DCS 8/16/79 8/31/79 7B

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

Christian Hospital, Northeast
11133 Dunn Road
St. Louis, Missouri 63136

TELEPHONE NO.: AREA CODE (314) 355 2300

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

Same, and:
Christian Hospital, Northwest
1225 Graham Road
Florissant, Missouri 63031
(314) 839-3800

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Vince A. Gargaro, Consultant
Nuclear Medicine Associates, Inc.

TELEPHONE NO.: AREA CODE (216) 663 7000

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 24-13383-01 030-02382

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

Refer to page #4 of form NRC 313M

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.)*

James W. DeHnam, Jr., M.D. with consultation from Nuclear Medicine Assoc., Inc., Cleveland, Ohio 44125

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
10 CFR 31.11 FOR IN VITRO STUDIES	X	3.0
10 CFR 35.100, SCHEDULE A, GROUP I	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III	X	2000
10 CFR 35.100, SCHEDULE A, GROUP IV	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V	X	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

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	2000

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
Sr-90	Sealed Source Atlantic Research Corp. Model B-1	156 mCi	Treatment of superficial eye diseases.

ML 19180146

RECEIVED BY LFMB
Date AUG 9 1979
Log

Amend 10 (Renewal)

FORM NRC-313M (8-78)

JUL 27 1979

Control No. 02035

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	
X	Names and Specialties Attached; and
	Duties as in Appendix B; or *(Check One)*
X	Equivalent Duties Attached
8. TRAINING AND EXPERIENCE Refer to page #4 on NRC 313M	
	Supplements A & B Attached for Each Individual User; and
	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
	Appendix C Form Attached; or
X	List by Name and Model Number
10. CALIBRATION OF INSTRUMENTS	
	Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
X	Equivalent Procedures Attached; and
	Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
X	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT	
X	Description and Diagram Attached
12. PERSONNEL TRAINING PROGRAM	
X	Description of Training Attached
13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL	
X	Detailed Information Attached
14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*	
	Appendix F Procedures Followed; or
X	Equivalent Procedures Attached

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

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	Searle, Landauer	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	Searle	Monthly
		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: 7B

(2) LICENSE FEE ENCLOSED: $ 150.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

X William R. Alley

(1) NAME *(Type or Print)*

X William R. Alley

(2) TITLE

X Administrator

c. DATE

X 7/23/79

FORM NRC-313M (8-78)

Prepared 7/10/79 Control No. 02035

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.

Authorized Users from Item #4 on NRC-313M:

	GROUPS
James Walton DeBnam, Jr., M.D.	I, II, III, IV, V, Xe, Sr-90
Robert W. Lohr, M.D.	I, II, III, Xe
Antonio B. Santillano, M.D.	31.11, 35.31, I
John W. Durr, M.D.	31.11, 35.31, I
James H. Allen, M.D.	31.11, 35.31, I
Jean Kang, M.D.	31.11, 35.31, I
William L. Walter, M.D.	Sr-90, only at Northwest

For physician training and experience, refer to previous applications for license #24-13383-01.

FORM NRC-313M
(8-78)

MEDICAL ISOTOPES COMMITTEE

Responsibility:

The Committee is responsible for:

1. Ensuring that all individuals who work with or in the vicinity of radioactive material have sufficient training and experience to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.

2. Ensuring that all use of radioactive material is conducted in a safe manner and in accordance with NRC regulations and the conditions of the license.

Duties:

1. Be familiar with all pertinent NRC regulations, the terms of the license, and information submitted in support of the request for the license and its amendments.

2. Review the training and experience of any individual who uses radioactive material (including physicians, technologists, physicists, and pharmacists) and determine that the qualifications are sufficient to ensure them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.

3. Establish a program to ensure that all individuals whose duties may require them to work in the vicinity of radioactive material (e.g., nursing, security and housekeeping personnel) are properly instructed as required by Section 19.12 of 10 CFR Part 19.

4. Review and approve all requests for use of radioactive material within the institution.

5. Prescribe special conditions that will be required during a proposed use of radioactive material such as requirements for bioassays, physical examinations of users and special monitoring procedures.

6. Review the entire radiation safety program at least annually to determine that all activities are being conducted safely and in accordance with NRC regulations and the conditions of the license. The review shall include an examination of all records, reports from the radiation safety officer, results of NRC inspection, written safety procedures and management control system.

7. Recommend remedial action to correct any deficiencies identified in the radiation safety program.

8. Maintain written records of all committee meetings, actions, recommendations and decisions.

Applicant... 5077070
Check No... 4150(10)
Amount/Fee Category... Renewal
Type of Fee... AUG 9 1979
Date Check Rec'd...
Received By... JUL 27 1979

Item #7
1 of 3 pages
Prepared 7/10/79
License #24-13383-01
Control No. 02035

Orig. To...
Action Compl 8/9/79

9. Ensure that the byproduct material license is amended, when necessary, prior to any changes in facilities, equipment, policies, procedures, and personnel.

Meeting Frequency:

The medical isotopes committee shall meet as often as necessary to conduct its business, but not less than once in each calendar quarter.

MEDICAL ISOTOPES COMMITTEE

The following members compose the Medical Isotopes Committee of Christian Hospital, Northeast

Name	Medical Specialty
James Walton DeBnam, Jr., M.D.	Radiation Safety Officer/ Radiologist
Mark Edward Markley	Administration Member
GENE DAVIS, JR., M.D.	Radiologist
Paul K. Ormay, M.D.	Radiologist
John W. Durr, M.D.	Pathologist/Hematologist
Roy L. Eaton, M.D.	Internist (Pulmonary)

Nuclear Medicine Associates' visiting consulting physicists available periodically and/or as required.

Qualification of the above members are outlined in the attached curriculum vitae.

Duties and responsibilities of the Medical Isotope Committee are attached.

JAMES WALTON DEBNAM, JR., M.D., CURRICULUM VITAE

Birth:	October 28, 1936 - Louisville, Kentucky
Education:	
1954-1958	University of Louisville, Louisville, Ky, BA
1958-1962	University of Louisville School of Medicine - M.D.
Internships and Residencies:	
1962-1963	Rotating Internship, Detroit Receiving Hospital Wayne State University, Detroit, Michigan
1965-1967	Radiology Residency, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO
Academic Appointments:	
1967-1970	Instructor in Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO
1970-1971	Assistant Professor of Radiology, Medical College of Georgia, Augusta, Georgia
1971-1974	Clinical Instructor in Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, Missouri
1974-1976	Assistant Professor of Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine St. Louis, MO
1976- to present	Clinical Assistant Professor of Medicine, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO
Military Service:	Senior Assistant Surgeon, United States Public Health Service, 1963-1965
Hospital Appointment:	Christian Hospital Northeast - Northwest, St. Louis, MO 1976 to present
Board Certification:	American Board of Radiology, 1969 The American Board of Nuclear Medicine, 1972
Societies:	Member - St. Louis Metropolitan Medical Society; Missouri State Medical Society; American Medical Association; American College of Radiology; Society of Nuclear Medicine; Radiological Society of North America
Medical Licenses:	Kentucky 13410 1963 Missouri R3273 1968 Illinois 36-43236 1970

Control No. 02035

MARK EDWARD MARLEY

7747 A Olson Loop
Fort Meade, Maryland 20755
Home (301) 674-7872
Office (301) 677-4453

PERSONAL

Age: 27. Born in Independence, Missouri, February 10, 1951. Married.
Height: 5' 7". Weight: 145 lbs. Excellent health.

OCCUPATIONAL OBJECTIVE

To obtain an administrative position in a health care facility.

EMPLOYMENT HISTORY

December, 1977 to date

Commander (Rank - Captain)
702nd Medical Company (Clearing)
Fort Meade, Maryland

Responsible for personnel management of 130 enlisted and seven officers within a company. Standards, policies, training, promotions, establishing budgets, and deployment capabilities are among some of the numerous duties I have as the Commander. Am directly responsible for over $1,000,000 worth of equipment.

May, 1977 to
December, 1977

Patient Administrator and Adjutant
10th Combat Support Hospital
Fort Meade, Maryland

Primary function was as the Hospital Administrator for Hospital Facility at Boy Scout Jamboree, Moraine State Park, Butler, Pennsylvania. Duties included supervision, patient transfers, medical records administration, and establishment of patient flow system to render medical care for 20,000 scouts on site.

August, 1975 to
May, 1977

Reassigned as Assistant Chief
Patient Administration Division
Reynolds Army Hospital
Fort Sill, Oklahoma

*(See responsibilities on next page)

April, 1975 to
August, 1975

Chief
Patient Administration Divison
47th Field Station Hospital
Fort Chaffee, Arkansas

Was assigned on a temporary basis to process all Indochinese refugees from Vietnam. Responsibilities included patient administration, health care coordination for HEW, immigration and naturalization service, chemical disease control, and public health administration.

February, 1975 to
April, 1975

Assistant Chief
Patient Administration Division
Reynolds Army Hospital
Fort Sill, Oklahoma

*Involved in all administrative functions including supervisory duties of the patient care delivery system, admissions, dispositions, outpatient/ inpatient records, coding, medical boards, air evacuation department, and advisor for the Civilian Health and Medical Program for the Uniform Services (CHAMPUS), a health insurance program for military dependents who require care beyond military capabilities. Directly responsible for the supervision of 40 civilian employees.

March, 1974 to
February, 1975

Patient Assistance Officer
Race Relations Officer
Reynolds Army Hospital
Fort Sill, Oklahoma

Handled patient and equal opportunity inquiries. Educational instructor for the affirmative action plan.

October, 1973 to
March, 1974

Entered the United States Army as
2nd Lt. Medical Service Corp
Attended Officer's Basic Training at
Academy of Health Sciences
Fort Sam Houston, Texas

October, 1973 to
March, 1974
(Continued)

Was selected and completed the Patient Administration Course at Academy of Health Sciences Fort Sam Houston, Texas

Spent the first six months of my military career at the Academy of Health Sciences to obtain a working knowledge of the Medical Service Corp and the Patient Administration Division within a health care facility.

EDUCATION

December, 1978

Master of Arts Degree in Management and Supervision with concentration in Health Care Administration completed in October, 1978, from Central Michigan University. Graduation and Degree received in December, 1978.

Curriculum offered rigorous training in management and supervision in the area of Health Care Administration. Completed study of problems and practices including legal aspects of Health Care Facilities.

September, 1974 to
May, 1977

18 Hours of Business Management and Administrative Courses completed.
Cameron University
Lawton, Oklahoma

September, 1969 to
August, 1973

B.S. Degree in Sociology
Southwest Missouri State University
Springfield, Missouri

Curriculum offered training in the social sciences and social-economic behavior to qualify for tasks in urban and rural community planning.

