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

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIALS LICENSE - MEDICAL

Approved by OMB 3150-0041 Expires 5-31-83

INSTRUCTIONS - *Complete Items 1 through 20. If this is an initial application or an application for renewal of a license, use supplemental sheets where necessary. Item 20 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to: Director, Office of Nuclear Material 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 20 and the appropriate fee enclosed.*

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

Mercy Hospital Medical Center
Sixth and University Avenues
Des Moines, Iowa

TELEPHONE NO.: AREA CODE (515) 247-4370

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

Same as 1a
and
421 Laurel Street
Suite 410
Des Moines, Iowa for bone densitometer

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Stan A. Huber Consultants
235 Essex Lane
New Lenox, IL

TELEPHONE NO.: AREA CODE (815) 722-8009

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 14-01137-01

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 attached Item 8

5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than RSO will be used, complete training and experience as in Supplement A.)*

John Henderson, M.D.

Applicant ... APM
Check No. 05829
Amount/Fee Category 350
Type of Fee ... Rem
Date Check Rec'd 4/18/85
Received By ...

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
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	3000
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

ADDITIONAL ITEMS:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	X	30
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	X	200
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	600

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
Iodine-125	Sealed Source AECL Model C324	200 mCi per source (Maximum of two (2) sources)	Nuclear Data Model ND1100 Bone Density Scanner

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INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

For Items 7 through 23, check the appropriate box(es) and submit a detailed description of all the requested information. Begin each item on a separate sheet. Identify the item number and the date of the application in the lower right corner of each page. If you indicate that an appendix to the medical licensing guide will be followed, do not submit the pages, but specify the revision number and date of the referenced guide: Regulatory Guide 10.8 , Rev. 1 Date: October 1980

NOTE: All appendices referenced on this page are based on Regulatory Guide 10.8, Rev. 1, and are attached to this application. Some appendices have been slightly modified to reduce the regulatory burden.

7. MEDICAL ISOTOPES COMMITTEE

	Names and Specialties Attached; and
X	Duties as in Appendix B; or *(Check One)*
	Equivalent Duties Attached

8. TRAINING AND EXPERIENCE

X	~~Supplements A & B Attached for Each Individual Used;~~ and See attached Item 8
	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

X	Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
	Equivalent Procedures Attached; and
X	Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
	Equivalent Procedures Attached

11. FACILITIES AND EQUIPMENT

X	Description and Diagram Attached

12. PERSONNEL TRAINING PROGRAM

X	Description of Training Attached

13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

X	Detailed Information Attached

14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*

X	Appendix F Procedures Followed; or
	Equivalent Procedures Attached

15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*

X	Appendix G Rules Followed; or
	Equivalent Rules Attached

16. EMERGENCY PROCEDURES *(Check One)*

X	Appendix H Procedures Followed; ~~or~~ and
	Equivalent Procedures Attached

17. AREA SURVEY PROCEDURES *(Check One)*

X	Appendix I Procedures Followed; ~~or~~ and
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
N/A	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

N/A	Detailed Information Attached

23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b

N/A	Detailed Information Attached

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24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	R. S. Landauer, Jr. and Company	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	R. S. Landauer, Jr..and Company	Monthly
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify) This institution is committed to the ALARA program set forth in Appendix O, attached to this application.

Based on the radionuclides and procedures to be used, the use of pocket dosimeters and bioassay services are considered not applicable for Groups I, II, and III.

For radionuclide therapy procedures, we confirm I-131 will be used in capsule form rather than liquid. Should administration of I-131 in liquid form ever be deemed medically necessary, we would limit personnel attending the dose administration to a minimum. A 24-hour thyroid uptake would be performed on all personnel attending such a case and the results reviewed with them. The bioassay will follow action levels and follow-up actions listed in NRC Reg. Guide 8.20, "Applications of Bioassay for I-125 and I-131

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS

CITY | STATE | ZIP CODE

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

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

26. CERTIFICATE
(This item must be completed by applicant)

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

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

(1) LICENSE FEE CATEGORY: 7C

(2) LICENSE FEE ENCLOSED: $ 580.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)* R. Patricia Clare Sullivan, R.S.M.

(1) NAME *(Type or Print)* Sister Patricia Clare Sullivan, RSM

(2) TITLE President

c. DATE February 1, 1985

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REGION III

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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 45338 (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.

RADIATION SAFETY/MEDICAL ISOTOPES COMMITTEE

The membership of this committee will consist of at least three members and will include:

1. the radiation safety officer;

2. the hospital administrator or other administrative official directly responsible to the hospital administrator in the hospital's internal chain of command;

3. a physician specialist* from each department where radioactive materials are used; and

4. a representative of the hospital's nursing staff.

*Some departments, such as the nuclear pharmacy, may not be under the supervision of a physician. In these cases, the supervisory paramedical professional will be a member of the committee.

The names and qualifications of the committee members will be documented in the committee's records, will be updated as necessary, and will be available for inspection by the NRC.

APPENDIX B

RADIATION SAFETY/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

The committee shall:

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 all individuals who use radioactive materials (including physicians, technologists, physicists, and pharmacists) and determine that their qualifications are sufficient to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.

3. Establish 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 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 the adequacy of the institution's 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.

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

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.

Ref: NRC 31 3M Item 8

TRAINING AND EXPERIENCE

Radiation Safety Officer

Radiation Safety Officer; Training, Duties & Availability:

a). Training:

The training and experience descriptions of the Radiation Safety Officer (R.S.O.) are appended to this application.

b). Duties:

The R.S.O. is responsible for the overall radiation protection program within the institution. The R.S.O. has authority to implement and enforce all NRC license stipulations and regulations pertaining to the institution on a daily basis and has authority immediately terminate any hazardous operation The R.S.O. responsibilities involve not only routine applications and occupational personnel within the restricted areas using radioactive materials in the institution but also all non-occupational personnel and visitors in non-restricted areas, as well as security and handling procedures from the time radioactive shipments arrive in the hospital, day or night, through the time all such sources are properly used or disposed. The R.S.O. must provide and document extensive education (initialy, as needed and at least annually) of all personnel and public who may come within the vicinity of radioactive materials.

c). Availability:

The R.S.O. must provide back-up 24 hours per day coverage during illness, vacations or emergency by providing Administration and the occupational personnel with the phone numbers of consulting physical scientists and the Regional NRC Division of Compliance.

NAME OF AUTHORIZED USER	AUTHORIZATION
*Julio Acebey, M.D. ✓	Groups I, II, III, ~~IV~~, and ~~V~~ Xenon-133
**Harrison W. Pratt, D.O. ✓	Group I, In vitro studies
*Stephan M. Cooper, M.D. ✓	Groups I, II, III, ~~IV~~, and ~~V~~ I-131 CA etc. Xenon-133 and in vitro studies
*John Henderson, M.D. ✓	Groups I, II, III, ~~IV~~, and ~~V~~ I-131 for Xenon-133 treatment of hyperthyroidism, Cardiac dysfunction or Thy. CA.
not added ***P. Ruben Koehler, M.D. ABR Radiology only	All procedures which he is qualified for
***Nicholas DeVries, M.D. No clinical exp.	All procedures which he is qualified for
***Michael A. Disbro, M.D. ✓ 500 hrs. for the Groups.	All procedures which he is qualified for

I, II and III
I-131 for treatment of hyperthyroidism, cardiac dysfunction or thyroid CA.
Xe-133

*For training and experience of the above, please reference NRC license #14-01137-01 and refer to attached Training and Preceptor forms for additional procedures.

