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Form AEC-313 (8-64) 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R0027

INSTRUCTIONS — Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commission with respect to Items 8 through 13 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material 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, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc. Include ZIP Code.)

Fitzsimons Army Medical Center
Denver, Colorado 80240

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1(a). Include ZIP Code.)

Fitzsimons Army Medical Center
12101 East Colfax Avenue
Aurora, Colorado 80240

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Department of Radiology
Department of Pathology
Clinical Investigation Service

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

05-00046-13 (Renewal)

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

Individual Users will be approved by the Fitzsimons Army Medical Center Radioisotope Committee (See Appendix I)

5. RADIATION PROTECTION OFFICER. (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

The Radiation Protection Officer will be appointed by Special Orders in accordance with procedures contained in Hospital Regulation 40-604 (Appendix II

6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

See supplemental sheet

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for human use, supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

See supplemental sheet

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8 TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	See Item 4 and Appendix I		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9 EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
See Item 4 and Appendix I				

10 RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
See Appendix III					

11 METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE

See Appendix III

12 FILM BADGES, DOSIMETERS, AND BIO ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing, or name of supplier)

See supplemental sheet

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13 FACILITIES AND EQUIPMENT Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached (Circle answer) Yes No

See Appendix IV

14 RADIATION PROTECTION PROGRAM Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

See Appendix II

15 WASTE DISPOSAL If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

See Appendix V

CERTIFICATE (This item must be completed by applicant)

16 THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF

Fitzsimons Army Medical Center
Applicant named in item 1

Date 22 February 1974

By H. F. Cowgill
H. F. Cowgill, M.D., Colonel, MC
Chief, Department of Radiology
Title of certifying official

WARNING.—18 U. S. C., Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

* U.S. GOVERNMENT PRINTING OFFICE : 1968 O—322-213

DEPARTMENT OF THE ARMY

HEADQUARTERS FITZSIMONS ARMY MEDICAL CENTER

DENVER, COLORADO 80240

22 FEB 1974

RADIATION HEALTH AND SAFETY

STANDING OPERATING PROCEDURE

Annexes

1. PURPOSE. This Standing Operating Procedure (SOP)

a. Implements the applicable laws, regulations, conditions and restrictions under which radioactive materials and X-ray devices are used.

b. Promulgates the rules, direction, and guidance of the FAMC radioisotope Committee in the proper and safe handling of radioactive material and equipment which produces x- and gamma radiation.

c. Controls the procurement, receipt, storage, use, repair, transfer and disposal of radioactive material and equipment which produce x-rays or gamma radiation.

d. Prescribes the radiation protection program for Fitzsimons Army Medical Center.

2. SCOPE. This SOP applies to all activities and organizations using radioactive material and/or equipment which produce X-rays or gamma radiation at Fitzsimons Army Medical Center, 12101 East Colfax Avenue, Aurora, Colorado.

3. IMPLEMENTATION: The Radiation Protection Officer, (RPO), FAMC, is the principal staff officer responsible for the implementation of this SOP. Temporary minor exceptions to specific provisions may be considered on an individual basis by the RPO providing such exceptions do not jeopardize radiological safety or violate law, regulation, the conditions of USAEC Licenses or the provisions of DA Authorizations to use radioactive materials.

4. ORGANIZATION OF THESE REGULATIONS. To facilitate the use and understanding of this SOP, the contents have been divided into separate annexes, each dealing with a specific topic. Therefore, it is necessary to consult only the annex dealing with the specific matter in question to find the pertinent information.

5. DEFINITIONS. As used in this SOP, the following definitions apply:

a. Shall, Will infer a standard, condition, or procedure which must be met if one is to be in compliance with regulations.

b. May, Should, Is Recommended infer a standard, condition, or procedure from which one may deviate for good and sufficient reason without violating existing regulations. Decisions to deviate from the accepted procedures in this SOP warrant the careful consideration of the Principal User or other responsible individuals in a supervisory capacity.

Herbert F Cowgill

H. F. COWGILL, M.D.
Colonel, MC
Chief, Department of Radiology

ANNEXES TO RADIATION HEALTH AND SAFETY STANDING OPERATING PROCEDURE

SECTION I - ADMINISTRATION

A. Authorization to Use Radioactive Material
APPENDIX: Non-Routine Medical Uses of Radioactive Material

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C. Role of FAMC Radiation Protection Officer

D. Control Measures and Protection Standards for Radiation Exposure

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F. Medical Evaluation of Radiation Workers

G. Pregnancy Surveillance Program

H. Training and Experience of Users of Radioisotopes and X-Ray Workers

SECTION II - SUPPLY AND LOGISTICS

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J. Accountability and Inventory of Radioactive Material and Machines Which Produce X- or Gamma Radiation

K. Transportation of Radioactive Materials
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L. Radioactive Waste
APPENDIX: Radioactive Waste Disposal Sink Dump Limits

M. Leak Testing Sealed Sources

SECTION III - SUPPORT OF ACTIVITIES

N. Survey of Working Areas

O. Machine-Produced Radiation

P. Radiation Protection Aspects of Patient Care
APPENDIX 1. Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with Sealed Sources
APPENDIX 2. Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with Non-Sealed Sources

ANNEX A: AUTHORIZATION TO USE RADIOACTIVE MATERIAL

1. PURPOSE. The purpose of this ANNEX is to describe the administrative policies and procedures relating to the use of radioactive material.

2. GENERAL. Fitzsimons Army Medical Center has been issued various USAEC Licenses and DA Authorizations to permit the receipt, possession, storage, use, transfer, and disposal of radioactive material within the installation. No individual may be licensed by the AEC to use radioisotopes at FAMC. Accordingly, the possession and use of radioactive materials by individuals at FAMC is permitted only when specifically authorized by the FAMC Radioisotope Committee.

3. DEFINITIONS.

a. US Atomic Energy Commission License. A license issued to FAMC which permits the receipt, possession, storage, utilization, transfer, and disposal of certain radioactive material at FAMC subject to specific conditions. USAEC Licenses are issued for byproduct material, special nuclear material, etc.

b. Department of the Army Authorizations. An authorization issued by Department of the Army to FAMC which permits the receipt, possession, storage, utilization, transfer, and disposal of naturally-occurring and accelerator-produced radioactive material at FAMC.

c. FAMC Radioisotope Authorization. An authorization issued by the FAMC Radioisotope Committee to an individual within the authority of the USAEC License and DA Authorization held by FAMC to receive, possess, store, use, transfer, and dispose of radioactive material, FAMC Radioisotope Authorizations are subject to the conditions of the USAEC Licenses, the Code of Federal Regulations, Department of Army Regulations, and this SOP.

d. Human Use of radioactive materials refers to the diagnositic or therapeutic application of radioactive material to a human being.

e. Non-human Use of radioactive materials refers to those applications in which radioactive material is not applied or injected into human beings. In-vitro studies of human tissues are included in this category providing none of the product material is to be administered to humans.

f. Principal User is an individual who, by virtue of his training and experience with radioactive material, has been authorized by the FAMC Radioisotope Committee to possess and use radioactive material for a given purpose. A Principal User bears the responsibility for the safe handling of the material and for proper precautionary measures to protect himself and others from unwarranted exposure to radiation. He may dictate such rules, procedures or other restrictions as he deems necessary to effect the proper handling of the radioactive material. He is directly responsible to the FAMC Radioisotope Committee.

g. Co-worker is an individual who possesses adequate training and experience with comparable radioactive material or equipment to qualify him as a Principal User. A co-worker performs such duties under the Authorization of the Principal User as directed. A Co-worker is responsible to the Principal User for safe and proper handling of radioactive materials.

h. Trainee is an individual who does not possess adequate training and experience to be authorized as a Principal User himself. He is assigned to this category so that he may obtain the necessary experience under the direct supervision of the Principal User and Co-workers. It is the aim of the Trainee to obtain suitable training and experience to become qualified as a Principal User or Co-worker.

i. Technician is an individual who, under the supervision of the Principal User and/or Co-worker, performs certain routine duties involving the use of radioactive material. He does not possess suitable training and experience to be classified as a Principal User or Co-worker, and is not undergoing such training as would qualify him to attain that status. Technicians must be trained in the safe handling of radioactive material, contamination control, and precautionary measures which may be taken to protect themselves and others from unwarranted exposure to radiation.

j. Health Physics is a profession devoted to the protection of man and his environment from unwarranted radiation exposure.

4. PROCEDURES FOR INITIALLY OBTAINING FAMC RADIOISOTOPE COMMITTEE AUTHORIZATION TO SUE RADIOACTIVE MATERIAL.

a. The Principal User prepares in final form the following documents (The appropriate forms and assistance in their preparation will be furnished by the Radiation Protection Officer on request):

(1) Non-human Use.

(a) Disposition Form (DA Form 2496) requesting authorization to use radioactive material (Non-Human Use). The Disposition Form shall contain the information indicated.

(b) Statement of Training and Experience.

(c) A standard Curriculum Vitae.

(2) Human Use.

(a) Disposition Form (DA Form 2496) requesting authority to use Radioactive Material (Human Use). The disposition form shall contain the information indicated.

(b) AEC Form 313a (page 3). Preceptor Statement.

(c) A standard Curriculum Vitae.

