

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

Missouri State Chest Hospital  
Nuclear Medicine Department  
Mt. Vernon, Missouri 65712

TELEPHONE NO.: AREA CODE (417) 466-3711

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

Same as 1.a., also  
see item 1.b. on page 16

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Jerry L. Harris CNMT

TELEPHONE NO.: AREA CODE (417) 831-6520

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

a. ☐ NEW LICENSE

b. ☐ AMENDMENT TO LICENSE NO. \_\_\_\_\_

c. ☒ RENEWAL OF LICENSE NO. \_\_\_\_\_

24-18732-01

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

Jim Williams, M.D. Wayne E. Putnam,  
Carl M. Regier, M.D.  
Donald R. Lash, D.O.

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.)

D.O.

Jim Williams, M.D.

## 6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)	ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
10 CFR 31.11 FOR IN VITRO STUDIES			IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
10 CFR 35.100, SCHEDULE A, GROUP I	X	AS NEEDED	PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED	PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
10 CFR 35.100, SCHEDULE A, GROUP III	X	5,000	GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED	IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED	XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	300
10 CFR 35.100, SCHEDULE A, GROUP VI					

3.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
Applicant: <i>Mr. J. L. Harris</i>			RECEIVED
Check No. <i>0848508550</i>			MAR 04 1985
Amount/Fee <i>\$580.00</i>			REGION III
Type of Fee <i>Renewal</i>			
Date Check Rec'd <i>4/9/83</i>			
Received By <i>C. J. Harris</i>			

U.S. NRC  
FEE MGMT. BRANCH  
MAR 14 1985  
NO 17

FORM NRC-313M

(8-78)

CONTROL NO. 7,8439

MAR 4 1985

8506050246 850510  
REC3 LIC30  
24-18732-01  
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: Oct. 1980

7. MEDICAL ISOTOPES COMMITTEE		15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL (Check One)	
<input checked="" type="checkbox"/>	Names and Specialties Attached; and	<input checked="" type="checkbox"/>	Appendix G Rules Followed; or
<input checked="" type="checkbox"/>	Duties as in Appendix B; or _____ (Check One)		Equivalent Rules Attached
	Equivalent Duties Attached	16. EMERGENCY PROCEDURES (Check One)	
8. TRAINING AND EXPERIENCE		<input checked="" type="checkbox"/>	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)		<input checked="" type="checkbox"/>	Appendix I Procedures Followed; or
<input checked="" type="checkbox"/>	Appendix C Form Attached; or		Equivalent Procedures Attached
	List by Name and Model Number	18. WASTE DISPOSAL (Check One)	
10. CALIBRATION OF INSTRUMENTS		<input checked="" type="checkbox"/>	Appendix J Form Attached; or
<input checked="" type="checkbox"/>	Appendix D Procedures Followed for Survey Instruments; or _____ (Check One)		Equivalent Information Attached
	Equivalent Procedures Attached; and	19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS (Check One)	
<input checked="" type="checkbox"/>	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	
<input checked="" type="checkbox"/>	Description and Diagram Attached		Detailed Information Attached; and
12. PERSONNEL TRAINING PROGRAM			Appendix L Procedures Followed; or _____ (Check One)
<input checked="" type="checkbox"/>	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)	
<input checked="" type="checkbox"/>	Detailed Information Attached	<input checked="" type="checkbox"/>	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
<input checked="" type="checkbox"/>	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	<input checked="" type="checkbox"/> FILM	Siemens Gammasonics, Inc.	Monthly
	<input type="checkbox"/> TLD		
	<input type="checkbox"/> OTHER (Specify)		
b. FINGER	<input type="checkbox"/> FILM		
	<input checked="" type="checkbox"/> TLD	Siemens Gammasonics, Inc.	Monthly
	<input type="checkbox"/> OTHER (Specify)		
c. WRIST	<input type="checkbox"/> FILM		
	<input type="checkbox"/> TLD		
	<input type="checkbox"/> OTHER (Specify)		

d. OTHER (Specify)

## 25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

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

MAILING ADDRESS

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

CITY

STATE

ZIP CODE

## 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)

b. APPLICANT OR CERTIFYING OFFICIAL (Signature)

(1) NAME (Type of Print)

Donald C. Lankins

(2) TITLE

Hospital Director

c. DATE

2-22-85

(1) LICENSE FEE CATEGORY:  
Political Subdivision

(2) LICENSE FEE ENCLOSED: \$

Members of the Medical Isotope Committee and their specialities are:

- |                               |                   |
|-------------------------------|-------------------|
| 1. Jim Williams M.D.          | Radiology         |
| 2. Subhasah S. Kherdekar M.D. | Internal Medicine |
| 3. Donald C. Lamkins          | Administrator     |

There is no pathologist available to serve on the committee.



- A. All users listed on page 1 have been listed as users on previous N.R.C. licenses. The following is a list of the user and his previous license No.

1. Jim Williams M.D.	24-18732-01
2. Carl M. Regier M.D.	24-18732-01
3. Donald R. Lash D.O.	24-18732-01
4. Wayne E. Putnam D.O.	24-18732-01

- B. The radiation safety officer is Jim Williams M.D.

Office phone 417-678-2122  
Home phone 417-678-4343

## 1. Survey meters

- a. Manufacturer's name: Victoreen  
 Manufacturer's model number: 1B CDV-715  
 Number of instruments available: one  
 Minimum range: 0 R/hr to 0.5 R/hr  
 Maximum range: 0 R/hr to 500 R/hr
- b. Manufacturer's name: Victoreen  
 Manufacturer's model number: 6A CDV-700  
 Number of instruments available: one  
 Minimum range: 0 mR/hr to 0.5 mR/hr  
 Maximum range: 0 mR/hr to 50 mR/hr

## 2. Dose calibrator

- Manufacturer's name: Capintec  
 Manufacturer's model number: CRC-6A  
 Number of instruments available: One

## 3. Instruments used for diagnostic procedures

Type of Instrument	Manufacturer's Name	Model No.
General Electric	Radicamera II	H2500C
General Electric	PortaCamera	IIC

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

<u>X</u>	1.	Survey instruments will be calibrated at least annually and following repair.
<u>X</u>	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.

3. Survey instruments will be calibrated

- a. By the manufacturer
- b. At the licensee's facility

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.

- c. By a consultant or outside firm

- (1) Name Radiation Consultants of Mid-America
- (2) Location Shawnee Mission, Kansas
- (3) Procedures and sources \_\_\_\_\_

