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

Nuclear Medicine Service
Veterans Administration Medical Center
600 South 70 Street
Lincoln, NE 68510 ext. 219

TELEPHONE NO.: AREA CODE (402) 489 3802

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

Erwin D. Zeman, M.D. ext. 219

TELEPHONE NO.: AREA CODE (402) 489 3802

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO. _____
c. ☒ RENEWAL OF LICENSE NO. 26-16293-01

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

Erwin D. Zeman, M.D.
For training and experience see previous license No. 26-16293-01

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.)*

Same as #4.

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	2 curies
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	x	2 curies
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.	x	2 curies

NO

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
			8103170300 28pp

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: February 1, 1981

7. MEDICAL ISOTOPES COMMITTEE	
×	Names and Specialties Attached; and
×	Duties as in Appendix B; or _____ *(Check One)*
	Equivalent Duties Attached
8. TRAINING AND EXPERIENCE	
×	Supplements A & B Attached for Each Individual User; and
×	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
×	Appendix C Form Attached; or
	List by Name and Model Number
10. CALIBRATION OF INSTRUMENTS	
×	Appendix D Procedures Followed for Survey Instruments; or _____ *(Check One)*
	Equivalent Procedures Attached; and
×	Appendix D Procedures Followed for Dose Calibrator; or _____ *(Check One)*
	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT	
×	Description and Diagram Attached
12. PERSONNEL TRAINING PROGRAM	
×	Description of Training Attached
13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL	
×	Detailed Information Attached
14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*	
×	Appendix F Procedures Followed; or
	Equivalent Procedures Attached

15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*	
×	Appendix G Rules Followed; or
	Equivalent Rules Attached
16. EMERGENCY PROCEDURES *(Check One)*	
	Appendix H Procedures Followed; or
×	Equivalent Procedures Attached
17. AREA SURVEY PROCEDURES *(Check One)*	
×	Appendix I Procedures Followed; or
	Equivalent Procedures Attached
18. WASTE DISPOSAL *(Check One)*	
×	Appendix J Form Attached; or
	Equivalent Information Attached
19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*	
×	Appendix K Procedures Followed; or
	Equivalent Procedures Attached
20. THERAPEUTIC USE OF SEALED SOURCES NA	
	Detailed Information Attached; and
	Appendix L Procedures Followed; or _____ *(Check One)*
	Equivalent Procedures Attached
21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon – 133)	
×	Detailed Information Attached
22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS NA	
	Detailed Information Attached
23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b	
	Detailed Information Attached NA

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY		FILM	ICN LABORATORIES	MONTHLY
		TLD		
		OTHER (Specify)		
b. FINGER		FILM	ICN LABORATORIES	MONTHLY
		TLD		
		OTHER (Specify)		
c. WRIST		FILM	ICN LABORATORIES	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.

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

170.11 (a) No. 4

(1) LICENSE FEE CATEGORY:

(2) LICENSE FEE ENCLOSED: $ _____

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

Erwin D. Zeman MD

(1) NAME *(Type of Print)*

ERWIN D. ZEMAN, M.D.

(2) TITLE

Chief, Nuclear Medicine Service

c. DATE

2-6-81

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.

FORM NRC-313M
(8-78)

FORM NRC-313M-SUPPLEMENT A
(8-78)

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
Erwin D. Zeman, M.D.	Iowa - Nebraska

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Nuclear Medicine	Nuclear Medicine	October 27, 1976
American Board of Pathology	Radioisotopic Pathology (PA-CP)	May of 1976

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	SEE PREVIOUS LICENSE NO. 26-16293-01		
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
		SEE PREVIOUS LICENSE NO. 26-16293-01		

0290

FORM NRC-313M-SUPPLEMENT A (8-78) — 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
Alexander Kovac, M.D.	(Attached)

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Diagnostic Radiologist	6/68

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	TYPE AND LENGTH OF TRAINING: SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Albert Einstein Medical Center Philadelphia, PA 4/65-2/66 Queens Hosp. Jamaica, NY 2/66-6/68	30 hours 70 hours	50 hours (Queens)
b. RADIATION PROTECTION	Queens-35 2/66-6/68	35 hours	N/A
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Albert Einstein Queens	10 hours 15 hours	12 hours
d. RADIATION BIOLOGY	Queens	25 hours	N/A
e. RADIOPHARMACEUTICAL CHEMISTRY	A. E. Queens	10 hours 25 hours	12 hours