(d) If the contemplated use is not listed in the Appendix to AR 40-37, or if the contemplated dosage range exceeds the range shown in that Appendix, the Principal User must submit a protocol for Non-routine Medical Use of Radioactive Material. This protocol is an adaptation of Appendix F, AEC Licensing Guide - Medical Programs. Detailed information will be provided from the Radiation Protection Officer upon request. Patient dose calculations and literature reprints should accompany the protocol.

(e) If the contemplated use involves the use of human volunteers, the provisions of AR 70-25, "Use of Volunteers as Subject of Research", apply. It is the responsibility of the Principal User to obtain the required approval, through Command channels, from the Secretary of the Army. A copy of this approval will be forwarded with the request.

b. The Principal User obtains administrative approval from the individual occupying the next higher command position and forwards all to the following:

Radiation Protection Officer
Radiation Therapy Service
Building 500

c. The Radiation Protection Officer will conduct an initial survey of the contemplated laboratory facility to evaluate potential occupational hazards. The procedure and qualifications of the workers will be evaluated to insure adequate training and experience in the safe handling of radioisotopes.

d. The Radiation Protection Officer will verify the presence of all documents, attach additional documents as needed, and insure that the procedure, the radioisotopes and activity requested may be allowed within the limitations of USAEC licenses and DA Authorizations issued to FAMC. The file is then forwarded to the FAMC Radioisotope Committee for approval.

e. Following approval, the Authorization will be recorded and distribution effected.

5. AMENDMENT OF FAMC RADIOISOTOPE AUTHORIZATIONS TO USE RADIOACTIVE MATERIAL.

If, at any time, the applicant desires to deviate from the procedure, the radioisotope, or specified investigation as described on the approved Authorization, he shall request an amendment to his Authorization by submitting a Disposition Form (DA Form 2496) describing the proposed changes to his FAMC Radioisotope Authorization through the Radiation Protection Officer to the FAMC Radioisotope Committee.

6. REVIEW AND RENEWAL OF AUTHORIZATIONS. Current Authorizations will be reviewed at least annually and at other times as deemed appropriate by the Radiation Protection Officer. After review, Authorizations are renewed, discontinued, or revised in accordance with current requirements.

APPENDIX I (NON-ROUTINE MEDICAL USES OF RADIOACTIVE MATERIAL) to ANNEX A (AUTHORIZATION TO USE RADIOACTIVE MATERIAL)

1. Experimental and non-routine medical uses of byproduct materials include all human uses not specified in the Appendix to AR 40-37. Such uses may be classified into one of two phases of development:

a. Clinical Research applies to a new use of radioactive material in humans. Little or nothing is known about the procedure and little or nothing has been published on the subject. The basis for proceeding with the new use in humans is derived from knowledge obtained from animal studies. This phase of development includes the initial introduction into humans and initial trials on a limited number of patients.

b. Clinical Evaluation applies to the planned testing of a new diagnostic or therapeutic procedure in an appropriate series of control and diseased humans. The procedure and results of clinical research will ordinarily have been reported in the literature or at meetings. If adequate information has not been published, the applicant should have spent sufficient time with those who developed the test to be thoroughly familiar with the details.

2. The clinical research phase of experimental or non-routine medical use of radioactive material is normally limited to physicians who have broad experience in the use of radioisotopes and who have appropriate facilities and equipment available to conduct research. The individual physician to be designated as the authorized user should normally have broad and varied experience in the use of radioisotopes and in clinical research investigation.

3. The clinical evaluation phase of experimental or non-routine medical use of radioactive material is normally limited to physicians under the supervision of an individual physician with broad experience in clinical evaluation and the use of radioisotopes and under the guidance of a radioisotope committee representing a number of disciplines. Adequate resources to conduct the trials shall be available.

4. Applications for experimental or non-routine uses of radioactive material in humans are reviewed by the FAMC Radioisotope Committee. Applications should be supported by a research protocol which includes:

a. Title of study.

b. The purpose for conducting the study. Indicate whether the study is to be clinical research or clinical evaluation and explain why.

c. The plan of investigation in sufficient detail to permit a critical evaluation of the methods for conducting the experiments and the controls established.

d. A statement as to whether any planned complementary drug or radioisotope administration is contemplated in conjunction with the study.

e. A statement about the expected fate of the isotope administered and, if the procedure is for therapy, a statement about the expected effects.

f. If the application is for clinical research, an outline of related work conducted by the applicant or others in laboratory animals and in humans, including data on localization, effective half-life, and radiation dosage. If no work has been conducted in animals, explain why. Pertinent references and a brief abstract prepared by the applicant of published or unpublished material should be submitted (The brochure of a commercial supplier is not a satisfactory authority for this purpose.

g. If the application is for clinical evaluation, pertinent references and a brief abstract prepared by the applicant of published or unpublished material, including information on localization, effective halflife, and radiation dosage should be submitted (The brochure of a commercial supplier is not a satisfactory authority for this purpose).

h. If volunteers are to be used as human subjects of research, the provisions of AR 70-25 apply, and the applicant must include the written consent of the Secretary of the Army secured in accordance with that regulation.

i. If investigational drugs are to be used clinically in the project on human subjects, the provisions of AR 40-7 apply, and the applicant must include the written approval of the Army Investigational Drug Review Board obtained in accordance with that regulation. Investigational drugs are defined as: "A new drug, not yet approved by the Commissioner of Food and Drugs, Department of Health, Education, and Welfare for general use by the public as a safe and efficacious drug, and that is proposed for clinical study under Department of Army auspices after adequate preclinical information has been obtained."

j. A description of human subjects to be studied:

(1) Persons without manifest disease - number, method of selection, age range.

(2) Persons with manifest disease - number, nature of pathology, method of selection, age range.

(3) Pregnant women shall ordinarily be excluded from any test not involving the condition of the pregnancy itself. Specify whether or not pregnant women will be tested and if so, explain why.

ANNEX B: RESPONSIBILITIES OF PRINCIPAL USERS OF RADIOACTIVE MATERIAL

1. PURPOSE. The purpose of this ANNEX is to delineate the responsibilities and authority of a Principal User of radioactive material.

2. DEFINITIONS.

a. Principal User. See definition, para 3F, ANNEX A to this SOP.

b. Co-worker. See definition, para 3g, ANNEX A to this SOP.

c. Trainee. See definition, para 3h, ANNEX A to this SOP.

d. Technician. See definition, para 3i, ANNEX A to this SOP.

3. SPECIFIC RESPONSIBILITIES.

a. Become thoroughly familiar with the contents of this SOP prior to the use of radiation sources.

b. Obtain and use radiation sources only as authorized by this SOP.

c. Take adequate precautionary measures to protect himself and others from unwarranted exposure to radiation.

d. Seekadvice and assistance from the Radiation Protection Officer when in doubt concerning the safety of an operation.

e. Prescribe rules, procedures, SOP's, or protocols for the use of radioactive materials under his control to insure their proper and safe use. These will be made available to any radiation worker in that area and will be furnished to the Radiation Protection Officer upon request (See the APPENDIX to this ANNEX for a list of radiation laboratory safety rules).

f. Insure that all personnel working under his Authorization or in his area of responsibility are familiar with the specific practices to be followed or avoided in the interest of radiological safety. The Radiation Protection Officer will assist in providing instructions in radiation safety upon request.

g. Preclude the misuse of radioisotopes and radiation-producing devices by unstable or irresponsible personnel who might endanger themselves or others by their conduct.

h. Insure that all rules, procedures, and practices of radiological safety are vigorously followed in the work area.

i. Seek the assistance of the appropriate supervisors if assistance in obtaining cooperation and compliance is needed. Although the Radiation Protection Officer is available to provide necessary technical advice on matters of radiological safety, enforcement of regulations and rules is basically the responsibility of the immediate supervisor. All disputes should be resolved at the lowest possible level.

j. The Principal User shall promptly report to the Radiation Protection Officer all known or suspected overexposures to radiation. The overexposed individual shall cooperate in any and all attempts to evaluate his radiation exposure.

k. Maintain a current inventory of the curiage of radioactive material on hand to be readily available to the Radiation Protection Officer upon request.

l. Provide information and assistance to the Radiation Protection Officer personnel which is necessary to the completion of adequate radiation protection surveys. If classified or sensitive information must be discussed, it must be clearly identified so that it will not become subject to compromise.

m. The Principal User is directly responsible to the FAMC Radioisotope Committee for violations of this SOP by personnel working under his authorization. The Radiation Protection Officer will report all cases of this nature to the Committee whenever appropriate corrective actions are not initiated by the Principal User or when violations are repeated or flagrant. The Principal User will be invited to the meeting at which the matter is discussed.

n. Additional specific responsibilities are described in:

(1) ANNEX H, para 2

(2) ANNEX K, para 4b

(3) ANNEX L, para 1c

(4) ANNEX N, para 2b, 2c

(5) ANNEX P, para 2b

(6) ANNEX U, para 2b

(7) ANNEX W, para 3

(8) ANNEX X, APPENDIX 4

APPENDIX (RECOMMENDED RULES OF LABORATORY SAFETY FOR RADIATION WORKERS)
to ANNEX B (RESPONSIBILITIES OF PRINCIPAL USERS OF RADIOACTIVE MATERIAL)

1. No eating, drinking, smoking or applying cosmetics in any area where radioisotopes are stored or used.

2. Do not bring food or drink into areas where radioisotopes are used or stored, even if it is to be eaten elsewhere.

3. Do not store food (lunch bags, soft drinks, etc.) in cabinets, refrigerators, etc., which are used or have been used for radioactive material.