PROFESSIONAL MEMBERSHIP

Member, American Hospital Association
Society of Patient Representatives
Since 1974

Member, Reserve Officer Association
Since 1973

HONORS

May, 1977	Army Commendation Medal
April, 1977	Expert Field Medical Badge
December, 1973	Commandant's List
October, 1973	National Defense Act Ribbon
August, 1973	Distinguished Military Student

PUBLICATIONS

Co-author of article, "Medical Unit Self-Contained Transportable Deployment" to be published at a later date.

REFERENCES

Personal references, transcripts, and job evaluations are available upon request.

NORTHWEST RADIOLOGISTS, INC.

Room 201
11155 Dunn Road
St. Louis, MO 63136
Phone (314) 355-6565

Donald E. Callahan, M.D.
Robert W. Lohr, M.D.
Paul K. Orsey, M.D.
Mye M. Kyaw, M.D.
Kil Soo Lee, M.D.

James W. Dickson, Jr., M.D.
Gene L. Davis, Jr., M.D.
Dale F. Dierberg, M.D.
Federico B. Reiter, M.D.

CURRICULUM VITAE

NAME	Gene L. Davis, Jr., M. D.
DATE OF BIRTH	August 18, 1946
PLACE OF BIRTH	Charleston, West Virginia
MARITAL STATUS	Married
CHILDREN	None
HOME ADDRESS	625 Chamblee Lane Creve Coeur, Missouri 63141
PROFESSIONAL ADDRESS	Northwest Radiologists, Inc. Room 201 11155 Dunn Road St. Louis, Missouri 63136 Telephone: (314) 355-6565

EDUCATION AND EXPERIENCE

1964 - 1968	B.A. (Chemistry), University of Virginia, Charlottesville, Virginia
1968 - 1972	M.D. University of Virginia, Charlottesville, Virginia

INTERNSHIP

1972 - 1973	Barnes Hospital, Washington University School of Medicine, St. Louis, Missouri (Internal Medicine)

RADIOLOGY RESIDENCY

1973 - 1976	Co-Chief Resident, Diagnostic Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, Missouri (R. G. Evens, M.D., Director)

SPECIALTY BOARDS

American Board of Radiology, Certification in Diagnostic Radiology - June 1978

MEDICAL LICENSURE

Licensed to practice medicine in states of Missouri and Virginia

PROFESSIONAL ORGANIZATIONS

American Medical Association
Radiological Society of North America
American College of Radiology
St. Louis County Medical Society
Society of Nuclear Medicine
American Institute of Ultrasound in Medicine
Greater St. Louis Society of Radiology
Southern Medical Association
Missouri State Medical Society
Missouri State Radiological Association

JOURNALS

Journal of the American Medical Association
American Journal of Radiology .
Seminars in Radiology
Radiologic Clinics of North America
Radiology
Archives of Internal Medicine
Journal of Southern Medical Association
Journal of Clinical Ultrasound
Reflections (Journal of AIUM)
New England Journal of Medicine

TEACHING APPOINTMENTS

1976 - Present

Instructor in Clinical Radiology, Mallinckrodt Institute of Radiology, Barnes Hospital, Washington University School of Medicine, St. Louis, Missouri

HOSPITAL AFFILIATIONS

1976 - Present

Staff Radiologist
Christian Hospital Northeast and Northwest
St. Louis, Missouri

AWARDS, HONORS, PUBLICATIONS AND PRESENTATIONS

Alpha Omega Alpha Medical Honorary
Medical Research Award, University of Virginia School of Medicine, 1971
Lange Publications Medical Research Award, 1972
Davis, C and Davis Jr: Detection of Circulating DNA by Counterimmunoelectrophoresis, presented at the interim meeting of the American Rheumatism Association, December 11, 1971, San Diego, California
Davis, C and Davis, J: Detection of Circulating DNA by Counterimmunoelectrophoresis, Arthritis and Rheumatism, Vol
Davis, C, and Gibula, H: Slipped Capital Femoral Epiphysis, Orthopedic Reviews, Vol. 4, 53-57, Oct. 1975
Co-Chief Resident in Diagnostic Radiology, 1975 - 1976, Mallinckrodt Institute of Radiology, Barnes Hospital, Washington University School of Medicine, St. Louis, Mo.

CURRICULUM VITAE

NAME:	Orsay, Paul R.
DATE OF BIRTH:	9-18-34, Chicago, Illinois
PRELIMINARY EDUCATION:	Shimer College, Mt. Carroll, Illinois, Sept. 1951-June 1953 University of Chicago College, Sept. 1953-June 1956
MEDICAL EDUCATION:	University of Chicago Medical School, Sept. 1956-June 1960
INTERNSHIP:	University of Iowa Hospital, July 1960-July 1961
MILITARY SERVICE:	Captain U.S.A.F., July 1961-July 1963, Chief Dispensary Service, Lackland A.F.B., San Antonio, Texas
RESIDENCY:	Mallinckrodt Institute of Radiology, St. Louis, Mo. July 1963-June 1966
BOARD CERTIFICATION:	American Board of Radiology, Dec. 1968
ORGANIZATIONS:	Greater St. Louis Society of Radiologists: Missouri Radiological Association: Radiological Society of North America: American College of Radiology
PUBLICATIONS:	None
HOSPITAL APPOINTMENTS:	Christian Hospital Northeast - Northwest, 1969 - to present

COLLEGE OF AMERICAN PATHOLOGISTS
Commission On Laboratory Inspection And Accreditation
7400 Skokie Blvd., / Skokie, Illinois 60076

PERSONNEL QUALIFICATION FORM

INSTRUCTIONS

A. One form should be completed for each professional person serving as director or department head.
B. Reinspection: Duplication of previously submitted forms is not necessary. Submit forms on new persons only.

1. NAME Jon W. Durr
2. POSITION OR TITLE:
   A. ____ Director
   B. X Associate
   C. ____ Assistant
   D. X Department Director (M.D., Ph.D.)
   E. ____ Department Supervisor (M.A., B.A., etc.)
3. AREA OR CATEGORY OF RESPONSIBILITY:
   A. ____ Laboratory as a whole
   B. X Departmental:
      ____ Microbiology
      ____ Chemistry
      ____ Histopathology
      ____ Hematology
      X Immunohematology
      ____ Cytopathology
      ____ Serology
      ____ Radiobioassay
4. EDUCATION AND EXPERIENCE:
   A. College or University

College or University	Major Field	Dates	Degree Date
University of Missouri	Medicine	1957 - 1964	M.D. 1964

   B. Laboratory Training (indicate number of years):
      ____ Intern ____ Resident ____ Medical Technology
      ____ Other: ____

Name of Institution	Dates From	Dates To	____ Formal Program ____ On-Job Training Name of Director or Supervisor	Degree
Washington University (Jewish Hospital)	1970 -	1972	Bob Alvin	
University of Missouri	1972 -	974	Fred Lucas	

   C. Experience:

Name of Institution	Dates From	Dates To	Position - Responsibility (Chem., Bact., Histo., etc.)
Allen Medical Laboratories	1975 -	Present	General & Blood Bank

5. CERTIFICATION:

Certifying Authority	Specialty	Dates
American Board of Pathology	Anatomic and Clinical Pathology	1974

6. RESEARCH ACTIVITIES:

Institution	Area of Study	Dates
None		

Control No. 02035

CURRICULUM VITAE

NAME: Royal J. Eaton, M.D.

BIRTH: November 1, 1937, Buffington, Missouri

DEGREES:
1959 A.B. (Chemistry) University of Missouri
1964 M.D. University of Missouri Medical School

POSITIONS:

1964 - 1964	Internship, University of Texas Medical Branch, Galveston, Texas
1965 - 1966	Private Practice
1968 - 1969	Private Practice
1969 - 1970	Junior Assistant Resident, The Jewish Hospital of St. Louis, St. Louis, Missouri
1970 - 1971	Senior Assistant Resident, The Jewish Hospital of St. Louis, St. Louis, Missouri
1971 - 1972	Fellow in Pulmonary Medicine, The Jewish Hospital of St. Louis, Missouri
1972 - 1973	Fellow in Pulmonary Medicine, John Cochran Veterans Administration Hospital, St. Louis, Missouri
1973 - 1974	Chief Resident in Medicine, The Jewish Hospital of St. Louis, Missouri
1974 - 1976	Private Practice
1976 -	Consultant in Pulmonary Medicine Christian Hospitals Northeast-Northwest

SPECIALTY BOARDS: 1973 Internal Medicine

1976 Pulmonary Diseases

MILITARY SERVICE:

1966 - 1966	January - July U.S. Naval Aerospace Medical Institute - Pensacola, Florida
1966 - 1968	U.S. Naval Forces

SOCIETIES:

American Thoracic Society
American College of Chest Physicians
Fellow, American College of Chest Physicians

PUBLICATIONS:

Eaton, Royal J., Senior, Robert M., Pierce, John A.: "Concepts of Respiratory Care Pertinent to the Pediatrician" Pediatric Clinics of North America - Vol. XX, No. 2. April, 1973.

12/77/jk

RADIATION DETECTION INSTRUMENTS

TYPE OF INSTRUMENTS	MANUFACTURER	MODEL #	NUMBER AVAILABLE	mR/hr MAXIMUM RANGE MINIMUM RANGE
Scanner	Picker	Magnascanner 500	1	
Camera	Searle	Pho Gamma IV	2	
Dose Calibrator	Mallinckrodt	Rad-X	1	
Ion Survey Meter	Victoreen	Cutie Pie 740-D	1	0-25 0-25000
G-M Survey Meter	Victoreen	G-M 490	2	0-0.2mR/ 0-200
Well Counter	Packard	Auto Well 5130	1	

Item #9
Prepared 7/10/79
License #24-13383-01

Control No. 02035

CALIBRATION OF INSTRUMENTS

A. The survey meter will be checked for operability prior to each use. This will be accomplished by holding the detector against an instrument check source or the dose calibrator sealed constancy source depending on the instrument or range to be tested. The highest recording obtainable will be included on all recorded surveys.

The unit will be calibrated at annual intervals by the Nuclear Medicine Associates, Cleveland, Ohio, in accordance with the procedure outlined in application for NRC license #34-16272-01. Records of these calibrations will be maintained and recommendations for repair will be followed.

Arrangements will be made for the availability of at least one survey meter while a unit is away for calibration or repair.