**For training and experience of the above, please reference NRC License #14-01137-01.

***For training and experience of the above, please reference the attached Training and Preceptor forms.

CONTROL NO. 78547

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

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

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

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME: Nicholas deVries, M.D

STREET ADDRESS: 1847 South 2600 East

CITY: Salt Lake City | STATE: Utah | ZIP CODE: 84108

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

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

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

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

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
	DIAGNOSIS OF THYROID FUNCTION	10	
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
I-131 or I-125	LIVER FUNCTION STUDIES *	6	using Tc-99m HIDA
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES *	See below	
	IN VITRO STUDIES		
OTHER	whole body I^{131}	5	
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING	6	
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY	2	
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
	BRAIN IMAGING		Thallium scans 24
	CARDIAC IMAGING	*	Pyrophosphate scans 3
	THYROID IMAGING	6	MUGA 13
	SALIVARY GLAND IMAGING		
Tc-99m	BLOOD POOL IMAGING	6	(GI. bleeding studies)
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING	22	
	LUNG IMAGING	49	
	BONE IMAGING	59	
OTHER	Renal Imaging	18	

PRECEPTOR STATEMENT *(Continued)*

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

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA	4	
	TREATMENT OF HYPERTHYROIDISM	2	
Au-198	INTRACAVITARY TREATMENT		
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT		
I-125 or Ir-192	INTERSTITIAL TREATMENT		
Co-60 or Cs-137	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other	Schilling's	3	
	Gallium scan	4	
	Leukocyte scan	10	

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

Radiation Physics: Lectures and Supervised Experience — 100 hours
Radiation Protection: Lectures and supervised experience — 25 hours
Mathematics/Chemistry: Radiopharmacy — Supervised Experience — 50 hours
Radiation Biology: Lectures — 25 hours

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

a. NAME OF SUPERVISOR
[illegible]

b. NAME OF INSTITUTION
University of Utah Medical Center

c. MAILING ADDRESS
50 North Medical Drive

d. CITY
Salt Lake City, Utah 84132

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE
Andrew Taylor MD

7. PRECEPTOR'S NAME *(Please type or print)*
Andrew Taylor, M.D

8. DATE
1-4-85

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

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

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

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

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

Michael A. Disbro M.D.

STREET ADDRESS

1809 South 1600 East

CITY	STATE	ZIP CODE
Salt Lake City	Utah	84105

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

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

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

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

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION	114	
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME	5	
	LIVER FUNCTION STUDIES	0	
	FAT ABSORPTION STUDIES	0	
	KIDNEY FUNCTION STUDIES	187	
	IN VITRO STUDIES	0	
OTHER	I-123 Thyroid Imaging	115	
I-125	DETECTION OF THROMBOSIS	1	
I-131	THYROID IMAGING	59	
P-32	EYE TUMOR LOCALIZATION	0	
Se-75	PANCREAS IMAGING	0	
Yb-169	CISTERNOGRAPHY	0	
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES	484	
OTHER	Xe-133 Skin Perfusion	13	
Tc-99m	BRAIN IMAGING	23	
	CARDIAC IMAGING (pyp infarct)	45	
	THYROID IMAGING	14	
	SALIVARY GLAND IMAGING	0	
	BLOOD POOL IMAGING (muga)	159	
	PLACENTA LOCALIZATION	0	
	LIVER AND SPLEEN IMAGING	788	
	LUNG IMAGING	500	
	BONE IMAGING	1047	
OTHER	Tc-99m HIDA-DISHIDA	115	

PRECEPTOR STATEMENT *(Continued)*

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

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	11	
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT	0	
I-131	TREATMENT OF THYROID CARCINOMA	50	
	TREATMENT OF HYPERTHYROIDISM	11	
Au-198	INTRACAVITARY TREATMENT	0	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	0	
	INTRACAVITARY TREATMENT	0	
I-125 or Ir-192	INTERSTITIAL TREATMENT	0	
Co-60 or Cs-137	TELETHERAPY TREATMENT	0	
Sr-90	TREATMENT OF EYE DISEASE	0	
	RADIOPHARMACEUTICAL PREPARATION	20	
Mo-99/ Tc-99m	GENERATOR	10	
Sn-113/ In-113m	GENERATOR	5	
Tc-99m	REAGENT KITS	20	
Other In-111 In-111 Tl-201 Ga-67	 Leukocyte Imaging Cisternography Cardiac Imaging Abscess/Tumor Imaging	 256 19 103 160	

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

Clinical training as fellow in Nuclear Medicine 7-81 to 6-82	2,500 hrs
Radiation physics training, lecture and supervised experience	150 hrs
Radiation protection training, " " " "	50 hrs
Radiation biology training, lectures	20 hrs
Radiopharmacy, chemestry and math supervised experimentation	50 hrs

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

a. NAME OF SUPERVISOR
David J. Schuyler

b. NAME OF INSTITUTION
Univ. of Utah Med Center

c. MAILING ADDRESS
50 North Medical Drive

d. CITY
Salt Lake City, Utah 84132

5. MATERIALS LICENSE NUMBER(S)
Univ. (state)1800001 VA 43-03299-01

6. PRECEPTOR'S SIGNATURE
Naomi Alazraki MD

7. PRECEPTOR'S NAME *(Please type or print)*
Naomi. P. Alazraki M.D.

8. DATE
January 3,1985

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

CONTROL NO. 78547

CURRICULUM VITAE

PERSONAL

Michael A. Disbro, M.D.
1809 South 1600 East
Salt Lake City, Utah 84105
801-485-0888
Married, wife Nicola Marie

EDUCATION

The Ohio State University College of Medicine
July. 1976 to June, 1979
Doctor of Medicine

The University of Notre Dame
September, 1972 to May, 1973
September, 1974 to May, 1976
Bachelor of Science

Universitat Innsbruck
July, 1973 to August, 1974
Area studies in German language

Westerville High School
Westerville, Ohio
Graduated June, 1972

TRAINING

The University of Utah Medical Center
Salt Lake City, Utah
Resident in Radiology
July, 1982 to date

The University of Utah Medical Center
Salt Lake City, Utah
Fellow in Nuclear Medicine
July, 1981 to June, 1982

The University of Texas Southwestern Medical School
Parkland Memorial Hospital and Affiliated Hospitals
Dallas, Texas
Resident in Neurological Surgery
July, 1980, to June, 1981

The University of Texas Southwestern Medical School
Parkland Memorial Hospital and Affiliated Hospitals
Dallas, Texas
Intern in General Surgery
July, 1979, to June, 1980

HONORS

Chief Resident, Department of Radiology 1984-1985
Trustee, Utah State Medical Association 1984-1985
President, University of Utah Housestaff Association 1983-84
Commendations of Achievement:
- The Ohio State University College of Medicine
  - Department of Internal Medicine
  - Department of Surgery
  - Department of Psychiatry

Scholar, University of Notre Dame 1972-1976

MEMBERSHIPS The Radiological Society of North America
The American Roentgen Ray Society
The American Medical Association
The Utah State Medical Association
The University of Utah Housestaff Association

ACCREDITATION Diplomate, National Board of Medical Examiners
Utah Medical Lisence #6880
Utah D.E.A. #AD1316478

PRESENTATIONS Minton JP, Disbro MA. Endocrine Ablation for Radiation and Chemotherapy Failure Metastatic Breast Cancer Patients. Society International de Chieroge, San Francisco, California. September, 1979.

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Disbro MA, Datz FL, Cook PS, Alazraki NP, Taylor AT, Indium-111 Labeled Leukocytes: Clinical Utility and Acuracy. The Society of Nuclear Medicine. San Diego, California. October, 1982.

Lawrence PF, Syverud JB, Disbro MA, Alazraki NP, The Evaluation of Technetium-99m Phosphate Imaging for Predicting Skin Ulcer Healing. Southwestern Surgical Congress. Phoenix, Arizona. May, 1983.

Disbro MA, Harnsberger HF, Osborn AG. The CT Evaluation of Peripheral Facial Nerve Dysfunction. The American Society of Head and Neck Radiology. San Antonio, Texas May, 1984.

PUBLICATIONS Cook PS, Datz FL, Disbro MA, Beightol RW, Baker WJ, Alazraki NP. The Implications of Pulmonary Uptake of Indium-111 Labeled Leukocytes. Journal of Nuclear Medicine 23;65, 1982.

Disbro MA, Datz FL, Cook PS, Alazraki NP, Taylor AT. Indium-111 Labeled Leukocytes: Clinical Utility and Acuracy. Clinical Nuclear Medicine 7:44, 1982.

Lawrence PF, Syverud JB, Disbro MA, Alazraki NP. Evaluation of Technetium-99m Phosphate Imaging for Predicting Skin Ulcer Healing. American Journal of Surgery 146:746, 1983.

Cook PS, Datz FL, Disbro MA, Alazraki NP, Taylor AT. Pulmonary Uptake in Indium-111 Leukocyte Imaging: Clinical Significance in Patients with Suspected Occult Infections. Radiology 150:557, 1984.

Veterans Administration

Memorandum

To: Mike Disbro, M.D.

Date: December 13, 1984

Subj: Nuclear Medicine Procedures Completed Between July 1, 1981 and June 30, 1982

The following s a list of procedures completed by Nuclear Medicine Service during the period of your fellowship, July 1, 1980 through June 30, 1982.