4. Do not use laboratory glassware or equipment for the preparation or consumption of food or drink.

5. Wear protective gloves, aprons, laboratory coats, etc., whenever there is a possibility of contaminating oneself.

6. Protect all breaks in the skin with waterproof material, e.g., rubber gloves, whenever handling radioactive materials.

7. Wash hands thoroughly, including under fingernails, with mild soap and water and a soft brush after handling any radioisotope and monitor hands with a suitable detector before going about any other work and whenever leaving the laboratory for meals, coffee-breaks, etc., and especially before eating, drinking, smoking or applying cosmetics.

8. Never wash hands with solvent materials; use mild soap and water and a soft brush if needed.

9. Eliminate all sharp objects, e.g., broken glassware, from areas where radioactive materials are used.

10. Wear film badges (dosimeters, if issued) at all times during duty hours, except for medical and dental appointments.

11. When leaving the work area for the day or for medical or dental appointment, leave the film badge (and dosimeter, if issued) in a controlled low background area where it will not be exposed. Do not take film badge home without permission from the Radiation Protection Officer.

12. Do not tamper with film badges or dosimeters. Protect them from damage.

13. Mark all radiologically contaminated, or potentially contaminated containers, and equipment clearly with radioactive marking tape.

14. At the conclusion of each run of the experiment using radioactive material; decontaminate areas, change absorbent paper, clean up equipment, etc., to avoid buildup of contamination.

15. Do not wear lab coats which were worn during the use of radioactive material for other work or outside the lab. Contamination on the coat may be spread, absorbed or ingested if care is not taken.

16. Never pipet by mouth, even water. Bad habits, once formed, are not easily broken.

17. Report all known or suspected exposures, contamination, spills, inhalations, ingestions, absorptions, or injections of radioactive materials IMMEDIATELY to the Radiation Protection Officer, Ext. 23290 and to your immediate supervisor. No punitive action will be taken against individuals who are accidentally exposed to radiation, for the accident or for prompt reporting.

18. Dispose of radioactive waste only in the receptacles provided. Do not mix radioactive and non-radioactive waste.

19. If a radioactive waste sink is available, follow the posted instructions for use. Be sure to complete the log book entry.

20. Keep work areas where radioactive materials are used free from unnecessary materials and equipment.

21. Where practical, use absorbent paper to limit the spread of contamination.

22. Use common sense.

23. Do not handle telephone, reports, etc., with contaminated hands or while using protective gloves.

24. Keep fingernails short and clean.

25. Personnel working with radioactive materials will report IMMEDIATELY any cuts or skin abrasions occurring during the working hours.

26. The following procedures are followed in the event of a wound incurred while working with radioactive materials:

a. Wash the injured area at once with running water. Time is important; even a few seconds may make a considerable difference.

b. Notify the appropriate superior and the Radiation Protection Officer (Ext. 23290).

c. Self-treatment or antiseptics shall not be employed until the wound has been checked by a Medical Officer.

27. To preclude the buildup of contamination, the laboratory will be surveyed by the occupants <u>daily</u>.

ANNEX C: ROLE OF FAMC RADIATION PROTECTION OFFICER

1. PURPOSE. To delineate the general responsibility of the Radiation Protection Officer.

2. RESPONSIBILITIES OF THE RADIATION PROTECTION OFFICER.

a. Serves as principal FAMC Staff Officer for control of radioactive material and sources of radiation.

b. Acts as executive agent for all USAEC Licenses and DA Authorizations for the possession, storage, and use of radioactive material at FAMC.

c. Acts as the custodian of all radioactive materials at FAMC.

d. Provides advice, assistance, and support of all activities using radioactive material or machine-produced radiation on matters of radiation safety.

e. Conducts and administers education and training programs in the use of radioactive material.

f. Furnishes technical support to activities with specific requirements which exceed their capabilities.

g. Performs missions which can be effectively consolidated to free individual users and enable them to more effectively utilize their resources toward the accomplishment of their primary objectives. Among these are the following:

(1) Performs radiation protection surveys.

(2) Administers the photodosimetry program.

(3) Radioactive Material Control including:

(a) Maintenance of inventory of radioactive material and machines which produce X-rays at FAMC.

(b) Insures compliance with possession limits, etc., of USAEC Licenses and DA Authorizations.

(c) Renders required administrative reports.

(d) Keeps necessary and required records to insure compliance with law and regulations.

(e) Monitors incoming shipments of radioactive material to avoid contamination of user's facilities and to insure compliance with federal packaging, labeling, and shipping requirements.

(3) Assists in shipping radioactive material from FAMC in compliance with Federal and Department of the Army Regulations.

(4) Provides full-range Radiation Protection support for all users of ionizing radiation sources and devices at FAMC.

(5) Supplies users with certain specialized Radiation Protection equipment needed for the control of radiological hazards.

(6) Develops and tailors radiation protection programs to meet the needs of individual users.

(7) Assists radiation workers in avoiding unwarranted exposure to radiation through close and continuous support.

ANNEX D: CONTROL MEASURES AND PROTECTION STANDARDS FOR RADIATION EXPOSURE

1. REFERENCES.

a. Title 10, Code of Federal Regulations, Part 20, U.S. Atomic Energy Commission Rules and Regulations.

b. AR 40-14, Control and Recording Procedures, Occupational Exposure to Ionizing Radiation.

c. AR 385-30, Safety Color-code Markings and Signs.

2. APPLICABILITY. The definitions and limitations stated in this ANNEX are peacetime standards for occupational exposure of personnel to ionizing radiation. Occupational exposure to ionizing radiation is that exposure incurred as a result of an individual's employment or duty. No portion of this ANNEX shall be interpreted as limiting the intentional exposure of an individual to radiation for the purpose of medical diagnosis or medical therapy of that individual.

3. DEFINITIONS AND REQUIREMENTS FOR RESTRICTED AREAS.

a. Restricted Area.

(1) Definition:

(a) Any area to which access will be limited by the Radiation Protection Officer and in which precautionary measures are taken for the purpose of protecting individuals from exposure to ionizing radiation and/or radioactive materials.

(b) Any area so designated by the Radiation Protection Officer.

(2) Requirements:

(a) Restricted Areas will be posted by the Radiation Protection Officer.

(b) The Restricted Area sign will read:

"RESTRICTED AREA"
"Persons who occupy this area for more than 10 hours per week must be registered with the Radiation Protection Officer"

b. Radiation Area.

(1) Definition: Any area, accessible to personnel, in which there

exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 2 millirem, or in any five (5) consecutive days a dose equivalent in excess of 100 millirem.

(2) Requirement: Each Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"RADIATION AREA"

c. High Radiation Area.

(1) Definition: Any accessible to personnel in which there exists radition at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 100 millirem.

(2) Requirements:

(a) A High Radiation Area shall not be established without the approval of the Radiation Protection Officer or his representative except in an emergency.

(b) Each High Radiation Area established for more than 30 days shall be equipped with control devices in accordance with para 20.203 (c) (2), 10 CFR 20.

(c) Except in an emergency, no individual shall enter a High Radiation Area until the area has been monitored by the Radiation Protection Officer.

(d) No individual shall enter or remain in a High Radiation Area unless personnel are immediately available in the vicinity to render assistance.

(e) Each High Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"HIGH RADIATION AREA"

d. Airborne Radiation Area.

(1) Definition: Any room, enclosure, or operating area in which airborne radioactive materials exist in concentration in excess of amounts specified in Appendix B, Table 1, Column 1, Title 10, Code of Federal Regulations, Part 20, or any room, enclosure, or operating area in which airborne radioactive material exists in concentrations which, averaged over a number of hours in any week during which individuals are in the area, exceed 25 percent of the amounts specified in the above referenced Code of Federal Regulations (from para 3-1e, AR 385-30).

(2) Requirements:

(a) An Airborne Radioactivity Area shall not be established without approval of the Radiation Protection Officer or his representative except in an emergency.

(b) The Radiation Protection Officer shall direct the use of respiratory protective devices, ventilation control measures, and other appropriate actions within Airborne Radioactivity Areas.

(c) Each Airborne Radioactivity Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"AIRBORNE RADIOACTIVITY AREA"

e. Areas Where Radioactive Material is Present.

(1) The provisions of this paragraph apply to materials which have been procured and are useful because of their radioactive component including natural Uranium or Thorium compounds used for histiological staining.

(2) Each area or room and principal container in which radioactive material is stored or used shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE MATERIAL(S)"

(3) Samples, working solutions, laboratory standards, check sources, etc., must be labeled, segregated, or otherwise identified in such a manner that all personnel in the area recognize that radioactive material is present in the object. Radioactive marking tape may be used for this purpose. However, beakers, flasks, test tubes, and other laboratory containers used transiently in laboratory procedures are exempt from labeling requirements.

f. Contaminated Areas.