B. The dose calibrator will be calibrated as follows:

1. Sealed sources will be used to establish accuracy and contancy. They will consist of:

Nuclide	Manufacturer	Model #	Activity (mCi)
Cs-137*	**MCW**	**750701**	**1 mCi**
Cs-137*	**MCW**	**3GA**	**1 mCi**
Cs-137	**NEN**	**NES 356**	**0.250**
Ba-133	**NEN**	**NES 358**	**0.200**
Co-57	**NEN**	**NES 352**	**1.0**

2. The accuracy of the assay of the above standards will be at least ± 5% and traceable to National Bureau of Standards sources.

3. The calibration procedure will be as follows:

a) The dose calibrator will be checked for accuracy at annual intervals and following repair using sealed sources having energies which encompass that portion of the spectrum of energies for which the dose calibrator is used. Nuclides that will be used are listed in item 1 above.

The activity displayed by the dose calibrator must agree with the stated assay within ± 10%. This error may exceed ± 10% but correction factors will be determined. If the unit displays readings with an error greater than ± 10%, arrangements will be made for immediate repair or adjustment but the unit may be used in the interim using the predetermined correction factors.

b) The dose calibrator will be checked for constancy each day of use. This will be accomplished using the **Cs-137*** standard. The sealed source will be placed in the chamber and the unit set to measure that nuclide. The activity displayed with background and decay considered, must fall within ± 5% of the predicted activity based on the value obtained at the time of the original accuracy test.

The daily constancy check will be extended to include verification of displayed activities using the same standard but with the dose calibrator set to measure each of the different nuclides to be assayed on that day. With background and decay considered, variation in displayed activities must fall within ± 5% of the activity shown at the time of the most recent accuracy check.

The acceptable range of error for the constancy checks may be extended to ± 10%, however correction factors will be determined. If variation greater than ± 10% are noted, arrangements will be made for immediate repair or adjustment but the unit may be used in the interim using the predetermined correction factors.

c) The dose calibrator will be checked for activity linearity at quarterly intervals and following repair. This test will be performed using the maximum dose received from a Radiopharmacy or the first elution from a new Mo/Tc generator. After assay of the entire contents of a generator elution vial, the concentration will be determined and an aliquot containing 20mCi will be drawn. The aliquot will be assayed for agreement with the calculated activity. In this way, the accuracy of the unit will be assured in the measurement of activities from the maximum on hand to a quantity approximating the maximum dose used for a patient study.

To reduce personnel exposure from a whole vial measurement of activity, an alternate method of obtaining a source for the activity linearity check may be used. An aliquot such as 0.5 to 1.0ml will be withdrawn from the elution vial and assayed in a syringe. The concentration of the eluant can be determined by dividing the displayed activity by the volume in the syringe. A 20mCi aliquot contained in the proper volume can then be withdrawn from the elution vial and used for the linearity test. In this way, the accuracy of the dose calibrator will be assured in the measurement of activities approximating the maximum doses used for patient studies.

The linearity test will be continued by repeating the assay of the 20mCi aliquot several times a day over a two to three day period until a measurement is made in which the activity displayed is less than the minimum dose likely to be used in a patient study and also less than the activity displayed during the annual accuracy check utilizing the standard with the energy similar to that of Tc-99m. In this way, the accuracy of the dose calibrator will be assured in the measurement of individual doses throughout the entire ranges of doses drawn for patient studies. In the event Technetium generator systems are not used, the linearity test described above will be performed using a source (instant Technetium or Radiopharmacy supplied dose) with an activity equal to or exceeding the maximum anticipated activity received for the performance of clinical studies.

The above linearity test data will be plotted as a function of activity vs. time and compared to predicted activities vs. the same time. The acceptable range of error will be ± 10%. If test result error exceeds ± 10%, arrangements will be made for immediate repair or adjustment. The unit may be used in the interim using predetermined correction factors.

d) The dose calibrator will be tested for geometrical variation at the time of installation and following chamber or liner repair or replacement. This test will be performed using a sufficient amount of activity in a geometrical configuration approximating a point source. The source will be inserted into the chamber along its central axis until the maximum activity response is displayed. The source will then be moved in the chamber to points above and below the maximum response point until displayed readings of 90% of maximum are found. This will include peripheral measurements within the chamber as well. The zone of 90% isoresponse will be identified. In reoutine assays, measurements will be made with all the activity within the 90% isoresponse zone of the chamber.

For nuclides with gamma energies less than 100 Kev such as Xenon and I-125 and those which may be received contained in unusual configurations (i.e.: syringes, capsules, cartridges or ampules), initial geometrical corrections will be determined using the manufacturer's assay and appropriate decay factors. The correction factors will be determined using the displayed activity vs. the manufacturer's assay at the time of receipt.

Acceptable correction factors may be on the order of $\pm$ 50% due to the unusual responses associated with these geometries. The manufacturer's assay will be assumed to be correct, however, and the correction factor will be used only as a constancy value to be compared to future shipments of these nuclides. In the event the constancy value varies by greater than $\pm$ 10%, the dose calibrator will be adjusted or repaired.

In the event the dose calibrator should fail or if it is away for repairs, the nuclear medicine program will be continued through the implementation of the following procedure:

A substitute dose calibrator will be acquired. While awaiting its arrival, in order to provide for operation of the nuclear medicine program, one of the following procedures will be used.

Technetium eluents will be assayed and the Mo-99 contaminent will be determined using a dose calibrator located at the nearest cooperating institution having a functional and properly calibrated unit. If activities must be transported for this purpose, they will be shielded with sufficient lead to reduce levels to 2.0mR/hr or less on contact with the shield, wrapped in sufficient absorbant toweling to absorb ten times the liquid volume contained in the vial or syringe, marked with labels indicating the presence of radioactivity, and carried by one occupational person assigned to this task throughout the entire trip. This same person will perform the assay, record the data, and return the activity to the location of authorized use.

Alternatively, Technetium eluent and Molybdenum contaminent assays will be performed using a calibrated pulse height analyzer and dectector system enabling the conversion of counts per minute to millicuries or microcuries. For this, equipment used will be the Picker Rectilinear Scanner using a Moly-Tech calibration system similar to the device marketed by Mallinckrodt, #775.

This pulse height analyser will be calibrated with Cs-137 prior to each use. The method parameters (i.e., windows, filters, voltages, etc) will be determined annually. The standrads used will be Tc-99m as assayed on the dose calibrator whn it was determined to be functional. For the Mo-99m assay, a Cs-137 standard will be used with the Mo-99 equivalent assumed equal to five times the Cs-137 assay.

Mathematical calculations will be used to determine activity needed for patient doses.

The above assay techniques will enable the measurement of Technetium 99m and its Molybdenum 99 contaminent to within $\pm$ 10% of the true assay. Every effort will be made to expedite repair and return of the dose calibrator.

C. Diagnostic instrumentation will be calibrated as follows:

1. The camera pulse-height analyzer will be calibrated using Tc-99m and uniform flood check will be performed each day of use.

2. The well and uptake system will be calibrated using a long-lived radionuclide such as Cs-137, Ba-133 or I-129, each day of use.

FACILITIES & EQUIPMENT
DECRIPTION

All radioactive source are stored in such a manner (lead, concrete, or refrigerator) so as to not exceed 2mR/hr at the surface of the barrier.

Mo-99/Tc-99m generator when used will be stored and eluted in the designated area. It will be shielded with lead bricks such that levels from all avenues of approach do not exceed 2.0mR/hr. Spent generators will be stored in the location identified in the attached diagram.

During elution, the eluate will be collected, assayed, and stored in a vial held in a quarter inch lead pig except during brief periods of transfer. Transfer of the eluate or portions of the eluate will be made by the use of syringes retained in lead shields designed for this purpose.

Eluates and compounds made from eluates will be drawn, synthesized, assayed and stored in lead vials or syringes such that levels as measured at contact with a low level survey meter do not exceed 2.0mR/hr except for brief periods during the actual transfer.

Radioactive materials obtained from radiopharmacy suppliers will be stored in their original shipping containers. If necessary, the doses will be placed behind additional shielding to reduce activity levels emitted from the container to 2mR/hr or less.

Syringe shields will be used on all accessories requiring the transfer of radiopharmaceuticals from vial to vial and in drawing up patient doses. Syringe shields will also be used in the administration of doses to patients except when the patients well being may be compromised. Under these circumstances the dose containing syringes will be kept shielded up to the moment of injection.

Steps in the preparation of compounds requiring periods of heating, shaking, agitation or mixing will be performed utilizing lead shielding and/or mechanical or ultrasonic agitation equipment and/or remote handling devices (tongs, forceps, etc) such that levels during the above period as measured by a low level survey meter do not exceed 2.0mR/hr.

Protective outer garments, such as laboratory coats and rubber gloves will be worn while handling radioactivity in uncontained form.

All possible set-ups will be made on easily cleanable trays. All trays and all other work surfaces will be covered with disposable absorbant paper.