BRAIN	Cerebral Blood Flow	23
	Brain Scans	23
	Cisternogram	9
THYROID	Thyroid Uptake	67
	Thyroid Scan (I-123)	48
	Thyroid Scan (Tc-99m)	14
	Perchlorate Washout	1
LUNG	Perfusion Lung Scan	213
	Ventilation Lung Scan	213
	Differential Function	6
HEART	Infarct Detection (PYP)	26
	Stress Perfusion (Tl)	10
	Rest Perfusion (Tl)	2
	Redistribution (Tl)	10
	Gated Blood Pool - Rest (Muga)	93
	Gated First Pass	26
DIGESTIVE SYSTEM	Gastric Empty	61
	G.I. Bleed	8
	Meckels	7
	HIDA	72
	Liver/Spleen	523
	Liver Flow	370
RENAL-URINARY	Renal Flow (Tc-99m-DTPA)	78
	Tubular ECT (I-131 Hippuran)	78
	Cystogram	1
	Relative Function (Tc-99m-DMSA)	9

CONTROL NO. 78547

SKELETAL SYSTEM	Bone Imaging	451
	Bone (Osteo)	70
TUMOR/ ABSCESS LOCALIZATION	Thyroid Metastases (I-131)	11
	Gallium Body Survey	139
	In-WBC Body Scan	150
VASCULAR SYSTEM	Venography	9
	Fibrinogem Uptake (I-125)	1
	Xe-133 Skin Perfusion	13
HEMATOLOGIC STUDIES	Plasma Volume (I-125 RISA)	4
	Red Cell Mass (Cr-51)	4
	Schillings Test	91

Sincerely,

Ed Greenberg

ED GREENBERG,
Supervisor, Nuclear Medicine

FISCAL YEAR REPORT - JULY 1981 - 1982

UNIVERSITY HOSPITAL DEPARTMENT OF RADIOLOGY

DIVISION OF NUCLEAR MEDICINE PATIENT STUDIES FOR THE MONTH OF _____

IMAGING PROCEDURES	IN	OUT	TOTAL
BONE SCAN	203	323	526
LIVER/SPLEEN w/FLOW	133	61	194
LIVER/SPLEEN SCAN	50	21	71
LUNG SCAN	265	22	287
LUNG VENTILATION STUDY	251	20	271
THYROID UPTAKE, MULTIPLE	9	38	47
THYROID SCAN	21	46	67
GALLIUM SCAN	18	3	21
COMPLETE RENAL FUNCTION	93	15	108
WHOLE BODY I-131	18	23	41
THALLIUM SCAN	23	68	91
LEUKOCYTE SCAN	93	13	106
PARTIAL BONE SCAN	9	10	19
RADIONUCLIDE THERAPY w/THYROID SCAN	3	4	7
RADIONUCLIDE THERAPY	20	29	49
GASTROINTESTINAL SCAN	58	27	85
PORTABLE	54	2	56
ADDITIONAL SCAN (9140)	39	45	84
IMAGE ANALYSIS (9175)		3	3
IMAGE ANALYSIS (9180)	1		1
IMAGE ANALYSIS (DETAILED)	33	23	56
EMERGENCY CHARGE	130	10	140
NUCLEAR ANGIOGRAM	21	9	30
CARDIAC SCAN	1		1
HIPPURAN STUDY	1		1
MYOCARDIAL SCAN	18	1	19
CARDIAC WALL MOTION	34	24	58
EJECTION FRACTION	34	24	58
CARDIOANGIOGRAM			
KIDNEY SCAN	15	1	16
BONE MARROW SCAN	1	1	2
LIVER FUNCTION, ROSE BENGAL			
LIVER FUNCTION WITH IMAGING	35	8	43
LIMITED OFFICE VISIT		2	2
OFFICE VISIT, FOLLOW UP			
CONSULTATION, LIMITED	1	5	6
CONSULTATION, COMPREHENSIVE	4	1	5
CONSULTATION, COMPLEX	10		10
CONSULT/OUTSIDE FILMS	2	1	3
EMERGENCY, PRO. FEE	56	1	57
ISOTOPE TECHNICAL PROCESSING CHARGE	1	1	2
B-12 ABSORPTION, SCHILLINGS	12	3	15
SCHILLINGS, TEST - PART II	8	2	10
PARTIAL LIVER	12	2	14
RED CELL SURV			
RED CELL SEQU			
RED CELL VOL		1	1
PLASMA VOL		1	1
CISTERNOGRAM	10		10
MISC	2	3	5
ISOTOPE 10	2		2
ISOTOPE 20	1	4	5
ISOTOPE 25	24	1	25
ISOTOPE 30	25	8	33

			TOTAL
ISOTOPE 35	2	2	4
ISOTOPE 40	11	13	24
ISOTOPE 50	6	7	13
ISOTOPE 60	1	7	8
ISOTOPE 70		12	12
ISOTOPE 80	1	5	6
ISOTOPE 90			
ISOTOPE 100	4	6	10
ISOTOPE 120	2	3	5
ISOTOPE 150	1		1

CONTINUED ON NEXT PAGE

CONTROL NO. 78547

IMAGING PROCEDURES - page two	IN	OUT	TOTAL
ISOTOPE 350	1	1	2
ISOTOPE 400	5		5
ISOTOPE 500	6	1	7
ISOTOPE 600	2		2
THERAPY P-32		6	6
TOTAL IMAGING PROCEDURES	1896	973	2869

IN VITRO STUDIES			
T4, T3	940	1946	2886
T4	612	1327	1939
T3	14	11	25
TSH	370	848	1218
DIGOXIN	746	600	1346
DIGITOXIN			
HBsAG UNITS	297	3437	3734
HBsAG PATIENT	517	1263	1780
HEPATITIS B SURFACE ANTIBODY	106	300	406
HEPATITIS B CORE ANTIBODY	51	181	232
HEPATITIS A ANTIBODY	82	210	292
PARATHYROID HORMONE	73	250	323
RENIN	59	70	129
B-12	311	205	516
FOLATE	254	166	420
LH	43	212	255
FSH	47	241	288
GH	209	237	446
ANTI DNA	30	65	96
METHOTREXATE		1	1
T3 RIA	117	191	308
INSULIN	93	114	207
PROLACTIN	83	481	564
HCG QUANTITATIVE	34	282	316
HCG SCREEN	55	298	353
ESTRIOL	1	89	90
PROGESTERONES	2	177	179
HBe Ag	16	20	36
HBe Ab	15	35	50

RESEARCH:

RENINS	67
INSULIN	107
HBsAG	85
DIGOXIN	6
TOTAL	265

TOTAL IN VITRO PROCEDURES	5,177	13,258	18,649 ~~18,435~~
TOTALS (IMAGING AND IN VITRO)	CONTROL NO. 78547		21,304
PREVIOUS MONTH TOTAL 18,679			

~~21,518~~

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

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

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

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME
JOHN F. HENDERSON, M.D.

STREET ADDRESS
MERCY HOSPITAL MEDICAL CENTER
SIXTH AND UNIVERSITY AVENUES

CITY | STATE | ZIP CODE
DES MOINES | IOWA | 50314

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

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

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

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

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc 99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

PRECEPTOR STATEMENT *(Continued)*

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

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA	3	
	TREATMENT OF HYPERTHYROIDISM	16	
Au-198	INTRACAVITARY TREATMENT		
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT		
I-125 or Ir-192	INTERSTITIAL TREATMENT		
Co-60 or Cs-137	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other			

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

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

a. NAME OF SUPERVISOR
BYRON AUGSPURGER, M.D.

b. NAME OF INSTITUTION
V.A. MEDICAL CENTER

c. MAILING ADDRESS
30 TH. & EUCLID

d. CITY
DES MOINES, IOWA 50310

5. MATERIALS LICENSE NUMBER(S)
14-01137-01

6. PRECEPTOR'S SIGNATURE
X Byron Augspurger MD

7. PRECEPTOR'S NAME *(Please type or print)*
BYRON AUGSPURGER, M.D.

8. DATE
March 4, 1985

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

CONTROL NO. 78547

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

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

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

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME
STEPHAN M. COOPER, M.D.