(1) Definition: Any Area, including work areas, which are contaminated with radioactive material to levels in excess of values published in the APPENDIX to ANNEX U of this regulation (Contamination Control and Decontamination Operations).

(2) Requirements.

(a) Any area which may routinely become contaminated during experimental procedures may be posted conspicuously with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"POTENTIALLY CONTAMINATED AREA"

(b) Any area which is contaminated may be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"CONTAMINATED AREA"

(c) All areas designated as "Contaminated Areas" or "Potentially Contaminated Areas" will always be regarded as heavily contaminated and must be surveyed by the Radiation Protection Officer following use and decontamination in order to be considered free of contamination.

g. Special Areas of Concern.

(1) At the discretion of the Radiation Protection Officer, dose rates may be posted for informational purposes at any point.

(2) Specially-designated sinks through which radioactive material may be discharged into the sanitary sewer system shall be conspicuously posted with the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE MATERIAL DISPOSAL SINK"

(3) All laboratory receptacles for radioactive waste shall be conspicuously posted with the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE WASTE"

(4) Equipment containing or likely to contain radioactive material, and equipment requiring special precautions to perform specific tasks, will be posted with a sign stating that approval of the Radiation Protection Officer is required before any maintenance or repair of this item is initiated.

4. EXPOSURE OF INDIVIDUALS TO RADIATION IN RESTRICTED AREAS.

a. In accordance with para 20.101, 10 CFR 20, and AR 40-14, no user shall possess, use, or transfer radioactive material (for the purpose of this regulation, any source of ionizing radiation) in such a manner as to cause any individual in a restricted area to receive a dose in excess of the limits specified as follows:

(1) The accumulated dose to the whole body, head and trunk, active blood-forming organs, gonads, or lens of the eye, shall not exceed:

(a) 3 rem in any calendar quarter, nor

(b) 5(N-18) rem total lifetime dose, where N equals the individual's present age, at his last birthday.

(2) The accumulated dose to the skin of the whole body or to the thyroid shall not exceed:

(a) 10 rem in any calendar quarter, nor

(b) 30 rem in any calendar year.

(3) The accumulated dose to the hands and forearms, or to the feet and ankles, shall not exceed:

(a) 25 rem in any calendar quarter, nor

(b) 75 rem in any calendar year.

b. No individual under 18 years of age shall be occupationally exposed to ionizing radiation in excess of that allowed to any individual in the population at large (500 millirem in any calendar year).

c. Notwithstanding the above criteria, an emergency (once in a lifetime) dose of 25 rem to the whole body or a major portion thereof is authorized, providing such exposure is necessary to save life or perform an unusual task which, if left uncorrected, would have the potential for seriously endangering health and/or valuable property. Except under the most unusual circumstances, the exposure will be authorized in advance by the Radiation Protection Officer, and each individual so exposed will wear a self-reading pocket ionization chamber capable of indicating an exposure up to 50 Roentgens, in addition to other personnel monitoring devices (See pages 99 to 101, NCRP Report Number 39, Basic Radiation Protection Criteria).

d. When dosimetry indicates that an individual may have received greater than 200 millirem whole body exposure; exposure to unusual concentrations of airborne radioactive material; or the individual believes he may have been exposed to excessive ionizing radiation, the Radiation Protection Officer will investigate the circumstances of the exposure. A written report of the investigation will be prepared.

e. When it is determined that an individual may have received a dose of ionizing radiation in excess of the limits stated in para 4a and 4b above, or has been exposed to airborne concentrations of radioactive material in excess of 25% of the amounts specified in Appendix B, Table 1, Column 1, 10 CFR 20, a report of the findings will be made to the FAMC Radioisotope Committee for recommendation for corrective action to be taken. Reports of investigation of overexposures and corrective action will be submitted through Health Services Command, Fort Sam Houston, Texas, to the Surgeon General and the USAEC in compliance with pertinent directives.

f. The exemption of medical exposure from consideration relative to permissible exposure limits of this ANNEX apply only to the patient. All

other personnel, such as physicians and technicians administering exposures, are subject to the permissible limits listed above.

5. ACCIDENTAL EXPOSURE TO IONIZING RADIATION. The specific procedures and responsibilities relating to the accidental exposure of personnel to known or suspected overexposures are delineated in ANNEX W to this Regulation.

a. Internal Exposure. All persons who are known or suspected to have been internally exposed to quantities of radioactive material in excess of 10% of the amounts specified in Appendix C, 10 CFR 20 (Appendix to ANNEX W of this Regulation), shall be reported to the Radiation Protection Officer.

b. External Exposure. All persons who are known or suspected to have been externally exposed to radiation levels in excess of those listed in para 4a and 4b, above, shall be reported IMMEDIATELY to the Radiation Protection Officer.

ANNEX E: PERSONNEL MONITORING

1. PURPOSE. The purpose of the personnel monitoring program is to:

a. Quantitatively estimate the magnitude of the exposure of individuals to sources of ionizing radiation.

b. Detect hazardous conditions relating to ionizing radiation exposure not found during radiation protection surveys.

2. SELECTION OF PARTICIPANTS. Personnel selected for personnel monitoring will include:

a. Individuals who are likely to be exposed to sufficient radiation from all occupational exposures to receive an accumulated dose in excess of ten (10) percent of the applicable quarterly basic Radiation Protection Standard (See ANNEX D).

b. Those other individuals selected by the Radiation Protection Officer.

c. Individuals less than 18 years of age who may be occupationally exposed to radiation.

3. DEVICES AND METHODS FOR PERSONNEL MONITORING

a. A film badge is the primary dosimetric device for personnel monitoring in the Army. It consists of a packet of radiosensitive photographic film in a plastic holder. The following types of film badges are available:

(1) Whole body badge. Sensitive to beta, X-ray, and gamma radiation and worn to measure the exposure received by the whole body.

(2) Wrist badge. Same as the whole body badge except that it is provided with a wrist band so that it can be used to measure the dose to the hands.

b. Pocket chambers provide a means of obtaining rapid indications of the accumulated dose over short periods of time. The direct reading personnel dosimeter enables individuals to monitor their own accumulated dose.

c. Various audible pocket ratemeters and integrating dosimeters are also available. These are useful for personnel intermittently exposed to high intensity X-ray or gamma radiation fields.

d. Thermoluminescent dosimeters are useful for dose measurements where other devices are too cumbersome or otherwise unsuitable.

e. Biodosimetric methods may be employed in some cases to assess the quantity of certain radioisotopes which are present within the body.

Available techniques include:

(1) Whole body counting.

(2) Selective organ scanning.

(3) Random breath analysis.

(4) Urinalysis.

4. GENERAL GUIDELINES.

a. Each person, except those being exposed to a radiation source for medical purposes, who occupies a Restricted Area for more than one (1) day, will wear a film badge unless specifically exempted by the Radiation Protection Officer.

b. Film badges will not be used for any purpose other than personnel monitoring without the approval of the Radiation Protection Officer.

c. Only those film badges issued by the FAMC Radiation Protection Officer shall be acceptable in meeting the requirements of this paragraph.

d. FAMC film badges shall not be worn by FAMC personnel when occupationally exposed at other facilities without the consent of the Radiation Protection Officer, FAMC. When military or civilian personnel assigned to FAMC are exposed to ionizing radiation at an installation outside the jurisdiction of FAMC, they shall insure that the required exposure information is furnished to the custodian of his DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation). The Radiation Protection Officer maintains these records at FAMC.

e. Other dosimetric devices and methods may be employed to supplement or replace the film badge under certain circumstances. The Radiation Protection Officer will designate those individuals authorized to substitute another device or method for the film badge based upon occupational hazards to which they are exposed.

f. Film badges will be stored in controlled, low dose rate areas when not being worn by the individual.

g. Film badges used for personnel dosimetry will not be worn during medical and dental x-ray exposures or when the individual is to receive a radioisotope treatment. Clearance will be obtained from the Radiation Protection Officer before wearing the film badge after completion of radioisotope treatment procedures.

h. Film badges will not be worn off duty.

i. The film badge will not be intentionally exposed, tampered with, or damaged.

j. Whenever a film badge is thought to have been lost, damaged, accidentally exposed, etc., the Radiation Protection Officer will be promptly notified. A replacement badge will be issued immediately.

k. The whole body badge should be worn on the torso, fully exposed.

l. The whole body film badge will be worn under the lead apron and the wrist badge under the lead glove when these protective items are worn.

m. The wrist badge should be worn on the side of the wrist facing the radiation source.

n. Film badges should never be carried in the pocket, subjected to mechanical stress, chemical fumes, heat, humidity, or direct sunlight since these can damage the film and give false results.

o. Film badges will be worn only by the individual to whom they are issued.

5. ADMINISTRATION.

a. Application for film badge service will be made to the Radiation Protection Officer on Disposition Form (DA Form 2469) providing detailed information.

b. Personnel on the permanent personnel monitoring service will be subject to medical examinations in accordance with ANNEX F.

c. The Radiation Protection Officer will exchange film badges and transmit the film packets, along with photodosimetry reports, to Lexington-Bluegrass Army Depot for monthly development and exposure evaluation.

d. Records of exposures will be maintained as follows:

(1) The Lexington-Bluegrass Army Depot maintains permanent records of all exposure readings and returns the Photodosimetry Report (DA 3484) to the FAMC Radiation Protection Officer.

