefore, the generator columns will be segregated so that they may be monitored separately to ensure decay to background levels prior to disposal.

or X Disposed of by commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

3. Other solid waste will be (check as appropriate)

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

_____ Disposed of by commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

4. The commercial waste disposal service used will be

Nuclear Lead Industries Milford MI 4804:

(Name) (City, State)

NRC/Agreement State License No. 21-19623-01

CONTROL NO. 78142

Item 18

12/20/84

When I-131 is used for therapy in our facility, it is in a capsule form. The technicians administering the capsules work quickly and efficiently. No special procedures are followed.

CRITTENTON HOSPITAL
ROCHESTER, MICHIGAN

Xe-133 INFORMATION

Xe-133 is to be used for pulmonary ventilation studies at Crittenton Hospital in the dpeartment of Nuclear Medicine. A maximum of ten (10) patient studies per week will be performed using 10mCi per patient. The Xe-133 will be obtained from radiopharmaceutical companies or radiopharmacies in unit dose vials.

The Xenon will be used in the Imaging room (I-664) and stored in the Hot Lab (I-684). The exhaust vents are in the ceiling and are indicated on the enclosed room diagram. The airflow rate through the exhaust vents is 207 ft^3/min in the Hot Lab and 294 ft^3/min in the imaging room. The fraction of air recirculated is grossly estimated to be 20%. The operation of the exhaust vents will be checked before performing any ventilation studies.

Areas where Xenon is to be used will be under negative pressure. The present supply and exhaust are nearly balanced as noted on the room diagrams. Therefore either the supply or exhaust rates will be adjusted to produce negative pressures, i.e. exhaust greater than supply. Airflow rates will be checked annually to ensure that all areas are under negative pressures.

A nose clamp or mask will be worn by the patient in order to minimize the escape of Xenon.

A gas trap will be used to absorb exhausted gases from patients. Three gas trap systems are presently under consideration for purchase: (1) Atomic Products Co. Model 130-330, (2) Victoreen "Nonex" Model 36-023; (3) Victoreen "Cryo-Safe" Model 36-025.

Energy Rules for Radioactive Gas Contamination. In case of leakage the following procedures will be followed: (1) Remove patient and evacuate room immediately; (2) Monitor activity level with survey meter; (3) Prevent entry into room until activity reaches safe level; and (4) Notify Radiation Safety Officer of incident.

Air concentration of Xe-133 in restricted areas should not exceed 1×10^{-5} uCi/ml and are calculated as follows:

1. Maximum activity used per week 10 pat./wk X10 mCi/pat. = 1.00×10^5 uCi/wk
2. Although a gas trap absorbs greater than 90% of the gas; assume an escape factor of 20%.
3. The volume of air available for dilution during a 40 hour week with an airflow of 394 ft^3/min: 394 ft^3/min X 1.7×10^6 ml/hr/ft^3/min X 40 hrs/wk = 2.68×10^{10} ml/wk.
4. The activity in air is 1×10^5 uCi/wk X 0.20 = 2×10^4 uCi/wk
5. Therefore the concentration in uCi/ml is
$$\frac{2 \times 10^4 \text{ uCi/wk}}{2.68 \times 10^{10} \text{ ml/wk}} = 7.46 \times 10^{-7} \text{ uCi/ml}$$
This is well below the MPC of 1×10^{-5} uCi/ml

ITEM 21
12/20/84

Air concentration of Xe-133, upon disposal by venting to outside into unrestricted areas should not exceed 3×10^{-7} uCi/ml average over one year, is calculated as follows:

