NRC FORM 313M (9-81) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR MATERIALS LICENSE – MEDICAL	Approved by OMB 3150-0041 Expires 9-30-86

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

Department of the Army
Walson Army Community Hospital
Fort Dix, New Jersey 08640-6000

TELEPHONE NO.: AREA CODE (609) 562 2852

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

2. PERSON TO CONTACT REGARDING THIS APPLICATION

CPT Samuel J. Murff
Radiation Protection Officer
TELEPHONE NO.: AREA CODE 609 562 5658

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

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. XX RENEWAL OF LICENSE NO. 29-07513-01

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

See Item 8 on page

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.)*

CPT Samuel J. Murff

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	N/A	
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	N/A	
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	N/A	
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	N/A	
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	N/A	
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA	N/A	
XENON 133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	N/A	

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

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

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

NOTE: Some appendices referenced on this page are based on Regulatory Guide 10.8, Proposed Revision 2 and are attached to the application.

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

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	US Army Ionizing Dosimetry Center Lexington, Kentucky 40511	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	US Army Ionizing Dosimetry Center Lexington, Kentucky 40511	Monthly
		OTHER (Specify)		
c. WRIST	X	FILM	US Army Ionizing Dosimetry Center Lexington, Kentucky 40511	Monthly
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

ALARA PROGRAM

This institution is committed to the ALARA program set forth in Appendix "O", with additional requirements, attached to this application.

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: Exempt

(2) LICENSE FEE ENCLOSED: $ _____

b. APPLICANT OR CERTIFYING OFFICIAL (Signature)

(1) NAME (Type or Print): ALBERT C. MOLNAR

(2) TITLE: Colonel, MC; Commanding

c. DATE

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 NRC Form 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.

CURRICULUM VITAE

July, 1985

NAME: Arthur J. Greene, M.D.

ADDRESS: [redacted]
Mount Laurel, New Jersey 08054

DATE OF BIRTH: 7 March 1955

PLACE OF BIRTH: St. Louis, Missouri

MARITAL STATUS: Single

EDUCATION

1977 — Washington University
St. Louis, Missouri
Degree: B.S., Biology

1981 — St. Louis University School of Medicine
St. Louis, Missouri
Degree: M.D.

POST-DOCTORAL TRAINING

1981 — Categorical Internship in Radiology
Walter Reed Army Medical Center
Washington, D.C. 20307-5001

1982 to 1985 — Radiology Residency
Walter Reed Army Medical Center
Washington, D.C. 20307-5001

PUBLICATIONS

Bova, J., Freedman, A., Hudson, T., and Greene, A. Radiographs obtained during gastrointestinal fluoroscopy. Radiology, 147:875-876, 1983.

Sherman, J., Hopper, K., Greene, A. and Johns, T. The Retrorenal Colon on Computed Tomography: A normal variant. Journal of Computed Assisted Tomography. 9(2):339-341 March/April.

CT Characterization of myelolipomas. (In work)

SOCIETIES

American College of Radiology

American Medical Association

BOARD CERTIFICATION

AMERICAN COLLEGE OF RADIOLOGY

17 June 1987

CURRICULUM VITAE
Lawrence J. Fetters, M.D., FCCP
COL, MC, U.S. ARMY

DATE & PLACE OF BIRTH: 22 April 1947, South Bend, Indiana

PRESENT ADDRESS: Walson Army Community Hospital
ATTN: HSXG-PS
Fort Dix, New Jersey 08640-6610

EDUCATION: Indiana University, 1965-1969, (A.B.)
Indiana University School of Medicine, 1968-1972, (M.D.)

INTERNSHIP: Madigan Army Medical Center, Tacoma, Washington, 1972-1973
(Straight Medicine)

RESIDENCY: Tripler Army Medical Center, Honolulu, Hawaii, 1976-1978
(Internal Medicine)

FELLOWSHIP: Brooke Army Medical Center, San Antonio, Texas, 1980-1982
(Pulmonary Medicine)

BOARD CERTIFICATION: American Board of Internal Medicine, Sept 1979
American Board of Internal Medicine (Pulmonary),
November 1982

LICENSURE: Indiana, 26 December 1972, Number 24469
Texas, 15 June 1981, Number G0404

STAFF POSITIONS: Flight Surgeon, Eleventh Aviation Battalion, West Germany,
1973-1976

Chief, Department of Medicine, Reynolds Army Hospital,
Fort Sill, Oklahoma, 1978-1980

Medical Director, Medical Intensive Care Unit, Reynolds
Army Hospital, Fort Sill, Oklahoma, 1978-1980

Chief, Medical Specialty Clinic and Pulmonary Service,
Womack Army Community Hospital, Ft. Bragg, North Carolina
1982-1984

Associate Medical Director, Medical Intensive Care Unit,
Womack Army Community Hospital, Ft. Bragg, North Carolina
1982-1984

Medical Director, Medical Intensive Care Unit, William
Beaumont Army Medical Center, El Paso, Texas 1984-1985

Chief, Pulmonary Service, William Beaumont Army Medical
Center, El Paso, Texas, 1984-1986

Deputy Commander for Clinical Services, Joint Task Force Bravo Medical Element, Palmerola Air Base, Honduras, June-December 1986

Deputy Commander for Clinical Services, Walson Army Community Hospital, Fort Dix, New Jersey, January 1987 to present

APPOINTMENTS: Clinical Assistant Professor of Medicine, Texas Tech Medical School, Lubbock, Texas, 1984-1986

Advanced Trauma Life Support Instructor, 1985 to present

ORGANIZATIONS: American College of Chest Physicians (Fellow)
American Society of Critical Care Medicine (Member)
American Thoracic Society (Member)

PRESENTATIONS: Fetters, LJ: Preoperative Evaluation of Bullous Lung Disease. Thirty-second Annual Pulmonary Disease Symposium, Fitzsimons Army Medical Center, Denver, Colorado, January 1981.

Fetters, LJ: Methacholine Challenge Testing. Thirty-third Annual Pulmonary Disease Symposium, Fitzsimons Army Medical Center, Denver, Colorado, January 1982.

ABSTRACTS: Matthews, JI, Fetters, LJ: Exercise Testing and Resectability in Bullous Emphysema; Am Rev Respir Dis 1983; 127 (4 Part 2):125.

Aldarondo, S, Zeballos, RJ, Weisman, IM, Fetters, LJ: Vocal Cord Dysfunction: Characterization and Pathogenesis; Am Rev Respir Dis 1986; 133 (4 Part 2):180.

ARTICLES: Fetters, LJ, Matthews, JI: Methacholine Challenge Test; Arch Int Med 1984; 144:938-940

18 June 1987

CURRICULUM VITAE
June Sekiguchi

DATE OF BIRTH: 31 August 41

PRESENT ADDRESS: Walson Army Community Hospital
ATTN: HSXG-NS
Fort Dix, New Jersey 08640

EDUCATION: Queen of Angels School of Nursing, 1962
CSULA, Los Angeles, Ca, 1962-1969 (BSN & PHN)
UTHSCSA, San Antonio, TX 1979-1983 (MSN)

LICENSURE: California, 1986-1988, Number V142522

STAFF POSITIONS:

Asst Chief, DON, Ft Dix, NJ 30 Sept 86 - Present

C, M-S Nsg (Staff Dev), Ft Carson, CO Nov 84 - Aug 86

AC, E&N (Administration) BAMC, 4 Jul 80 - Nov 84

C, Surg Nsg (Administration) BAMC, Sep 79 - Sep 80

Head Nurse (Gynecology), BAMC, Sep 78 - Sep 79

Student (Officer Training) Aug 77 - Aug 78

Administration (AC. E&N), WRAMC, Jan - Aug 77

Staff Nurse (Special Projects), WRAMC, Oct 76 - January 1977

Head Nurse (Ortho, N/S, Neuro), WRAMC, Jan - Oct 1976

Chief Nurse (FLD Nsg) Opn New Life, Guam, April 1975 - June 1975

Chief Nurse (Amin), Ft MacArthur, CA Oct 74 - Jun 75.