X have been approved by NRC and are on file in License No. 24-18831-01

\_\_\_\_\_ 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 \_\_\_\_\_

\_\_\_\_\_ 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

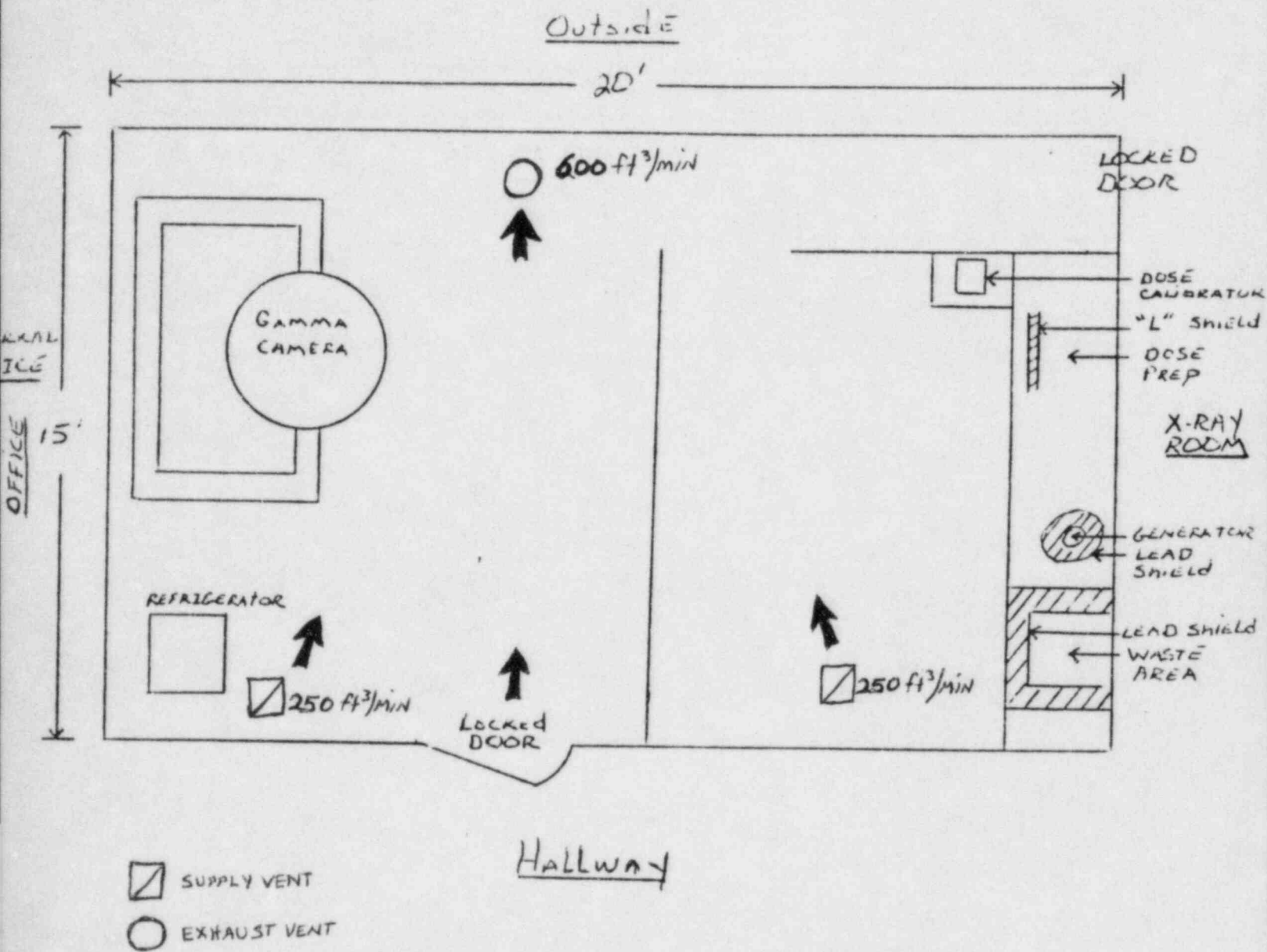
\_\_\_\_\_ the attached "Certificate of Instrument Calibration."  
 \_\_\_\_\_ the consultant's reporting form as attached.





The nuclear medicine department will be located on the third floor of a brick building. The following items will be in the department for the stated purpose:

"L" shield	dose prep shielding
warning tape and signs	posting of area
plastic bags, small	shoe covers, wet containers
disposable gloves	hand protection
masking tape	fastening shoe covers
forceps, tongs	safe handling
plastic bags, large	contaminated material
sponges, 4x4	sopping up
sponges, 2x2	wipe tests
paper towels	blotting and drying
radiac wash or detergent	decontaminating
scouring powder	friction cleaning
tags	identification
scissors	cutting paper
chux	absorbing
survey meter	monitoring
lead shielded hot plate	preparation of SCS
syringe shields	hand shielding
lead syringe carrier	transporting syringes
lead bricks	shielding
hot waste container	decaying
cold waste container	regular trash
non-porous counter tops	in case of spill
non-porous floors	in case of spill
refrigerator	storage
lead pigs	safe vial handling
labels	designate radiation
"no eating, drinking, or smoking permitted"	sign posted



Missouri State Chest Hospital

Before assuming duties, hospital personnel that will work with or near the vicinity of radioactive materials will receive proper instructions through lectures and demonstrations on the following items specified in 19.12 of 10CFR.

- A. Areas where radioactive material is used and stored
- B. Potential hazards associated with radioactive material
- C. Radiological safety procedures appropriate to their respective duties
- D. Pertinent Nuclear Regulatory Commission regulations
- E. Rules and regulations of the NRC license
- F. Pertinent terms of the NRC license
- G. Their obligation to report unsafe conditions
- H. Appropriate response to emergencies or unsafe conditions
- I. Their right to be informed of their radiation exposure and bioassay results
- J. Locations where the licensee has posted or made available notices, copies of pertinent licenses and license conditions (including applications and applicable correspondence), as required by 10CFR part 19

The training program will be of sufficient scope to ensure that all personnel, including technical, clerical, nursing, house-keeping, and security understand these items. Annual refresher training will be provided or whenever significant changes in duties, regulation, or terms of the license have been made.

1. The chief nuclear medicine technologist will place all orders for radioactive material and must ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.
2. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the nuclear medicine department.
3. During off-duty hours, security personnel will accept delivery of radioactive packages in accordance with the procedure outlined in the memorandum below.

MEMORANDUM

Memorandum For: Security Personnel  
From: Jim Williams M.D. Radiation Safety Officer  
Subject: Receipt of Radioactive Packages

Any package containing radioactive material that arrives between 4:30pm and 7:00am or on Saturday or Sunday shall be signed for by the security guard on duty and taken immediately to the nuclear medicine department. Unlock the door, place the package on top of the counter immediately to the front of the door, and relock the door.

If the package is wet or appears to be damaged, IMMEDIATELY contact the hospital Radiation Safety Officer or chief technologist. Ask the carrier to remain at the hospital until it can be determined that neither he nor the delivery vehicle is contaminated.

RADIATION SAFETY OFFICER: Jim Williams M.D.

HOME PHONE: 417-678-4343 OFFICE PHONE: 417-678-2122

CHIEF TECHNOLOGIST: Harold Gray CNMT

HOME PHONE: 417-637-2378 OFFICE PHONE: 417-466-3711



**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.

☐ 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.

☐ 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.

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

☐ Other (specify): \_\_\_\_\_

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

☒ 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

\_\_\_\_\_  
(Name) (City, State)

NRC/Agreement State License No. \_\_\_\_\_

ITEM 21 PROCEDURES AND PRECAUTIONS FOR USE PAGE 14  
OF RADIOACTIVE GASES (XENON-133)

This request is for the use of Xenon-133 at the Missouri State Chest Hospital. The gas will be supplied by Mallinckrodt, Inc. for clinical lung ventilation studies.

We anticipate a maximum of five (5) studies per week. The average activity per patient will be 10 millicuries. We have requested a possession limit of 300 millicuries.

We agree to follow the instructions provided in the package insert supplied with each shipment. The instructions for radioassay and radiation protection of personnel are all outlined in this package insert.

The Xe-133 will be stored under refrigeration in its original leaded shipping container. Refrigeration essentially eliminates loss of Xe-133 from its container. Unused Xe-133 will be allowed to decay in storage, under refrigeration, for a minimum of ten half lives prior to disposal. Xe-133 vials will be surveyed prior to disposal and the results recorded.