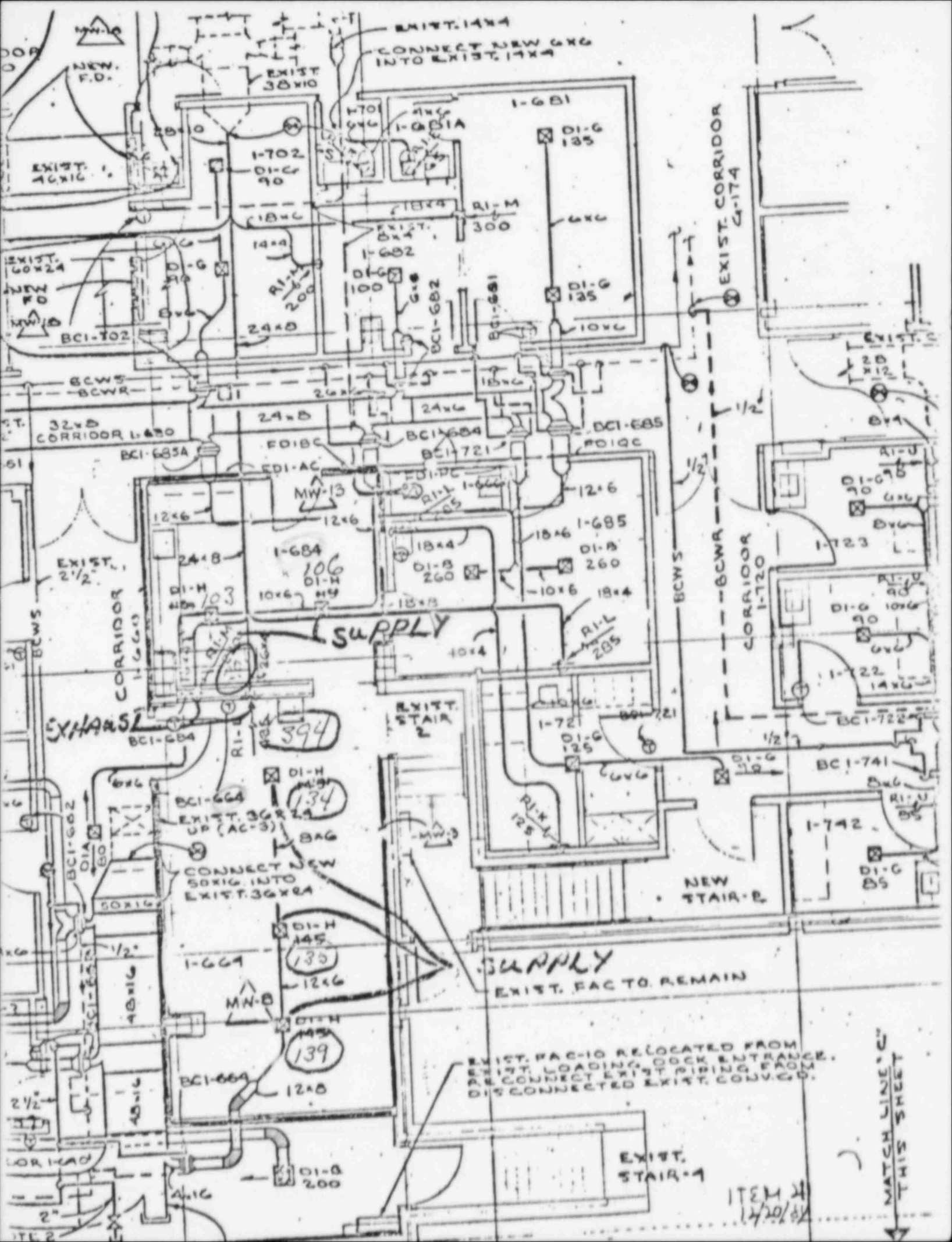
1. Assume the maximum average activity present during a week is 100 mCi, and the escape fraction is 0.20.
   The activity released in one year is: 1×10^5 uCi/wk X 0.20 X 52 wk/yr = 1.04×10^6 uCi/yr.
2. The airflow per year is: 394 ft^3/min X 1.7×10^6 ml/hr/ft^3/min X 168 hr/wk X 52 wk/yr = 5.85×10^{12}ml/yr.
   Therefore the concentration of Xe-133 in units of uCi/ml released to unrestricted areas is:
   $$\frac{1.04 \times 10^6 \text{ uCi/yr}}{5.85 \times 10^{12} \text{ml/yr}} = 1.78 \times 10^{-7} \text{ uCi/ml}$$

The gas trap exhaust will be monitored with GM detector weekly during ventilation study to ensure collection and trapping of system. Filters will be replaced when saturation is indicated.

Delivery system will be stored in ventilation room (Imaging room) during non-use. Saturated traps will be in unoccupied area and monitored for decay to background activity before disposal.

CONTROL NO. 78142

ITEM 21
12/20/84


EXIST. 14x4
CONNECT NEW 6x6 INTO EXIST. 14x4
NEW F.D.
EXIST 30x10
1-681
1-681A
1-702
EXIST. 40x16
EXIST. 60x24
NEW F.D.
1-682
EXIST. CORRIDOR G-174
BC1-702
BC1-682
BC1-681
BCWS
BCWR
32x8 CORRIDOR 1-680
BC1-683A
BC1-684
BC1-721
BC1-685
1-684
1-685
1-723
1-720
CORRIDOR
SUPPLY
EXHAUST
EXIST. STAIR 2
1-722
BC1-722
BC1-741
1-742
NEW STAIR-B
1-664
EXIST. FAC TO REMAIN
EXIST. FAC-10 RELOCATED FROM EXIST. LOADING DOCK ENTRANCE. RECONNECT EXIST PIPING FROM DISCONNECTED EXIST. CONV. G.D.
EXIST. STAIR-1
BC1-664
MATCH LINE - SHEET
ITEM 24
14/20/84

No radioactive material is used on animals in our facility.

ITEM 22

12/20/84

The only radioactive materials specified in Item 6.b that are utilized at Crittenton Hospital are I-131 for treatment of Hyperthyroidism and I-131 for treatment of Thyroid carcinoma. When I-131 is used for Thyroid carcinoma, Appendix K procedures are followed.

ITEM 23

12/20/84