Staff Nurse (OPC), Ft MacArthur, CA, April 1974 - October 1974

Staff Nurse (Ped Clinic) Ft MacArthur, CA, May 1973 - April 1974

Head Nurse (GU, ENT, Oral Surg), Ft Bragg, NC, August 1972 - May 1973

Staff Nurse (Burns), Far East Burn Center, Japan, August 71 - June 1972

Staff Nurse (Gen. Surg Nsg), 106 General Hospital, Japan, April - August 1971

Staff Nurse (N/S Nsg), 249 General Hospital, Japan, 10 July 70 - April 71

ORGANIZATION

American Nurses Association
Sigma Theta Tau

Radiation Safety Committee

The Radiation Safety Committee will act for the Commander to prevent or resolve hazardous and potentially hazardous conditions involving the use, storage and disposal of ionizing and nonionizing radiation devices or materials. The Radiation Safety Committee acting for the Commander, is responsible for the overall direction of the Radiation Protection Program. The Radiation Safety Committee will:

(1) Consist of, but not limited to the following members:

(a) Deputy Commander for Clinical Services, who will act as the chairperson.

(b) Medical Radiation Protection Officer, who will act as the recorder.

(c) Chief, Nuclear Medicine Service

(d) Chief, Department of Radiology.

(e) A Department of Nursing Representative.

(f) A nonvoting member from Logistics Division.

(2) Meet quarterly or more frequently, at the call of the chairperson. A quorum of not less than one-half of the committee's membership is required to conduct business, including the Radiation Protection Officer and the Chairperson.

(3) Maintain minutes which contain: the date of the meeting, members present, members absent, summary of deliberations and discussions, recommended actions, numerical results of all ballots, and ALARA program reviews. Minutes will be provided to each member and one copy will be retained for the duration of the license.

(4) Be responsible for monitoring the institutional Radiation Safety Program by utilizing an annual comprehensive radiation safety program review. This annual review will also consist of an ALARA trend exposure review.

(5) Develop and approve requirement for an authority statement and statement of responsibilities for the Radiation Safety Committee, Radiation Protection Officer and authorized radioisotopes users.

(6) Establish a program to ensure all persons whose duties my require them to work in or frequent areas where radioactive materials are used are appropriately instructed IAW 19.2 of 10 CFR Part 19.

(7) Credential radiation users and designated Radiation Safety Committee members using current NRC regulatory guidance.

(8) Review outstanding radiation protection deficiencies, recommend corrective actions, approve equipment and when necessary recommend disciplinary actions to be taken by the Commander to resolve outstanding radiation safety deficiencies.

(9) Review on a quarterly basis occupational exposures as pertaining to the ALARA policy and ensure that quarterly review of 1141's are being conducted by the Radiation Protection Officer.

(10) Established a Table of Investigation Levels for occupational exposure to ionizing radiation (see attached document). The Radiation Protection Officer will report to the committee if levels are exceeded.

(11) Review and approve, on a quarterly basis an inventory of sealed sources and radioisotopes.

(12) Review and approve records of disposal of radioisotopes.

(13) Review and approve SOP's, MEDDAC Regulations, and radioisotopes medical procedures.

(14) Review quarterly incidents involving ionizing radiation and corrective actions taken to prevent another incident.

(15) Approve amendments, official correspondence, prior to being submitted to the NRC or higher command.

(16) Ensure licensed material is used in compliance with NRC regulations.

(17) Ensure that byproduct material license is amended, if required, prior to any changes in facilities, equipment, policies, procedures and personnel.

CURRICULUM VITAE

July, 1985

NAME — Arthur J. Greene, M.D.

ADDRESS — [redacted]
Mount Laurel, New Jersey 08054

DATE OF BIRTH — 7 March 1955

PLACE OF BIRTH — St. Louis, Missouri

MARITAL STATUS — Single

EDUCATION

1977 — Washington University
St. Louis, Missouri
Degree: B.S., Biology

1981 — St. Louis University School of Medicine
St. Louis, Missouri
Degree: M.D.

POST-DOCTORAL TRAINING

1981 — Categorical Internship in Radiology
Walter Reed Army Medical Center
Washington, D.C. 20307-5001

1982 to 1985 — Radiology Residency
Walter Reed Army Medical Center
Washington, D.C. 20307-5001

PUBLICATIONS

Bova, J., Freedman, A., Hudson, T., and Greene, A. Radiographs obtained during gastrointestinal fluoroscopy. Radiology, 147:875-876, 1983.

Sherman, J., Hopper, K., Greene, A. and Johns, T. The Retrorenal Colon on Computed Tomography: A normal variant. Journal of Computed Assisted Tomography. 9(2):339-341 March/April.

CT Characterization of myelolipomas. (In work)

SOCIETIES

American College of Radiology

American Medical Association

BOARD CERTIFICATION — AMERICAN COLLEGE OF RADIOLOGY

NRC FORM 313M SUPPLEMENT A
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
ARTHUR J. GREENE	NEW JERSEY/Maryland

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
AMERICAN BOARD OF RADIOLOGY	NUCLEAR MEDICINE	6-86

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	BETHESDA NAVAL MEDICAL CENTER BETHESDA, MD' 20814 26 Sept to 28 Oct 1983	200	20
b. RADIATION PROTECTION	BETHESDA NAVAL MEDICAL CENTER BETHESDA, MD 20814 26 Sept to 28 Oct 83	Included in 200 hours above	0
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	BETHESDA NAVAL MEDICAL CENTER BETHESDA, MD 20814 26 Sept to 28 Oct 1983	Included in 200 hours above	0
d. RADIOPHARMACEUTICAL CHEMISTRY	BETHESDA NAVAL MEDICAL CENTER BETHESDA, MD 20814 26 Sept to 28 Oct 1983	Included in 200 hours above	0
e. RADIOPHARMACEUTICAL PHARMACOLOGY	BETHESDA NAVAL MEDICAL CENTER BETHESDA, MD 20814 26 Sept to 28 Oct 1983	Included in 200 hours above	40

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Tc-99 I-131 In-111 XE-133		WALTER REED ARMY MEDICAL CENTER WASHINGTON, D.C.	640 Total Hours	Diagnostic Imaging

Item 8a
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DEPARTMENT OF THE NAVY
NAVAL HOSPITAL
NAVAL MEDICAL COMMAND, NATIONAL CAPITAL REGION
BETHESDA, MARYLAND 20814

IN REPLY REFER TO
NHBNTH:86:KTW:jeh
1520/8401
28 October 1983

CAPT Arthur J. Greene, USA
14516 MacBeth Drive
Silver Spring, Maryland

Dear Captain Greene:

The following training information is enclosed for your records. It documents the training you received as a result of completing the Medical Officers Course in Nuclear Medicine and Radioisotope Techniques at the Naval Hospital, Bethesda, MD.

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES			
FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Course #8401, Medical Officers Course in Nuclear Medicine and Radioisotope Techniques, Naval	47	27
		(74 hours total)	
b. RADIATION PROTECTION	Hospital, Naval Medical Command, National Capital Region, Bethesda, MD 20814, 20 September through 28 October 1983.	37	0
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Same as above.	26	0
d. RADIATION BIOLOGY	Same as above.	21	0
e. RADIOPHARMACEUTICAL CHEMISTRY	Same as above.	45	3
		(48 hours total)	

A total of 200 hours of training was received. The training and experience indicated above was obtained under the supervision of LCDR E. D. Silverman, MC, USN, Head, Nuclear Medicine Branch, Radiology Department. NRC License Number 19-02891-05 applies.

E. Silverman

E. D. SILVERMAN
LCDR, MC, USN

Course #8401 -- 5 wks.

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

CPT Arthur J. Greene, MC, USA

STREET ADDRESS

14516 MacBeth Drive

CITY | STATE | ZIP CODE

Silver Spring, Maryland

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	None	
	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		"	

Item 8a
Page 15

PRECEPTOR STATEMENT (Continued)

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

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES WHERE THIS PERSONAL PARTICIPATION C	COMMENT (Additional information or comments may be submitted in duplicate on separate sheets.) D
P-32 (Soluble)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	None	
P-32 (Colloidal)	INTRACAVITARY TREATMENT	"	
I-131	TREATMENT OF THYROID CARCINOMA	"	
	TREATMENT OF HYPERTHYROIDISM	"	
Au-198	INTRACAVITARY TREATMENT	"	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	"	
	INTRACAVITARY TREATMENT	"	
I-125 or Ir-192	INTERSTITIAL TREATMENT	"	
Co-60 or Cs-137	TELETHERAPY TREATMENT	"	
Sr-90	TREATMENT OF EYE DISEASE	"	
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR	Eluted one generator.	
Sn-113/ In-113m	GENERATOR	None	
Tc-99m	REAGENT KITS	None	
Other		"	

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

200 hours training in the basic sciences of nuclear medicine received by completion of Course #8401, Medical Officers Course in Nuclear Medicine and Radioisotope Techniques, Naval Hospital, Naval Medical Command, National Capital Region, Bethesda, MD 20814, 26 September through 28 October 1983.