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
^{99m}Tc	25-30mC$_i$	Queens	5 years	Liver/Spleen Scan Brain Scan/Lung Scan/Vascular Studies, etc.
^{111}In	100mC$_i$	Queens	6 months	R-E System Scans Blood Pool Studies
^{67}Ga	3-5mC$_i$	Queens	1½ years	Scans (body)
57Co	50mC$_i$	Queens	1 year	B_{12} deficiencies anemias

2. State or Territory in which licensed to practice medicine:

Vermont
Washington
Ohio
New York
Indiana
Delaware
Texas
Nebraska

FORM NRC-313M-SUPPLEMENT A
(8-78)

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
Herman W. Knoche, Ph.D.; Radiation Safety Officer	

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
	SEE PREVIOUS LICENSE NO. 26-16293-01	

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	SEE PREVIOUS LICENSE		
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
		SEE PREVIOUS LICENSE		

852

FORM NRC-313M-SUPPLEMENT B
(8-78)

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

Erwin D. Zenan, M.D.

STREET ADDRESS

Veteran's Administration Hospital
600 South 70th Street

CITY | STATE | ZIP CODE

Lincoln NE 68510

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		SEE PREVIOUS LICENSE NO. 26-16293-01 Continuous education and training since 1959.
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
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			

2. Dr. E. D. Zeman, M.D., serves as radiation safety officer on a day to day basis. In his absence, Dr. Alexander Kovac will serve as radiation safety officer. Form NRC-313M-Supplement A has been submitted and contains all pertinent information.

Item #2.

December, 1980

3. Survey meters are calibrated by Julius Haes, University of Nebraska at Lincoln. See attached calibration report.

Item #3

December 1980

PRECEPTOR 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		SEE PREVIOUS LICENSE NO. 26-16293-01 Continuous training and education since 1959.
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

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

a. NAME OF SUPERVISOR

b. NAME OF INSTITUTION

c. MAILING ADDRESS

d. CITY

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE

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

8. DATE

FORM NRC 313M SUPPLEMENT B
(8-78)

822

INSTRUMENT CALIBRATION CERTIFICATION

LICENSE:

Veterans Administration Medical Center
600 S. 70th St.
Lincoln, Nebraska 68510

INSTRUMENT:

Make: digi/master
Reactor Experiments, Inc.

Model Number: None

Serial Number: None

CALIBRATION SOURCE:

Cesium - 137

992.8 mCi: (January 11, 1981)

DATE OF CALIBRATION:

January 11, 1981

RESULTS:

This instrument was calibrated at two points on the R/hr. scale (1.83 and 0.55 R/hr.) and has an average multiplier correction factor of 0.66.

This instrument was calibrated on the mR/hr. scale from a range of 0.3 to 90 mR/hr. (8 points) and has an average multiplier correction factor of 0.87.

This report should be preserved for future reference in accordance with the Nuclear Regulatory Commission Regulations 10 CFR Part 20.

Julius E. Haes, Jr.
Health Physicist

K&E

February 3, 1981

Survey Instrument Calibration

All survey instruments are calibrated annually and serviced by authorized individuals (guidelines follow that of USNRC RG 10.8, dated October 1980). Any instrument placed in storage will be exempt from the annual calibration procedures, but will be calibrated prior to use if taken out of storage. Records are maintained.

Survey instruments of G-M and ionization type are calibrated using a point source of radiation at least at two points on each scale or at least up to 1 R/hr. (Higher range scales will be checked for correct response to radiation). The two points are separated by 1/3 and 2/3 of full scale.

The exposure rate measured by the instrument shall differ from the true exposure rate by less than 10% of full scale (read appropriate Section of the instrument manual to determine how to make necessary adjustments to bring instrument into calibration). Readings within ±20% will be considered acceptable if a response factor is prepared and attached to the instrument. When instruments give reading greater than 1 R/hr and scales are not calibrated, appropriate notes will be issued to the user and attached to the instrument. A "Certificate of Instrument Calibration" will be furnished for each instrument calibrated.

The calibration source is a Cesium-137, Nuclear Chemical Model W-711 sealed source in a Model 371M shield. The source activity and output is calibrated by a Victoreen R unit which is calibrated by sources traceable to NBS (1019 ± 8.3 MCi; October 30, 1979).