(2) The FAMC Radiation Protection Officer maintains DD Form 1141 (Record of Occupational Exposure to Ionizing Radition) for all military and civilian personnel assigned or attached to FAMC who are participants in the FAMC Personnel Monitoring Program in accordance with AR 40-14.

(3) When a DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation) is maintained on an individual by the Radiation Protection Officer, the jacket of his medical record will be annotated, "Film Badge Wearer, Call Ext. 23290 for information regarding DD Form 1141" and a copy of a Locator Card will be placed on the left side of the jacket by the custodian of the individual's medical record.

(4) The Radiation Protection Officer will forward the DD Form 1141 to the custodian of the individual's medical records prior to the departure of an individual and the entry on DA Form 1615 (File Charge-Out Record) will identify these individuals to the medical records clerk maintaining the Health Record who will request the DD Form 1141 from the Radiation Protection Officer. (Ext. 23290)

(5) The Radiation Protection Officer will send the photodosimetry reports on non-FAMC employees (i.e., those persons for whom no DD Form 1141 is maintained by FAMC, and former FAMC employees whose DD Form 1141 has been forwarded) to the appropriate custodian of the medical record of each monitored individual at intervals not to exceed a calendar quarter. Reports of zero exposure will not be furnished to monitored visitors, unless requested by the visitor or the custodian of his exposure record.

(6) The "Record of Occupational Exposure to Ionizing Radiation" and records of biodosimetry results on FAMC personnel shall be made available to the individual or his superiors upon request.

(7) The results of bioassay, whole body radioactivity measurements, or estimation of internal exposure to persons registered in the FAMC Personnel Monitoring Program, shall be sent to the Radiation Protection Officer who is responsible for posting data to the DD Form 1141 and other dosimetry files.

(e) Discontinuation of personnel monitoring will be accomplished by completion of Disposition Form (DA Form 2496) (Request for Discontinuation of Film Badge Service) when an individual departs or is assigned duties which, in the opinion of the Radiation Protection Officer, do not warrant continuation.

6. INVESTIGATIONS.

a. The Radiation Protection Officer will inquire into all excessive, unusual, or unanticipated exposure results. All lost film badges and film badge readings in excess of 200 millirem will be investigated by the Radiation Protection Officer and a written record of the findings will be prepared.

b. When exposures greater than the limits specified in AR 40-14 are found, a formal investigation will be conducted and a brief explanation of the probable cause of overexposure will be entered on the individual's DD Form 1141 by the Radiation Protection Officer.

ANNEX F: MEDICAL EVALUATION OF RADIATION WORKERS

1. GENERAL. It is necessary to periodically evaluate the health of radiation workers in order to provide baseline data for future comparisons, supplement the radiation protection program, provide for timely detection of developing medical problems, and for medicolegal reasons. The references cited in paragraph 7 of this annex provide guidelines needed for evaluation of individuals. In order to insure that all radiation workers at FAMC receive timely and appropriate medical evaluations, a comprehensive program is needed for this installation.

2. PURPOSE. It is the purpose of this annex to promulgate the medical evaluation procedures for radiation workers at Fitzsimons Army Medical Center based upon applicable regulations, guidelines, and the professional opinions of the members of the Radioisotope Committee.

3. RESPONSIBILITIES.

a. The FAMC Radioisotope Committee is responsible for providing guidance and rendering professional opinions regarding suitable medical evaluation procedures for radiation workers at Fitzsimons Army Medical Center, to include a determination of medical examination policy for all personnel occupationally exposed to ionizing radiation at FAMC and determining specific parameters for examination in event of a suspected or actual overexposure to ionizing radiation.

c. The Radiation Protection Officer is responsible for:

(1) Classifying individual workers at FAMC into the categories given in para 4 of this annex.

(2) Providing up-to-date notification of this classification to the Preventive Medicine Officer, Military Personnel, and the Physical Examination Section, FAMC.

(3) Detecting working conditions which could result in the accidental ingestion, inhalation, injection, or absorption of radioisotopes by workers, taking action to reduce such hazards, and calling the areas of hazard to the attention of the Preventive Medicine Officer.

d. Preventive Medicine Officer:

(1) Determining the nature of special studies, organ function tests, and bioassays which might be of benefit in the medical evaluation of workers who are exposed to potential hazards from the use of radioisotopes.

(2) Evaluating the results of such directed studies which are not a part of routine medical examination.

(3) Insuring that the Physical Examination Section implements the decisions made and considers the results of such studies, assays, and tests as part of the medical examination of these specific workers.

(4) Providing advice and guidance to examining physicians concerning the scope and conduct of medical examination for radiation workers.

(5) Seeking the advice of specialists and/or members of the Radiosiotope Committee in any instance where such advice might assist in determining the exact nature of the hazard, the critical organ, and the nature and usefulness of the studies to be undertaken.

4. CATEGORIES OF PERSONNEL. Personnel working with radiation will be divided into two major categories according to the hazard to which they are exposed. The categories are mutually exclusive in most instances; however, some individuals may fall into both categories. Such individuals should be examined in accordance with requirements of both categories.

a. Personnel Exposed to an External Radiation Hazard. Those individuals who are potentially exposed to X-ray or gamma radiation emanating from X-ray machines, sealed gamma sources, etc.

b. Personnel Exposed to an Internal Radiation Hazard. This group includes those individuals who, by virtue of their duties, routinely are in the proximity of unsealed radioactive material and, therefore, potentially subject to inhalation, ingestion, absorption, or injection of such material into their bodies.

5. MEDICAL EVALUATIONS

a. Initial Examination. Preplacement/pre-employment/pretransfer medical examinations are required; however, they may be temporarily deferred with the expressed consent of the Preventive Medicine Officer.

(1) For workers exposed to ionizing radiation hazards, this examination should include a routine medical examination using SF 88 and 89 for military personnel and SF 78 for civilian personnel, a review of prior occupational exposure, and a description of any unusual exposure to ionizing radiation resulting from previous occupations, accidents, or diagnostic procedures. Any therapeutic exposure will be listed by the dosage and the areas treated. This information on diagnostic and therapeutic radiation will be recorded as a portion of the history, but will not be entered on DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation). The family and personal medical

history will note the presence or absence of cancer, blood dyscrasias, thyroid disease, history of recurrent abortion, congenital malformation, or any other inheritable conditions which may be associated with exposure to ionizing radiation. Sufficient blood counts (white cell count with differential, red cell count, hemoglobin, hematocrit, and platelet count) to establish a baseline will be performed. Personnel exposed to an internal radiation hazard may receive whole body count, bioassay studies, selective organ scans and/or other appropriate additional studies if directed for that individual by the Preventive Medicine Officer.

b. Periodic Examination. Routine examinations for all radiation workers exposed to an ionizing radiation hazard, whether military or civilian, are to be administered on the basis of applicable regulations for military personnel, i.e., 40 and over, annually; ages 30-39, every 2 years; below age 29, every 3 years, unless more frequent examinations are indicated for certain individuals. When a periodic examination is otherwise required, it should include a CBC with platelet count and any special evaluations directed by the examining physician.

c. Special Examinations. Routine bioassay, scanning, whole body counting, or other special studies of personnel will be restricted to those tests specifically designated on an individual basis at the discretion of the Commander or his representative.

d. Final Examination. At the termination of assignment of an individual to a position which warrants classification as a radiation worker, a final examination will be conducted, primarily for medicolegal considerations. The examination is similar to the initial examination except that only an interim history need be recorded for the purposes of this Regulation. The examination will always include a CBC with platelet count. Previously, conducted special examinations which resulted in abnormal findings may be repeated as part of the final examination at the discretion of the Commander or his representative.

6. MEDICAL SURVEILLANCE OF OCCUPATIONALLY EXPOSED PERSONNEL.

a. Special Cases. If the Radiation Protection Officer identifies areas of particular hazard from radioisotopes, especially areas of potential internal hazard from radioisotopes, he will take appropriate action to minimize the hazard and will advise the Preventive Medicine Officer of the hazard. The Preventive Medicine Officer, seeking whatever consultation he deems necessary, will direct the appropriate additional studies, organ function tests, bioassays, whole body counts and/or selective organ scans which might be of medical benefit in the evaluation of suspected exposure of the individual. He will insure that such studies are conducted and that the results are evaluated by well-trained professional personnel.

b. Consultation. Professional advice in the area of radiation exposure is available from Chief, Ophthalmology; Chief, Radiation Therapy; and/or

Chief, Nuclear Medicine. Any physician engaged in the evaluation of radiation workers may seek the advice of any of these individuals to assist in such evaluations. Upon request, the Radiation Protection Officer will provide each physician engaged in evaluation of radiation workers a copy of the Medical Addendum to "Safe Handling of Radioisotopes," by the International Atomic Energy Agency.

c. Reports. Abnormal medical findings discovered during medical examinations of radiation workers will be IMMEDIATELY reported to the Subcommittee for appropriate action. The Radiation Protection Officer (Ext. 23201/26245) will coordinate such reporting.