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

a. NAME OF SUPERVISOR
E. D. SILVERMAN, LCDR, MC, USN

b. NAME OF INSTITUTION
Naval Hospital, Naval Medical Command

c. MAILING ADDRESS
Nuclear Medicine Branch

d. CITY
Bethesda, MD 20814

5. MATERIALS LICENSE NUMBER(S)
19-02891-05

6. PRECEPTOR'S SIGNATURE
Eugene Silverman, LCDR, MC, USN

7. PRECEPTOR'S NAME (Please type or print)
E. D. SILVERMAN, LCDR, MC, USN
Head, Nuclear Medicine Branch

8. DATE
28 October 1983

FORM NRC 313M SUPPLEMENT 8
(8-78)

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CURRICULUM VITAE

SUPPLEMENTAL INFORMATION TO AMENDMENT #20

Samuel James Murff
Captain, MS
Chief, Radiation Protection

PROFESSIONAL MEMBERSHIP:

Health Physics Society

National Environmental Health Association

American Industrial Hygiene Association

SCHOOLS & COLLEGES:

Central Michigan University, McGuire Air Force Base, New Jersey, Dates: April 1985 to present, 9 semester hours in Administration.

NON-TRADITIONAL SCHOOLS:

Eberline Comprehensive Radiation Detection Instrumentation Course, Albuquerque, New Mexico: July 29 - Aug 2, 1985.

Medical Effects of Nuclear Weapons Course, Bethesda, Maryland: Sept 15 - 19, 1985.

Advanced Management of Radiation Accidents, University of New Mexico, School of Medicine, Albuquerque, New Mexico: Oct 3 - 5, 1985.

Nuclear Medical Science Officer's Course, US Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland: Oct 20 - 25, 1985.

Medical X-ray Survey Techniques Course, Academy of Health Sciences, US Army, Ft Sam Houston, Tx: May 12 - 23, 1986.

14 July 1987

CURRICULUM VITAE
Samuel Osborne

DATE OF BIRTH:

PRESENT ADDRESS: Walson Army Community Hospital
ATTN: HSXG-PM
Fort Dix, New Jersey 08640

EDUCATION:

Jellico High School - June 1983
Jellico TN, 37870

NON-TRADITIONAL

Radiation Safety Technician Course (91 X),Academy of Health Science, US Army, Ft Sam Houston, Tx; Jan 25, 1987 to April 17, 1987.

Medical Laboratory Course (92B), Academy of Health Science, US Army, Ft Sam Houston, Tx; Jun 1, 1985 to August 30, 1985.

STAFF POSITION:

May 1,1987 TO PRESENT:
Walson Army Community Hospital, Ft Dix, New Jersey, 08640.
Radiation Safety Technician/Alternate RPO

Nov 1, 1985 to June 1, 1986
Madigan Army Medical Center, Ft Lewis Washington, 98433.
Medical Laboratory Technician/RIA Technician (I 125)

NRC FORM 313M SUPPLEMENT A (9-81)

U.S. NUCLEAR REGULATORY COMMISSION

Approved by OMB 3150-0041 Expires 9-30-86

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
OSBORNE, SAMUEL D., SP4	

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Academy of Health Science US Army, Ft. Sam Houston, TX 25 Jan 87 to 17 Apr 87	170	
b. RADIATION PROTECTION	Academy of Health Science US Army, Ft. Sam Houston, TX 25 Jan 87 to 17 Apr 87	147	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Academy of Health Science US Army Ft. Sam Houston, TX 25 Jan 87 to 17 Apr 87	68	
d. RADIATION BIOLOGY	Academy of Health Science US Army Ft. Sam Houston, TX 25 Jan 87 to 17 Apr 87	15	
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
I 125	≤ 10 microcuries,	Madigan Army Medical Center	01 Nov 85 to 01 Jun 86	User

Item 8b
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INSTRUMENTATION
(Nuclear Medicine Clinic)

1. Survey meters:

   a. Manufacturer's name: Victoreen, Inc.

      Model number: 498

      Number of instruments available: 4

      Minimum range: 0-1 mR/h Maximum range: 0-1 R/H

   b. Manufacturer's name: Victoreen

      Model number: 425 (Survey and Area monitor)

      Number of instruments available: 2

      Minimum range: 0-500 CPM Maximum range: 0-500,000 CPM

2. Dose calibrator:

   Manufacturer's name: Capintec Dose Calibrator

   Manufacturer's model: CRC-4

   Number of instruments available: 1

3. Instruments used for diagnostic procedures:

Type of Instrument	Manufacturer's Name	Model
a. Gamma Camera	Siemens	AA-3204
b. Up-take Probe & Spectroscaler	Picker	621901/4R

4. Other:

   a. Picker Spectroscaler, Model Number 4R: QTY - 1

   b. Picker Scintillation Well Counter, Model Number 621940: QTY - 1

INSTRUMENTATION
(RADIATION DETECTION INSTRUMENTS)

1. Survey meters:

   a. Manufacturer's name: Eberline

      Model number: ESP-1

      Number of instruments available: 1

      Minimum/Maximum range: Bkg-5000 mR/h Bkg-20,000 CPM

   b. Manufacturer's name: Ludlum Scaler/Ratemeter

      Model number: 2200

      Number of instruments available: 1

      Minimum range : 0-500 CPM Maximum range: 0-500,000

2. Liquid Scintillation Counter

   Manufacturer's name: LKB Wallac

   Manufacturer's model: 1214

   Number of instruments available: 1

4. Other:

   a. Ludlum (Scaler)

      Model 2000 QTY - 1

      Minimum 0-500 CPM Maximum 0-500,000 CPM

   b. Ludlum Geiger Counter

      Model 3 with a thin window pancake detector QTY - 2

      Minimum: 0-50 CPM Maximum 0-500 CPM

Pocket Dosimeters

Number Available	Range	Manufact/model	Use/User
2	0-1500 mR	Dosimeter Corp/15	Indiv. Monitoring/RPO
1	0-500 mR	Stephen Corp/Unk	Indiv. Monitoring/RPO
1	0-600 R	Dosimeter Corp/686	Indiv. Monitoring/RPO
2	Dosimeter Chargers, Dosimeter Corp, Model 909/2000A		

CALIBRATION OF SURVEY INSTRUMENTS

Check appropriate items.

__X__ 1. Survey instruments will be calibrated at least annually and following repair.

__X__ 2. Calibration will be performed at two points on each scale used for radiation protection purposes, i.e., at least up to 1 R/hr.

The two points will be approximately 1/3 and 2/3 of full scale. A survey instrument may be considered properly calibrated when the instrument readings are within ± 10 percent of the calculated or known values for each point checked. Readings within ± 20 percent are considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret readings to within ± 10 percent. Also, when higher scales are not checked or calibrated, an appropriate precautionary note will be posted on the instrument.

3. Survey instruments will be calibrated

_____ a. By the manufacturer

_____ b. At the licensee's facility

(1) Calibration source

Manufacturer's name _____
Model no. _____
Activity in millicuries _____
or
Exposure rate at a specified distance _____
Accuracy _____
Traceability to primary standard _____

_____ (2) The calibration procedures in Section I of Appendix D will be used
or

_____ (3) The step-by-step procedures, including radiation safety procedures, are attached.

__X__ c. By a consultant or outside firm

(1) Name US Army TMDE Support Center, Attn: AMXTM-CE-AP

(2) Location Aberdeen Proving Grounds, MD

(3) Procedures and sources

__X__ have been approved by NRC and are on file in License No 29-07513-01

_____ have been approved by an Agreement State; a copy of the Agreement State license, the procedures, and a description of the sources are attached, and the consultant's report will contain the information on

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

_____ are described in the attachment, and the consultant's report will contain the information on

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

CALIBRATION PROGRAM

EQUIPMENT	CALIBRATION SITES	FREQUENCY
Victoreen Model 498	US ARMY TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	90 DAYS
Victoreen Model 740F	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	90 Days
Eberline Model ESP-1	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	90 Days
Ludlum Model 3	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	90 Days
Victoreen Model 425	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	90 Days
Dosimeters	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	Annually
Ludlum Model 2000	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	Annually
Ludlum Model 2200	US Army TMDE Support Center ATTN: AMXTM-CE-AP Aberdeen Proving Grounds, MD	Annually

Model Procedure for Calibrating Dose Calibrator
(See § 35.50.)