To provide for radiation levels corresponding to the scales of the survey instruments, the inverse square law is used. For more sensitive instruments where the distance needed is impractical, filters are placed in the beam to decrease the radiation to the desirable levels. The Victoreen R unit as described above is used to calibrate all filtered radiation.

This source has a "coned" field of radiation so that the operator is outside the field of radiation of high levels during calibration procedures. The source has a sliding arm which brings the activity into its radiation position and/or shielded position. Film badges will be worn by the operator and the ALARA concept will be followed.

Julius E. Haes, Jr., MPH
Consulting Health Physicist
Route 1, Box 166
Roca, NE 68430

Item #3

December 1980

October, 1980

MINI-RESUME

Name: Julius Ernest Haes, Jr.

Born: August 21, 1931

Education:

(1) B.A. with majors in Physics and Mathematics, minor in Biology from Mankato State College, Mankato, Minnesota (1958).

(2) A.E.C. Special Fellowship in Radiological Health from University of Washington, Seattle, Washington (1959).

(3) M.P.H. with major in Environmental Health from University of Minnesota, Minneapolis, Minnesota (1966).

(4) Other special courses in:

(a) Occupational Health
(b) Non-ionizing Radiation
(c) Business Management

Professional Experience: Total of 25 years.

(1) Registered X-Ray Technologist in the United States Air Force, Travis A.F.B., California and Immanuel Hospital, Mankato, Minnesota. Total of 5 years including part time work. This experience included routine conduction of medical roentgenograms, organizing and conduction of training programs in medical x-ray and supervising training.

(2) Health Physicist and Radiation Safety Officer with job locations at the (a) New England Center Hospital, Boston, Massachusetts, (b) University of Minnesota, Minneapolis, Minnesota and (c) University of Nebraska, Lincoln, Nebraska. Total of 20 years of full time work.

This experience includes (a) medical health physics (b) organization and conduction of environmental sampling and measurement of samples obtained for radioactivity, (c) instruction of specific radiation protection courses, (d) organizing and conduction of training programs in health physics and (e) Radiation Safety Officer and responsible for the organization and conduction of a Systems Radiological Health Programs for three separate administrative bodies. This program includes the use of radioactive materials in human use and non-human use in an educational facility, nuclear radioactive pacemakers, teletherapy treatment, medical and industrial x-ray and microwave and laser units. Supervisory capacity for the responsibility of three employees.

February 3, 1981
J. E. Haes Jr., consulting Health Physicist

In accordance with Appendix D, the following information is submitted with regard to Calibration of Instruments

Section I

A. Calibration of survey meters performed with radionuclide sources.

1. Sources approximate point sources.

2. Traceable to with 5% accuracy to WS (NBS) calibrations.

3. Servicing is semi-annual (preventive maintenance contract with Searle-Siemens).

5. Exposure rate differs from true exposure rate by less than 10% of full scale.

NOTE: Sources of Cs-137, Ra-226 or Co 60 are appropriate for use in calibrations.

B. A reference check source of long half-life, e.g. Co-137 or Ra P & E is read at time of above calibrations.

Specific geometry is relative to detector. A reading of this reference check source is taken:

1. Before each use and after each survey to ensure instrument operational function.

2. After each maintenance or battery (power) change.

3. At least quarterly.

D. Records of calibrations are maintained in daily and periodic logs.

E. Radio-active decay and Inverse Square Law used, tangentially.

1. Methods for Calibration of Dose Calibrator.

a. Tested for linearity

(1) Installation and semi-annually

(2) Geometric variation (installation)

(3) Instrument accuracy (installation and annually)

b. After repair and/or adjustment all appropriate tests are repeated.

c. Daily and before each use of instrument: Ra-226 is source used.

d. Quarterly zero set.

e. Test of instrument linearity, Decay curve

f. Test for geometrical variation

g. Test for instrument accuracy

Done semi-annually by preventive maintenance with reference standards traceable to NBS

In-house sources of Cs-137, Co-57 and Ba-133 are not at hand. Maintenance (factory repair) provides these.

The daily log with Ra-226 has been used and calibrated quarterly with little or no variation.

Item 4

December 1980

5. a. 99M-TC generator (Mallinckrodt) is stored in a Mallinckrodt generator lead shield. (See enclosed description).

b. 1. Prepared radiopharmaceuticals that need to be refrigerated are stored in a lead lined refrigerator "under the counter" in the RIA laboratory.