7. REFERENCES.

a. AR 40-5, Preventive Medicine.

b. AR 40-14, Control and Recording Procedures, Occupational Exposure to Ionizing Radiation.

c. AR 40-501, Standards of Medical Fitness.

d. AR 50-5, Nuclear Surety.

e. TB MED 62, Diagnostic X-ray Protection.

f. TB MED 270, Control of Hazards to Health from Microwave Radiation.

g. TB MED 279, Control of Hazards to Health from Laser Radiation.

h. Medical Addendum, Safe Handling of Radioisotopes, International Atomic Energy Agency, Vienna, 1960.

ANNEX G: PREGNANCY SURVEILLANCE PROGRAM

1. Female radiation workers are subject to the pregnancy surveillance program. It is the responsibility of both the individual and her supervisor to notify the Radiation Protection Officer, FAMC, immediately upon learning of a confirmed pregnancy.

2. In cases where the pregnant employee is exposed to ionizing radiation, the Preventive Medicine Officer and the Radiation Protection Officer will survey the working environment and will, in conjunction with the employee's personal physician, determine the advisability of her continuing work in this environment for the duration of her pregnancy.

3. The Preventive Medicine Officer will make specific recommendations to the appropriate personnel branch for a change in working environment during pregnancy when it is considered medically desirable in individual cases.

ANNEX H: TRAINING AND EXPERIENCE OF RADIOISOTOPE USERS AND X-RAY WORKERS

1. PURPOSE. The purpose of this ANNEX is to establish the standards of training for all personnel who work with radioisotopes and x-rays at Fitzsimons Army Medical Center.

2. GENERAL. The standards of training for personnel working with radioisotopes and x-rays at FAMC have been established by the Radioisotope Committee. The training outlined below, or its equivalent, is considered prerequisite for individuals who work in categories described. Exception to these requirements may be granted on an individual basis by, and at the discretion of, the FAMC Radioisotope Committee.

3. Training and Experience Required of Individuals.

a. Radiation Therapy Service

(1) Physicians- Approval to use the teletherapy sources and the brachytherapy sources requires that the physician be certified by the American Board of Radiology in General Radiology or Therapuetic Radiology.

(2) Technicians- It is required that therapy technicians be registered or eligible for registry examination. The degree of direct supervision by the using physician is determined by the level of training the technician has achieved.

(3) Training- Added training in health and safety are provided as necessary during routine conferences, chart rounds, and class periods in the Radiation Therapy Service.

b. Nuclear Medicine Service

(1) Physicians- Approval to use radioisotopes in the Nuclear Medicine Service depends on proof of the physicians having achieved Board Certification or Board eligibility in either General Radiology, Nuclear Medicine or Internal Medicine accompanied by documentation of his immediate training and experience in diagnostic and therapeutic Nuclear Medicine.

(2) Technicians- Technicians use and handle radioisotopes under the directions of the physicians. It is required that civilian technicians be registered and that military technicians be registry eligible. Student technicians, are assigned to the Service to complete the practical portion of their training and are required to have completed the total didactic course of instruction at a recognized training facility.

(3) Training- Training in health and safety is a continuing function in the Nuclear Medicine Service. Routinely scheduled lectures, conferences and demonstrations are conducted by the Chief, Nuclear Medicine, the Senior Nuclear Medicine Technician, the Radiological Physicist, and manufacturer's representatives.

c. Research and In-Vitro Laboratory Services

(1) Research Scientists. It is required that documentation of training and experience with radioactive materials be submitted with a researchers request for approval. Should researchers desiring to use isotopes and not have prior training, a series of laboratory and lecture periods are provided by the Radiation Protection Officer using the facilities and personnel of the Nuclear Medicine Service. Such training continues until the trainee demonstrates ability to safely aquire, store, handle and use the materials in question. Arrangements to attend training conferences at other medical institutions or at commercial vendor's facilities are made as required.

(2) In-vitro Testing. In-vitro testing is accomplished by medical technologist. Documentation of the training and experience in handling radioisotopes is required prior to approval for use. Continued training in health and safety is provided during regular scheduled visits to the laboratory by the Radiation Protection Officer. When new In-vitro procedures are introduced into the laboratory, training is accomplished in these through vendor conferences and demonstrations.

d. Diagnostic Radiology Service

(1) Physicians- Physicians do not routinely operate diagnostic x-ray units. They rely on the technicians. Fluoroscopy, by contrast is routinely operated by physicians. It is required that physicians who desire to operate any x-ray machine be familiar with the contents of TB Med 62, received training in the operation of the machine by the Chief Technician.

(2) Technicians- Civilian technicians are required to be registered or to be eligible for registry examination. Military technicians are required to be registry eligible. Student technicians, work under direct supervision and are required to have completed the x-ray Technicians course of Instruction at the Academy of Health Sciences, FSHT.

(3) Training- Routine Health and Safety training of physicians and technicians is accomplished on a regular scheduled basis using lectures, demonstrations and practical exercises.

4. QUALIFICATION AND CERTIFICATION

a. Personnel may become qualified in the use of radioisotopes through the receipt of training at FAMC or through constructive credit granted by the Radioisotope Committee for previous training and experience which parallels the comparable FAMC training.

b. Certification of satisfactory completion of appropriate training which is conducted under the auspices of the RPO will be made by that organization.

c. In the case of physicians, evidence of satisfactory completion of the clinical practical experience will be provided to the RPO by the Principal User under whom the experience is obtained.

d. Records of training and experience of radioisotope workers will be maintained by the RPO.

e. Upon the completion of the blocks of instruction, appropriate records will be maintained.

5. REFERENCES.

a. APPENDIX C, USAEC Licensing Guides - Medical Programs.

b. TR 31- Training in Radiological Protection: Curricula and programming, International Atomic Energy Agency, Vienna, 1964.

c. 10 CFR 30- Rules of General Applicability to Licensing of Byproduct Material, Rules and Regulations of the US Atomic Energy Commission.

d. TB MED 62- Diagnostic X-ray Protection.

e. NBS Handbook Number 93.

f. NCRP Reports Numbered: 8, 22, 28, 30, 33, 34, 35, 36, and 40.

g. ICRU Reports Numbered: 10c, 10d, and 10e.

ANNEX I: RECEIPT, TRANSFER AND SHIPMENT OF RADIOACTIVE MATERIAL

1. PURPOSE. The purpose of this annex is to familiarize Principal Users and other personnel with the Health Physics aspects of radioactive material procurement, receipt, transfer, and shipment.

2. DEFINITIONS. For the purpose of this annex the following definitions apply:

a. Radioactive material. Any material which undergoes spontaneous nuclear disintegration with emission of corpuscular or electromagnetic radiations. Radioactive material includes naturally-occurring isotopes, special nuclear material, byproduct material, accelerator-produced isotopes, source material, and items contaminated with radioactive material.

b. Radioactive commodity. An item of US Government property to which a Federal Stock Number (FSN) has been assigned, composed in whole, or in part, of radioactive material.

c. US Atomic Energy Commission License. A License issued to FAMC which permits the receipt, possession, use, transfer, storage, and disposal of certain radioactive material at FAMC subject to specific conditions. USAEC Licenses are issued for byproduct material, source material, special nuclear material, etc.

d. Department of the Army Authorizations. An Authorization issued by the Department of the Army to FAMC which permits the receipt, possession, use, transfer, storage, shipment, and disposal of naturally-occurring and accelerator-produced radioactive material at FAMC.

e. FAMC Radioisotope Authorization. An Authorization issued by the FAMC Radioisotope Committee to an individual within the authority of the USAEC Licenses and DA Authorizations held by FAMC to receive, possess, use, transfer, store, and dispose of radioactive material. Radioisotope Authorizations are subject to the conditions of the USAEC Licenses, the Code of Federal Regulations, Department of the Army Regulations, and FAMC Regulations.

3. GENERAL.

a. The Radiation Protection Officer, in coordination with the FAMC Transportation Officer, controls the movement of all radioactive material onto, off of, and within the installation.

b. The Radiation Protection Officer, in coordination with the Director of Logistics, controls the procurement, receipt, and transfer of all radioactive material at FAMC.

c. Questions concerning procurement, receipt, transfer, and shipment should be directed to Radiation Protection Officer, Extension 23290.

4. PROCUREMENT OF RADIOACTIVE MATERIAL.

a. General.

(1) A Principal User may procure for use at FAMC only those radioisotopes currently authorized for his use by the FAMC Radioisotope Committee, subject to the limitations of his Authorization.

(2) The maximum quantity which may be ordered at any one time is limited by the maximum activity of that radioisotope which the User is authorized to possess unless arrangements have been made with the Radiation Protection Officer

(3) Receipt and/or transfer of gifts containing radioactive material shall not be accomplished without prior approval of the Radiation Protection Officer. This has particular application in those instances where normal supply channels are not utilized. All gifts will be delivered to the locations shown in para 4c(3), below.

b. Principal Users.

(1) The Principal User shall submit a completed DA Form 14-115 (Purchase Request and Commitment) through his department or service supply channels and through the Radiation Protection Officer for the procurement of all radioactive materials.

(2) In addition to the information required by AR 37-108, each DA Form 14-115 shall contain the following:

(a) Radionuclide, chemical form, and total activity (Activity is given as microcurie (uCi), millicurie (mCi), curie (Ci), microgram (ug), milligram (mg), gram (g), or milligram-radium equivalent (mg Ra eq), as appropriate).