By the use of Atomic Products Corporations's Pulmonex Xenon System the release of Xe-133 into the air will be prevented. The operation of the trap will be checked semi-annually by filling a balloon from the exit port on the trap. If the counts from the balloon are considerably above background, the charcoal cartridge will be considered saturated and replaced. The old cartridge will be placed in the decay waste area for ten half lives before disposal. A survey will be performed before disposal to ensure background readings(circular enclosed).

Nose clamps and face masks will be used to reduce Xe-133 loss. However, we anticipate a 20% loss due to leakage and diffusion.

The diagram on page 10 shows air intake and exhaust locations. No air is recirculated. The exhaust is not located within thirty (30) feet of any air intake. The air flow rates will be measured semi-annually.

In the event that there is an accidental release of Xe-133, the imaging room will be evacuated for thirty (30) minutes and the door locked to prevent inadvertent entry. Prior to reentry a survey will be performed to assure that the Xe-133 has been exhausted.

The following calculations show that the nuclear medicine imaging area meets Nuclear Regulatory Commission ventilation requirements:

Restricted Area

$$A = \frac{10 \text{ mci}}{\text{pt}} \times \frac{5 \text{ pt}}{\text{wk}} \times \frac{10^3 \text{ uci}}{\text{mci}}$$

$$A = 5 \times 10^4 \text{ uci/wk}$$

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

$$V = \frac{5 \times 10^4 \text{ uci/wk} \times 0.20}{1 \times 10^{-5} \text{ uci/ml}}$$

$$V = 1 \times 10^9 \text{ ml/wk}$$

Required Ventilation Rate is:

$$\frac{1 \times 10^9 \text{ ml/wk}}{40 \text{ hr/wk}} \div \frac{1.7 \times 10^6 \text{ ml/hr}}{\text{ft}^3/\text{min}} = 14.7 \text{ ft}^3/\text{min}$$

Unrestricted Area

$$A = \frac{5 \text{ pt}}{\text{wk}} \times \frac{10 \text{ mci}}{\text{pt}} \times \frac{10^3 \text{ uci}}{\text{mci}} \times \frac{52 \text{ wk}}{\text{yr}} \quad V = \frac{600 \text{ ft}^3}{\text{min}} \times 1.49 \times \frac{10^{10} \text{ ml/yr}}{\text{ft}^3/\text{min}}$$

$$A = 2.6 \times 10^6 \text{ uci/yr} \times 0.20$$

$$V = 8.94 \times 10^{12} \text{ ml/yr}$$

$$A = 5.2 \times 10^5 \text{ uci/yr}$$

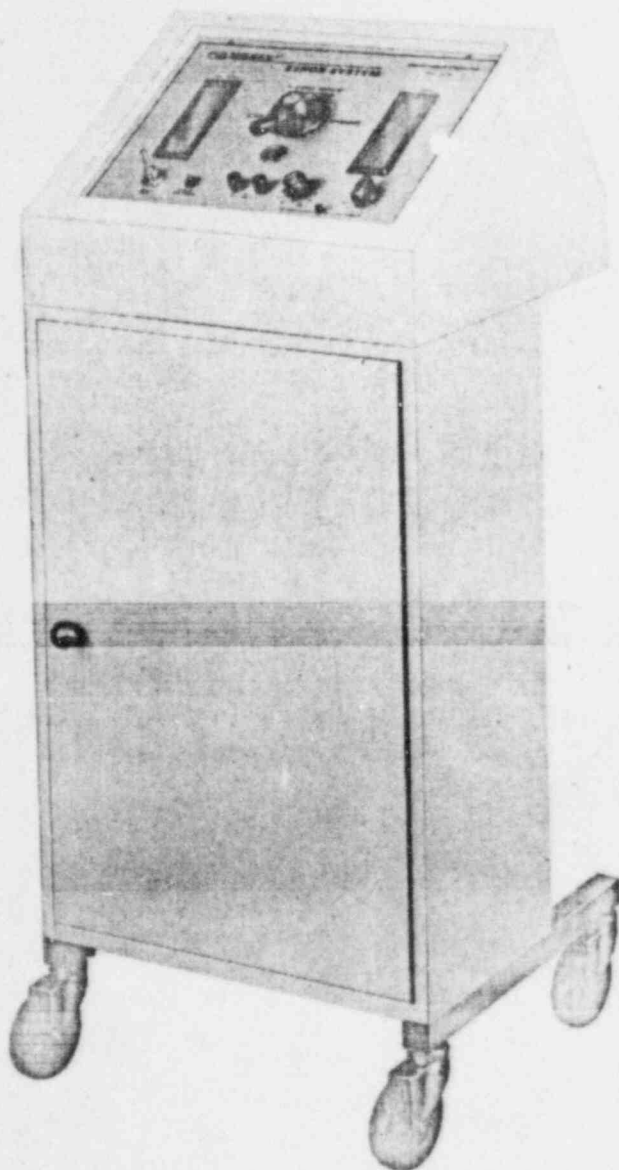
$$C = \frac{5.2 \times 10^5 \text{ uci/yr}}{8.94 \times 10^{12} \text{ ml/yr}}$$

$$C = 0.58 \times 10^{-7} \text{ uci/ml}$$

$$0.58 \times 10^{-7} \text{ uci/ml} < 3 \times 10^{-7} \text{ uci/ml}$$

# **PULMONEX XENON SYSTEM**

One technician can perform an entire study by simply moving a single handle.



**SIMPLE, SAFE OPERATION**

Full-function xenon delivery system with built-in xenon gas trap for rebreathing, washout, perfusion and single breath studies on supine or seated patients.

- Complete easy-to-use system.
- "Air-in"/"Air-out" breathing tubes and motor-driven circulator assures resistance-free breathing.
- Two lead glass windows permit observation of patient breathing bags.
- All flow circuits automatically controlled by a master valve system.
- Automatically timed washout.
- Accepts any commercial form of xenon.
- Rolls easily on large casters for positioning of supine or seated patients.
- Fully shielded.
- Carbon dioxide and moisture traps included.



ITEM 1.b. PLACE OF USE OF RADIOACTIVE  
MATERIALS

PAGE 16

It is our intention to provide Mobile Nuclear Medicine Imaging services to the following hospitals:

Dade County Memorial Hospital ✓ *code 16*  
1005 South Main  
Lockwood, Missouri 65682

Sale Hospital Inc. ✓ *code 32*  
113 W. Hickory St.  
Neosho, Missouri 64850

McCune-Brooks Hospital ✓ *code 14*  
627 W. Centennial  
Carthage, Missouri 64836

South Barry County Mem. Hospital ✓ *code 16*  
P.O. Box 469  
Cassville, Missouri 65625

St. Vincent's Hospital ✓ *code 21*  
801 Lincoln  
Monett, Missouri 65708

Aurora Community Hospital ✓ *code 14*  
500 Porter  
Aurora, Missouri 65605

Jane Chinn Hospital ✓ *not listed*  
Rose and Austin Streets  
Webb City, Missouri 64870

A statement from each hospital administrator, granting approval, is enclosed. None of the hospitals listed above have active N.R.C. licenses

Radiopharmaceuticals will be administered only under the supervision of one of the authorized users.

All doses will be assayed prior to transport.

The doses will be transported in individual lead syringe shields enclosed in a foam packed case. The case will be secured in the right rear corner of the vehicle, away from the driver.