Dimensions: Door--1/4" thick (lead)
2 feet, 5 1/4" high
1 foot, 4" wide

All walls are 1/4" thick lead.

2. Prepared radiopharmaceuticals that do not need to be refrigerated are kept behind the L-bar in the hot lab when not in use. The L-bar is 1" thick and 2 foot, 1" high. (See attached diagram)

c. 1. Radioactive waste is stored in plastic containers behind lead shielding in the hot lab. These are waste products that are prepared radiopharmaceuticals only. The dimensions of the lead shielding are as follows:

1 foot, 1 1/2" high
1" thick (lead)
8" wide

This is located under the counter in the hot lab (see attached diagram). Decaying 99 MTC generators are not stored in the Nuclear Medicine Department. 99 MTC generators are stored in the hot lab for 15 days after receipt and then the generators are all stored in an isolated segment in the main warehouse until delivery is made to Mallinckrodt. It has been confirmed that access to the warehouse is not possible without assistance from warehouse personnel. The area where the warehouse personnel store the generators is surveyed weekly for possible contaimination. The dosimeter readings are recorded.

d. Preparation and dispensing of Group III Kit radiopharmaceuticals is accomplished behind an L-block which is equipped with lead glass. The dimensions of the L-block are as follows:

1" thick
2 foot, 1" high

.here are no rooms across from the use and storage area, only a hallway. This area will be monitored weekly to assure that the radiation level in this area does not exceed the limit specified in 10CFR 20.105.

