Log 9oct18 SW
Remitter Southwest med Cent
Check No. 6357
Amount $120
Fee Category 7C
Type of Fee mat
Date Check Rec'd.
Date Completed 10/20/87
By: [illegible]

EXHIBIT A

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

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

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

South West Medical Center
3915 Watson Rd.
St. Louis MO 63109

TELEPHONE NO.: AREA CODE (314) 644-7100

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

Same as 1a

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Mark Beanblossom, Consultant
N.M.A. Medical Physics Service

TELEPHONE NO.: AREA CODE (314) 427-5833

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

a. ☐ NEW LICENSE
b. ☒ AMENDMENT TO LICENSE NO. _____
c. ☐ RENEWAL OF LICENSE NO. _____

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.)*

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		
10 CFR 35.100, SCHEDULE A, GROUP I		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III		
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

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

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
Item 11 change in facility description 21 change in procedure for use			of Radioactive Xe-133 gas

8810090087 871023
REG3 LIC30
24-09769-01 PDR

CONTROL NO. 84321

RECEIVED
OCT 19 1987
REGION III

FORM NRC-313M (8-78)

OCT 19 1987

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

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

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

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY		FILM		
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
		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: 7C

(2) LICENSE FEE ENCLOSED: $ $120.00

b. APPLICANT OR CERTIFYING OFFICIAL (Signature)

X (1) NAME (Type or Print) John A. Gantz, M.D.

(2) TITLE
X Director Nuclear Medicine

c. DATE Oct 5, 1987

FORM NRC-313M (8-78)

PRIVACY ACT STATEMENT

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

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

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

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

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

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

Facilities and Equipment Diagram

Air Supply
Air Exhaust
___ Scanner
1 Uptake/Well
2 Camera
3 Lockable Door
4 Receipt Area
5 Generator
6 Kit Preparation
7 Isotope Storage
8 Dose Preparation
9 Waste Storage
10 Dose Calibrator
11 Refrigerator
12 Xenon Unit

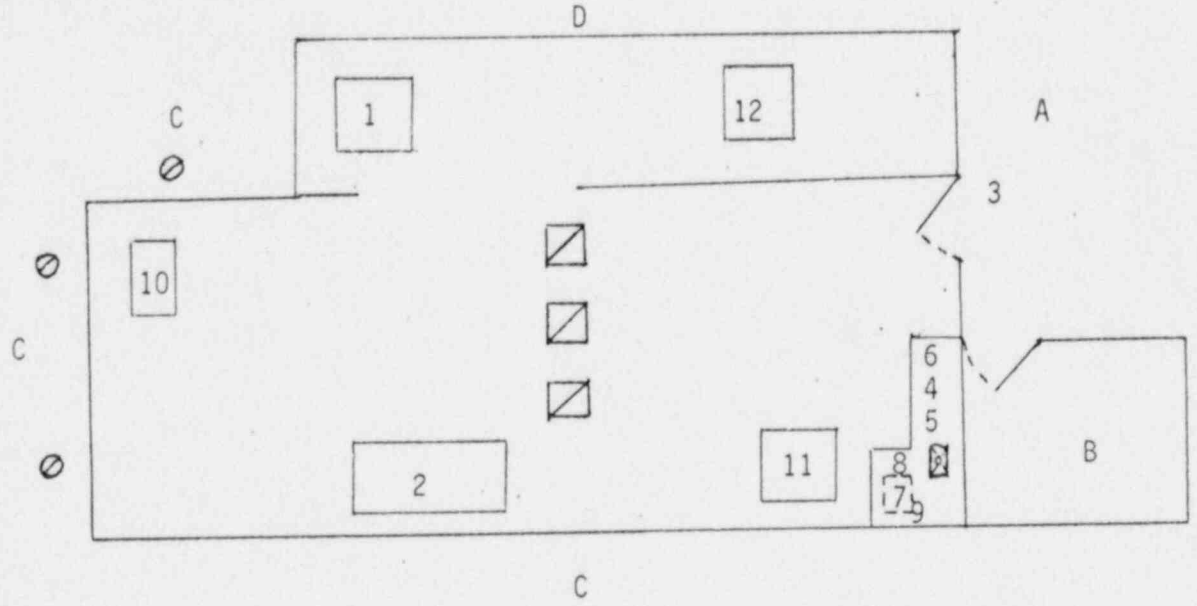
Adjacent Areas

A Hall
B Restroom
C Exterior
D Storage

Sink
Lead Castle

Lead Shielding

___ L x ___ W x ___ H x ___ T
___ L x ___ W x ___ H x ___ T
___ L x ___ W x ___ H x ___ T
___ L x ___ W x ___ H x ___ T



Item #11
1 of 1 pages
Prepared _____
Lic. #24-09769-01

ITEM #21

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES

1) Quantities to be used:

   a) Patient Information

      1) One study per month
      2) 6 mCi per study

   b) Possession Limit: 100 mCi

2) Use and storage areas

   The imaging room is used for the storage and use of Xenon. (See diagram).