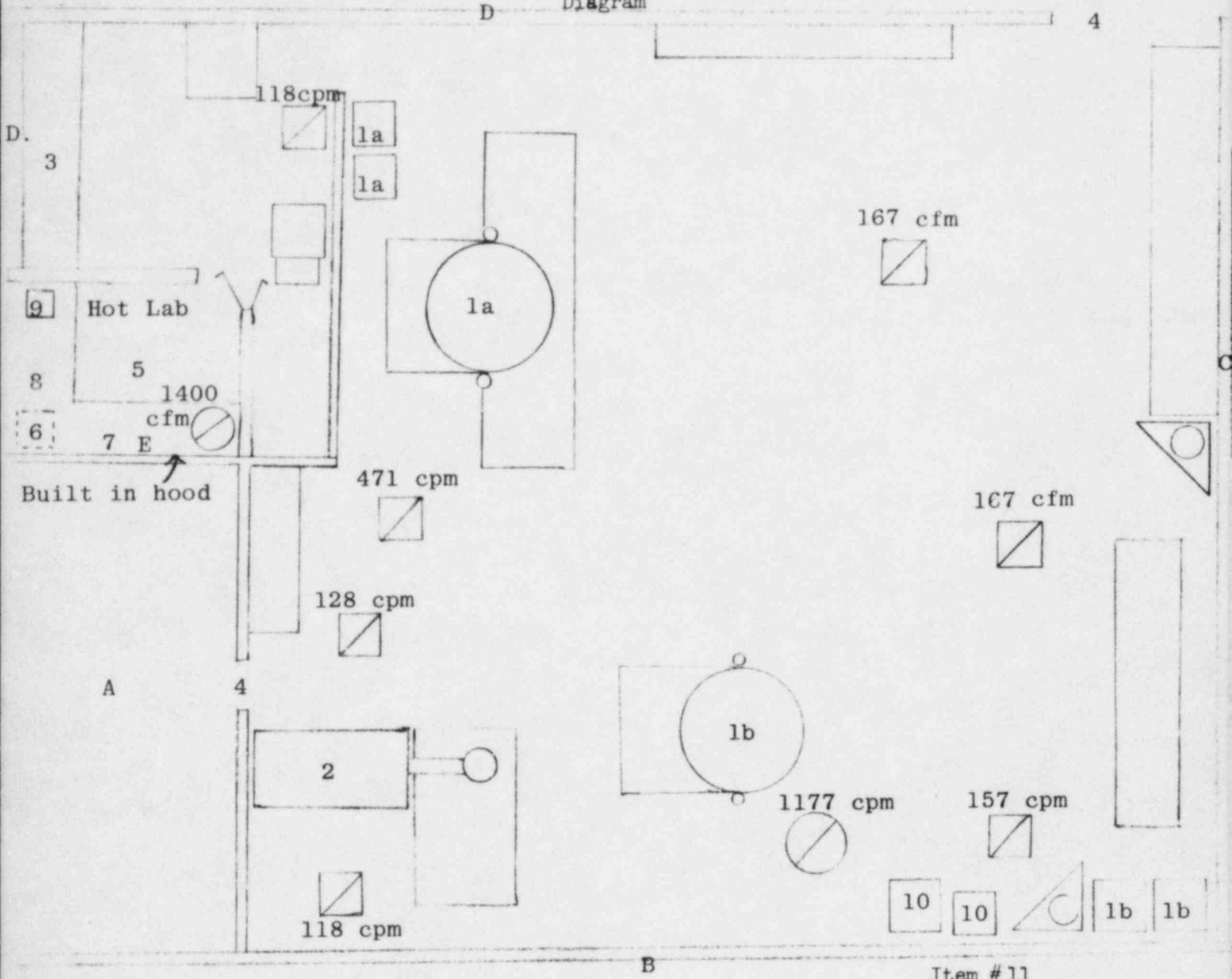
A decontamination kit will be maintained in the department. It will include the following items:

DECONTAMINATION KIT

ITEM	PURPOSE
1. Warning tape, chalk, & signs.	posting of area
2. Plastic bags, small	shoe covers, wet containers
3. Disposable gloves	hand protection
4. Masking tape	fasten shoe covers, etc.
5. Forceps, tongs	safe handling
6. Large plastic bags	for contaminated material
7. Sponges 4 x 4	sopping up
8. Paper towels	blotting & drying
9. Radiac wash or detergent	detergent
10. Scouring powder	friction
11. Tags	identification
12. Scissors	cut absorbent paper, etc.
13. Whatman #1 filter paper	taking swipes following decontamination.
14. Chux	cover area following decontamination
15. G-M survey meter	monitoring

Nuclear Medicine Dept.

Facilities and Equipment Diagram



Scale: 1" = 4'

Item # 11
2 of 4 pages
Prepared 7/10/79
License #24-13383-01

KEY: L=Length, W=Width, H=Height, T=Thickness, N/A=Not Applicable

- Air Intake
- Air Exhaust
- 2 Sinks
- 6 Lead Castle
- 1a&b Cameras
- 2 Scanner
- 2 Uptake
- ___ Well
- ___ Scaler
- ___ Clerical/desk
- 3 File
- 4 Lockable Door
- ___ Exhaust Hood
- 5 Isotope Receipt Area
- 6 Generator
- 7 Kit Preparation
- 8 Isotope Storage
- 7 Dose Preparation
- 8 Waste Storage
- 9 Dose Calibrator
- ___ Monitoring Equipment
- ___ Decontamination Kit
- ___ Refrigerator
- ___ Ceiling Height
- ___ Ceiling Height
- 10 Xenon System

Adjacent Areas

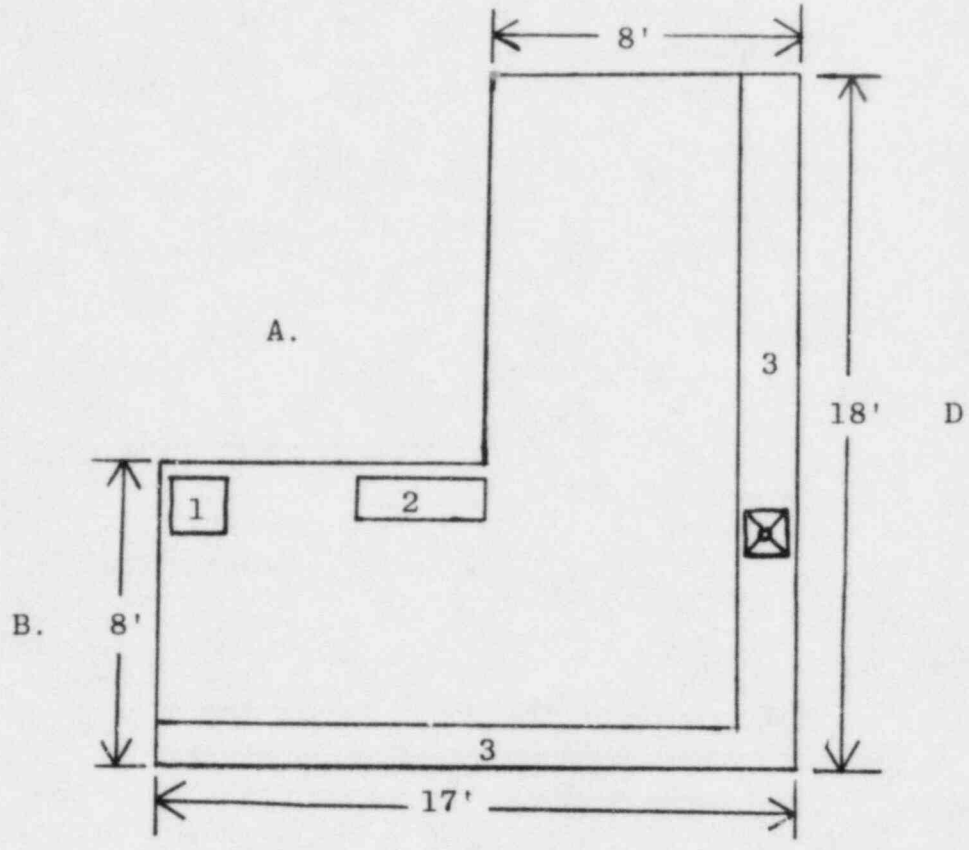
- A Waiting room
- B E.K.G.
- C Mechanic Room
- D Hall
- E Xenon Storage
- ___ _____
- ___ _____
- ___ _____

Shielding

- 6 Lead Castle 8" L x 16" W x 8" H x 2" T
- ___ ___ L x ___ W x ___ H x ___ T
- ___ ___ L x ___ W x ___ H x ___ T
- ___ ___ L x ___ W x ___ H x ___ T

Pathology Dept.

Facilities and Equipment
Diagram



Scale: 1 cm = 2'

Item # 11
4 of 4 pages
Prepared 7/10/79
License #24-13383-01

KEY: L=Length, W=Width, H=Height, T=Thickness, N/A=Not Applicable

		Adjacent Areas	Shielding
Air Intake	___ Isotope Receipt Area	A Micro Biology	
Air Exhaust	___ Generator	B Electrophoresis	___
Sink	3 Kit Preparation	C Medical Offices	___L x ___W x ___H x ___T
Lead Castle	___ Isotope Storage	E Serology	
___ Camera	___ Dose Preparation		___
___ Scanner	___ Waste Storage	___ _____	
___ Uptake	___ Dose Calibrator	___ _____	___L x ___W x ___H x ___T
2 Well	___ Monitoring Equipment	___ _____	___
___ Scaler	___ Decontamination Kit	___ _____	___L x ___W x ___H x ___T
___ Clerical/desk	1 Refrigerator		
___ File	___ Ceiling Height		___
___ Lockable Door	___ Ceiling Height		___L x ___W x ___H x ___T
___ Exhaust Hood			

PERSONNEL TRAINING PROGRAM

In accordance with Section 19.12 of 10 CFR, Part 19, the following is a description of the training required for all personnel who work with or in the vicinity of radioactive materials:

1. The nuclear medicine department will be staffed by individuals who will be classified as occupational employees. These individuals will perform their duties from the radiation safety viewpoint under the direction of the physician(s) named on the license application.

2. Every effort will be made to hire nuclear medicine technology registered or registry eligible personnel to work with radioactive material. Orientation of such personnel for a day or two by the physician(s) named on the license and/or by the supervising technologist will include the following:

   a. Indicate areas where radioactive materials are used or stored.
   b. Potential hazards associated with radioactive materials.
   c. Radiological safety procedures appropriate to their respective duties.
   d. Pertinent NRC regulations.
   e. The rules and regulations of the license.
   f. The pertinent terms of the 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.

If evaluation of the radiation handling techniques of a new technologist is found to be inadequate, arrangements will be made to send the employee for a 40 hour formal course from our consulting physicists, Nuclear Medicine Associates, Inc., Cleveland, Ohio. This course combines didactic and clinical training which will include points "b" through "i" listed above as well as quality control and patient procedures.

3. Our consulting physicists, mentioned in this addendum, will visit our facility quarterly to review all procedures, equipment and records. Personnel will receive refresher training relative to duties, regulations, or terms of the license during these visits or by the physician(s) named on this license application, or by supplementary training at least annually or more frequently, as needed.

4. Access into areas where radioactive material is stored or used will be restricted for nonoccupational personnel. When it is necessary for nonoccupational personnel to enter these areas, as in the case of certain patients who need special care, personnel so involved will be present under the direction of the nuclear medicine technologist, who will ensure that the exposure of these persons is held to the minimum required for the performance of the nuclear medicine procedure. Further, all nonoccupational personnel will receive instruction as to the location and potential hazards associated with radioactive material during their hospital orientation process and annually thereafter in the form of verbal instructions and/or hospital interdepartment memos.

Item #12
Prepared 7/10/79
License #24-13383-01

PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

1. The chief nuclear medicine technologist his/her designee will place all orders for radioactive material and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded. The receipt area identified in the Item #11 diagram is designed such that radiation levels in unrestricted areas do not exceed the limits specified in 10 CFR 20.105.

2. The security guard will escort courriers to the nuclear medicine department when packages are delivered bearing a D.O.T. Radioactive III label. Packages bearing a Radioactive I or II label will be signed for by the security guard and taken immediately to the appropriate department.

3. The following directive will be issued to hospital personnel:

TO: Managerial Personnel of:

Security
Purchasing
Receiving
Nursing
Volunteers

FROM: Administration

SUBJECT: Delivery of packages containing radioactive materials.