You or your contractor may use the following model procedure for checking and testing the dose calibrator. If you, or the contractor, follow the model procedure, you may say on your application, "We will establish and implement the model procedure for calibrating our dose calibrator that was published in Appendix C to Regulatory Guide 10.8, Revision 2."

If you develop your own dose calibrator calibration procedure for review, you should carefully review § 35.50 and all the features in the model procedure. Say on your application, "We have developed a dose calibrator calibration procedure for your review that is appended as ATT 9.3.", and append your dose calibrator calibration procedure.

Model Procedure

1. Test for the following at the indicated frequency and for the suggested tolerance:

   a. Constancy at least once each day prior to assay of patient dosages (±5 percent).

   b. Linearity at installation and at least quarterly thereafter (±5 percent).

   c. Geometry dependence at installation (±2 percent).

   d. Accuracy at installation and at least annually thereafter (±5 percent).

2. After repair or adjustment, repeat the above tests as appropriate.

3. Constancy means reproducibility in measuring a constant source over a long period of time. Assay at least one relatively long-lived source such as Cs-137, Co-60, Ba-133, Co-57,* or Ra-226* using a reproducible geometry each day before using the calibrator. Consider the use of two or more sources with different photon energies and activities. Use the following procedure:

   a. Assay each reference source using the appropriate dose calibrator setting (i.e., use the Cs-137 setting to assay Cs-137).

   b. Measure background at the same setting, and subtract or confirm the proper operation of the automatic background subtract circuit if it is used.

   c. For each source used, either plot on graph paper or log in a book the background level for each setting checked and the net activity of each constancy source.

   d. Using one of the sources, repeat the above procedure for all commonly used radioisotope settings. Plot or log the results.

   e. Establish an action level or tolerance for each recorded measurement at which the individual performing the test will automatically notify the chief technician or authorized user of suspected malfunction of the calibrator. These action levels should be written in the log book or posted on the calibrator.

4. Inspect the instrument on a quarterly basis to ascertain that the measurement chamber liner is in place and that the instrument is zeroed according to the manufacturer's instructions.

---

*Co-57 and Ra-226 are not subject to NRC licensing; the appropriate State agency should be consulted to determine its requirements for possessing this material.

5. Linearity means that the calibrator is able to indicate the correct activity over the range of use of that calibrator. This test is done using a vial or syringe of Tc-99m whose activity is at least as large as the maximum activity normally assayed in a prepared radiopharmaceutical kit, in a unit dosage syringe, or in a radiopharmaceutical therapy, whichever is largest.

Decay Method

a. Assay the Tc-99m syringe or vial in the dose calibrator, and subtract background to obtain the net activity in millicuries. Record the date, time to the nearest minute, and net activity on the Dose Calibrator Linearity Test Form (see Exhibit 1). This first assay should be done in the morning at, for example, 8 a.m.

b. Repeat the assay at about noon, and again at about 4 p.m. Continue on subsequent days until the assayed activity is less than 10 microcuries. For dose calibrators on which you select a range with a switch, select the range you would normally use for the measurement.

c. Convert the time and date information you recorded to hours elapsed since the first assay.

d. On a sheet of semilog graph paper or on the sample form in Exhibit 1, label the logarithmic vertical axis in millicuries and label the linear horizontal axis in hours elapsed. At the top of the graph, note the date, model number, and serial number of the dose calibrator. Then plot the data.

e. Pick a data point that falls near a millicurie value that you frequently use for patient dosages. Draw a letter "O" around that point on the graph. Multiply the millicurie value of the data point by 16. Subtract 24.1 hours from the time associated with the data point you chose. Plot a new point for the time and activity you have calculated, and draw a letter "C" around that point.

f. Draw a solid straight line through the two points "0" and "C" on the graph.

g. Multiply the millicurie value at point "0" by 1.05, and plot that point directly above point "0." Draw a dashed line through this point parallel to the solid line.

h. Multiply the millicurie value at point "0" by 0.95, and plot that point directly below point "0." Draw a second dashed line through this point also parallel to the solid line.

i. If any data points fall outside the dashed lines, the dose calibrator should be repaired or adjusted. If this cannot be done, it will be necessary to make a correction table or graph that will allow you to convert from activity indicated by the dose calibrator to "true activity."

j. The regulations require that the dose calibrator be tested for linearity between the range of the highest dosage administered and 10 microcuries. If more than 70 hours is needed to cover this range, continue decaying the vial, and record the data on a second worksheet and graph.

k. Put a sticker on the dose calibrator that says when the next linearity test is due.

Shield Method

If you decide to use a set of "sleeves" of various thicknesses to test for linearity, it will first be necessary to calibrate them.

a. Begin the linearity test as described in the decay method described above. After making the first assay, the sleeves can be calibrated as follows. Steps b through d below must be completed within 6 minutes.

b. Put the base and sleeve 1 in the dose calibrator with the vial. Record the sleeve number and indicated activity.

c. Remove sleeve 1 and put in sleeve 2. Record the sleeve number and indicated activity.

d. Continue for all sleeves.

e. Complete the decay method linearity test steps b through i above.

f. From the graph made in step d of the decay method, find the decay time associated with the activity indicated with sleeve 1 in place. This is the "equivalent decay time" for sleeve 1. Record that time with the data recorded in step b.

g. Find the decay time associated with the activity indicated with sleeve 2 in place. This is the "equivalent decay time" for sleeve 2. Record that time with the data recorded in step c.

h. Continue for all sleeves.

i. The table of sleeve numbers and equivalent decay times constitutes the calibration of the sleeve set.

The sleeve set may now be used to test dose calibrators for linearity.

a. Assay the Tc-99m syringe or vial in the dose calibrator, and subtract background to obtain the net activity in millicuries. Record the net activity.

b. Steps c through e below must be completed within 6 minutes.

c. Put the base and sleeve 1 in the dose calibrator with the vial. Record the sleeve number and indicated activity.

d. Remove sleeve 1 and put in sleeve 2. Record the sleeve number and indicated activity.

e. Continue for all sleeves.

f. On a sheet of semilog graph paper or on the sample form in Exhibit 1, label the logarithmic vertical axis in millicuries, and label the linear horizontal axis in hours elapsed. At the top of the graph, note the date, model number, and serial number of the dose calibrator.

g. Plot the data using the equivalent decay time associated with each sleeve.

h. Pick a data point that falls near a millicurie value that you frequently use. Draw a letter "O" around that point on the graph. Multiply the millicurie value of the data point by 16. Subtract 24.1 hours from the time associated with the data point you chose. Plot a new point for the time and activity you have calculated, and draw a letter "C" around that point.

i. Draw a solid straight line through the two points "O" and "C" on the graph.

j. Multiply the millicurie value at point "O" by 1.05, and plot that point directly above point "O." Draw a dashed line through this point parallel to the solid line.

k. Multiply the millicurie value at point "O" by 0.95, and plot that point directly below point "O." Draw a second dashed line through this point also parallel to the solid line.

l. If any data points fall outside the dashed lines, the dose calibrator should be repaired or adjusted. If this cannot be done, it will be necessary to make a correction table or graph that will allow you to convert from activity indicated by the dose calibrator to "true activity."

m. Put a sticker on the dose calibrator that says when the next linearity test is due.