It will not be a normal procedure to leave radioactive material in the vehicle unattended. However, if it becomes absolutely necessary, the technologist will be instructed to lock all vehicle doors to prevent unauthorized access to the material. The technologist will also drive the vehicle. He is an experienced Nuclear Medicine Technologist familiar with 10CFR 19.12, as well as procedures for decontamination and other emergencies as outlined in our Procedure Manual.

A diagram for each hospital is enclosed, showing the area to be used for imaging.

The diagnostic instruments transported by van will be calibrated at each location prior to use.

No radioactive material will be left at the hospitals listed. A contamination survey will be performed before leaving each location and all detectable contamination will be removed.

No radioactive material will be stored in the vehicle overnight. A contamination survey will be performed in the vehicle at the end of each day it is used.

All radioactive materials will be received at the Nuclear Medicine Department, Missouri State Chest Hospital, Mt. Vernon, Missouri under the terms and conditions of that license.

We do not request the use of Xe-133 at the above hospitals.

\*MODEL PROGRAM FOR MAINTAINING OCCUPATIONAL RADIATION EXPOSURES  
AT MEDICAL INSTITUTIONS ALARA  
MISSOURI STATE CHEST HOSPITAL

(Licensee's Name)

2-22-85

(Date)

1. Management Commitment

- a. We, the management of this (medical facility, hospital, etc.), are committed to the program described in this paper for keeping exposures (individual and collective) as low as is reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policy, procedures, and instructions to foster the ALARA concept within our institution. The organization will include a Radiation Safety Committee (RSC)<sup>1</sup> and a Radiation Safety Officer (RSO).
- b. We will perform a formal annual review of the radiation safety program, including ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants.
- c. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.
- d. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

<sup>1</sup>Private practice physician licenses do not include an RSC.

2. Radiation Safety Committee (RSC)<sup>2</sup>

- a. Review of Proposed Users and Uses
  - (1) The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and uses for which he has applied to ensure that the applicant will be able to take appropriate measures to maintain exposure ALARA.
  - (2) When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should have systematized procedures to ensure ALARA and shall have incorporated the use of special equipment such as syringe shields, rubber gloves, etc., in his proposed use.
  - (3) The RSC will ensure that the user justifies his procedures and that dose will be ALARA (individual and collective).
- b. Delegation of Authority

(The judicious delegation of RSC authority is essential to the enforcement of an ALARA program.)

  - (1) The RSC will delegate authority to the RSO for enforcement of the ALARA concept.
  - (2) The RSC will support the RSO in those instances where it is necessary for the RSO to assert his/her authority. Where the RSO has been overruled, the Committee will record the basis for its action in the minutes of the Committee's quarterly meeting.

<sup>2</sup>The RSO on private practice physician licenses will assume the responsibilities of the RSC under Section 2.

c. Review of ALARA Program

- (1) The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.
- (2) The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table O-1 below are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded (see Section 6).<sup>3</sup>
- (3) The RSC will evaluate our institution's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers as well as those of management.

3. Radiation Safety Officer (RSO)

a. Annual and Quarterly Review

- (1) Annual review of the radiation safety program. The RSO will perform an annual review of the radiation safety program for adherence to ALARA concepts. Review of specific procedures may be conducted on a more frequent basis.
- (2) Quarterly review of occupational exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of Section 6 of this program.
- (3) Quarterly review of records of radiation level surveys. The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

b. Education Responsibilities for ALARA Program

- (1) The RSO will schedule briefings and educational sessions to inform workers of ALARA program efforts.

<sup>3</sup>The NRC has emphasized that the Investigational Levels in this program are not new dose limits but, as noted in ICRP Report 26, "Recommendations of the International Commission on Radiological Protection," serve as check points above which the results are considered sufficiently important to justify further investigations.

- (2) The RSO will ensure that authorized users, workers, and ancillary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that management, the RSC, and the RSO are committed to implementing the ALARA concept.

c. Cooperative Efforts for Development of ALARA Procedures

Radiation workers will be given opportunities to participate in formulation of the procedures that they will be required to follow.

- (1) The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.
- (2) The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and will encourage the use of those procedures.

d. Reviewing Instances of Deviation from Good ALARA Practices

The RSO will investigate all known instances of deviation from good ALARA practices and, if possible, will determine the causes. When the cause is known, the RSO will require changes in the program to maintain exposures ALARA.

4. Authorized Users

a. New Procedures Involving Potential Radiation Exposures

- (1) The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radioactive materials for a new procedure.
- (2) The authorized user will evaluate all procedures before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

b. Responsibility of Authorized User to Persons Under His/Her Supervision

- (1) The authorized user will explain the ALARA concept and his/her commitment to maintain exposures ALARA to all persons under his/her supervision.
- (2) The authorized user will ensure that persons under his/her supervision who are



subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

## 5. Persons Who Receive Occupational Radiation Exposure

- a. The worker will be instructed in the ALARA concept and its relationship to working procedures and work conditions.
- b. The worker will know what recourses are available if he/she feels that ALARA is not being promoted on the job.

## 6. Establishment of Investigational Levels In Order to Monitor Individual Occupational External Radiation Exposures

This institution (or private practice) hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the RSC and/or the RSO. The Investigational Levels that we have adopted are listed in Table O-1 below. These levels apply to the exposure of individual workers.

Table O-1

	<i>Investigational Levels (mrems per calendar quarter)</i>	
	<i>Level I</i>	<i>Level II</i>
1. Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	125	375
2. Hands and forearms; feet and ankles	1875	5625
3. Skin of whole body*	750	2250

\*Not normally applicable to nuclear medicine operations except those using significant quantities of beta-emitting isotopes.

The Radiation Safety Officer will review and record on Form NRC-5, "Current Occupational External Radiation Exposures," or an equivalent form (e.g., dosimeter processor's report), results of personnel monitoring not less than once in any calendar quarter as required by § 20.401 of 10 CFR Part 20. The following actions will be taken at the Investigational Levels as stated in Table O-1:

- a. Quarterly exposure of individuals to less than Investigational Level I.

Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's exposure is less than Table O-1 values for the Investigational Level I.

- b. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II.

The RSO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I and will report the results of the reviews at the first RSC meeting following the quarter when the exposure was recorded. If the exposure does not equal or exceed Investigational Level II, no action related specifically to the exposure is required unless deemed appropriate by the Committee. The Committee will, however, consider each such exposure in comparison with those of others performing similar tasks as an index of ALARA program quality and will record the review in the Committee minutes.

- c. Exposure equal to or greater than Investigational Level II.

The RSO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, will take action. A report of the investigation, actions taken, if any, and a copy of the individual's Form NRC-5 or its equivalent will be presented to the RSC at the first RSC meeting following completion of the investigation. The details of these reports will be recorded in the RSC minutes. Committee minutes will be sent to the management of this institution for review. The minutes, containing details of the investigation, will be made available to NRC inspectors for review at the time of the next inspection.

- d. Reestablishment of an individual occupational worker's Investigational Level II to a level above that listed in Table O-1.

In cases where a worker's or a group of workers' exposures need to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented.

The RSC will review the justification for, and will approve, all revisions of Investigational Level II. In such cases, when the exposure equals or exceeds

the newly established Investigational Level II, those actions listed in paragraph 6.c above will be followed.

7. **Signature of Certifying Official<sup>4</sup>**

I hereby certify that this institution (or private practice) has implemented the ALARA Program set forth above.

<sup>4</sup>The person who is authorized to make commitments for the administration of the institution (e.g., hospital administrator) or, in the case of a private practice, the licensed physician.