When courriers or common carriers arrive with packages containing radioactive materials, contact the security guard on duty. Personnel, except the security guards who are trained in the proper handling of radioactive materials, are not to personally accept packages containing radioactive materials.

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

*Through the operator or phone (314) 469-1380

Item #13
Prepared 7/10/79
License #24-13383-01

PROCEDURES FOR OPENING PACKAGES CONTAINING
RADIOACTIVE MATERIAL

1. Visually inspect package for any sign of damage (e.g. wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.

2. Inspect the package for the presence of D.O.T. diamond-shaped radioactive White I, Yellow II, or Yellow III labels.

3. If no D.O.T. label or a White I label is present, go to step #7 below.

4. If a D.O.T. Yellow II or Yellow III radioactive label is affixed to the package, proceed to step #5 below.

5. Measure exposure rate at 3 feet from package surface. If greater than 10 mR/hr, stop procedure and notify the Radiation Safety Officer.

6. Measure surface exposure rate. If greater than 200 mR/hr, stop procedure and notify the Radiation Safety Officer.

7. Put on gloves.

8. Open the outer package (following manufacturer's direction, if supplied) and remove packing slip. Open inner package to verify contents (compare requisition, packing slips, and label on bottle), check integrity of final source container (inspect for breakage of seals or vials, loss of liquid, discoloration of packing material). Check also that shipment does not exceed possession limits.

9. Wipe external surface of final source container with moistened cotton swab or filter paper held with forceps, assay and record. (To be performed on all shipments specified in Part 10, CFR 20.205(b), and any others suspected of being externally contaminated).

10. Monitor the packing material and packages for contamination before discarding:

    a. If contaminated, treat as radioactive waste.

    b. If not, obliterate radiation labels before discarding in regular trash.

LABORATORY RULES FOR THE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats, or other protective clothing at all times in areas where radioactive materials are used.

2. Wear disposable gloves at all times while handling uncontained radioactive materials.

3. Monitor hands and clothing for contamination after each procedure or before leaving the area.

4. Use syringe shields for preparation of patient doses and administration to patients except in circumstances, such as pedicatric cases, where their use would compromise the patient's well-being.

5. Do not eat, drink, smoke or apply cosmetics in any area where radioactive material is stored or used.

6. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10%.

7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These should be worn at chest or waist level.

8. Wear TLD finger badges during elution of generator and preparation, assay, and injection of radiopharmaceuticals.

9. Dispose of radioactive waste only in specially designated receptacles.

10. Never pipette by mouth.

11. Survey generator, kit preparation, and injection areas for contamination after each procedure or at the end of the day. Decontaminate if necessary.

12. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level if applicable.

13. Always transport radioactive material in shielded containers.

Item #15
Prepared 7/10/79
License #24-13383-01

EMERGENCY PROCEDURES

Minor Spills

1. NOTIFY: Notify persons in the area that a spill has occurred.

2. PREVENT THE SPREAD: Cover the spill with absorbent paper.

3. CLEAN UP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Include all other contaminated materials such as disposable gloves.

4. SURVEY: With a G-M survey meter, check the area around the spill, and your hands and clothing for contamination.

5. REPORT: Report incident to the Radiation Safety Officer.

Major Spills: Activity $>$ 1mCi and $T_{\frac{1}{2}} >$ 20 hrs or Activity $>$ 30mCi and $T_{\frac{1}{2}} <$ 20 hrs.

1. CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.

2. PREVENT THE SPREAD. Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.

3. SHIELD THE SOURCE. If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. CLOSE THE ROOM. Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP. Notify the Radiation Safety Officer immediately.

6. PERSONNEL DECONTAMINATION. Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

RADIATION SAFETY OFFICER: James Walton DeBnam, Jr., M.D.

OFFICE PHONE: (314) 355-2300, Extension #5657

HOME PHONE: (314) 469-1380

Item #16
Prepared 7/10/79
License #24-13383-01

Control No. 02035

SURVEY PROCEDURES

A. All elution, preparation and injection areas will be surveyed daily with a G-M survey meter and decontaminated if necessary.

B. Laboratory areas where only small quantities of radioactive material are used (less than 100 uCi) will be surveyed monthly.

C. All other laboratory areas will be surveyed weekly.

D. The weekly and monthly survey will consist of:

1. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mR/hr.

2. A series of wipe tests to measure contamiantion levels. The method of analyzing wipe tests will be such that contamination from any nuclide used in the department will be recognized by the detector system. To accomplish this, the pulse height analyzer windows will be adjusted so that the lower level discriminator includes the energy level of the lowest energy nuclide utilized within the department, and the upper level discriminator includes the energy level of the highest energy nuclide used in the department. Counts from the wipe sample will be compared to background counts to determine the presence of contamination. (See Item F below)

E. A permanent record will be kept of the weekly or montly survey results, including negative results. The record will include:

1. Location, date and type of equipment used.

2. Name of person conducting the survey.

3. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.

4. Measured exposure rates, keyed to location on drawing (point out rates that require corrective action).

5. Detected contamination levels, keyed to locations on drawing.

6. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rates after corrective action, and any appropriate comments.

F. Areas will be cleaned if the contamination levels exceed the following limits. When background counts are 10 cpm or less, the action level will be set at five times background. If background counts are between 11 and 50 cpm, the action level will be set at three times background. If background counts exceed 50 cpm, the action level will be set at twice background counts. If wipe samples show cpm levels above those identified above, decontamination procedures will be performed and the area re-wipe tested to assure that levels have been brought down to less than the action level. To avoid personnel exposure, contamination resulting from Tc-99m may be shielded and/or covered and allowed to decay.

WASTE DISPOSAL PROCEDURES

1. Liquid Waste will be disposed of

Check as appropriate

X By commercial waste disposal service (See also No. 4 below)

X In the sanitary sewer system in accordance with Section 20.303 of 10 CFR Part 20.

X Held for decay until radiation levels as measured 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.

____ Other (specify):_____

_____

_____

_____

_____

2. Mo-99/Tc-99m generators will be:

Check as appropriate

X Returned to the manufacturer for disposal

X Held for decay until radiation levels as measured with a low-level survey meter and with all shielding removed, have have reached background levels. All radiation labels will be removed or obliterated and the generators disposed of as normal trash. (Note: this method of disposal may not be practical for generators containing long-lived radioactive contaminants).

X Disposed of by commercial waste disposal service (See also No. 4 below).

____ Other (specify): _____

_____

_____

_____

_____

Item #18
Prepared 7/10/79
License #24-13383-01

3. Other Solid Waste will be:

Check as appropriate

__X__ Held for decay until radiation levels as measured 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.

__X__ Disposed of by commercial waste disposal service (See also No. 4 below)

____ Other (Specify): _____

_____

_____

_____

_____

4. The commercial waste disposal service used will be: Nuclear Engineering Co., Inc., Louisville, Kentucky

(Name) (City, State)

NRC/Agreement State License No. Kentucky State License #16NSF-1

Item 19-1

THERAPEUTIC USE OF RADIOPHARMACEUTICALS

Special precautions for patients treated with byproduct material listed in Groups IV or V, Schedule A, Section 35.100 of 10 CFR Part 35 are as follows:

a. Method for preparation and administration of therapeutic doses of Iodine-131. Therapeutic doses of I-131 will be ordered from reputable suppliers and received precalibrated, ready for dispensing to patients. These materials will be stored, until time for use, in the isotope storage area behind sufficient shielding to reduce the radiation levels to 2.0mR/hr at a distance where occupational workers can conveniently stand. All liquid sources will be opened in a fume hood with the fan activated. Patients requiring therapeutic amounts of I-131 less than 30mCi will be dosed in the hot lab, held for 30 minutes for observation and sent home or to their room. Hospitalized patients receiving greater than 30mCi will be dosed in their rooms.

b.(1). Only patients treated with greater than 8mCi I-131* or 23mCi Au-198* who require hospitalization will be placed in a private room with a toilet. Attempts will be made to use a corner room in a low traffic section of hallway.

b.(2). Patients will use disposable items whenever possible (e.g., dishes, utensils, etc.).

c.(1). Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after adminstration of the treatment dose. Exposure rates will be measured at the patient's bedside, three feet away and the entrance to the room. The Radiation Safety Officer or his designate will then determine how long a person may remain at these positions and will post these times in the patient's chart and on his door. The results of daily surveys will be used to recalculate permitted times which will be posted on the patient's chart and on his door. (Refer to Item #19, Form A). Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20. (i.e., 2mrems in any one hour or 100mrems in any seven consecutive days) Refer to Item #19, Form A.

c.(2). All linens will be surveyed for contamination before being removed from the patient's room and will, if necessary, be held for decay. Disposable plates, cups, eating utensils, tissue, surgical dressings, and other similar waste items will be placed in a specially designated container. The material will be collected daily by the Radiation Safety Officer (or his designee), checked for contamination, and disposed of as normal or radioactive waste, as appropriate. Non-disposable items used for these patients will be held in plastic bags in the patient's room, and checked for contamination by the Radiation Safety Officer or his designate. Items may be returned for normal use, held for decay or decontaminated, as appropriate.

d. The form, Nursing Instructions for Patients Treated with Phosphorus-32 Gold-198, or Iodine-131, (Item #19, Form B) will be completed immediately after administration of the treatment dose. A copy will be posted in the patient's chart. Nurses should spend only that amount of time near the patient required for ordinary nursing care. Special restrictions may be noted on the precaution sheet in the patient's chart. Nurses should

*Table 2 of NCRP #37.

read these instructions before administering to the patients. Call the Nuclear Medicine Department if you have any questions about the care of these patients. Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precautions sheet in the patient's chart. Patients must remain in bed while visitors are in the room and visitors should remain at least three feet from the patient. Radioactive patients are to be confined to their rooms except for special medical or nursing purposes approved by the Nuclear Medicine Department. No nurse, visitor or attendant who is pregnant should be permitted in the room of a patient who has received a therapeutic amount of radioactivity until the patient no longer presents a radiation hazard. Female visitors should be asked whether they are pregnant. Attending personnel must wear rubber or disposable plastic gloves when handling urinals, bedpans, emesis basins or other containers having any material obtained from the body of the patient. Wash gloves before removing and then wash hands. The gloves must be left in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

e.(1). Therapy patients will be allowed to use the toilet facilities since human excreta is exempt from waste disposal considerations. The patient will be instructed, however,to flush the toilet, urinal or bed pan several times after use. If the nurse helps to collect the excreta, she should wear disposable gloves. Afterwards she should wash her hands with the gloves on and again after the gloves are removed. The gloves should be placed in the designated waste container for disposal by the Nuclear Medicine Department. Vomiting within 24 hours after oral administration, urinary incontinence, or excessive sweating within the first 48 hours may result in contamination of linen and/or floor. If radioactive urine or feces is collected or spilled during collection, call the Nuclear Medicine Department, Ext. #5657 . Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination. All vomitus must also be kept in the patient's room for disposal by the Nuclear Medicine Department. Urine or feces need not be routinely saved, unless ordered on the chart. The same toilet should be used by the patient at all times and it should be well flushed (3 times). Utmost precautions must be taken to see that no urine or vomitus, is spilled on the floor or the bed. If any part of the patient's room is suspected to be contaminated, notify the Nuclear Medicine Department. If a nurse, attendant or anyone else knows or suspects that his skin, or clothing, including shoes, is contaminated, notify the Nuclear Medicine Department immediately. This person should remain in the patient's room and not walk about the hospital. If the hands become contaminated, wash immediately with soap and water. If a therapy patient should need emergency surgery or should die, notify the Nuclear Medicine Department immediately. When the patient is discharged call the Nuclear Medicine Department and request that the room be surveyed for contamination before remaking the room.