(b) Date required or delivery date.

(c) The requesting activity (Principal User) SHALL NOT indicate the USAEC License Number or DA Authorization Number for the radioactive material being procured.

(3) With regard to the procurement or disposal of radioactive commodities, the Principal User and/or Supply Control Branch will coordinate with the Radiation Protection Officer prior to the submission of DA Form 2765 or 2765-1 (Request for Issue or Turn-in).

c. Purchasing.

(1) Prior to placing any orders for radioactive material, purchasing personnel will request approval from the Radiation Protection Officer or his authorized representative.

(2) In order to obtain approval, the Radiation Protection Officer must be furnished with the following information from the DA Form 14-115:

(a) Identity of the radioisotope(s) being requested.

(b) Total activity of the radioisotope desired.

(c) Delivery date of the requested radioactive material.

(3) After approval has been granted, the authorized purchasing personnel will place the order and request delivery by the required date, with instructions for the vendor to ship to the following address (unless specifically exempted as authorized by the Radiation Protection Officer):

(a) For any item destined for any organization located at FAMC:

1 For items to be delivered by mail:

Radiation Protection Officer
Nuclear Medicine Service
Fitzsimons Army Medical Center
Denver, Colorado 80240

2 For items to be delivered by all other means:

Radiation Protection Officer
Building 511
Nuclear Medicine Service
Fitzsimons Army Medical Center
Denver, Colorado 80240

(b) Any item requiring special handling or pick-up by the Radiation Protection Officer, must be coordinated with the Radiation Protection Officer as soon as the requirement is identified.

(4) The personnel authorized to order radioactive material will, unless otherwise instructed by the Radiation Protection Officer, furnish the Radiation Protection Officer with copy #3 of DA Form 14-115 or a facsimile having the following additional information, as appropriate:

(a) Charge Accounts:

1 Name of person placing order

2 Purchase Request Number

3 Call number

4 Purchase/Delivery Order number

(b) Non-charge Accounts

1 Name of person placing order

2 Purchase Request number

3 Purchase/Delivery Order number

5. RECEIPT OF RADIOACTIVE MATERIAL.

a. All incoming shipments of radioactive material will be received by the Radiation Protection Officer, Nuclear Medicine Service, FAMC. The following procedure will then be followed:

(1) The shipping container and packing material will be inspected for damage and monitored for contamination.

(2) The labeling of the package, the packing slip, and other documents will be compared with the DA Form 14-115 or DA Form 2765 to insure the accuracy of the shipment.

(3) The exposure rate at one (1) foot from the primary unshielded container and at one (1) foot from the primary container enclosed in the protective shield supplied by the vendor will be recorded.

(4) The shipment if then transported to the appropriate user.

(5) Appropriate entries are made in the Radioactive Material Receipt Files and Inventory Records.

b. If shipments are found to be contaminated, they will be decontaminated to acceptable levels by the Radiation Protection Officer prior to delivery to the user.

c. Under no circumstances will an incoming shipment of radioactive material be refused when delivered.

d. The use should note the exposure rate measurements posted by the Radiation Protection Officer and govern his handling and storage of the radioactive material accordingly.

e. The Radiation Protection Officer's inspection does not constitute an assay or an evaluation of the pharmaceutical quality of the radionuclide.

f. The Radiation Protection Officer operates during normal FAMC duty hours. After duty hours, radioactive material is to be received only by the AOD, who will place the shipment in the custody of the X-ray Technician on duty in the Department of Radiology.

g. The Principal User must notify the Radiation Protection Officer if an urgent or specially refrigerated shipment is expected. The Radiation Protection Officer will insure the prompt inspection and survey of the shipment so that the delivery will not be unduly delayed.

6. TRANSFER OF RADIOACTIVE MATERIAL.

a. Transfer of radioactive material within FAMC shall be accomplished only between persons authorized to use those radioisotopes by the FAMC Radioisotope Committee.

b. Transfer of radioactive material between Principal Users at FAMC and other activities or agencies outside the jurisdiction of FAMC shall be coordinated with the Radiation Protection Officer. The Principal User, in coordination with the Radiation Protection Officer, will prepare a DA Form 2791-R (Radioactive Material Movement) for the transport of radioactive material. The Radiation Protection Officer must have proof in writing that the recipient is licensed or authorized to possess the radioactive material, by the USAEC or other authority, before the transfer is accomplished.

c. Transfer of all adapted or experimental items of equipment containing radioactive material that are to be returned to a vendor for repair, return or replacement, and/or disposal shall be processed in the following manner:

(1) The item containing the radioactive material shall not be removed from its normal location without the approval of the Radiation Protection Officer.

(2) The Principal User shall contact the Radiation Protection Officer for instructions.

(3) The Principal User shall prepare a DA Form 2496 (Disposition Form) addressed to the Radiation Protection Officer, FAMC, which shall contain the following information:

(a) A statement requesting that the equipment be returned to the appropriate vendor for repair and return, or returned to the vendor for replacement and/or disposal.

(b) Complete address of the vendor.

(c) Make and model number of the equipment.

(d) Serial number of the equipment and/or the radioactive source.

(e) The radionuclide present.

(f) The total activity of the source (uCi, mCi, Ci, ug, mg, g, or mg Ra eq, as appropriate).

(4) The Principal User shall coordinate with his Supply and Service Division in the preparation of a DA Form 2407 (Maintenance Request - MR) to be submitted to the Combined Maintenance Branch (CMB), FAMC. It is imperative that the MR contain the make, model, serial number, Federal Stock Number (FSN) of the item, radioisotope, total activity, and description of the work to be performed.

(5) It is the responsibility of the Combined Maintenance Branch and Purchasing and Contracting (P&C) Branch, FAMC, to coordinate with the Supply Control Branch (SCB) in completing the necessary documents for shipment of equipment. Th[illegible]e documents are:

(a) Shipping Document. DD Form 1348-1 or DD Form 1149-4 with fund citation and Purchase Order number.

(b) DD Form 1155. Order for Supplies and Services.

(6) The CMB, FAMC, shall notify the Radiation Protection Officer to coordinate the pickup of the shipping documents from CMB, FAMC, and the equipment from the Principal User.

(7) All adapted or experimental equipment containing radioactive material being returned to FAMC by the vendor shall be shipped to the address given in para 4c(3)(a)1, above.

7. SHIPMENT OF RADIOACTIVE MATERIAL.

a. The Radiation Protection Officer will process all outgoing shipments identified as containing radioactive material and returnable containers for radioactive material departing FAMC.

b. The Principal User shall coordinate with his Supply and Service Division and SCB in the preparation of the Shipping Document.

c. The Radiation Protection Officer or his representative will insure that the container is properly identified, described, packaged, and labeled in accordance with existing regulations and that the shipping documents and instructions are properly forwarded.

d. The Radiation Protection Officer will coordinate the shipment with the Transportation Officer.

8. REFERENCES.

a. Title 10, Code of Federal Regulations, Rules and Regulations of the US Atomic Energy Commission.

b. Title 42, Code of Federal Regulations, Rules and Regulations of the US Public Health Service, Department of Health, Education and Welfare.

c. Title 49, Code of Federal Regulations, Rules and Regulations of the Department of Transportation.

d. AR 37-108, General Accounting and Reporting for Finance and Accounting Offices.

e. AR 710-2, Material Management for Using Units, Support Units and Installations.

ANNEX J: ACCOUNTABILITY AND INVENTORY OF RADIOACTIVE MATERIAL AND MACHINES WHICH PRODUCE X OR GAMMA RADIATION

1. RESPONSIBILITIES.

a. The Radiation Protection Officer is responsible for the physical inventory and accountability for all radioactive material and ionizing radiation producing devices in accordance with AR 700-52 and AR 40-61.

b. The Radiation Protection Officer is responsible for insuring that the total inventory of any radioisotope on hand at any one time does not exceed the possession limitations imposed for that isotope by the USAEC Licenses or DA Authorizations, as appropriate.

c. Each Principal User is responsible for the control, security, and inventory of all radioactive material in his possession at all times. He will insure that the maximum quantity which he has on hand at any one time does not exceed the possession limit stated in his FAMC Radioisotope Authorization. Quantities in excess of his possession limits will be returned to the Radiation Protection Officer.

2. PROCEDURES.

a. Inventory records will be updated on a quarterly basis at FAMC.

b. Inventory of radioisotopes used under Non-Human Use Authorizations will be performed as part of one radiation protection survey performed during the quarter.

c. Inventory of radioisotopes used under Human Use Authorizations will be inventoried quarterly as of the last working day of the quarter.

d. Machines and devices which produce ionizing radiation will be registered with the Radiation Protection Officer in accordance with AR 700-52. This registry will be updated as needed and verified semi-annually.

3. RECORDS.

a. All FAMC radioisotope inventory records and registry of devices and machines which produce ionizing radiation will be maintained in accordance with pertinent directives.

b. Other files and records deemed necessary to effect control of radioisotopes and insure compliance with limits of USAEC Licenses, DA Authorizations, and FAMC Radioisotope Authorizations are authorized, except that no form may be used at the local level to supplement or replace the DA Form 8-235 (Pharmacy, Drug and Narcotic Stock Record) prescribed in para 3-5, AR 40-61 (Medical Material Policies and Procedures).