Donald C. Lamkins  
Signature

Donald C. Lamkins  
Name (print or type)

Hospital Director  
Title

Institution (or Private Practice) Name and Address:

Missouri State Chest Hospital  
Mt. Vernon, Missouri 65712

**SALE HOSPITAL, INC.**

113 WEST HICKORY STREET  
NEOSHO, MO 64850  
417-451-1234

**ALLERGY**

G.C. OLIVE, M.D., A.B.A.I.

**FAMILY PRACTICE**

W.D. DABBS, M.D., A.B.F.P.

R.J. McFARLAND, M.D., A.B.F.P.

D.L. McMILLAN, M.D., A.B.F.P.

**GENERAL PRACTICE**

P.B. ANDERSON, M.D.

G.W. BLANKENSHIP, M.D.

R.E. KENNEY, M.D.

H.C. LENTZ, M.D.

**INTERNAL MEDICINE**

R.J. BETZ, M.D., A.B.I.M.

**PEDIATRICS**

PATRICIA C. KOONCE, M.D.

**SURGERY**

R.F. BETZ, M.S., M.D., F.A.C.S.

J.R. CARTER, M.D.

**UROLOGY**

JOHN P. KOONCE, M.D.

G.C. OLIVE, M.D.

President

ROY E. KENNEY, M.D.

Vice-President

DAVID L. McMILLAN, M.D.

Secretary

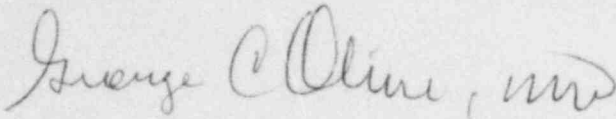
14 January 1985

Nuclear Diagnosis, Inc.  
P.O. Box 3371  
Springfield, Missouri 65808

Dear Sirs:

Radioactive material may be used at our institution under the condition of  
Nuclear Regulatory Commission License No. 24-1873-2-01.

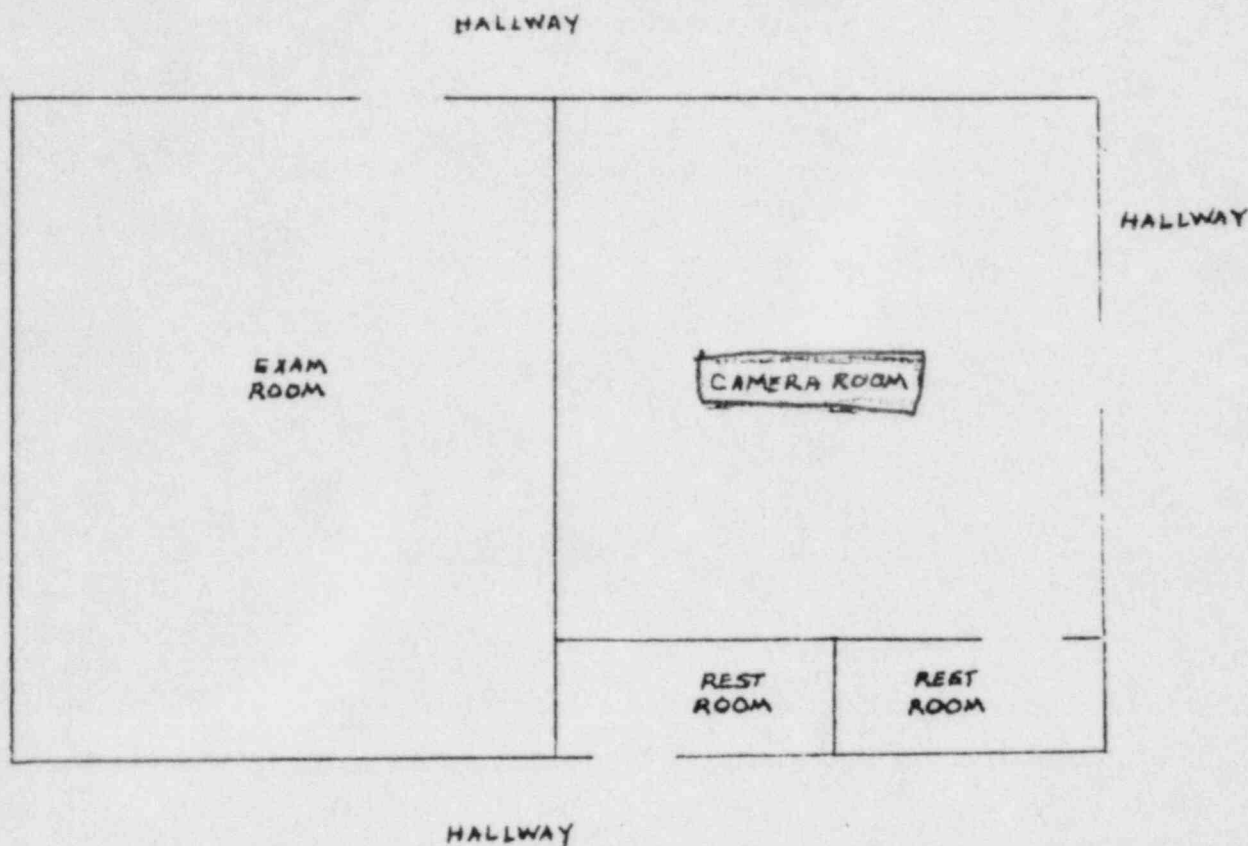
Sincerely,



George C. Olive, M. D.  
Administrator

GCO:jw

c



SALE MEMORIAL HOSPITAL  
NEOSHO MISSOURI

CONTROL NO. 78439



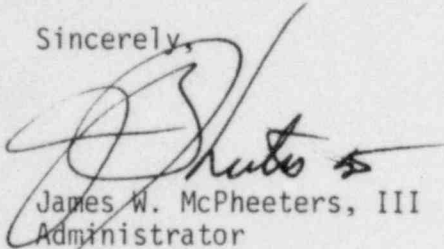
February 1, 1985

Mr. Jerry Harris, Operations Manager  
Nuclear Diagnosis, Inc.  
P. O. Box 3371  
Springfield, Missouri 65808

Dear Jerry:

Radioactive material may be used at our institution under the conditions  
of Nuclear Regulatory Commission license no. 24-18732-01.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. McPheeters", with a stylized flourish at the end.

James W. McPheeters, III  
Administrator

JWM:zh

1ST FLOOR McCune - Brooks  
Cathage, MO.

ERG

STAIRS

TOIL

N.M.  
CAST

TOIL.

WORK

OFFICE

STOR

TOIL

SAN

FILING

E.R.  
CLEAN  
UP

E.R.

LABORATORY

SAN. DSG DSG DSG

DARK

Room

X-RAY

CONTROL

X-RAY

E.R.

OFFICE

ER  
ENTRANCE

P. WAITING

*Dade County Memorial Hospital*

*Post Office Box 210*

*Lockwood, Missouri 65682*

February 6, 1985

Mr. Jerry L. Harris  
Operations Manager  
Nuclear Diagnosis, Inc.  
P. O. Box 3371  
Springfield, Missouri 65808

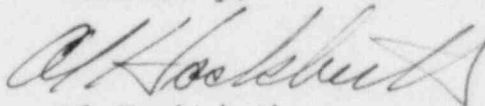
Dear Jerry:

Per your recent correspondence I would like for you to have on record:

Radioactive material may be used at our institution under the conditions of Nuclear Regulatory Commission License No. 24-18732-01.