e.(2) Surgical dressings should be changed only as directed by the physician. Gold-198 leaking from a puncture wound will stain the dressings dark red or purple. Such dressings should not be discarded but should be collected in plastic bags and turned over to the Nuclear Medicine Department. Handle these dressings only with tongs or tweezers. Wear disposable gloves.

e.(3) Disposable items should be used in the care of these patients, whenever possible. These items should be placed in the designated waste container. Contact the Nuclear Medicine Department for proper disposal of the contents of the designated waste container. Disposable plates,

cups, and eating utensils will be used by patients who are treated with iodine-131. All clothes and bed linens used by the patient should be placed in the laundry bag provided and left in the patient's room to be checked by a member of the Nuclear Medicine Department. All non-disposable items should be placed in a plastic bag and left in the patient's room to be checked by a member of the Nuclear Medicine Department.

f. See attached GUIDELINES FOR EMERGENCY SURGERY OR DEATH OF THE RADIOACTIVE PATIENT *

g.(1) Before a therapy patient's room is reassigned to another patient, the room will be surveyed for contamination (and decontaminated if necessary) and all radioactive waste and waste containers will be removed.

g.(2) Instructions for Patient & Family - Patient will not be discharged until radioactivity reaches 30mCi. This will be determined by measuring the dose rate at time of administration from a distance of no less than 3 meters, allowing the patient to act as much like a point source as possible. Patient will be discharged when reading at identical location and circumstances reaches 30% of initial value, assuming 100mCi dose.

(i) In the event that all persons in the household of the radioactive patient, and hence all those persons with whom the patient will have appreciable contact, are over age of 45 years:

-The patient should be instructed to remain at distances greater than 3 feet from other people, except for brief periods for necessary procedures.

-Babies and young people (of ages less than 45 years) should not visit the patient, but if they do, the visits should be brief, and a distance of at least 9 feet from the patient should be maintained.

(ii) In the event that a person under the age of 45 years lives in the household of the patient:

-Stricter precautions shall be observed than when all contacts are with persons over 45 years of age.

-Children and persons under 45 years of age shall not be allowed in the same room, nor at a distance of less than 9 feet, for more than a few minutes a day. Observance of these conditions will insure that persons under 45 years of age will not be exposed to more than 0.5 R per year from the radioactive individual.

-Other restrictions may be specified by the physician.

All restrictions will be removed when the activity reduces to a point that will result in no greater than 0.5 R to persons in the family from that point until total decay. For I-131, that will be the time where radio-activity in the thyroid gland reaches 8mCi. or a reading of 1.8mR/hr @ 1 meter*. An effective half-life of six days will be used for this computation. For Au-198, those values will be 23mCi or 5.3mR/hr @ 1 meter. An effective half-life of 65 hours will be used for this computation.

Item #19, Form F will be used for the purpose of informing all.

* Table 2 of NCRP Report #37.

GUIDELINES FOR EMERGENCY SURGERY OR DEATH OF THE RADIOACTIVE PATIENT *

In most hospitals, deceased patients with large amounts of radionuclides will be encountered only rarely, since, in principle, radionuclide therapy is not given to moribund patients. If several days intervene between treatment and subsequent surgery or death, the radiation hazard is usually considerably reduced. In most hospitals, the number of patients receiving large internal doses of radionuclides in any one week is small. The need for emergency surgery would not be usual, nor would the death of one of these patients.

The identification of a particular patient as radioactive is the responsibility of the physician in charge of the case. The radioactive patient shall be properly identified at all times. If a radioactive patient dies in the hospital, the physician who pronounces him dead should be responsible for attaching a radioactivity precautions tag to the body. The physician in charge of the case and the Radiation Protection Officer shall be notified at once.

In general bodies containing less than 5mCi. need no precautions for any type of handling. Those containing between 5 and 30mCi may be buried or cremated with no preparation or embalmed according to standard injection procedures without special precautions. If the body is to be subjected to autopsy, the Radiation Safety Officer will designate any special precautions. The body containing more than 30mCi. can be buried or cremated with no preparation, but if embalming is to be carried out, it should be with the guidance of a Radiation Safety Officer. Among patients that die outside the hospital, the funeral director will seldom encounter bodies with hazardous exposure rates.

Preparation for Burial or Cremation Without Autopsy:

Consider first the cases in which no autopsy is to be performed and the body need not be opened. Embalming will be by the injection method, and the likelihood of contamination of the embalmer is small. Nevertheless, even in these cases, rubber gloves shall be worn by all who are involved in the procedures in order to avoid the possibility of contamination by radioactive fluids from the body. The exposure rate at about 25cm. from the center of the radioactive material should be measured; if this is less than 0.25 R/h, no further precautions are necessary as far as the gamma radiations are concerned. Item #19, Form C and D will be completed.

Radioactive Iodine, I-131, Administered Orally or Intravenously; No Autopsy:

The dose of I-131 administered in the treatment of thyroid disease rarely exceeds 100mCi. Within an hour after a patient has received this dose, measurements with an ionization chamber type survey meter may be expected to indicate a surface exposure rate over the abdomen on the order of 0.3 R/h. During the first 24 hours after administration of I-131, the blood and urine may contain considerable radioactivity. These fluids should accordingly be removed into closed systems and later flushed directly into the sewer, followed by an adequate volume of water.

The day after administration, the general distribution of radiation is

greatly modified, both by urinary excretion of a large part of the radionuclide and by concentration of the remaining part in functioning thyroid tissue. At this time only radiation from these regions of iodine storage need be considered. Any region of high activity which is not to be removed, should be marked by the Radiation Protection Officer so that it can be avoided.

Any Radionuclide Injected Interstitially or in Seeds: No Autopsy:

Various colloidal radioactive preparations may be injected interstitially into tumors. Radon seeds, radioactive gold wires, radium wires, and other preparations may be implanted in limited regions. If the nuclide emits only beta rays, it is unlikely that there will be any appreciable external irradiation. If it is a gamma emitter, the active tissues may be extirpated or the region can be identified and avoided.

Body to be Opened for Surgery or Autopsy:

The usual precautions for preventing the spread of an infectious material should aid in keeping the radioactive material localized. At autopsy the general principle is to remove the main source of radiation hazard as early as possible, without causing general contamination. At surgery this cannot be usually be done, hence regions of high activity should be avoided or shielded. Item #19, Form D and E will be completed.

As long as the body remains unopened, the radiation received by anyone near it, is due almost entirely to gamma rays. The change in emphasis when an operation or autopsy is to be performed is due to the possible exposure of the hands and face to relatively intense beta radiation. Beta radiation is readily absorbed by material interposed between its source and the operator. Even rubber gloves are useful in this regard. The gamma rays are not absorbed appreciably by rubber gloves.

Any radionuclide in a Body Cavity which is to be Opened:

The Radiation Protection Officer will evaluate the radiation hazard and suggest suitable procedures regarding the safety of personnel during the entire operation.

a. Autopsy -

As much body fluid as possible should be removed before the body is opened. The remaining radioactive material may be expected to be widely distributed over the surfaces of the cavity and of the organs within it. The use of bare hands will not be permitted because of the contamination of skin and nails that would result and the difficulty of complete removal of such contamination.

Monitoring the body after removal of the viscera may indicate a radiation level low enough so that subsequent procedures can be carried out without special precautions. Regions of high activity, if present, can be indicated and avoided or approached with precautions. If the removed organs are to be disected immediately, each one should be monitored and treated in accordance with the findings. After desired small samples have been taken, the radioactive tissues that are to be retained should immediately be placed in appropriately shielded vessels for storage, or for disposal according to procedures approved by the Radiation Protection Officer. Where adequate cold

storage facilities are available, the organs may be stored for several days without significant alteration, or the viscera may be fixed. This would allow for the natural decay of the radioactive reducing possible exposure.

b. Emergency Surgery -

If surgery must be carried out within a highly radioactive cavity, speed is desirable. Accordingly, an experienced surgeon should perform the operation. The surgeon and his assistants should wear gloves and glasses or goggles for the protection of the eyes from possible splashing of foreign material, as well as from beta radiation.

Radioactive Iodine 131 Orally or Intravenously Administered.

a. Autopsy - Urine should be drained away and blood disposed of, if possible, in the same manner as if no autopsy were to be performed.

b. Surgery - Precautions are essentially the same as for autopsy. During the first day after administration, the blood may be expected to contain considerable radioactivity, and care should be taken not to let it accumulate on gloves or gowns. After the first day, the circulating radioiodine has greatly decreased, and regions of high activity can be identified and usually avoided.

Interstitial Implants and Colloidal Interstitial Infiltration.

At surgery or autopsy, these regions can be readily identified, and avoided as far as possible. At autopsy, if the entire block of tissue containing the radionuclide can be removed readily, this should be done first. If only a sample of the treated region is to be taken, this part of the body should be avoided until the rest of the autopsy has been carried out.

Accident or Injury During Surgery or Autopsy

If an injury occurs during surgery or autopsy, where the rubber gloves are cut or torn, radioactivity may be introduced into the wound. In addition to ordinary treatment of the wound, the Radiation Protection Officer shall be consulted with regard to any possible radiation hazard.

SUMMARY

In general, most procedures performed in nuclear medicine involve the use of Technetium 99m. Due to this radionuclides short half-life, six hours, a period of 24 hours should reduce even the highest dose encountered in nuclear medicine to a safe level. Most other procedures generally encountered in nuclear medicine involving nuclides other than Technetium-99m require dose of 5mCi or less. As indicated in the opening paragraph, activities at this level require little or no special procedures. Those situations involving special precautions and procedures are generally limited to quantities of radioactivity introduced into the patient during therapy treatment. The Radiation Protection Officer should be consulted to establish proper precautions and procedures for each individual case.