STREET ADDRESS
MERCY HOSPITAL MEDICAL CENTER
SIXTH AND UNIVERSITY AVENUES

CITY | STATE | ZIP CODE
DES MOINES | IOWA | 50314

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

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

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	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc 99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

PRECEPTOR STATEMENT *(Continued)*

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

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
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	INTRACAVITARY TREATMENT		
I-125 or Ir-192	INTERSTITIAL TREATMENT		
Co-60 or Cs-137	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other			

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

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a. NAME OF SUPERVISOR
BYRON AUGSPURGER, M.D.

b. NAME OF INSTITUTION
V.A. MEDICAL CENTER

c. MAILING ADDRESS
30 TH. & EUCLID

d. CITY
DES MOINES, IOWA 50310

5. MATERIALS LICENSE NUMBER(S)
14-01137-01

6. PRECEPTOR'S SIGNATURE
Byron Augspurger M.D.

7. PRECEPTOR'S NAME *(Please type or print)*
BYRON AUGSPURGER, M.D.

8. DATE
March 4, 1985

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

CONTROL NO. 78547

The American Board of Radiology

Organized through the cooperation of the American College of Radiology, the American Roentgen Ray Society, the American Radium Society, the Radiological Society of North America and the Section on Radiology of the American Medical Association Hereby certifies that

Peter Ruben Koehler, M.D.

Has pursued an accepted course of graduate study and clinical work, has met certain standards and qualifications and has passed the examinations conducted under the authority of The American Board of Radiology

On this the twenty-second day of June, 1962

Thereby demonstrating to the satisfaction of the Board that he is qualified to practice the specialty of

Radiology

THE AMERICAN BOARD OF RADIOLOGY INCORPORATED IN THE DISTRICT OF COLUMBIA 1934

Laurence F. Hobbins
President

Secretary

ENDORSED BY THE AMERICAN BOARD OF RADIOLOGY FOR NUCLEAR MEDICINE

Peter Ruben Koehler

1962

PAGE 17-E

Ref: NRC 31 3M - Item 9

INSTRUMENTATION

a) Survey Meter(s)

One (1) William B. Johnson & Assoc, Inc GSM-5
Ranges 0-0.2 mr/hr 0-20 mr/hr

One (1) Victoreen Model #491
Ranges 0-0.1 0-100 mr/hr

One (1) Victoreen Frisker
Ranges 0-5-- 0-500,000cpm

One (1) Ludlum 14 C survey meter
Ranges 0-0.2 0-2000 mR/hr

One (1) Victoreen ionization Chamber
Ranges 3-10; 3-100; 3-1000 Mr/hr

b) Dose Calibrator

One (1) Rad-X Meletron dose calibrator

One (1) Capintec CRC 30 dose calibrator

c) Diagnostic Instruments

One (1) Searle LFOV scintillation camera system
One (1) Searle Model 37 G.P. Pho/Gamma camera system
One (1) General Electric Porta Camera 2C
One (1) Searle L.E.M. Pho/Gamma camera system

One (1) Picker Dyna Camera Model 4-15 camera system
One (1) Eberline Mini Scaler Ms-2 fibrinogen Probe

One (1) Victoreen Xenogard air trap monitor

Ref: NRC 31 3M - Item 10

CALIBRATION OF INSTRUMENTS

a). Survey Meter:

The survey meters will be calibrated at least annually, and after repairs, by any firm that is approved by the NRC for such calibrations. Instruments will be calibrated on at least two points on each scale range. Currently, our calibration service firm is Stan A. Huber Consultants, Inc., of New Lenox, Illinois, whose radiation sources and procedures are on file with the NRC under license #12-17503-01.

The licensee shall perform operational constancy checks on survey instruments before each day's use to ensure proper functioning of the devices. For any infrequently used meters, these reference source operational checks shall be taken at least quarterly, per NRC Regulatory Guide 10.8 (October 1980) Appendix D, Section 1, Item B.

b). Dose Calibrators:

We shall follow the calibration methods and frequencies for dose calibrators as defined in NRC Regulatory Guide 10.8, dated October 1980, Appendix D, Section 2, "Methods for Calibration of Dose Calibrator".

For the linearity test, we will use a vial of Tc99m whose activity is equivalent to the maximum anticipated activity to be assayed. For the accuracy test, Stan A. Huber Consultants, Inc., of New Lenox, Illinois, or other licensed calibration firms, will use the following sources under the authority of their NRC license:

Model NES-356, 200 microcuries of Cs-137 (high energy)

Model NES-352, 1 millicurie of CO-57 (low energy)

Model NES-358, 250 microcuries of Ba-133 (medium energy)

We use a NEN Model NES-356 Cs-137 standard, 200 microcuries, for our day-of-use dose calibrator constancy checks. Records of all tests and checks will be maintained.

We request use of the "Calicheck" (CaliCorp) system or "Lineator" system (Atomic Products) as an alternate method of performing dose calibrator quarterly linearity checks. The product certifications for those devices are on file with the NRC.

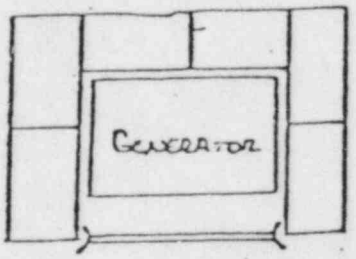
CONTROL NO. 78547

FACILITIES AND EQUIPMENT

Shielding Around Generator:

The generator is shielded on the rear by a wall of standard size lead bricks (each 2" thick X 4" wide X 8" long). This wall is three (3) bricks (12") high and two (2) bricks (16") long. Immediately adjoining both sides of this rear wall are side walls of lead bricks of the same dimensions as the rear wall. The front of the generator area is shielded by an upright Protective Lead Barrier 15" high X 15" wide X 1/2" thick, to prevent direct exposure to personnel eluting the generator. The generator area location on the hot lab work bench is shown on the facility sketch. A top view of this arrangement is shown below.

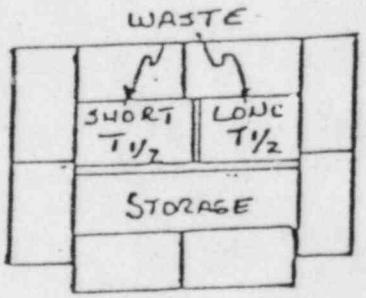
See (A) on attached sketch.



Storage and Waste Area Shielding:

The active storage/waste area is sheilded on all four (4) sides by standard size lead bricks as described above for the generator area shielding, except that a front lead brick wall is substituted for the protective lead barrier. This storage area is located on the hot lab area work bench as shown on the facility sketch. This lead brick storage area will be divided by plywood or similar material into three (3) compartments as shown on the diagram below. We do not anticipate the use of many long-lived radionuclides and the short-lived waste compartment contents can be more frequently surveyed for disposal to avoid waste accumulation or the need for any other radioactive storage or waste areas. A top view of the storage area shielding is shown below:

See (B) on attached sketch.