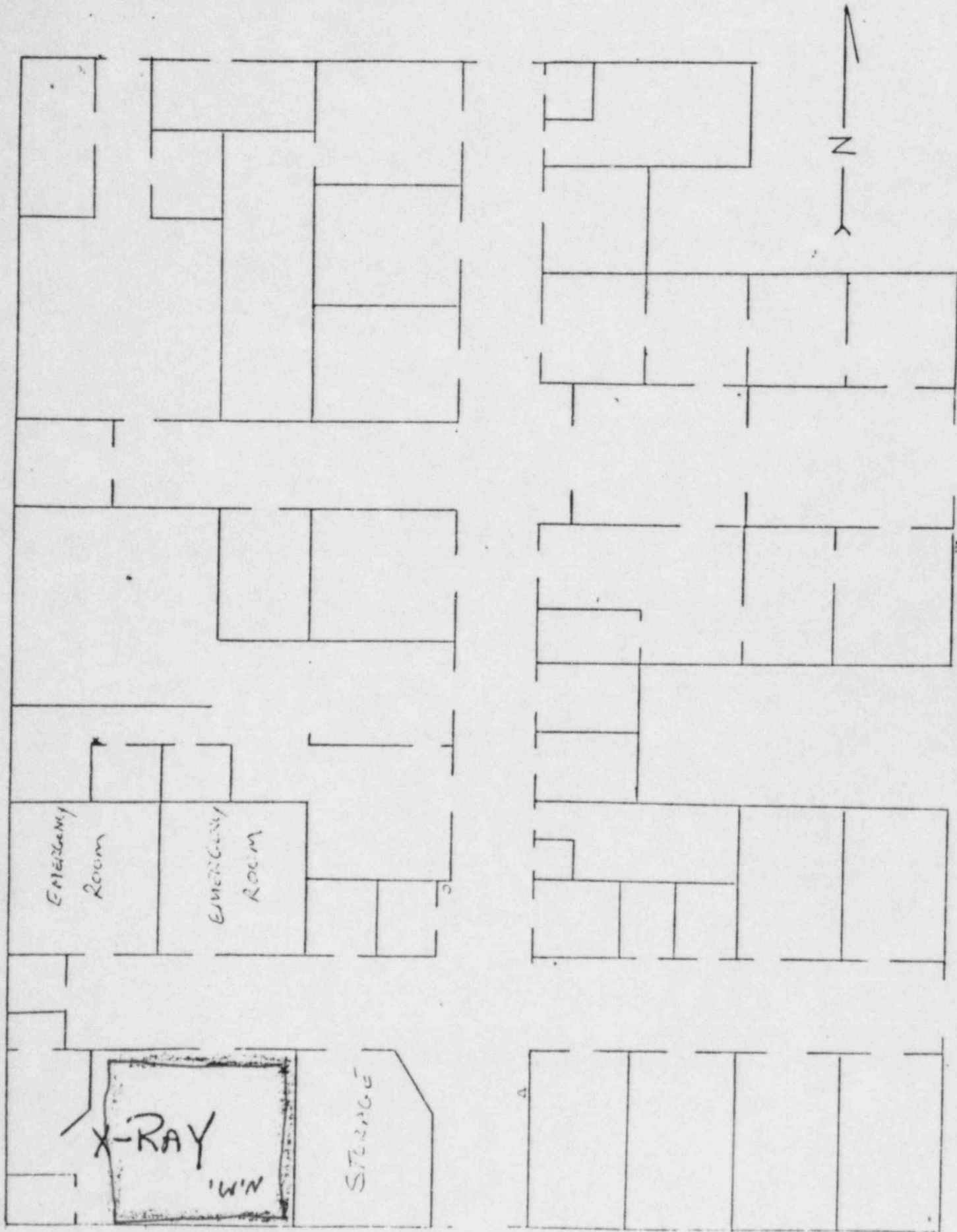
We appreciate your service.

Sincerely,



Al Hackbirth  
Administrator

AH:cj



DADE CO. MEMORIAL HOSPITAL  
Lockwood, Missouri 64501

Emergency entrance



*South Barry County Memorial Hospital*

PHONE 847-4115 - 847-4116

Cassville, Missouri 65625

EDWARD E. BROWNING  
Administrator

GOVERNING BOARD  
ELECTED

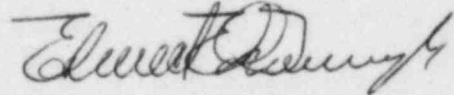
February 6, 1985

Nuclear Diagnosis  
Post Office Box 3371  
Springfield, Mo. 65808

MEMORANDUM:

Radio Active Material may be used at our institution  
under the conditions of the Nuclear Regulatory Commission.  
License Number 24-18732-01.