*Summary of information found in NCRP Report #37.

Item #19, Form A
OR
Item #20, Form D
5 of 10 pages
Prepared 7/10/79
License #24-13383-01

RADIATION SURVEY FORM

Room Diagram

Film Badges Issued to:

	Time Limit
Nurse @ Bedside	min/hr
Visitor @ Chair	min/hr.
Pt. Bed #	hrs
Pt. Bed #	hrs
Pt. Bed #	hrs
Pt. Bed #	hrs

Name	Date	mRem

CERTIFIED BY_____ DATE/TIME_____

IMPORTANT: THIS RECORD MUST BE PERMANENTLY MAINTAINED

Control No. 02035

CALCULATIONS

Show line drawing of patients and neighboring rooms on other side of this form. Indicate location of patient and neighboring beds, patient orientation, visitors chair, hallways, doors, and outside walls. Room must be a private one, preferably with two outside walls and patients feet oriented to outside wall. Use G-M (low level) and ion (high level) chamber survey meter to determine radiation levels. Record obtained values on drawing at location of measured readings. Readings should be taken at (1) patients bedside, (2) visitors chair, and (3) mid-bed on all neighboring beds. Query for recently performed nuclear medicine procedures if elevated readings are obtained.

NURSES - limited to 2.0mRems/hr. (2.0 ÷ bedside reading) x 60 min. per hr = maximum minutes of bedside care each (but every) hour.

VISITORS - should be limited to 100mRems/total treatment time. If visitor's chair mr/hr x total treatment time is greater than 100mRems, limit visiting time as (100 ÷ (total treatment time x visitor's chair reading) x 60 min. per hr. = maximum minutes/hour for each hour.

NEIGHBORING PATIENTS - should be limited to 100mRems. Readings taken at mid-bed x total treatment time can usually be limited to less than 100mRems either through distance or shielding. Neighboring patients should be transferred if this is not possible when the total exposure approaches 100mRems.

ITEM #19 - FORM B

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH PHOSPHORUS-32, GOLD-198, or IODINE-131

Patient's Name: _____

Room No.: _____ Physician's Name: _____

Radioisotpe Administered: _____

Date and Time of Administration: _____

Dose Received: _____ Method of Administration: _____

Exposure Rates in mR/hr

Date	3 feet from bed	10 feet from bed

(Comply with all Check Items)

_____1. Visiting time permitted: _____

_____2. Visitors must remain _____from patient.

_____3. Patient may not leave room.

_____4. Visitors under 18 not permitted.

_____5. Pregnant visitors not permitted.

_____6. Film badges must be worn.

_____7. Use and complete the following tags:

_____door

_____bed

_____chart

_____wrist

_____8. Gloves must be worn while attending patient.

_____9. Patient must use disposable utensils.

_____10. All items must remain in room until OK'd by Radiation Safety.

_____11. Smoking is not permitted.

_____12. Do not release room to admitting until OK'd by Radiation Safety.

_____13. Other instructions.

In case of Emergency Contact:

RSO_____ On/off duty telephone #_____/_____

Prepared 7/10/79
License #24-13383-01

ITEM #19 - FORM C

Specific Instructions to Reduce Radiation Exposure During Embalmment

(to be filled out by Radiation Safety Officer and forwarded to funeral director)

The following procedures should be implemented during the embalming of _____.

( ) This body does not contain significant amounts of radioactive material. No special precautions are necessary if standard embalming procedures are employed.

This body contains radioactive material. The following procedures should be observed:

( ) A closed system should be used to drain fluids. Use suction if necessary. Fluid can be disposed of via sewer, flush with copious amounts of water.

( ) Blood and urine should be removed via closed systems. Dispose via sewer with copious amounts of water.

( ) Other _____

_____

_____

Signed _____
Radiation Safety Officer

Date _____

Copy of this report is maintained in Radiation Safety Office files

Control No. 02035

ITEM #19, FORM D

Radiation Hazard Evaluation Form

(to be filled out by Radiation Safety Officer for his use)

Name _____ Date and _____

Time of Death _____

Radioisotope _____

Amount administered _____

Route of Administration _____

Amount present _____

Distribution within body _____

_____

_____

_____

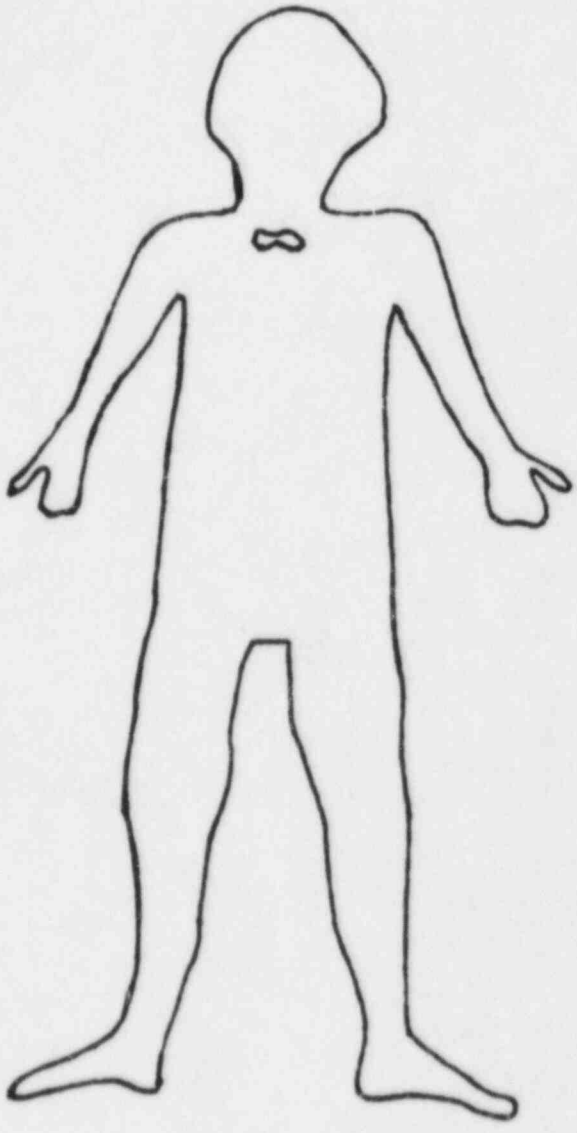
Indicate Distances _____

Suggest ring badges if exposure

0.25 R/hr @ 25 cm

See NCRP #37 p. 27.

Limit hand exposure to 1.5 Rems



Date of Survey _____

Instrument Used _____

Signed _____
Radiation Safety Officer

Date _____

Prepared 7/10/79
License #24-15383-01

ITEM #19, FORM E

Specific Instructions for Autopsy

(to be filled out by Radiation Safety Officer)

The following procedures should be followed if so indicated:

( ) Wear Safety Glasses.

( ) Wear Plastic (non absorbant) Gown.

( ) Cover Floor with Bench Liner.

( ) Wear Double Thickness Autopsy Gloves.

( ) Wear Whole Body Film Badge.

( ) Wear Ring Badge.

( ) Remove the _____area or tissue first before proceeding further. Identify it as radioactive.

( ) Leave the _____area or tissue untouched until last.

( ) Cover the _____area or tissue with shielding as provided.

( ) Use only long instruments --8" or greater.

( ) Fluids, Blood, Urine should be removed via closed system. Flush with copious amounts of water.

( ) Small Specimens need -- need not -- be handled with special precautions.

( ) Waste Container needs to be provided for contaminated sponges, gowns, and instruments.

( ) Organs are to be kept in storage for _____days before fixation.

Autopsy Performed by _____Patient Name_____

Whole Body or Ringer Badge No. _____ Exposure _____

Signed _____
Radiation Safety Officer

Date:_____

THIS REPORT MUST BE SAVED !

ITEM #19, Form F

INSTRUCTIONS FOR FAMILY OF RELEASED PATIENT

Name of Patient_____
Name of Hospital _____Address_____Tel.No._____
For further information contact_____Tel.No._____

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

_____ was treated on _____, 19____.
(Name of Patient)
with _____millicures of _____in the form of _____.

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

UNTIL THAT DATE:

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

a) _____(Date) to _____(Date)

Permissible distance _____feet or more, for _____hours/week.
(At other times remain farther than 6 feet).

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

SPECIAL PRECAUTIONS:

a) Spouse or other person caring for patient.

_____
_____
_____

b) Children or pregnant women: _____
_____
_____

c) Sleeping Arrangements:_____
_____
_____.

IF THE PATIENT IS TO BE HOSPITALIZED, OR IF DEATH SHOULD OCCUR, NOTIFY THE FOLLOWING INDIVIDUAL(S) IMMEDIATELY:

_____

_____

A COPY OF THIS FORM SHOULD BE KEPT WITH THE PATIENT'S RECORD.

PROCEDURES & PRECAUTIONS FOR USE OF RADIOACTIVE GASES

I. Quantities to be Used:

A. Patient information.

1. 15 studies per week
2. 10 mCi per patient

B. A 2000 mCi possession limit is requested.

II. Use and Storage Areas:

A. The hot lab fume hood shown in the attached diagram will be used to store and dispose of all the Xenon received and intentionally discharged to the environment. The hot lab will be used to prepare doses and assay them prior to use. The camera room will be used for all patient administrations and for the imaging procedures. Proximity to unrestricted areas is indicated in the diagram found on page #3 of Item #11.

Xe-133 sources will be stored in their original shipping safes or in the Rad-X Xenon-Kow II system. Accessory lead shielding will be provided to insure levels at the surface of the barrier do not exceed 2.0 mR/hr. A survey will be conducted with the survey meter to insure shielding is adequate after the placement of sources in the hood.

B. The imaging room is equipped with exhaust ductwork leading to the roof of the hospital. There is another dedicated exhaust system located in the hot lab. Exhaust fans are mounted on the roof to assure negative pressure throughout the exhaust ductwork. Total air is exhausted from the nuclear medicine department at the rate of 2577 cfm; 1177 cfm from the camera room and 1400 cfm from the lab.

C. The hospital ventilating system provides a total of 1326 cfm into the room. Therefore, with 2577 cfm exhaust capability and 1326 cfm supply, a negative pressure is created in the department drawing in air through the warm air supply and the cracks around the doors. Xenon gas "spilled" into the nuclear medicine department cannot escape into the halls but must go through the exhaust systems.