6. Geometry independence means that the indicated activity does not change with volume or configuration. This test should be done using a syringe that is normally used for injections. Licensees who use generators and radiopharmaceutical kits should also do the test using a vial similar in size, shape, and construction to the radiopharmaceutical kit vials normally used. The following test assumes injections are done with 3-cc plastic syringes and that radiopharmaceutical kits are made in 30-cc glass vials. If you do not use these, change the procedure so that your syringes and vials are tested throughout the range of volumes commonly used.

a. In a small beaker or vial, mix 2 cc of a solution of Tc-99m with an activity concentration between 1 and 10 mCi/ml. Set out a second small beaker or vial with nonradioactive saline. You may also use tap water.

b. Draw 0.5 cc of the Tc-99m solution into the syringe and assay it. Record the volume and millicuries indicated on the Dose Calibrator Geometry and Accuracy Form (see Exhibit 1).

c. Remove the syringe from the calibrator, draw an additional 0.5 cc of nonradioactive saline or tap water, and assay again. Record the volume and millicuries indicated.

d. Repeat the process until you have assayed a 2.0-cc volume.

e. Select as a standard the volume closest to that normally used for injections. For all the other volumes, divide the standard millicuries by the millicuries indicated for each volume. The quotient is a volume correction factor. Alternatively, you may graph the data and draw horizontal 5 percent error lines above and below the chosen "standard volume."

f. If any correction factors are greater than 1.05 or less than 0.95, or if any data points lie outside the 5 percent error lines, it will be necessary to make a correction table or graph that will allow you to convert from "indicated activity" to "true activity." If this is necessary, be sure to label the table or graph "syringe geometry dependence," and note the date of the test and the model number and serial number of the calibrator.

g. To test the geometry dependence for a 30-cc glass vial, draw 1.0 cc of the Tc-99m solution into a syringe and then inject it into the vial. Assay the vial. Record the volume and millicuries indicated.

h. Remove the vial from the calibrator and, using a clean syringe, inject 2.0 cc of nonradioactive saline or tap water, and assay again. Record the volume and millicuries indicated.

i. Repeat the process until you have assayed a 19.0-cc volume. The entire process must be completed within 10 minutes.

j. Select as a standard the volume closest to that normally used for mixing radiopharmaceutical kits. For all the other volumes, divide the standard millicuries by the millicuries indicated for each volume. The quotient is a volume correction factor. Alternatively, you may graph the data and draw horizontal 5 percent error lines above and below the chosen "standard volume."

k. If any correction factors are greater than 1.05 or less than 0.95 or if any data points lie outside the 5 percent error lines, it will be necessary to make a correction table or graph that will allow you to convert from "indicated activity" to "true activity." If this is necessary, be sure to label the table or graph "vial geometry dependence," and note the date of the test and the model number and serial number of the calibrator.

7. Accuracy means that, for a given calibrated reference source, the indicated millicurie value is equal to the millicurie value determined by the National Bureau of Standards (NBS) or by the supplier who has compared that source to a source that was calibrated by the NBS. Certified sources are available from the NBS and from many radioisotope suppliers. The activity of at least one reference source should be within the range of activities normally assayed. At least three sources with different principal photon energies (such as Co-57, Ba-133, and Cs-137) should be used. The regulations require that, if a Ra-226 source is used, it must be at least 10 microcuries; if any other source is used, it must be at least 50 microcuries.

   a. Assay a calibrated reference source at the appropriate setting (i.e., use the Co-57 setting to assay Co-57), and then remove the source and measure background. Subtract background from the indicated activity to obtain the net activity. Record this measurement on the Dose Calibrator Geometry and Accuracy Form (see Exhibit 1). Repeat for a total of three determinations.

   b. Average the three determinations. The average value should be within 5 percent of the certified activity of the reference source, mathematically corrected for decay.

   c. Repeat the procedure for other calibrated reference sources.

   d. If the average value does not agree, within 5 percent, with the certified value of the reference source, the calibrator will be repaired or adjusted.

   e. At the same time the accuracy test is done, assay the source that will be used for the daily constancy test (it need not be a certified reference source) on all commonly used radioisotope settings. Record the settings and indicated millicurie values with the accuracy data.

f. Put a sticker on the dose calibrator that says when the next accuracy test is due.

8. The RSO will review and sign the records of all geometry, linearity, and accuracy tests.

See Exhibit 1 for some forms you may want to use.

APPENDIX E

Model Procedure for Monitoring Performance of Imaging Equipment
That Has Been Transported
(See §§ 35.35 and 35.80.)

The NRC normally limits its review of equipment quality assurance programs to those programs developed for radiation safety equipment. However, when delicate imaging equipment is transported, e.g., by a mobile nuclear medicine service, it is reasonable to assume that it may suffer damage in transit. Therefore, the NRC requires that mobile nuclear medicine services have an imaging equipment quality assurance program to ensure that the use of byproduct material will not be inimical to the public health and safety.

You may use the following procedure to ensure the proper operation of imaging equipment that has been transported. If you follow the procedure, you may say on your application, "We will establish and implement the model procedure for ensuring imaging equipment performance that was published in Appendix E to Regulatory Guide 10.8, Revision 2."

If you want to develop your own procedure for review, you should consider for inclusion all the features in the model procedure and the procedure recommended by the manufacturer and carefully review the requirements of §§ 35.35 and 35.80. Say on your application, "We have developed a procedure for ensuring imaging equipment performance for your review that is appended as ATT. 9.5.", and append your imaging equipment quality assurance procedure.

Model Procedure

1. Perform the following checks daily at each location of use before administering byproduct material:

   a. Peak each camera according to the manufacturer's instructions.

b. With a frequently used collimator in place, image a flood field of either Tc-99m or Co-57. Accumulate at least 1,000,000 counts for small-field-of-view cameras and 3,000,000 counts for large-field-of-view cameras. Process the image as if it were an image of a patient.

c. Do not administer material until an authorized user or a designated technologist approves the camera for use.

d. You do not have to make a permanent record of these checks.

2. Perform the following checks weekly:

a. With the same frequently used collimator in place, image a parallel-line-equal-space (PLES), bar, orthogonal-hole (OH), or resolution-quadrant phantom with the flood field as a source.

b. If a PLES or bar phantom is used, rotate it 90° so that the camera is tested for both vertical and horizontal geometric linearity.

c. If a resolution-quadrant phantom is used, rotate it so that each quadrant is imaged in each quadrant of the crystal. Then turn it over and again image it four more times. This procedure will check both resolution and horizontal and vertical geometric linearity in each quadrant of the crystal.

d. Process the images as if they were images of a patient. Mark them clearly to indicate image orientation, source activity, and date.

e. Retain the images for 2 years.

3. Perform the following safety checks after repairs and quarterly:

a. Check the motion interlocks by activating the emergency-off switches on the camera. With the camera in motion, activation of the

emergency-off switch should stop the motion. If this might jeopardize imaging components in the system, perform only the checks described in paragraph 3.b.

b. Check the motion switches. Put the camera in motion and first release just the direction switch to stop the motion. Then put the camera back in motion and release just the dead-man switch. Test all motion switches and all directions in this manner. Release of either the motion switch or the dead-man switch alone should disable the camera motion. If this is not the case, repair the camera before clinical use.

4. Set the equipment in the same manner each time checks are run. Make a record of all these checks. Keep a separate file or ring binder for each camera. Retain the record for 2 years.

Delete Procedures from Previous Application

A. Covered under a general NRC license:

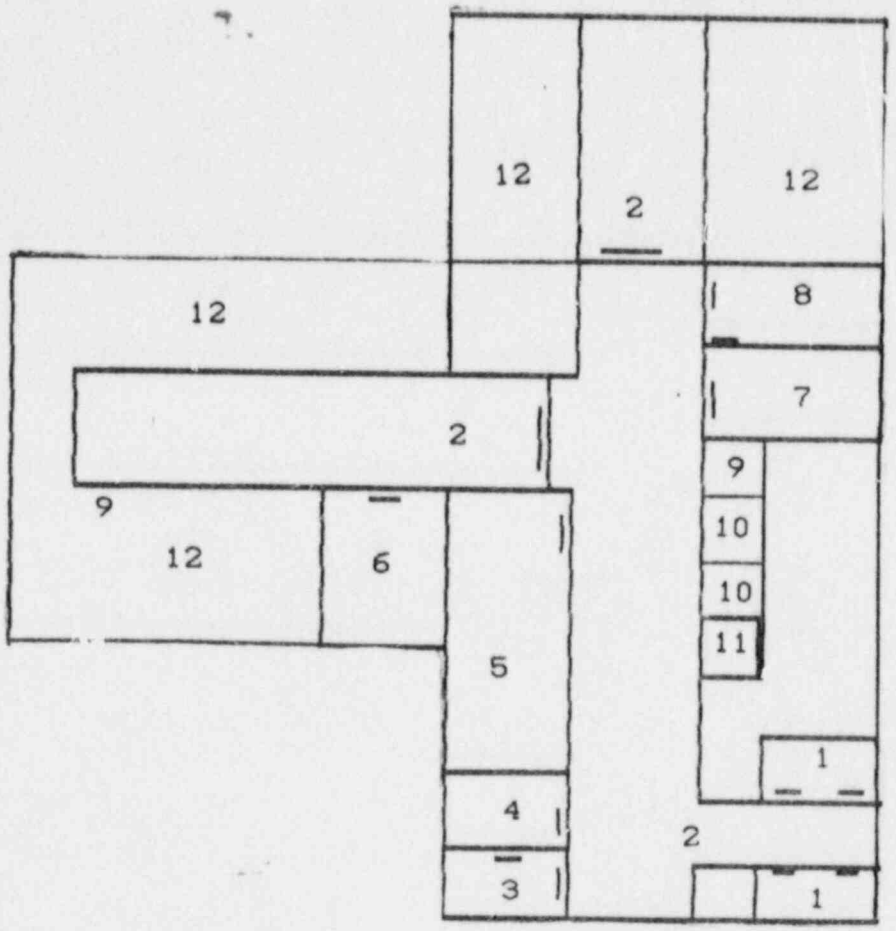
1. Bacteriology - Bactec Performance Test Kit