Item #5

December 1980

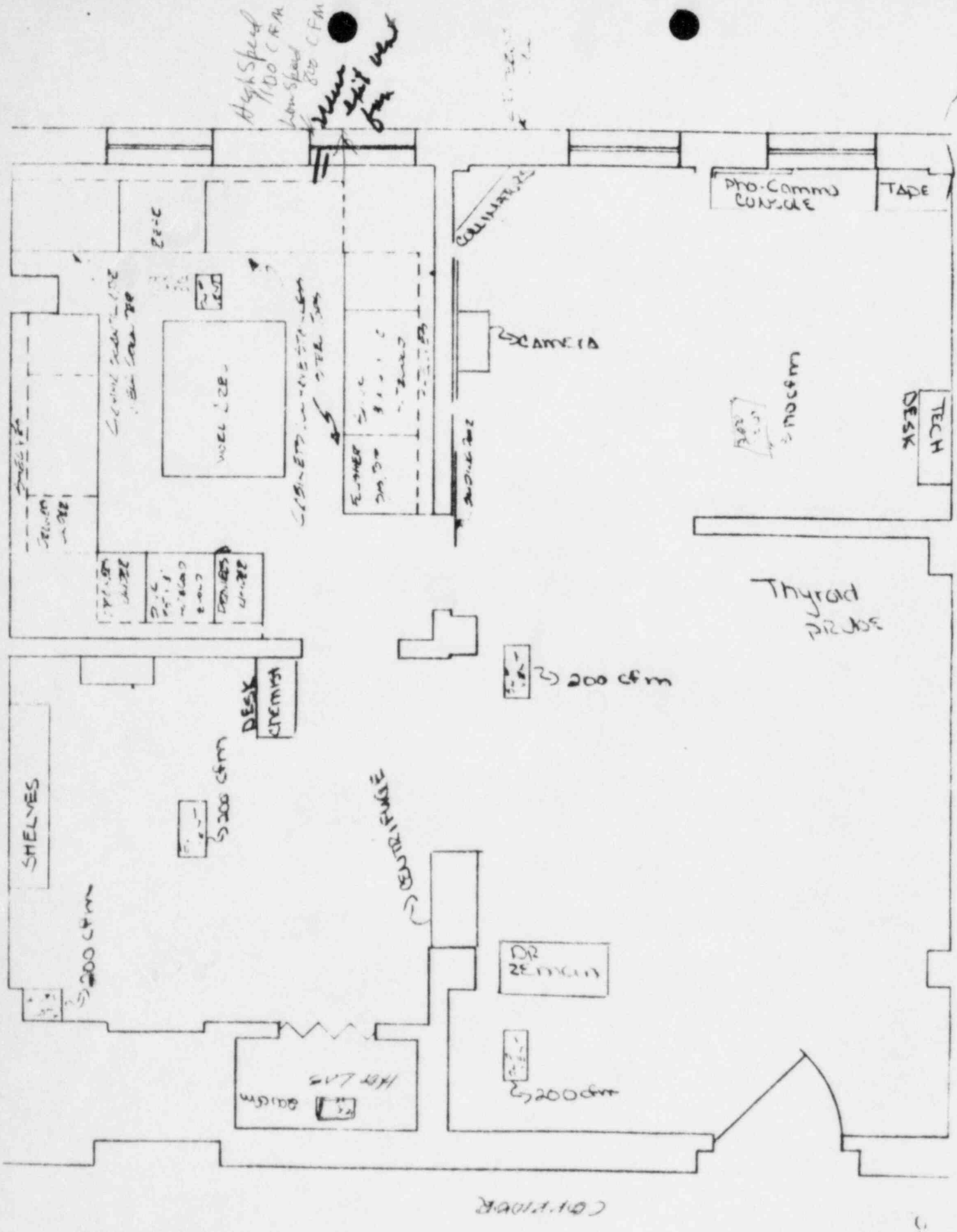


DIAGRAM OF NUCLEAR MEDICINE SERVICE

Item #5
December 1980

6. Dr. R. E. H. Puntenney, Chief of Staff, is now a member of the radioisotope and radiation safety committee.

7. Radiation levels in the area of Supply Service where radioactive materials are stored until delivery to Nuclear Medicine Service will be monitored weekly (included in the weekly W/Pi+CST) to make sure they do not exceed the limits specified in 10 CFR 20.105 (b). However, it should be confirmed that delivery of radioactive materials to Nuclear Medicine Service is made as soon as possible after receipt of the item. Conversation with warehouse personnel has verified that radioactive materials are delivered to Nuclear Medicine Service within one hour of receipt and that packages are <u>not</u> <u>opened</u> in the warehouse.

Item #7

December 1980

8. All radiation workers and ancillary personnel shall receive instruction in the following area.

Radiation in a Restricted Area

I. Storage, transfer and use of radioactive materials in a restricted area.

   a. Precautionary measures employed
   b. Who shall be involved
   c. Specific steps taken in each of the three areas.

II. Health protection problems associated with exposure to radioactive materials and/or radiation in a restricted area. Health risks--minimal.

III. Precautions and procedures to minimize exposure.

   a. Emphasize shielding devices.
   b. Concept of time, distance, and shielding.
   c. Particular procedures followed at this VAMC.

IV. Purpose and function of personnel monitoring devices and other protective devices employed.

   a. Personnel monitoring devices and what they measure.
   b. Shielding devices.
   c. Geiger Mueller meter.
   d. Wipe tests for contamination.

V. Conditions for radiation protection as outlined in the license.

   a. Overall look at the license.

VI. Responsibility to report conditions in violation of the license.

   Radiation safety officer--who he is and that violations should be reported to this person.

VII. What to do in case of a radiation accident at this VAMC.

   a. Individual responsibilities--everyone has a job to do.
   b. Precautionary measures to be taken by all those involved in the accident.

VIII. Radiation exposure reports.

   Availability to personnel for viewing.

This instruction shall be given to personnel at the time they begin work at this VAMC and thereafter on a refresher basis.

Item #8

December 1980

9. Personnel will be given the following instructions in reference to the handling of therapeutic Iodine-131.

a. Personnel shall wear gloves when opening vials of therapeutic 131 I.

b. Vials of therapeutic 131 I will be opened in a fume hood, or

c. Personnel shall wear surgical masks when opening the vials to decrease the possibility of intake of volatile iodine.

d. Vials of therapeutic 131 I will be opened behind the L-bar in the hot lab.

Item #9

December 1980

10. a. The airflow ratings of each are supply vent and each air exhaust vent will be remeasured semiannually to determine that the system continues to operate in accordance with the specifications submitted.

c. To monitor the Xenon exhaust level, we shall use the Xen alarm Xenon trap monitor supplied by atomic products corporation. Please refer to the attached sheet for complete product information.

If this VAMC becomes licensed to use 133 Xenon, the Pulmonex Xenon system will be a high priority for purchase consideration. It is equipped with a charcoal xenon gas trap, as described in the attached literature, keeping this Nuclear Medicine Service within NRC regulations. With the addition of the xenon trap monitor, the entire system will be sufficient for safe use of Xenon-133. Please refer to the attached literature for a full description of the pulmonex xenon system and the xenalarm xenon trap monitor. This equipment is appropriate to the budget of this government agency.