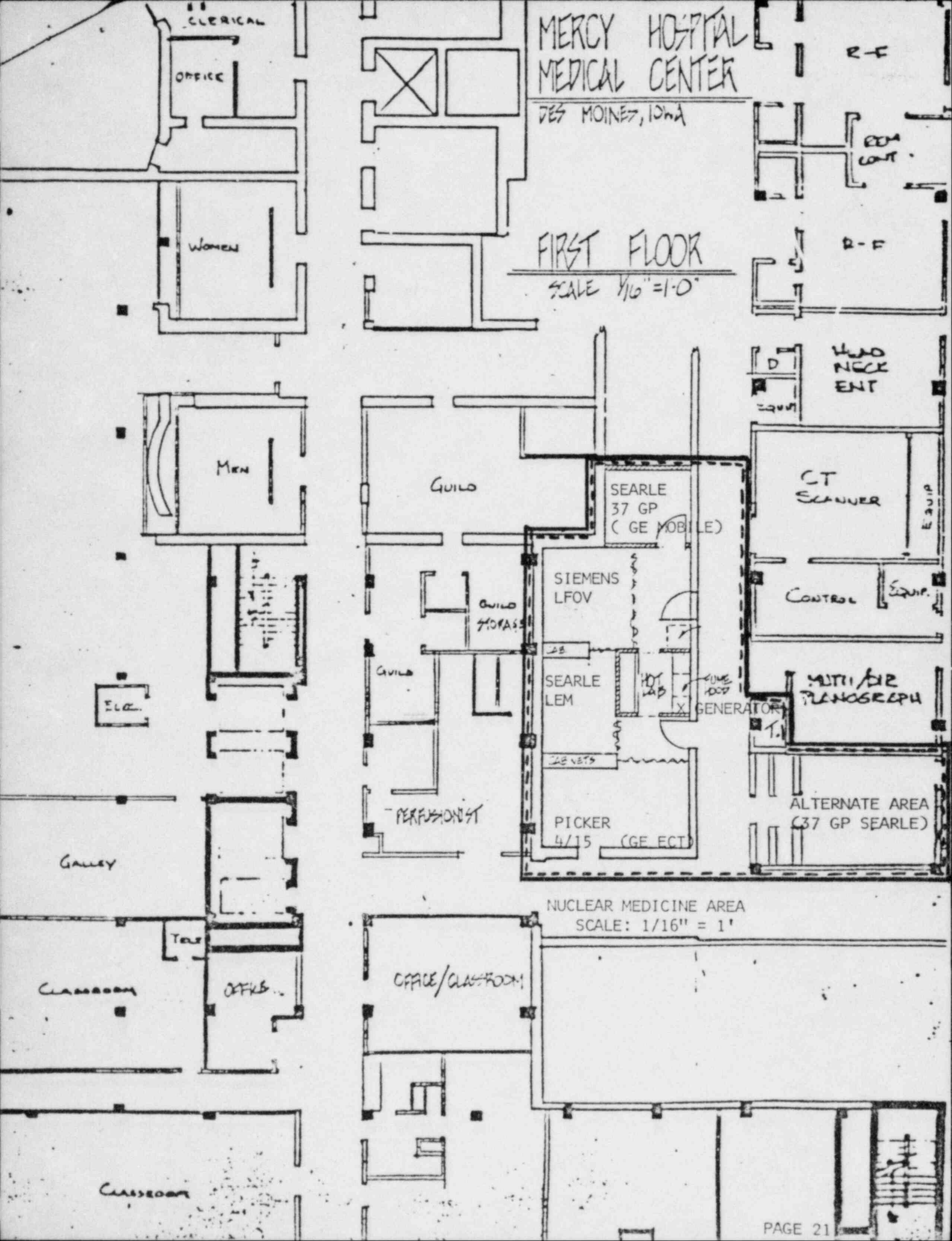


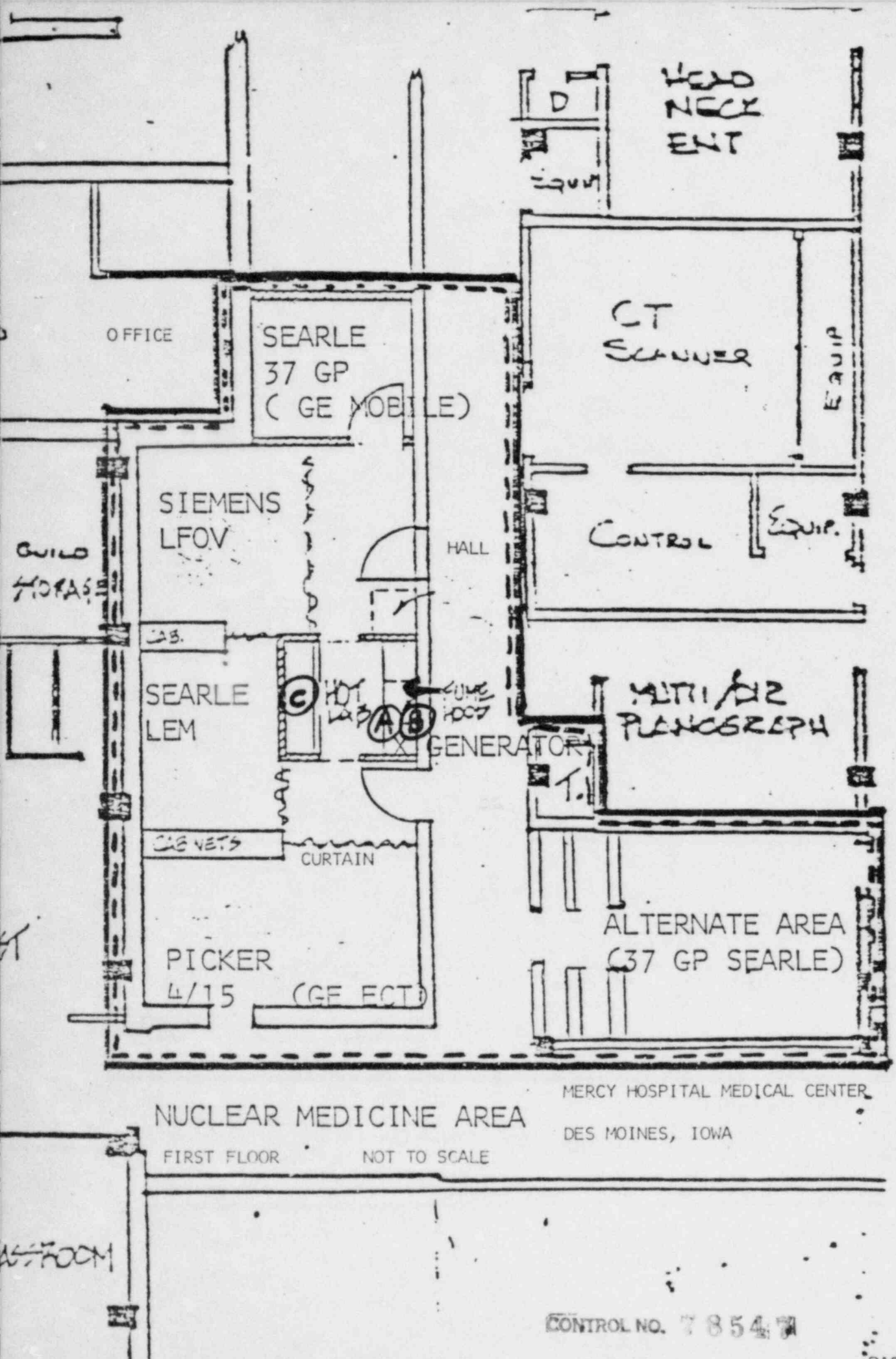
Dose Preparation Area:

The dose preparation area on the hot lab area work bench as shown on the facility sketch, is shielded in the front by an upright Protective Lead Barrier (15" X 15" X 1/2" thick). Disposable gloves, remote handling tongs (4" to 8" long), survey meters, plastic backed absorbent pads and all other ancillary supplies mentioned in NRC Regulatory Guide 10.8, dated October 1980, will also be on hand in this hot lab area.

Equivalent shielding to maintain minimal exposure levels may be used.

See (C) on attached sketch


MERCY HOSPITAL
MEDICAL CENTER
DES MOINES, IOWA
FIRST FLOOR
SCALE 1/16" = 1'-0"
CLERICAL
OFFICE
WOMEN
MEN
GUILD
SEARLE
37 GP
(GE MOBILE)
SIEMENS
LFOV
GUILD
SEARLE
LEM
X GENERATOR
PERFUSIONIST
PICKER
4/15 (GE ECT)
CT
SCANNER
CONTROL
HEAD
NECK
ENT
ALTERNATE AREA
(37 GP SEARLE)
NUCLEAR MEDICINE AREA
SCALE: 1/16" = 1'
GALLEY
CLASSROOM
OFFICE/CLASSROOM
CLASSROOM



MERCY HOSPITAL MEDICAL CENTER

NUCLEAR MEDICINE AREA

DES MOINES, IOWA

FIRST FLOOR NOT TO SCALE

CONTROL NO. 78547

PERSONNEL TRAINING PROGRAM

I. Individuals who work in or frequent restricted areas will be instructed in the items specified in 10 CFR 19.12 at the time of initial employment and at least annually thereafter.

This instruction will include:

a. All terms of the license pertinent to radiation safety.

b. Areas where radioactive material is used or stored.

c. Potential hazards associated with radioactive material.

d. Radiological safety procedures appropriate to their respective duties.

e. Pertinent NRC regulations.

f. Rules and regulations of the license.

g. Obligation to report unsafe conditions to the radiation safety officer.

h. Appropriate response to emergencies or unsafe conditions.

i. Right to be informed of their radiation exposure and bioassay results.

j. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions (including applications and applicable correspondence, as required y 10 CFR Part 19.

II. Individuals whose duties may require them to work in the vicinity of licensed material will be informed about radiation hazards and appropriate precautions at the time of initial employment and at least annually thereafter. This information will be provided initially at hospital employee orientation sessions and annually thereafter at in-service meetings.