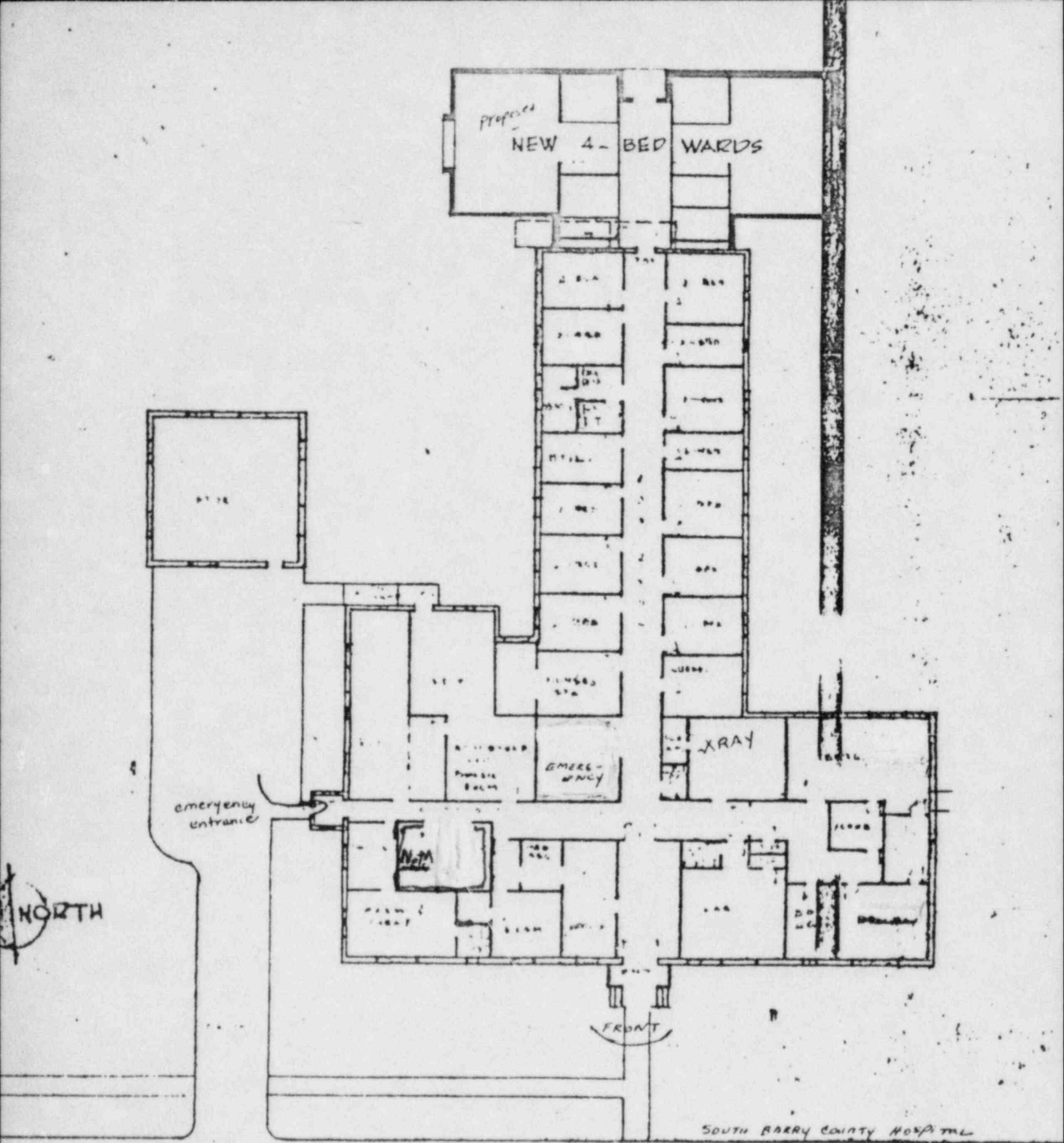
Sincerely,



Edward E. Browning  
Administrator

/jv

CONTROL NO. 78489



GRAVEL AVE

SOUTH BARRY COUNTY HOSPITAL  
DASHING, MO. 65621

FLOOR PLAN  
SCALE: 1" = 20'

**Saint Vincent's Hospital**  
801 Lincoln  
Monett, Mo. 65708

January 21, 1985

Mr. Jerry L. Harris  
Operations Manager  
Nuclear Diagnosis, Inc.  
P.O. Box 3371  
Springfield, MO 65808

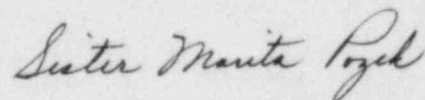
Dear Mr. Harris:

We would like to continue the services of Nuclear Diagnosis, Inc. to perform nuclear medicine imaging procedures at St. Vincent's Hospital; therefore,

February 1, 1985

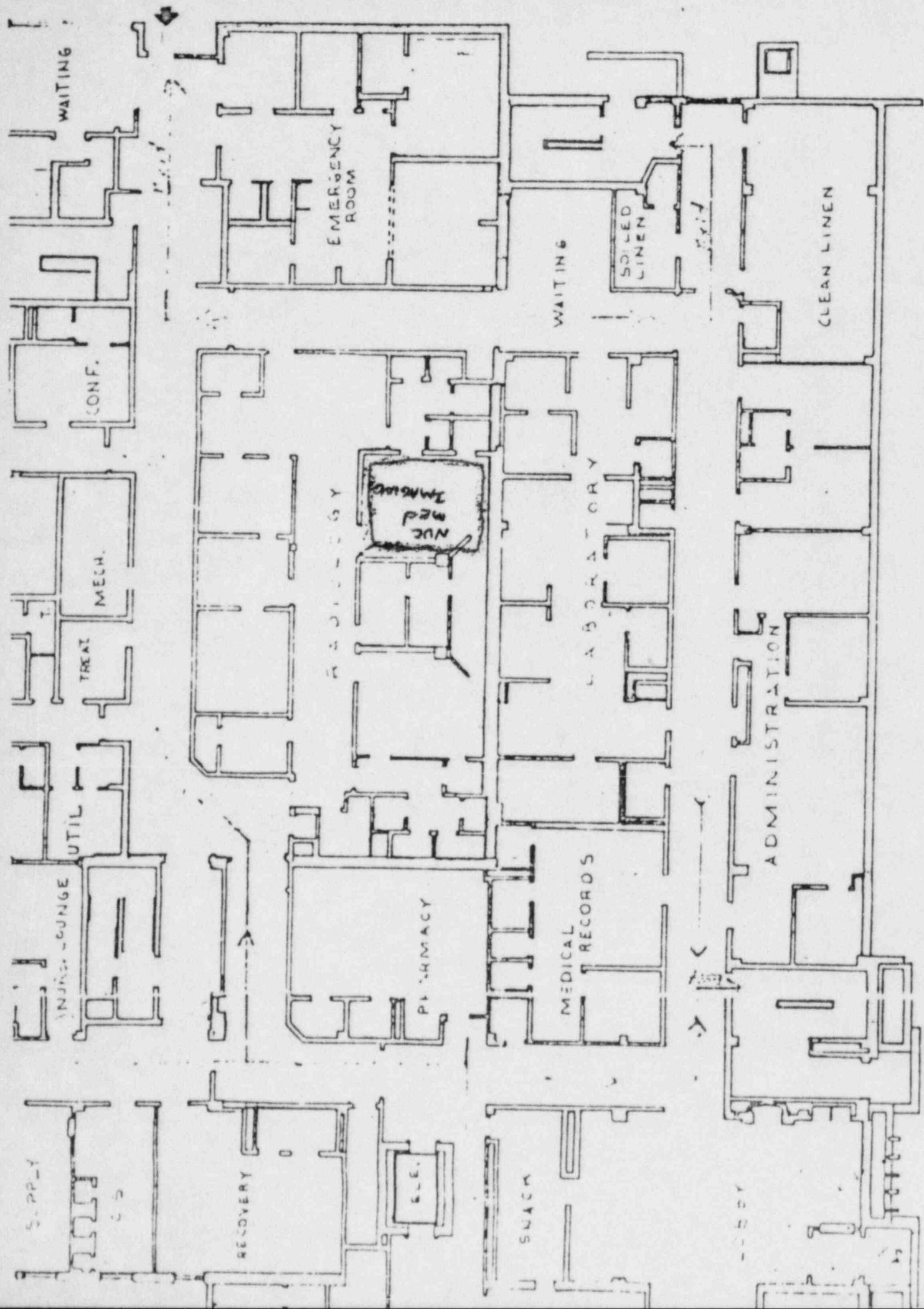
Radioactive material may be used at our institution under the conditions of Nuclear Regulatory Commission license no. 24-18732-01.

Sincerely,



Sister Marita Pozek  
Administrator

SMP/csc







# *Aurora Community Hospital*

TELEPHONE CODE 417—678-2122  
500 PORTER, AURORA, MO. 65605

January 14, 1985

Mr. Jerry L. Harris  
Operations Manager  
Nuclear Diagnosis, Inc.  
P.O. Box 3371  
Springfield, MO 65808

Dear Jerry:

In response to your letter of January 11, 1985, please know that the Aurora Community Hospital grants permission for Nuclear Diagnosis, Inc., to perform nuclear medicine imaging procedures in our institution.

We realize that radioactive material may be used at our institution under the conditions of the Nuclear Regulatory Commission license no. 24-18732-01, and we give our permission for such.