Item #10

December 1980

"XENALARM" XENON TRAP MONITOR

- **Simple, sensitive, compact unit immediately alerts user to excess concentrations of radioactive xenon.**
- **Visual and aural alarms.**

Placed at the exhaust port of any xenon gas trap, the Xenalarm monitors the xenon exhaust level and automatically trips a visual and aural alarm when concentrations of radioactive xenon exceed 1 x 10^{-2} uCi/ml. NRC and State agencies require that the xenon concentration in controlled areas does not exceed 1 x 10^{-5} uCi/ml averaged over one year based on a 40 hour work week.

A "beeper" audio alarm and a flashing red light warn of excessive radioactive xenon. The audio alarm may be turned off at any time by a simple "off-on" switch. Should the alarm activate during or after a study, the charcoal cartridge in the trap should be changed immediately after the completion of the study.

The "Test" button permits manual activation of the alarm system to ascertain its operation. A method to calibrate the unit with a known ^{137}Cs source is provided.

The complete unit measures 8-1/2" W x 3-11/16" H x 13-3/16" D.

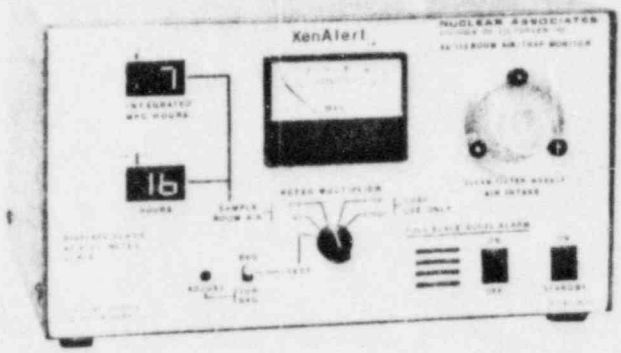
136-250 Xenalarm Xenon Trap Monitor $795.00

"XenAlert" ™

XENON-133 ROOM AIR/TRAP MONITOR

- **Large meter reads directly in MPC units.**
- **Digital register shows integrated MPC-Hours.**
- **Audio and visual alarms alert personnel to hazardous xenon concentrations.**
- **Fully-shielded counting chamber.**
- **Compatible with all xenon-dispensing, administration and trapping systems.**

Now, concentrations of xenon-133 in room air **and** gas trap effluent can be quantitatively monitored continuously and accurately with the unique "XenAlert" Monitor. Unlike present, non-integrating devices, the "XenAlert" eliminates tedious and complex calculations by automatically computing total exposure (in MPC-Hours units) and exposure rate (in fraction of MPC). Xenon monitoring has never been easier!



Additional "XenAlert" Features:

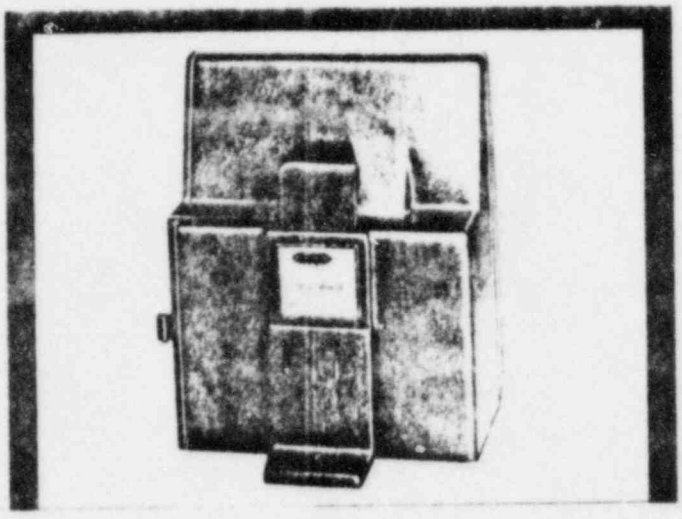
- **Background Subtract Circuit.** Permits subtraction of background radiation to assure maximum accuracy when counting ^{133}Xe.
- **Total Hours Register.** Displays total hours of xenon data accumulation.
- **Power Indicator.** Light-emiting diode flashes once per second to indicate data accumulation.
- **Integration Disable Circuit.** Suspends MPC-Hours and Hours data accumulation during gas trap monitoring, assuring that the digital registers will display only room air integration values.
- **Emergency Alarm.** Loud alarm is activated automatically when 80 MPC-Hours have been accumulated.