APPENDIX E

PROCEDURES FOR ORDERING AND ACCEPTING DELIVERY
RADIOACTIVE MATERIAL

1. The Supervisory Nuclear Medicine Technologist will place all orders for radioactive materials and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

2. A system for ordering and receiving radioactive materials will be established and maintained. The system will consist minimally of the following.

   a. Ordering of routinely used materials

      (1) Written records that identify the isotope, compound, activity levels, and supplier, etc, will be used.

      (2) The written records will be referenced when opening or storing radioactive shipment.

   b. Ordering of specially used materials (e.g., therapeutic uses)

      (1) A written request will be obtained from the physician who will perform the procedure.

      (2) Persons ordering the materials will reference the physician's written request when placing the order. The physician's request will indicate isotope, compound, activity level, etc.

      (3) The physician's written request will be referenced when receiving, opening, or storing the radioactive material.

   c. It is essential that written records* be maintained for all ordering and receipt procedures.

3. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the Nuclear Medicine Department.

4. During off-duty-hours, security personnel or other designated individuals will accept delivery of radioactive packages in accordance with the procedures outlined in the sample memorandum below.

*In the case of special orders, the physician's written request and appropriate shipping/receipt records will be referenced and the dose assayed prior to its administration.

SAMPLE**MEMORANDUM

MEMORANDUM FOR: Security

FROM: Hospital Administrator

SUBJECT: RECEIPT OF PACKAGES CONTAINING RADIOACTIVE MATERIAL

Any packages containing radioactive material that arrive between 4:30 p.m. and 7 a.m. or on Sundays shall be signed for by the Security Supervisor on duty and taken immediately to the Nuclear Medicine Department. Unlock the door, place the package on top of the counter immediately to the right of the door, and relock the door.

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.

**RADIATION SAFETY OFFICER _____

**OFFICE PHONE _____

**HOME PHONE _____

**On the actual memo that is used, this information will be filled in and updated as necessary.

CONTROL NO. 78543

APPENDIX F

PROCEDURES FOR SAFELY OPENING PACKAGES

CONTAINING RADIOACTIVE MATERIAL

Only trained Nuclear Medicine personnel are to open radioactive material shipments. These personnel have been instructed in the "Radioactive Shipment Receipt and Notification Procedures" which the Radiation Safety Officer has distributed to personnel who could possibly have contact with a radioactive shipment delivery.

The radioactive material shipments are to be opened in accordance with the NRC Regulatory Guide 10.8 dated October, 1980, Appendix F, "Procedures for Opening Packages Containing Radioactive Material".

The basic steps are:

a. Monitor the outside of the package and record the survey reading. The exterior reading limits and notification procedures are in the Appendix F guide. (200 mr/hr at surface and 10 mr/hr at 3 feet from the package surface.)

b. Wear gloves while opening the package behind the lead shield on the hot lab work bench.

c. Check packing material in accordance with the Appendix F guide referenced above. Record the inside packing material survey reading.

d. Report any leakage immediately to the Radiation Safety Officer who in turn will notify the supplier and/or NRC Division of Compliance.

e. Detain the driver or courier of the radioactive shipment if any package is apparently damaged or suspected as leaking, until the shipment is pronounced safe by the Radiation Safety Officer or the proper authorities have been notified. If the driver insists on leaving prior to this time, obtain the driver's name, company name, and phone numbers for any follow-up that may be needed.

APPENDIX G

GENERAL RULES FOR SAFE 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 radioactive materials.

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

4. Always use syringe shields for routine preparation of patient doses and administration to patients, except in circumstances such as pediatric cases when their use would compromise the patient's well-being. In these exceptional cases, use other protective methods such as remote delivery of the dose (e.g. through use of a butterfly valve).

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

   b. Do not store food, drink, or personal effects with radioactive material.

6. a. 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 percent.

   b. For therapeutic doses, also check the patient's name, the radionuclide, the chemical form, and the activity vs. the order written by the physician who will perform the procedure.

7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These devices should be worn at chest or waist level. Personnel monitoring devices when not being worn to monitor occupational exposures should be stored in a designated low background area.

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 and properly shielded 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.

APPENDIX H

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 radiactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.

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

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

Major Spills

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 Radiaton 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:_____
*OFFICE PHONE:_____
*HOME PHONE:_____

*ALTERNATE NAMES AND TELEPHONE NUMBERS DESIGNATED BY RADIATION SAFETY OFFICER:

_____
_____
_____

*On the actual copy that is posted in the nuclear medicine department, this information will be filled in and updated as necessary.

APPENDIX I

AREA SURVEY PROCEDURES

1. All elution, preparation, and injection areas will be surveyed daily with an appropriately low-range survey meter and decontaminated if necessary.*

2. Laboratory areas where only small quantities of radioactive material are used (less than 200 uCi) will be surveyed monthly.

3. Waste storage areas and all other laboratory areas will be surveyed weekly.

4. The weekly and monthly surveys will consist of:

   a. A measurement of radiation level with a survey meter sufficiently sensitive to detect 0.1 mr/hr.

   b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 200 dpm per 100 cm^2 for the contaminant involved. Wipes of elution and preparation areas or other "high background" areas will be removed to a low background area for measurement.

5. A permanent record will be kept of all survey results, including negative results. The record will include:

   a. Location, date, and identification of equipment used, including the serial number and pertinent counting efficiencies.

   b. Name of person conducting the survey.

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

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

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

   f. 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.

6. Area will be cleaned if the contamination level exceeds 200 dpm/100 cm^2.

*For daily surveys where no abnormal exposures are found, only the date, the identification of the person performing the survey, and the survey results will be recorded.

APPENDIX I

ALTERNATE WIPE TEST METHOD

Alternate method of assaying wipe test (smear test) samples for detecting surface contamination. Because of the relatively small quantities of radioactive materials used at our hospital, we feel the following procedure is sufficient to detect surface contamination levels:

a. Wipe test samples will be assayed by holding the smear immediately adjacent to the open window of our low level g.m. survey meter. Care will be taken to avoid contamination of the probe.

b. The smear will be held adjacent to the probe for approximately 30 seconds to ensure that any contamination over normal background levels will be detectable.

c. Normal background levels at our hospital are approximately 0.05 mr/hr. Any wipe test reading over that level will indicate the need to decontaminate the tested area.

Ref: NRC 313M - Item 18

WASTE DISPOSAL PROCEDURES

G. Unused sources and/or residues are decayed in the lead shielded hot lab storage area for a period of at least (10) half lives (fifteen (15) half lives in the case of Mo-99 and Tc-99m) and/or until radiation levels, as determined with a low level survey meter are found to be that of normal background readings (usually §0.05 mR/hr) before disposal as regular trash. In certain cases when the initial calibrated activity of a radionuclide is already low, the Radiation Safety Officer may authorize specific disposals before the ten half-lives have elapsed, as long as the surveyed source shows no detectable activity above background on the low level survey meter. Radiation labels are obliterated before such disposal. Surveys are performed with source shielding removed.

We may use any NRC licensed waste disposal service as a back-up method of disposal, especially if an accumulation of long lived waste would develop. We may also transfer radioactive materials to any appropriately licensed recipient.

H. Therapeutic doses of radiopharmaceuticals will be administered under the direct supervision of the licensed physician users. Nursing instructions from NRC Regulatory Guide 10.8, dated October 1980, Appendix K, "Radiation Safety Procedures for Therapeutic Use of Radiopharmaceuticals" will be followed.

*RADIATION SAFETY OFFICER: _____
ON DUTY PHONE: _____
HOME PHONE: _____

*On the actual copy that is posted in the nuclear medicine department, this information will be filled in and updated as necessary.

CONTROL NO. 78547

REF: NRC 313M - Item 19

We request exemption from following procedures specified in Appendix K, Regulatory Guide 10.8, dated October, 1980, for therapy patients who have received less than 30 mCi and do not require hospitalization because of the amount of radioactive material present. Occasionally, patients who have received less than 30 mCi doses must be hospitalized for other reasons and we do not feel the radiation hazards present in these cases and on such an infrequent basis warrants following the restrictive Appendix K procedures.

We will follow Appendix K procedures for cases where more than 30 mCi therapy doses have been administered.