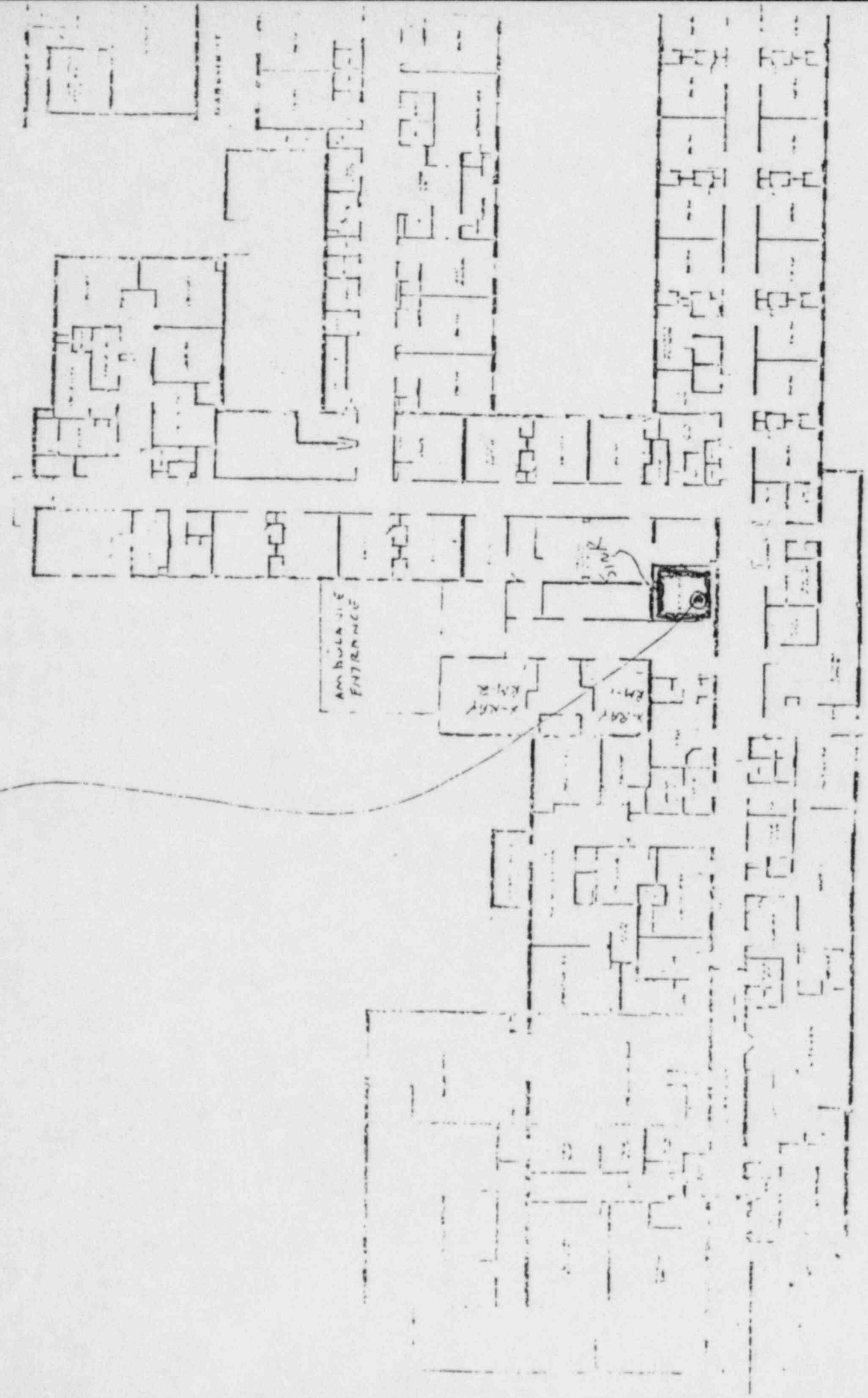
Sincerely,



Charles Drewel  
Administrator

CD/ad

ADAMS COMMUNITY HOSPITAL  
NUCLEAR STUDIES ROOM



Adams Community Hospital



Since 1910

ROSE & AUSTIN STREETS  
WEBB CITY, MISSOURI 64870

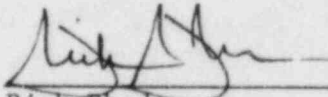
417-673-2404

January 14, 1985

Nuclear Diagnosis, Inc.  
P.O. Box 3371  
Springfield, Missouri 65808

To Whom it May Concern:

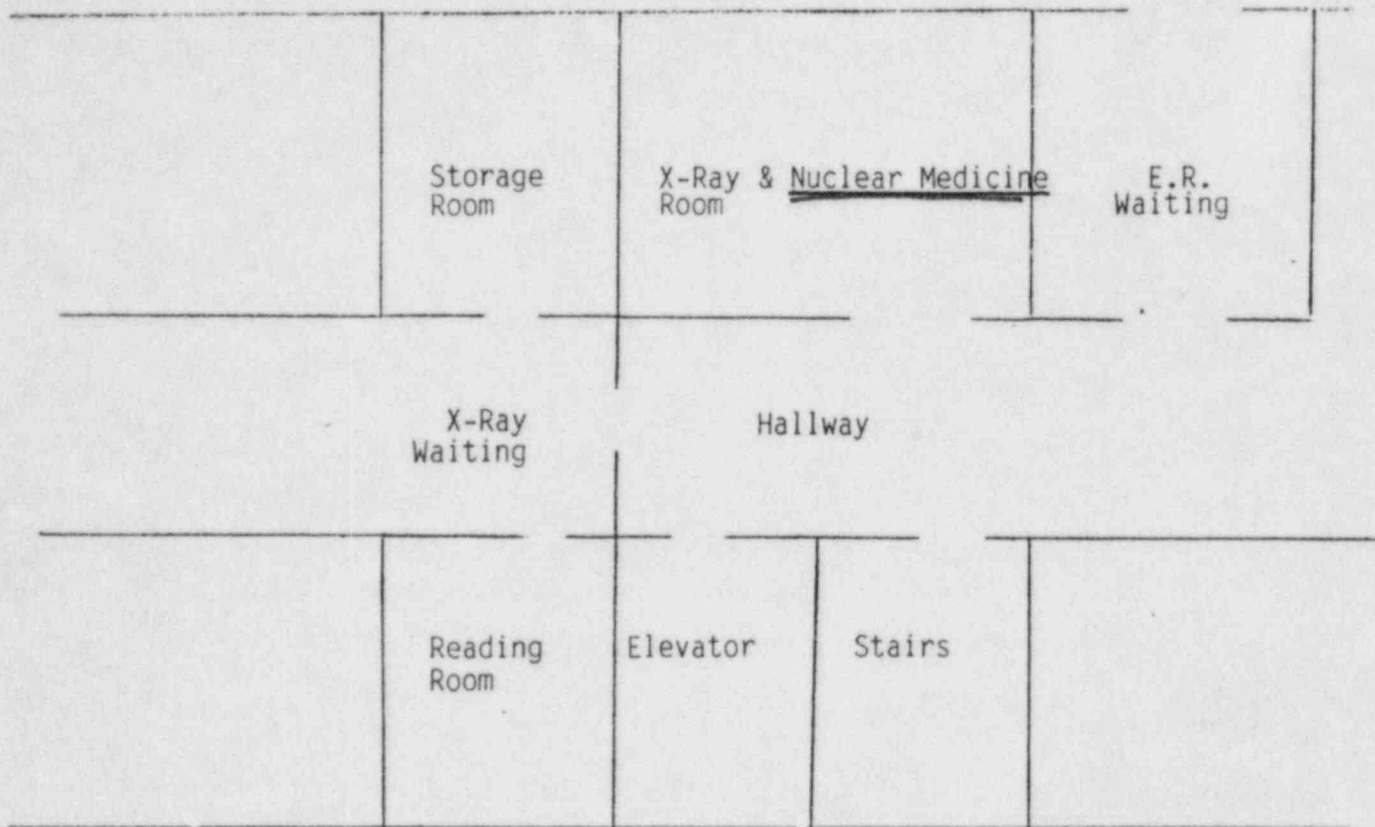
Radioactive material may be used at our institution  
under the conditions of Nuclear Regulatory Commission  
license no. 24-18732-01.

  
Rick Rhodes  
Administrator

CONTROL NO. 78430

We want you to know when you need health care, you're among friends at our hospital.

Outside



JANE CHINN MEMORIAL HOSPITAL

CONTROL No. 7 8 4 3 9