2. Scintillation Gamma Counter - RIA

B. Not presently used in conjuction with NRC license:

1. Dosimeter Calibration, Model 06-200,Cesium-137 source (90 uCi)

WALSON ARMY COMMUNITY HOSPITAL

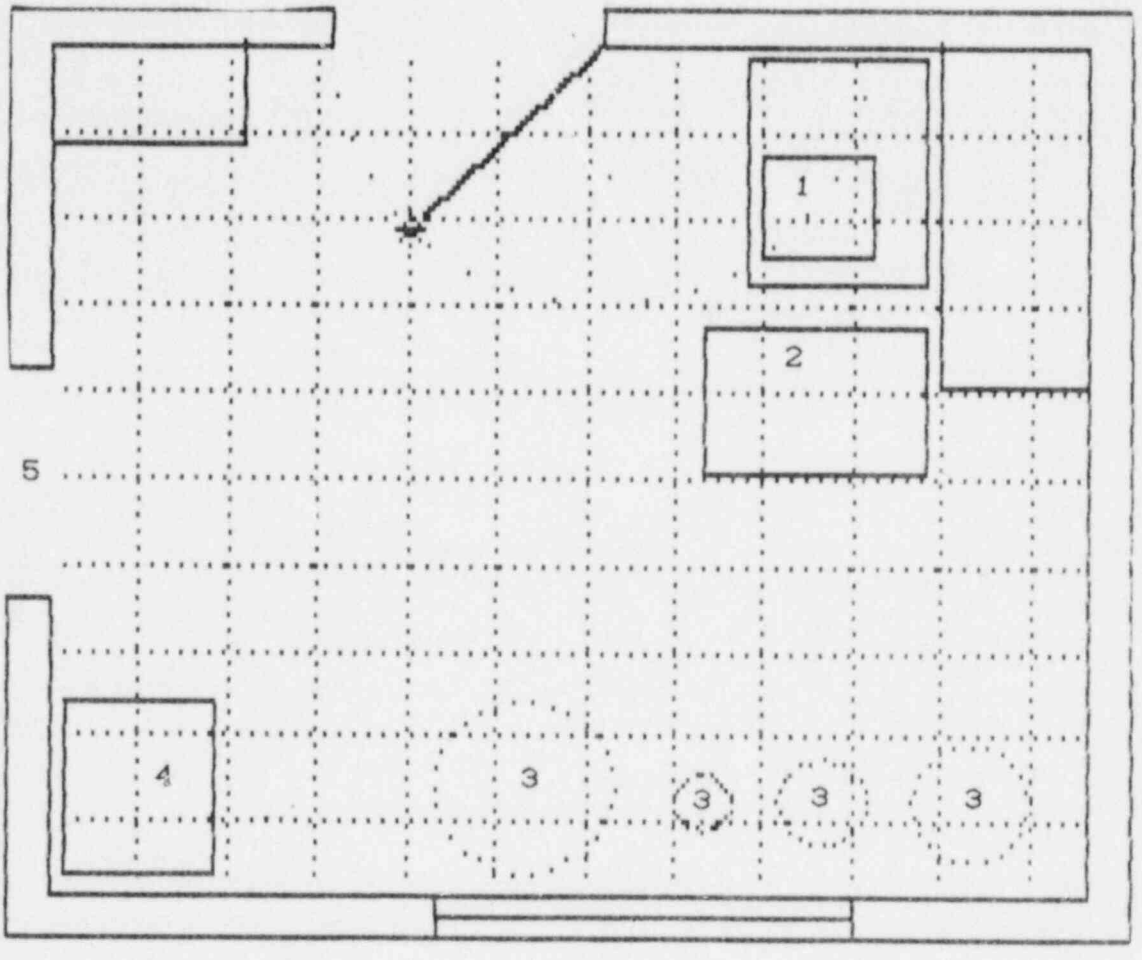


8th Floor
Overview of Nuclear Medicine Clinic (NMC)
(Not to Scale)

1. Elevator
2. Hallway
3. Hot Laboratory (NMC)
4. Nuclear Med Tech Office
5. Injection Room (NMC)
6. Gamma Camera Room
7. Chief, Nuclear Medicine Office
8. NMC Staff Break Area
9. Stairs
10. Public Restrooms
11. Janitor Storeroom
12. Offices not related to NMC.

WALSON ARMY COMMUNITY HOSPITAL

Hot Laboratory - Nuclear Medicine Clinic
(8th Floor)

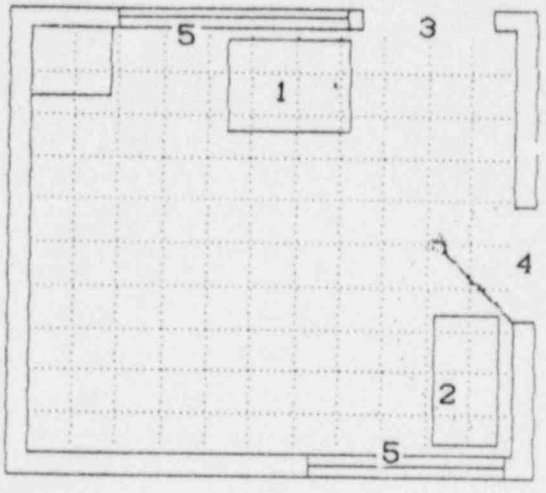


1 Grid = 1 ft

1. Cold Sink/cabinet Lead Lined
2. Lead Lined Source Safe
3. DOD Radioactive Storage Drums
4. Refrigerator
5. Door to NM Technician's Office

WALSON ARMY COMMUNITY HOSPITAL

Nuclear Medicine Technician's Office
(8th Floor)