REF: NRC 313M - Item 23
Leak Testing of Sealed Sources

Leak testing of sealed sources will be performed on a semi-annual frequency. We will use the leak test services of Stan A. Huber Consultants, Inc., New Lenox, Illinois (NRC License #12-17503-01), using their Model LT-2 Leak Test Kit for Sealed Sources, or other firm specifically authorized by the U.S. Nuclear Regulatory Commission to perform these tests.

We confirm that sealed sources will be stored in their original lead shielded containers. Any readings above background would indicate the need for additional shielding.

b. We plan to use a Victoreen Xenogard air trap monitor Model 36-751 gas trap system or similar NRC approved Xe-133 system for these procedures. (Descriptions attached.)

c. Entrance doors to the nuclear medicine area will be closed during any use of Xe-133 gas. Since camera room and hot lab are in the same room, there are no separate ventilation specifications or calculations for the hot lab.

4. Emergency Procedures

In the event of an accidental release of Xe-133 into the room, we will temporarily evacuate the room(s) and reclose the entrance door for a period of 20.7 minutes (five room air exchanges). With a total exhaust rate of at least 2400 cfm and a total room volume of approximately 9936 cubic feet, we estimate one room air turnover to be a maximum of 4.14 minutes.

We confirm that a low level survey meter will be used to survey the affected area to confirm normal background readings prior to permitting reoccupation of the room.

5. Xe-133 Concentrations in Restricted Areas:

20.103 of 10 CFR 20 requires that Xe-133 concentrations, averaged over a 40 hour week for a calendar quarter do not exceed 1 x E-5 uCi.

a. The estimated weekly utilization (A) of Xe-133 in our facilities will be 100 mCi (see Item 1,a,(2) of this application).

b. The estimated fraction of Xe-133 lost (f) during these procedures and during storage is 0.20 (or 20%).

c. The minimum amount of air flow (V) necessary per week to dilute the Xe-133 to less than 1 x E-5 uCi/ml is calculated as follows:

$$A/V \times f \leq 1 \times E\text{-}5 \text{ uCi/ml}$$

or

$$V \geq \frac{A \times f}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq \frac{100 \text{ mCi} \times 1000 \text{ uCi/mCi} \times .20}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq \frac{20 \times E4 \text{ uCi}}{1 \times E\text{-}5 \text{ uCi/ml}}$$

$$V \geq 20 \times E9 \text{ ml/week}$$

Since 1 cfm = 6.797 x E7 ml/40 hr week, this translates to a

required air flow rate of 29.42 cfm.

$$V \geq \frac{20 \times E9 \text{ ml/week}}{6.797 \times E7 \text{ ml}/40 \text{ hr week/cfm}}$$

$$V \geq 29.42 \text{ cfm}$$

We confirm that the ventilation rate will be well over 29.42 cfm to maintain air concentrations of Xe-133 as low as reasonably achievable. These rates will be checked semi-annually to verify compliance with NRC limits.

6. Xe-133 Concentrations in Unrestricted Areas:

a. We will use a charcoal gas trap as our primary means of disposing of Xe-133. Since Xe-133 gas traps are not 100% efficient for trapping Xe-133, we use the following method to ensure that Xe-133 concentrations will not exceed the 10CFR 20.106 limit of 3 x E-7 uCi/ml, averaged over 1 year.

(1) As calculated in item 5,c., of this application, the estimated fraction of Xe-133 lost during use and storage is 20 x E4 uCi/week.

(2) This can be expressed in uCi/year as follows:

$$20 \times E4 \text{ uCi/week} \times 52 \text{ weeks/year} = 1040000 \text{ uCi/year}$$

(3) 10CFR 20.106 requires that $C = A/V \leq 3 \times E\text{-}7$ uCi/ml

The required ventilation rate (V) to maintain concentrations below this level is therefore:

$$V \geq \frac{A}{3 \times E\text{-}7 \text{ uCi/ml}}$$

$$V \geq \frac{1040000 \text{ uCi/year}}{3 \times E\text{-}7 \text{ uCi/ml}}$$

$$V \geq 3.46E+12$$

(4) This rate can then be translated to cfm as follows:

$$V \geq \frac{3.46E+12 \text{ ml/year}}{1.484 \times E10 \text{ ml/year/cfm}}$$

$$V \geq 233.60 \text{ cfm}$$

We confirm the ventilation rate will be greater than 233.60 cfm to maintain Xe-133 levels in unrestricted areas as low as

reasonably achievable. The air flow rates will be remeasured semi-annually to verify compliance with NRC limits.

b. To monitor our Xe-133 gas trap exhaust (to ensure trapping efficiency) we will use either a commercially available trap monitor (such as a Rad-X Model 120) (brochure for Atomic Products equipment is attached) or will collect Xe-133 gas trap exhaust in a plastic bag and assay the Xe-133 content with our gamma camera.

If we obtain a trap monitor, we confirm we will follow the manufacturer's instructions for use and calibration frequency of the instrument (at least annually).

The bag method will involve:

(1) Determining camera detection efficiency using a known source of Tc99m, Co-57, Xe-133, or other low energy radionuclide. Configuration of the source will be in the form of a flood phantom rather than a point source to approximate the geometry of the bag.

(2) Assaying a Xe-133 exhaust bag and calculating the quantity (activity) of Xe-133 leakage. The frequency of this check will be initially and at least monthly, or more frequently, if more than 30 Xe-133 studies are performed in a given month.

(3) Calculating whether or not the trap is at least 95% efficient by dividing trap leakage by administered activity.

(4) Manufacturers specify that charcoal traps are at least 98% efficient for trapping Xe-133. Therefore, we feel that 95% is a reasonable action level at which point the charcoal filters would need replacement.

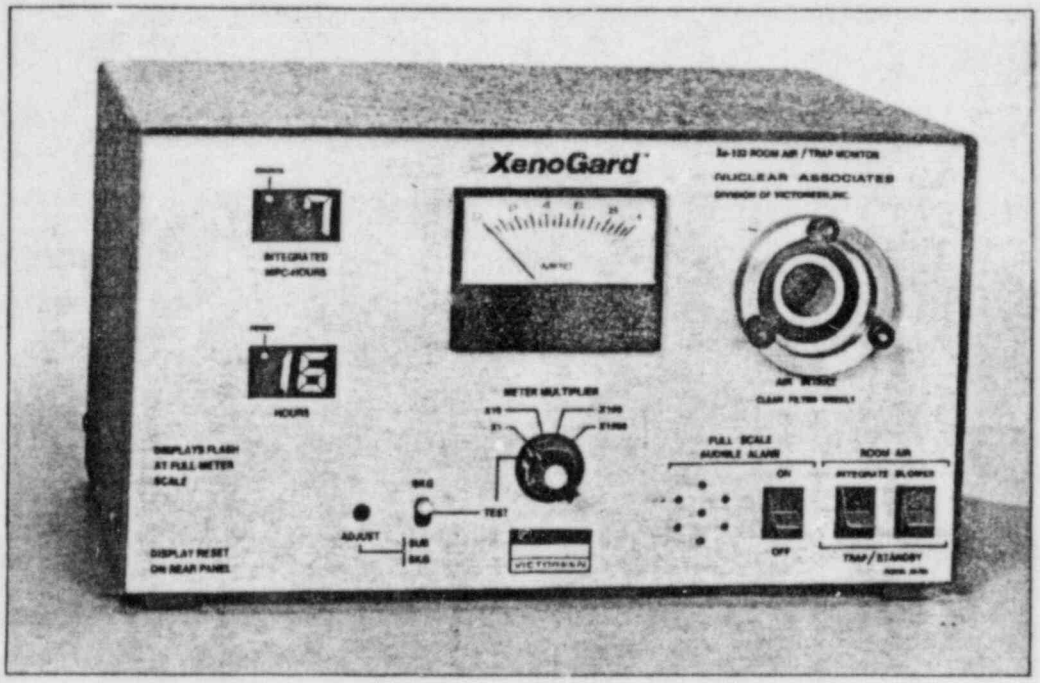
(5) The saturated filter will be removed and the portals will be tightly capped with rubber stoppers. In this manner, the cartridge will not leak since air is not flowing through the unit. The surface readings of the lead shielded "saturated" cartridge should not exceed normal background levels, as determined with a low level survey meter, or additional lead foil (1/8" thick) will be wrapped around the cartridge until this background reading is achieved. The unit will be stored in the hot lab storage area and allowed to decay. The attached sketches, descriptions of shielding, and previously defined calculations of average concentrations in air should serve to also cover this final phase of Xe-133 handling procedures.