III. Procedures for Routine Use:

A. The door between the hall and camera room will be adjusted so a sensible draft is felt at opening. The patient will be fitted with the rebreathing apparatus, and instructed as to the procedure. A trial run will be conducted when possible. The valving and tubing will be examined for continuity. The dose will be prepared and assayed on the dose calibrator if possible. The Xenon will be administered to the patient (intravenously or into the tubing airway) and three to four views obtained. The gas will be collected in the overflow washout bag until practically no Xenon remains in the patient as evidenced by the camera persistent scope. The gas will then be slowly absorbed on the charcoal column. The trap discharge will be directed to the exhaust system such that passthrough will

escape to the air stream. The gas will be shielded at all times up to patient administration, except during times of transfer from the shielded vial to a shielded syringe (if used).

TLD finger badges and whole body film badges will be worn by all personnel handling Xenon. Whole body badges will also be worn by all other occupational personnel present during Xenon usage. Visitors to the nuclear medicine department will be excluded from the camera room during the use of Xenon unless their presence is required or desired.

B. Xenon will be contained during the studies by use of a Rad-X Ventil-Con gas delivery system. Manufacturers product information is attached.

C. A face mask will be affixed to the patient during the study. To minimize leakage if a mouth piece is used, the patient will be fitted with a noseclamp.

IV. Emergency Procedures:

In the event there is an accidental patient associated loss of Xenon into the camera room, the exhaust system will clear the room to levels less than 1×10^{-5} uCi/ml in 6 minutes. During this time period, the camera room will be evacuated, provided patient safety and comfort can be assured. All unnecessary personnel will evacuate the room. The camera room door will be guarded against inadvertant entry during this time period.

A. Xenon, an inert gas, will rapidly equilibriate with the air in the camera room.

B. The exhaust system will reduce concentrations exponentially within the given time:

Given:

1. Camera room size = 1823 feet^3
2. Exhaust rate = [illegible] cfm = 3.3×10^7 ml
3. Clearance rate = [illegible].6% per minute
4. Dose released = [illegible] mCi = 1×10^4 uCi
5. Initial concentration = $\frac{1 \times 10^4 \text{ uCi}}{3.3 \times 10^7 \text{ ml}} = 3.0 \times 10^{-4}$ uCi/ml
6. Reasonable time needed to reduce concentrations = 6 minutes

Then:

$$\text{Final concentration} = e^{-\text{clearance rate} \times \text{time}} \times \text{initial concentration}$$

$$= e^{-.646 \times 6} \times 3 \times 10^{-4}$$

$$= 6.22 \times 10^{-6} \text{ uCi/ml}$$

This is less than the 1×10^{-5} uCi/ml allowed for a restricted area.

V. Air Concentrations of Xenon in Restricted Areas:

A. It is estimated that 150 mCi of Xenon will be used per week. 150 mCi x 10^3 uCi/mCi = 1.5 x 10^5 uCi (A).

B. It will be assumed that 25% of the activity used will be lost accidentally (f).

C. Total air exhaust from the department is 2577 cfm(1117 + 1400). 2577 cfm x 60 min/hr x 168 hr/wk x 2.832 x 10^4 ml/ft^3 = 7.3 x 10^{11} ml/wk (V).

D. The average concentration (C) will be:

$$C = \frac{A \times f}{V}$$

$$C = \frac{1.5 \times 10^5 \text{ uCi/week} \times .25}{7.3 \times 10^{11} \text{ ml/wk}}$$

$$C = 5.1 \times 10^{-8} \text{ uCi/ml}$$

This is less than 1 x 10^{-5} uCi/ml allowed under 10 CFR 20.103 for a restricted area.

VI. Methods of Xenon-133 Disposal:

A. All Xenon unused will be disposed of by decay in storage in the hot lab cabinet. Containers and apparatus will be surveyed unshielded with the low level survey meter held on contact with the source containing device. If levels are the same as background, the containers will be disposed after defacing the labels.

All used or escaped Xenon will be vented through the exhaust system to the outdoors. It has been demonstrated in the calculations done for Item #V(D) above, the average concentration of this effluent is 5.1 x 10^{-8} uCi/ml. This is less than the 3 x 10^{-7} uCi/ml allowed for an unrestricted area.

B. The charcoal trap is continuously monitored with a built in G-M detector. When the trap becomes saturated an audio visual alarm is activated indicating the cartridges need replacing.

An alternate method of checking for a saturated charcoal trap will be to conduct a survey with the G-M probe held on contact with the trap inlet hose. The maximum levels will be recorded during the washout phase. Immediately after maximum levels are reached, the probe will be placed on the discharge tube. If these levels reach 10% of the intake maximums, the trap will be considered less than 90% effective and will be replaced.

C. Saturated filters will be stored for decay in the hood, shielded such that levels do not exceed 2.0 mR/hr at the hood face. Any Xenon seepage from the filter will be exhausted to the outside through the hood exhaust system. The large volume of air discharge to the environment (1400 cfm) will insure concentrations are minimal.

Given:

1. A saturated trap contains a residual activity of 100 mCi when it is placed in storage.
2. 25% of the total activity escapes from the trap during storage and decay. 100 mCi x .25 = 25 mCi. 25 mCi x 10^3 uCi/mCi = 2.5 x 10^4 uCi (A).
3. The hood exhaust system discharges 1400 cfm. 1400 cfm x 60 $\frac{\text{min}}{\text{hr}}$ x 168 $\frac{\text{hr}}{\text{wk}}$ x 2.832 x 10^4 $\frac{\text{ml}}{\text{ft}^3}$ = 3.9 x 10^{11} $\frac{\text{ml}}{\text{wk}}$

Then:

The maximum concentration which could be exhausted per week is:

$$C = \frac{A}{V}$$

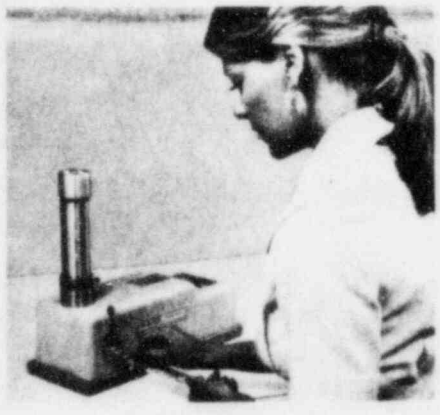
$$C = \frac{2.5 \times 10^4 \text{ uCi}}{3.9 \times 10^{11} \text{ ml}}$$

$$C = 6.4 \times 10^{-8} \text{ uCi/ml}$$

This is less than 3 x 10^{-7} uCi/ml allowed for an unrestricted area.

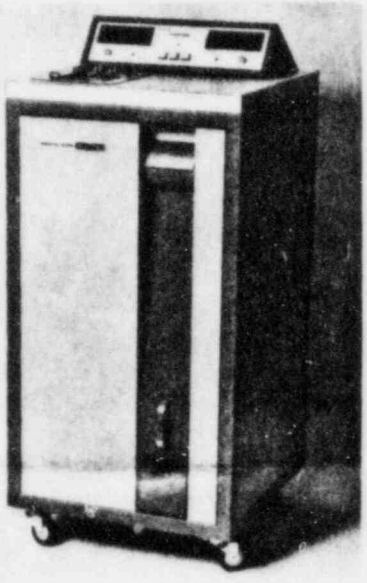
A survey will be conducted of the exhaust filters without the benefit of shielding and if levels are those of background, the filter may be discarded.

a ^{133}Xe Gas Control System from RADX



The START
Xenon-Kow II

^{133}Xe is most economically obtained in curie quantity glass ampules. The The Xenon-Kow II was designed to safely and conveniently crush the ampule and dispense ^{133}Xe in smaller doses. The dynamic volume storage chamber provides for constant concentrations (decay excepted), and transfer efficiencies exceed 98%. The economies realized will pay for the entire system, usually in the first year. Let us analyze and compare your current cost with our system cost.



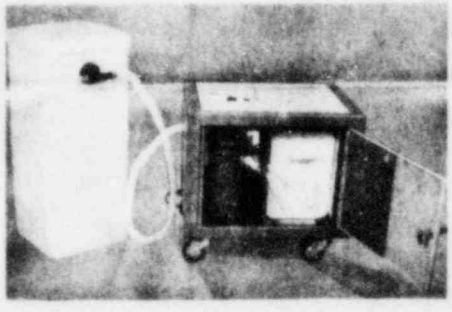
The HEART
of the System
Ventil-Con

The Ventil-Con controlled gas delivery system is used for patient administration of ^{133}Xe. You may administer the ^{133}Xe as a bolus or homogenous mixture with air and oxygen to perform the single breath, equilibrium and washout phases of lung ventilation studies.

Major features are:

- GM detector for ^{133}Xe concentration determinations
- Automatic O_2 replenishment
- Manual O_2 replenishment
- Emergency O_2 assist
- Swivel adapter for multiple views available
- In line, autoclavable, bacteriological filter
- Wide variety of face mask and mouthpieces available
- 10 liter dry spirometer
- Volume meter
- Dual channel strip chart recorder (optional)
- Breathing resistance less than 0.05-0.1 inches of water
- Arm adjustable for 0-60 inches
- Large CO_2 adsorber

We also make special Ventil-Cons for ^{127}Xe and cerebral perfusion studies by the Obrist technique[1].



The FINISH
Xenon Trap

The Radx Xenon Trap is the only activated charcoal trap with a built-in ^{133}Xe saturation detector/alarm. When the charcoal reaches its saturation point, (because there is no such thing as a "life-time" trap) an audio/visual alarm is activated indicating it's time to replace the 6-cylinder cartridge pack. Other features are a large desiccant jar for moisture removal, a "flame isolated" pumping system and an optional expandable interface (pictured).

Actually, the Xenon Trap is not the finish because with every piece of Radx equipment goes our one-year warranty, and our commitment to the future needs of nuclear medicine.

1. Obrist, W. D. et al, "Determination of Regional Cerebral Blood Flow by Inhalation of Xenon-133", Circulation Research, XX,124-134, January 1967.

RADX

P.O. Box 19164, Houston, Texas 77024 • (713) 468-9628

PROCEDURES AND PRECAUTIONS FOR USE OF Sr-90 SEALED SOURCES

Refer to Item #6b of NRC 313M, page #1.

1. The Sr-90 Eye Applicator will be secured against theft or loss while stored in its permanent storage location by locking it in a designated cabinet. Access will be through authorized personnel only.

2. The applicator will be secured while being transported by locking it in the trunk of the car.

3. A quarterly inventory log will be maintained by Dr. Walter. The log will be in his office.

4. If the source is disposed, it will be transferred to an authorized recipient or disposed through the services of a commercial company such as Nuclear Engineering Corporation, Morehead, Kentucky, License #16NSF-1

Item #23
Prepared 7/10/79
License #24-13383-01

Control No. 02035