136-751 "XenAlert" ^{133}Xe Room Air/Trap Monitor $1,975.00

136-753 Particulate-Matter Replacement Filter. Package of 25 filters 25.00

136-754 Hose for gas trap monitoring, 6-ft. . . 20.00

END



Ultra-Shield

ULTRA-SHIELD

CATALOG NUMBER

024

Ultra-Shield was designed to provide additional lead shielding around all four sides and top of the *Ultra-TechneKow*™ *FM*. A movable center shield is provided to allow easy access to the elution station.

Mallinckrodt NUCLEAR

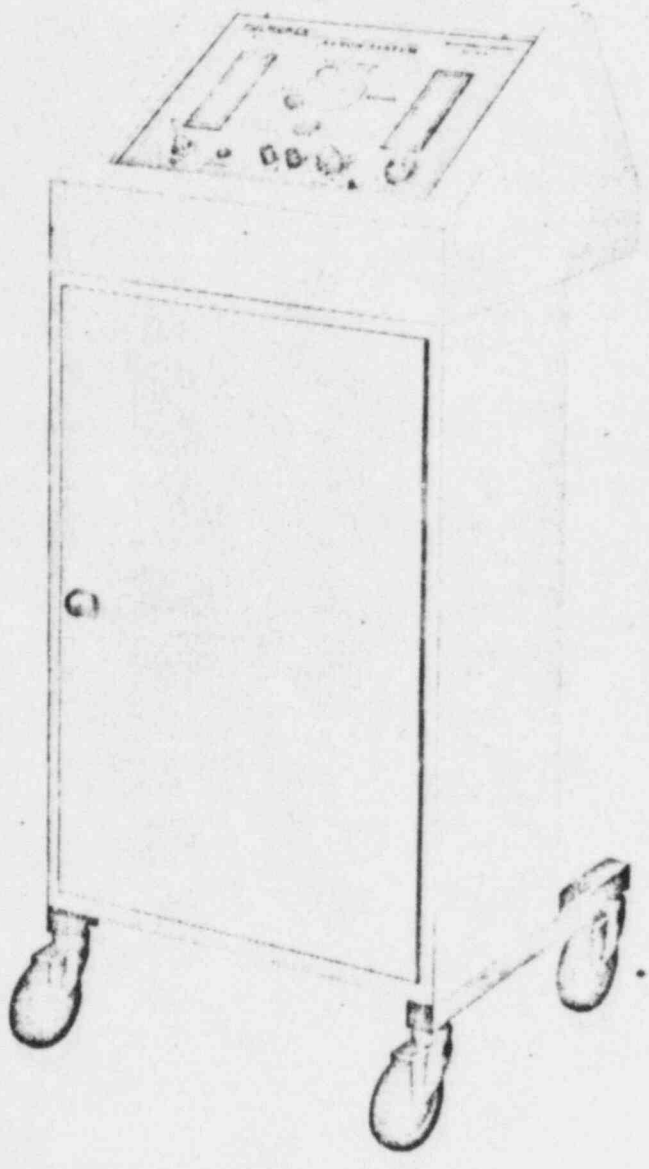
Item No's

EDT

0290

PULMONEX XENON SYSTEM

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



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 obser of patient breathing bags.
- All flow circuits automatically controll by a master valve system.
- Automatically timed washout.
- Accepts any commercial form of xeno
- Rolls easily on large casters for positioning of supine or seated patient
- Fully shielded.
- Carbon dioxide and moisture traps included.

SIMPLE, SAFE OPERATION

Medical Center

600 South
Seventieth Street
Lincoln, NE 68510

Veterans Administration

March 20, 1980

Director, Nuclear Medicine (115)
Veterans Administration Central Office
Department of Medicine and Surgery
Washington, D. C. 20420

SUBJECT: Application for Materials License - Medical

The enclosed letter and two copies of the Application for Materials License - Medical are being submitted to your office for concurrence. They should then be mailed on to the U. S. Nuclear Regulatory Commission.

W. G. WRIGHT
Acting Medical Center Director

Enclosures: 3

MAR 25 1980

JAMES J. SMITH, M. D. (115)
Director, Nuclear Medicine Service
VA Central Office
Washington, D.C. 20420

In Reply Refer To: 115