We also confirm that all disposal items are to be surveyed with a low level g.m. survey meter to confirm exposure rates of normal background (less than 0.05 mr/hr) prior to disposal.

XenoGard™

Xenon Room Air and Trap Monitor

Model 36-751



TM VICTOREEN, INC.

U.S. PATENT 4,286,155

VICTOREEN

VICTOREEN

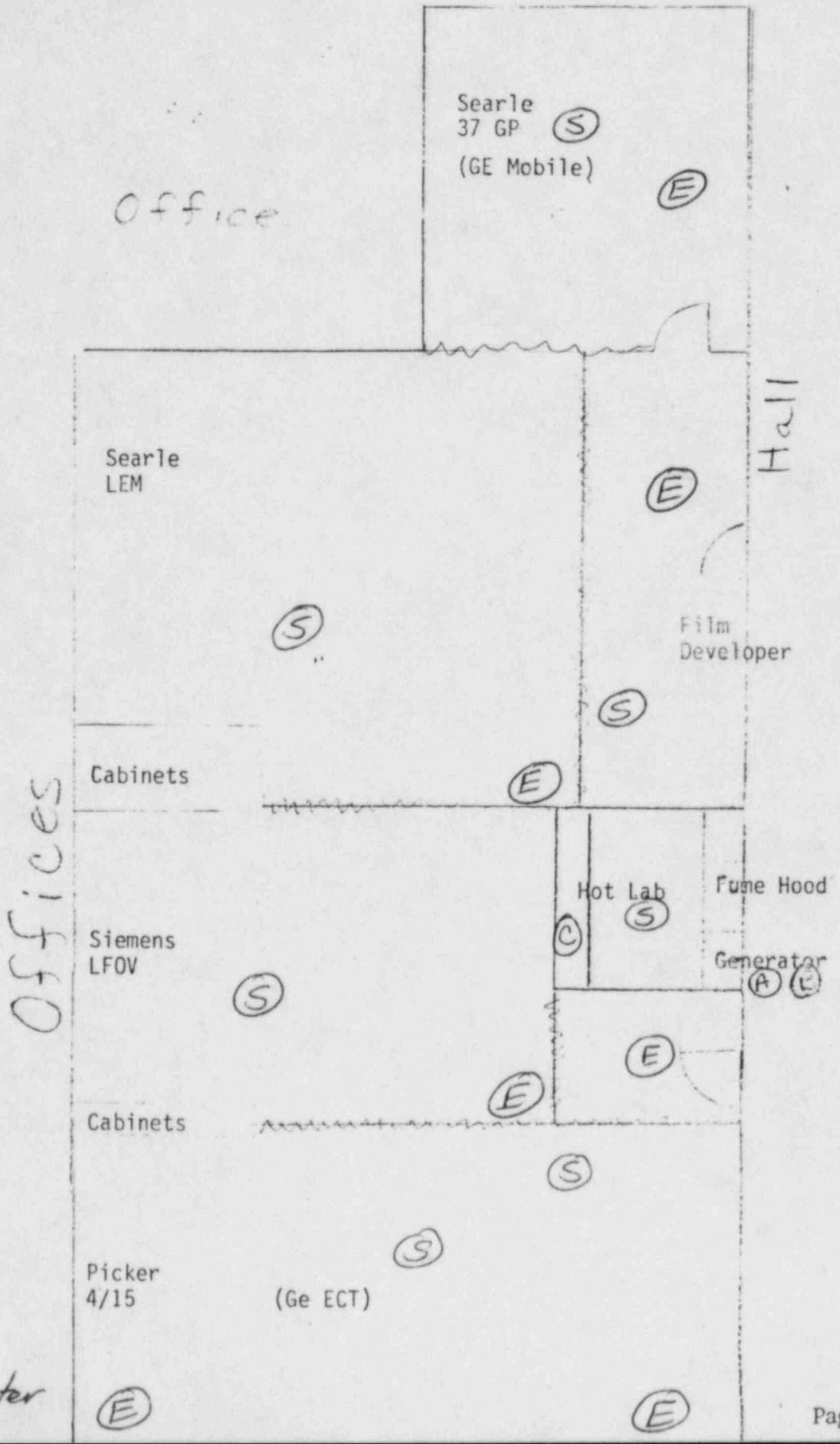
NUCLEAR ASSOCIATES

CONTROL NO. 78547

Victoreen, Inc.
Instrument Division

A Sheller-Glober Corporation Subsidiary

Mercy Hospital Medical Center
Des Moines, Iowa



First Floor
Not to Scale

curtains
Supply (S)
Exhaust (E)
All vents 7" diameter

APPENDIX O

MODEL PROGRAM FOR MAINTAINING OCCUPATIONAL RADIATION EXPOSURES AT MEDICAL INSTITUTIONS ALARA

_____
(Licensee's Name)

_____
(Date)

1. Management Commitment

a. We, the managment of this (medical facility, hospital, etc.) are committed to the program described in this paper for keeping exposures (individual and collective) as low as is reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policy, procedures, and instructions to foster the ALARA concept within our institution. The organization will include a Radiation Safety Committee (RSC)* and a Radiation Safety Officer (RSO).

b. We will perform a formal annual review of the radiation safety program, icluding ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants.

c. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

d. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

* Private practice physician licenses do not include an RSC.

2. Radiation Safety Committee (RSC)*

a. Review of Proposed Users and Uses

(1) The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and uses for which he has applied to ensure that the applicant will be able to take appropriate measures to maintain exposure ALARA.

(2) When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should have systematized procedures to ensure ALARA and shall have incorporated the use of special equipment such as syringe shields, rubber gloves, etc., in his proposed use.

(3) The RSC will ensure that the user justifies his procedures and that dose will be ALARA (individual and collective).

b. Delegation of Authority

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

(1) The RSC will delegate authority to the RSO for enforcement of the ALARA concept.

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

c. Review of ALARA program

(1) The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.

(2) The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table 0-1 below are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded (see Section 6).**

---

* The RSO on private practice physician licenses will assume the responsibilities of the RSC under Section 2.

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

(3) The RSC will evaluate our institution's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers as well as those of management.

3. Radiation Safety Officer (RSO)

a. Annual and Quarterly Review

(1) Annual review of the radiation safety program. The RSO will perform an annual review of the radiation safety program for adherence to ALARA concepts. Reviews of specific proedures may be conducted on a more frequent basis.

(2) Quarterly review of occupational exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of Section 6 of this program.

(3) Quarterly review of records of radiation level surveys. The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

b. Education Responsibilities for ALARA Program

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

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

c. Cooperative Efforts for Development of ALARA Procedures

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

(1) The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.

(2) The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and will encourage the use of those procedures.

d. Reviewing Instances of Deviation from Good ALARA Practices

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

4. Authorized Users

a. New Procedures Involving Potential Radiation Exposures

(1) The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radioactive materials for a new procedure.

(2) The authorized user will evaluate all procedures before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

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

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

(2) The authorized user will ensure that persons under his/her supervision who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

5. Persons Who Receive Occupational Radiation Exposure

a. The worker will be instructed in the ALARA concept and its relationship to working procedures and work conditions.

b. The worker will know what recourses are available if he/she feels that ALARA is not being promoted on the job.

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

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

Table O-1

Investigational Levels
(mrems per calendar quarter)

	Level I	Level II
1. Whole body, head and trunk;active blood-forming organs;lens of eyes; or gonads	125	375
2. Hands and forearms; feet and ankles	1875	5625
3. Skin of whole body*	750	2250

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

The Radiation Safety Officer will review and record on Form NRC-5, "Current Occupational External Radiation Exposures," or an equivalent form (e.g., dosimeter processor's report), results of personnel monitoring not less than once in any calendar quarter as required by 10.401 of 10 CFR part 20. The following actions will be taken at the Investigational Levels as stated in Table O-1:

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

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

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

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

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

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

d. Reestablishment of an individual occupational worker's Investigational Level II to a level above that listed in Table 0-1.

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

The RSC will review the justification for and will approve all revisions of Investigational Level II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions listed in paragraph 6.c above will be followed.

7. Signature of Certifying Official*

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

S. Patricia Clare Sullivan, R.S.M.
Signature

Sister Patricia Clare Sullivan RSM
Name (print or type)

President
Title

Institution (or Private Practice) Name and Address:

Mercy Hospital Medical Center
Sixth and University Avenues
Des Moines, Iowa 50314

---

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