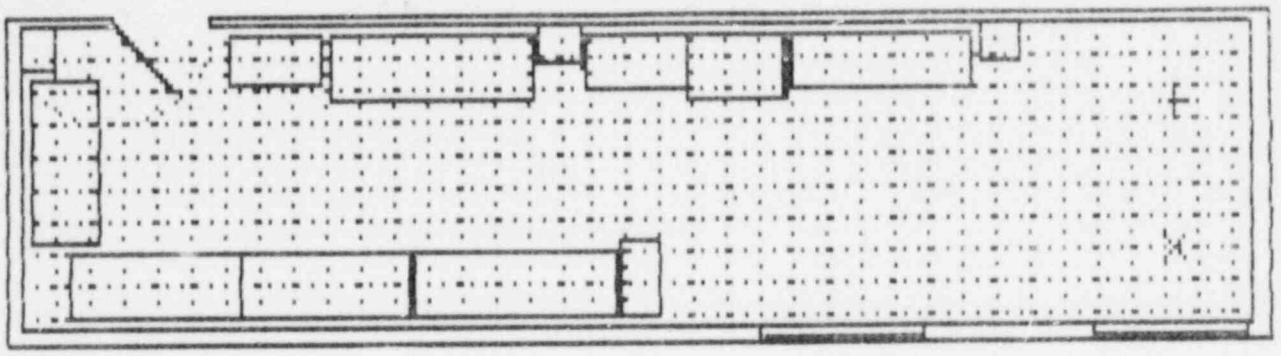


1 Grid = 1 ft

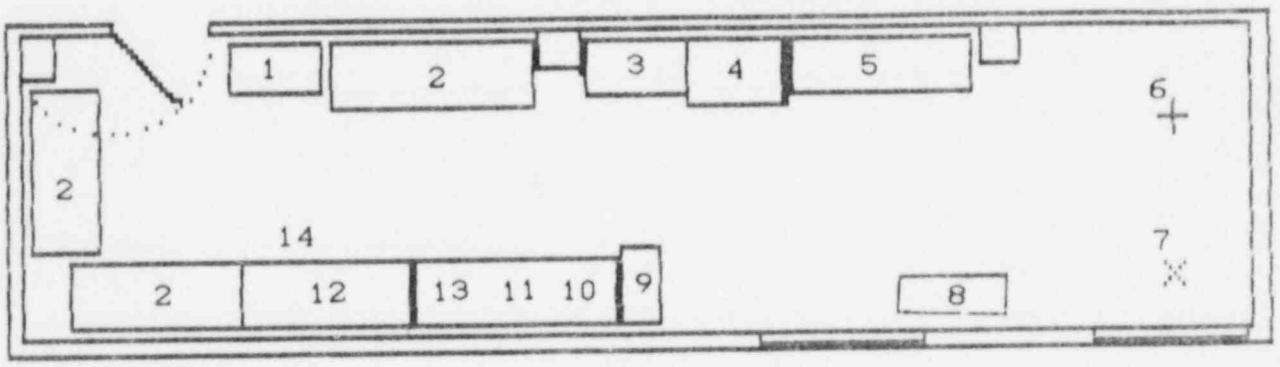
1. Desk
2. Files
3. Door to Hall
4. Door to the Hot Laboratory
5. Windows

WALSON ARMY COMMUNITY HOSPITAL

Nuclear Medicine Injection Room
(8th Floor)



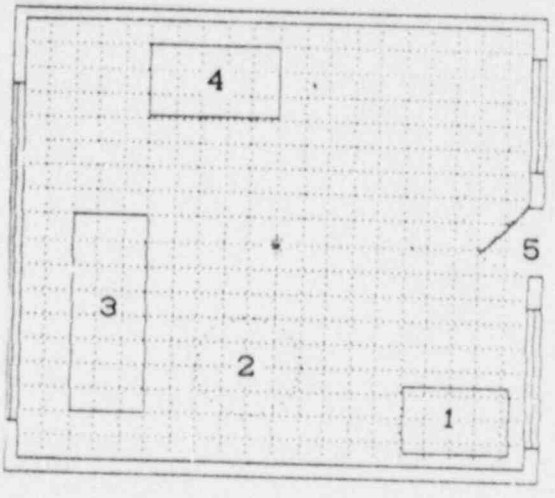
1 Grid = 1 ft



1. Injection Table
2. Counter Top
3. Files
4. Well Counter
5. Spectroscaler/Files
6. Iodine Up Take Probe
7. Up Take Probe Chair
8. Desks
9. Files
10. Shower/eye wash
11. Cold Sink
12. Hot Sink w/Lead Bricks

WALSON ARMY COMMUNITY HOSPITAL

Nuclear Medicine Gamma Camera Room*
(8th Floor)



1 Grid = 1 ft

1. Control Panel
2. Gamma Camera
3. Gamma Camera Table
4. Treadmill
5. Door to Hall

* Only major items were listed

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.

II. This instruction will include subjects:

a. Applicable regulations and license conditions.

b. Areas where radioactive material is used or stored.

c. Potential hazards associated with radioactive material in each area where the employees work.

d. Appropriate radiation safety procedures.

e. Licensee's in-house rules.

f. Each individual's obligation to report unsafe conditions to the Radiation Protection Officer.

g. Worker's right to be informed of occupational radiation exposure and bioassay results.

h. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions, IAW 10 CFR Part 19.

i. Radiation workers will be provided instructions concerning the ALARA philosophy and procedures to submit suggestions for improving health physics practices.

j. Radiation workers will be required to sign a statement/document which summaries the training received. Statement of Radiation Training will be maintained by the Radiation Protection Officer.

III. Ancillary personnel (Nursing, housekeeping, security) whose duties may require them to work in the vicinity of radioactive material will be initially informed of the possible radiation hazards and appropriate precautions; and thereafter annually.

SOP for After Hour Delivery of Radioisotopes

1. References.

a. Nuclear Regulatory Commission Regulations.

b. Walson Army Community Hospital Nuclear Regulatory Commission license and application.

2. PURPOSE. To provide guidelines in receiving radioisotopes after normal duty hours.

3. GENERAL. The following procedure should be followed when radioisotopes materials are delivered after normal duty hours:

a. The AOD/SDNCO will instruct the delivery person to place radioisotope packages on the floor and while the delivery person is still present, examine the radioisotope packages for sign of leakage (wet surface) and/or damaged.

b. If a package is noted to be damaged or leaking, it will be treated as contaminated until proven otherwise. The Medical Radiation Protection Officer will be notified and it will be handled as a radioactive spill according to current SOPs. The AOD/SDNCO will detain the delivery truck driver until the Medical Radiation Protection Officer has been notified and a determination to the extent of contamination has been made.

c. If the packages are acceptable, the SDNCO will:

1. Sign out the Nuclear Medicine Service keys and take radioisotope packages to the Nuclear Medicine Service storage area (8th floor, room #5). This room has a large radiation warning sign on the door. NOTE: Avoid prolonged exposure to packages, place packages on floor away from personnel until delivered to Nuclear Medicine. Pregnant individuals should not transport the radioisotopes packages to Nuclear Medicine. Other arrangements for delivery must be made if the AOD/SDNCO/DIVER are all pregnant or the possibility of being pregnant exists.

2. Place packages inside the "HOT LAB" refrigerator designated for radioactive materials, do not use the freezer.

3. Secure the Storage Room Door.

4. The SDNCO/AOD will ensure that the outer door of the Nuclear Medicine Services storage area is secured. Discrepancies and emergency situations should be reported to the Medical Radiation Protection Officer, 723-2002 (Beeper #14).

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSXG-PM	Radiation Emergency Notification

TO SEE DISTRIBUTION FROM MRPO DATE 23 June 1987 CMT 1

1. The following is a list of personnel to be notified in the event of an incident involving radioactive materials or ionizing/nonioizing devices: (In order of priority)

a. Medical Radiation Protection Officer — CPT MURFF, SAMUEL
DUTY: 562-5658/4067
HOME: 723-2002

b. Alternate Radiation Protection Officer — SP4 OSBORNE, SAMUEL
DUTY: 562-5658/4067
HOME: 723-5384

Samuel James Murff

SAMUEL JAMES MURFF
CPT. MS
Medical Radiation Protection
Officer

DISTRIBUTION:
ea individual
DENTAC COMMANDER
C. Radiology
Nuclear Medicine (2)
Pathology (1)
RIA (2)
BACT (2)
NCOIC. ER (2)
SGM (SDNCO BOOK)
Admin Officer (AOD BOOK)
Clinics w/xray unit(s)

Item 13b
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APPENDIX F

PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A quantity limits as specified in paragraphs 20.205(a)(1) and (c)(1) of 10 CFR Part 20 (more than 20 Ci for Mo-99 and Tc-99m). They will be monitored for surface contamination and external radiation levels within 3 hours after receipt if received during working hours or within 18 hours if received after working hours, in accordance with the requirements of paragraphs 20.205(a) through (c). All shipments of liquids greater than exempt quantities will be tested for leakage. The NRC Regional Office will be notified in accordance with the regulations if removable contamination exceeds 0.01 μCi/100 cm^2 or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 m).

2. For all packages, the following additional procedures for opening packages will be carried out:

   a. Put on gloves to prevent hand contamination.

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

   c. Measure exposure rate at 3 feet (or 1 m) from package surface and record. If >10 mR/hr, stop procedure and notify Radiation Safety Officer.

   d. Measure surface exposure rate and record. If >200 mR/hr, stop procedure and notify Radiation Safety Officer.

   e. Open the package with the following precautionary steps:

      (1) Open the outer package (following manufacturer's directions, if supplied) and remove packing slip.

      (2) Open inner package and verify that contents agree with those on packing slip. Compare requisition,* packing slip, and label on bottle.

      (3) Check integrity of final source container (i.e., inspect for breakage of seals or vials, loss of liquid, and discoloration of packaging material).