3) Procedures for Routine Use

   a) The dose will be prepared and assayed in the dose calibrator. If possible, shielding of the dose will be maintained at all times up to patient administration, except during identification and assay. Patients will be instructed as to the procedure and trial runs will be conducted if at all possible. Finger badges and whole body badges will be worn by all personnel handling Xenon. The camera room door will be closed.

   b) Face masks or mouthpieces along with a Xenon rebreathing charcoal trap apparatus will be employed (Radx Ventilcon-1). The face mask covers both mouth and nose. A nose clamp will be employed with the use of a mouthpiece. Tubing and valves will be inspected prior to use to assure continuity.

   c) Air flow measurements will be taken semi-annually to verify exhaust rates as stated, and to assure negative pressure in the camera room with respect to the hallway.

4) Concentration in Restricted Areas

   a) The air handling system of the camera room exhausts at a rate of 2000 cfm. No air is recirculated in the building. Supplies to the room will be dampered (if necessary) to achieve negative pressure in the room.

   b) Activity (A) = 6,000 uCi per month.
   Loss Factor (f) = 20% (patient associated losses).

   c) Room Volume = 36' x 24' x 8' = 3936 cu. ft.

   $3936 \text{ cu. ft.} \times 2.832 \times 10^{4} \text{ml/cu. ft.} \times 2000 \text{ cfm} \times 16 \text{ hrs} \times 60 \text{ min/hr} = 2.8 \times 10^{14} \text{ml.}$

   Concentration (C) = (A x f)/V

   $$C = \frac{6{,}000 \text{ uCi/month} \times .20}{2.8 \times 10^{14}} = 1.3 \times 10^{-11}$$

5) Emergency Procedures

a) In the event a dose of Xenon is accidentally released into the camera room, the room will be evacuated until levels have reduced to 1×10^{-5} uCi/ml. Removal of personnel will be effected if the patient's condition permits. The time required for this evacuation is described below:

Assume 100% loss to the room.
Activity = 6 mCi = 6,000 uCi
Room Volume = 3936 cu. ft. = 1.1×10^{8} ml
Initial Concentration (Co) = 6,000 uCi/1.1×10^{8} = 5.5×10^{-5} uCi/ml

Clearance Rate (CR) = 2,600 cfm/3936 cu. ft. = 3.12 minutes

Concentration = $Co\ e^{-cr} \times t$

$1 \times 10^{-5} = 5.5 \times 10^{-5} e - RT$

$= \log. 5.5 \times 10^{-5} \times .66T \log e$

$$t = \frac{\log 1 \times 10^{-5} - \log 5.5 \times 10^{-5}}{.66 \log e}$$

t = 3 minutes

Prior to re-entry, a measurement will be made using a low level G-M survey meter near the floor. A reading equivalent to background shall be considered as evidence that the ventilation has cleared the room of Xenon as calculated.

6) Concentrations in Unrestricted Areas

On-time = 4.5 hrs

$$\frac{6{,}000 \text{ uCi/study}}{2600 \text{ cfm} \times 3 \times 10^{-7} \text{ uCi/ml} \times 2.83 \times 10^{4} \text{ ml/cu. ft.} \times 60 \text{ min/hr}}$$

Therefore, for each study, the fan will remain on for 4.5 hours.

7. Disposal of Xenon

After each study, the Xenon collected in the bag will be expelled out the exhaust fan. The bag will be collapsed into the exhaust fan by the technologist. When the bag is surveyed and found to be background, the bag may be disposed of to routine trash.

8) After every 20 procedures, the trapping efficiency of the charcoal trap will be evaluated. A low-level G-M probe will be placed against the inlet tube of the trap during the equilibrium phase of the study and a reading taken. The probe will then be placed against the outlet from the trap at the initiation of the washout phase. The maximum reading during washout will be noted. If the maximum exhaust reading exceeds 10% of the inlet reading, taking background into consideration, the trap will be considered to be saturated and the cartridge will be replaced.

Saturated filters will be stored for decay in the hot lab with sufficient shielding so that levels do not exceed 2.0 mR/hr at the shielded surface. Material will be held for $10_{t1/2's}$, surveyed to determine levels of exposure at background and discarded.