      (4) Check also that shipment does not exceed possession limits.

   f. Wipe external surface of final source container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., μCi/100 cm^2, etc.). Check wipes with a thin-end-window G-M survey meter, and take precautions against the spread of contamination as necessary.

   g. Monitor the packing material and packages for contamination before discarding.

      (1) If contaminated, treat as radioactive waste.

      (2) If not contaminated, obliterate radiation labels before discarding in regular trash.

3. Maintain records of the results of checking each package, using "Radioactive Shipment Receipt Record" (see next page) or a form containing the same information.

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* In the case of special orders (e.g., therapy doses), also compare with physician's written request.

RADIOACTIVE SPILLS PROCEDURE

1. PURPOSE. To provide guidelines on the proper procedure to follow during a radioactive spill.

2. SCOPE: To establish orderly procedures to clean-up radioactive spills which may occur in the Nuclear Medicine Clinic and Pathology (RIA and BACT sections).

3. PROCEDURES:

a. In order of priority, the person responsible for overseeing actual clean-up will be the Medical Radiation Protection Officer (MRPO) and/or the Alternate Medical Radiation Officer.

b. In case of a minor spill involving Iodine 125 or Carbon 14, the following spill procedure will be followed:

(1) Notify persons working in the immediate area that a spill has occurred.

(2) Prevent the spread of contamination by covering the spill with absorbent paper. A germicidal agent may be applied if pathogens are present.

(3) Notify the Medical Radiation Protection Officer (5658, 4867 or Beeper #14) or the Alternate Medical Radiation Protection Officer (see roster posted on the designated radiation storage area located near BACT laboratory).

(4) Clean up the spill using the spill kit. First, using disposable gloves (two sets) and absorbent paper carefully fold the aborbent paper with the clean side out and place in a plastic bag for transfer to a radioactive waste container. Also put contaminated gloves and any other contaminated disposable materials in the plastic bag. Contaminated broken glass should be placed in a small paper bag and then placed in a plastic bag.

(5) The Medical Radiation Protection Officer or RIA Technician will survey the area with a low range, thin window GM survey meter (RIA section only). The Medical Radaition Protection Officer will use a portable scaler/rate meter with a scintillation pobe to monitor spills in the BACT section. The following areas will be checked: areas around spill, hands, shoes, clothing, etc.

(6) The Medical Radiation Protection Officer will supervise the clean-up of spills and will assist in completing the Radioactive Spill Report Form (attached as Annex B) and the Radioactive Spill Contamination Survey (attached as Annex C).

c. In case of a major spill involving Nuclear Medicine Radioisotopes, the following spill procedure will be followed:

(1) Clear the area, notify all persons not involved in the spill to vacate the room. These personnel should remain near by in a clean area, until the MRPO clears them to leave.

(2) Prevent the spread of contamination by covering the spill with absorbent paper, but do not attempt to clean it up. To Prevent the spread of contamination, limit the movement of all personnel who may be contaminated.

(3) Close the room and lock or otherwise secure the area to prevent entry.

(4) Notify the MRPO immediately (5658, 4067 or Beeper 814).

(5) Decontaminate personnel by removing contaminated clothing and flushing contamined skin with lukewarm water and then washing with mild soap. If contamination remains, induce perspiration by covering the area with plastic. Then wash the affected area again to remove ary contamination that was released by the perspiration. If possible, retain all rinse and wash water.

(6) The Medical Radiation Protection Officer will supervise the clean-up of spills and assist in the completing of the Radioactive Spill Report (attached as Annex B) and the Radioactive Spill Contamination Survey (attached as Annex C).

d. A Spill Kit will be maintained by each activity and stored in areas where radioisotopes are used and/or stored. This kit will contain the following items.

[1] Large paper bag - used to hold contents of kit.
[4] Small paper bags.
[6] Pairs of disposable gloves.
[2] Paper hats or OR hair nets.
[2] Pairs of shoe covers.
[4] Sheets of absorbent paper with plastic backing.
[6] Plastic trash bags with twist ties.
[1] China pencil or all purpose marking pencil.
[3] Radioactive material labeling.
[30] Contamination swipes (20) NU-CON (10) METRICEL.
[1] each: Clipboard, Pencil, SOP.and spill forms

WACH
Radioactive Spill Report

The spill occurred at __:__ am/pm on __-__-__ in room ____.

Instrument used to check for personnel contamination:
Meter model: _____ Meter S/N: _____ Probe model: _____ Probe S/N: _____

Personnel present	Personnel contamination results*

*On the back of the sheet, indicate any personnel decontamination, additional monitoring, or care instituted.

Instrument used to survey spill area before cleanup:
Meter model: _____ Meter S/N: _____ Probe model: _____ Probe S/N: _____
Survey the spill area to identify hot spots, then begin decontamination. When finished, conduct a postcleaning contamination wipe-test.

Radioisotopes present or suspected in the spill:

_____mCi of _____ as _____
_____mCi of _____ as _____
_____mCi of _____ as _____

Give a brief description of the accident: _____

Give a brief description of followup actions taken to prevent recurrence:

Name: _____
Date: _____

WACH
Radioactive Spill Contamination Survey

The spill occurred at ___:___ am pm on ___-___-___ in room _____. Decontamination was completed at ___:___ am pm.

Sketch of spill area

loc	pre-clean mR/hr	post-clean beta cpm	post-clean gamma cpm

Name: _____

Date: _____

WACH ALARA PROGRAM

1. REFERENCES.

a. AR 40-5, Preventive Medicine.

b. Reg 10.8, NCR Licensing Guide for Medical Licenses.

2. PURPOSE. To provide local guidelines for implementing an As Low As Reasonably Achievable program.

3. RESPONSIBILITIES.

a. The Medical Radiation Protection Officer will:

(1) Perform an annual review of the radiation protection program, which includes the following program elements: ALARA exposure trends, outstanding deficiencies, records of inspections, consultants visits and quality assurance records.

(2) Perform a quarterly ALARA exposure trend review of all radiation workers and determine that their exposures are within the ALARA Policy.

(3) Establish investigational levels for review of radiation workers exposures.

(4) Investigate radiation exposures which exceeds the investigational levels (ANNEX A) and provide a report to the Radiation Safety Committee.

(5) Provide briefing and educational sessions to inform workers of the ALARA program.

(6) Provide training for the Radiation Safety Committee in the ALARA philosophy.

(7) Establish procedures for receiving and evaluations of suggestions from radiation workers for improving health practices and encourage the use of these procedures.

(8) Investigate all known instances of deviation from good ALARA philosophy.

b. The Radiation Safety Committee will:

(1) Review all ALARA philosophy Investigations and make recommendations for corrective actions.

(2) Review and approve the quarterly and annual ALARA Review, which is prepared by the Medical Radiation Protection Officer.

5. PROCEDURES. The Annual ALARA Program Review will generally be initiated prior to the start of a new calendar year and submitted to the Radiation Safety Committee no later than the second quarterly meeting.

INVESTIGATIONAL LEVELS FOR OCCUPATIONAL EXTERNAL EXPOSURE

		INVESTIGATIONAL LEVELS - (mrems per calendar quarters)	
		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
4.	Head/Neck**	375	750

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

** Head/Neck exposure using a collar badge, not protected by lead apron.

4. Following actions will be taken at the Investigational Levels as indicated above:

a. Quarterly exposure of individuals less than Level I.

(Except when deemed appropriate by the Medical Radiation Protection Officer, no further action will be taken in those cases where an individual's exposure is less than values listed above for the Investigational Level I)

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

(The Medical Radiation Protection Officer will report the results of the investigational review at the first Radiation Safety 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 deem necessary by the Radiation Protection Officer or the Radiation Safety Committee. The Radiation Safety Committee minutes will record document this review)

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

(The Medical Radiation Protection Officer will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II, If warranted, take action. A report of the investigation, action taken, if any, and a copy of the individual's Form NRC-5 (DD Form 1941) will be presented to the Radiation Safety Committee at the first meeting following completion of the investigation. Details of these reports will be recorded in the minutes. Committee minutes will be forward to the hospital commander for review. The minutes, containing details of the investigation, will be available to NRC inspectors for review at the next inspection)

d. Re-establishment of an individuals occupational worker's Investigational Level II exceeded that which is listed above.

(In cases where worker's exposures need to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented. The Radiation Safety Committee will review and approve, all revisions of Investigational Levels II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions actions listed in paragraph c above will be followed)