ANNEX K: TRANSPORTATION OF RADIOACTIVE MATERIALS

1. PURPOSE. To prescribe general guidelines for the transportation of radioactive material within and from FAMC and to implement the provisions of AR 55-55 and 49 CFR 171-178.

2. RESPONSIBILITIES

a. The Transportation Officer, FAMC is responsible for providing the means by which radioactive materials are transported.

b. The Radiation Protection Officer is responsible for:

(1) Controlling all radioactive material at FAMC to include location, transfer, and transportation.

(2) Insuring that packaging meets standards of 49 CFR 173.24 and other pertinent directives.

(3) Insuring that all packaging and accessories which have previously been used for shipments of radioactive materials and are being shipped empty conform to 49 CFR 173.29 and other pertinent directives.

(4) Verifying that removable radioactive contamination does not exceed the limits specified in 49 CFR 173.397.

(5) Assigning Transport Group classification and the Transport Index to shipments of radioactive materials in accordance with 49 CFR 173.390 and 173.389 (i).

(6) Labeling of packages of radioactive materials in the manner prescribed in 49 CFR 173.399, 173.402, and 173.414 and other pertinent directives.

(7) Preparing and/or advising on the preparation of shipping documents for shipment of radioactive material as required.

(8) Releasing shipments to carriers after verifying that the vehicle intended for transport is suitable, in a proper state of repair, placarded in in accordance with 49 CFR 177.823 (a)(1), and free from any obvious condition which could reasonably impair the safe transport of the cargo. Vehicles not meeting these tests will be immediately reported to the Transportation Officer.

(9) Surveying military vehicles which have been used to transport radioactive materials for dose rate at any accessible surface and removable radioactive surface contamination in accordance with 49 CFR 177.843 and 173.397 and other pertinent directives.

(8) Releasing shipments to carriers after verifying that the vehicle intended for transport is suitable, in a proper state of repair, placarded in accordance with 49 CFR 177.823 (a)(1), and free from any obvious condition which could reasonably impair the safe transport of the cargo. Vehicles not meeting these tests will be immediately reported to the Transportation Officer.

(9) Surveying military vehicles which have been used to transport radioactive materials for dose rate at any accessible surface and removable radioactive surface contamination in accordance with 49 CFR 177.843 and 173.397 and other pertinent directives.

3. POLICIES.

a. All shipments and transportation requirements for radioactive material will be coordinated with the Radiation Protection Officer and the Transportation Officer.

b. Vehicles transporting radioactive materials:

(1) Will be placarded front, rear, and on each side while it contains radioactive materials with the word "RADIOACTIVE" (Black letters on yellow background, letters not less than 4 inches high using approximately a 5/8-inch stroke and the placard larger than lettering by at least one inch on each side) whenever radioactive material requiring "Radioactive Yellow - III" label is transported and also when radioactive cargo not requiring this lebel is transported but, in the opinion of the Radiation Protection Officer, such placards should be displayed.

(2) Will not carry flammables, Class A explosives, pyrotechnics, vegetables, fruit, bagged grains, or other contaminable foodstuffs, with any radioactive material.

(3) Will not be left unattended on a public highway.

(4) Will be subject to inspection prior to loading and must conform to the provision of DD Form 626 (Inspection Report).

(5) Will display a notice on the dash board which states:

WARNING
THIS VEHICLE IS CARRYING
RADIOACTIVE MATERIAL

When damaged, the package(s) are safe to
handle for short periods. In case of accident
notify: FAMC Radiation Protection Officer 366-5311 ext 23201

(6) Will carry a copy of DD Form 836 (Special Instructions for Motor

Vehicle Drivers) and a copy of the Appendix to this Annex (Emergency Procedures to follow in Accident and/or Incident Situations).

(7) Will be loaded in such a fashion that the distance between the packages and the driver or any passenger in the cab of the vehicle will not be less than the distances given in Table 6, paragraph 13b(13), TM 55-315.

(8) Will be loaded such that the load is not likely to become damaged or dislodged during transit.

(9) Will have all packages of radioactive material contained within the cargo portion of the vehicle, i.e., no tailgate loading.

(10) Will be surveyed and decontaminated, if necessary, to the levels prescribed in 49 CFR 177.843 and 173.397, and other pertinent regulations, prior to being returned to general use.

(11) Will be equipped with a portable survey instrument in operating condition during operation to assist in contamination control in event of accident or incident.

(12) Will be operated at a safe speed in conformity with local conditions, but will not exceed posted speed limits under normal operating conditions. During adverse weather or road conditions, the speed of the vehicle will be reduced to that safe for the existing conditions.

c. Passenger-carrying vehicles, including POV and motor vehicles which carry passengers for hire, will NOT be used to transport radioactive materials unless there is no other practicable means of transportation available and then only with the expressed consent of the Radiation Protection Officer and the Transportation Officer. When passenger-carrying vehicles are authorized for use in transporting radioactive materials, the requirements in para 3b above will be met (49 CFR 177.870).

d. The U.S. Mail and Parcel Post will not be used for shipment of radioactive material except in case of emergency, or for the movement of radioisotopes which meet the requirements specified in 39 CFR 125.2 and para 5a(4), TM 55-315. All such shipments must be coordinated with the Radiation Protection Officer (para 3-13b, AR 55-55).

4. REFERENCES.

a. AR 55-38 - Reporting of Transportation Discrepancies in Shipment.

b. AR 55-55 - Transportation of Radioactive and Fissile Material Other than Weapons.

c. AR 385-40 - Accident Reporting and Records.

d. 39 CRF, Rules and Regulations of the Postal Service.

e. WR 55-1 - Transportation and Travel.

f. WR 385-2 - Accident Reporting

APPENDIX (EMERGENCY PROCEDURES TO FOLLOW FOR VEHICLE ACCIDENT/INCIDENT TO ANNEX H (TRANSPORTATION OF RADIOACTIVE MATERIALS)

1. GENERAL. A radiological emergency is any unplanned event which could adversely affect the safe movement of radioactive materials. A severe emergency could result from collision, fire, explosion, or loss of control, e.g., theft, spillage, leakage, and misplacement of the radioactive material. Your first aim should be to protect yourself and others from overexposure and contamination. Second, efforts should be made to confine the contamination to the local area. Although no set of rules is available to handle every conceivable incident, the proper adaptation of the more specific guidance furnished below will minimize the danger to persons and property. In the event there is reason to believe that personnel may have been contaminated and/or overexposed, efforts will be directed toward locating those persons so that any necessary decontamination and medical assistance may be furnished.

2. DEFINITIONS.

a. Accident - Includes any physical damage to the container(s); any overexposure of personnel; or contamination of personnel and equipment in detectable amounts.

b. Incidents - unexpected events which are not accidents as defined above, but which may increase in hazard severity or, if the unsafe practice or condition is not corrected, may result in a future accident. Incidents include errors committed in handling operations; malfunctions of transport equipment which might result in danger to the loading, if not corrected; malfunction of the container or associated equipment components which degrade safety.

3. STATEMENTS OF CIVIL AUTHORITIES. If queried by civil authorities concerning contents of the vehicle, the operator will state only that the vehicle was transporting small quantities of well-contained radioactive material, either radioisotopes or waste, as the case may be. He will refer all additional questions of this nature to the Radiation Protection Officer, FAMC, or his representative.

4. EMERGENCY ACTION IN THE EVENT OF FIRE, EXPLOSION, LEAKAGE OR SPILL.

a. Immediate Action by Vehicle Operator:

(1) Pull out of the line of traffic; DO NOT LEAVE VEHICLE UNATTENDED UPON PUBLIC HIGHWAY.

(2) Extinguish fire; use dry chemical fire extinguisher.

(3) In case of leakage, try to control spread of liquid by the most practical means.

b. Utilize on-site personnel in order to:

(1) Isolate the area. If necessary, increase the distances indicated on the DD Form 836 to keep personnel out of smoke, leakage, spillage and mists. Establish an exclusion area to protect the general public from exposure to radiation in excess of 2mR/hr and all detectable contamination.

(2) Render first aid.

(3) Notify the Radiation Protection Officer, FAMC (Ext. 23201)

(4) Notify the Military Police, FAMC (Ext. 15 or 21211)

(5) Control personnel who may have contacted the fumes, spillage, smoke or dust.

(a) Obtain names and addresses of witnesses and affected individuals.

(b) Discourage smoking, eating, drinking, and leaving until the Radiation Protection personnel arrive.

c. Subsequent Action by the Operator:

(1) Assist the Radiation Protection Officer as required.

(2) Document the accident. The operator will make out an accident report as soon as possible at the scene of the accident or incident.

Accident reports will consist of completion of Motor Pool issued accident forms. An incident will cover all things which may occur which are not categorized as vehicular accidents and to include delays enroute. The incident report will consist of a brief but concise written narrative covering "What happened", "Where it Happened", and "What Persons or Objects were involved".

5. PROCEDURES IN CASE OF THEFT OR LOSS.

a. Notify the Radiation Protection Officer, FAMC (Telephone 23201) who in turn will notify the Military Police.

b. Attempt to recover in case of loss.

ANNEX L: RADIOACTIVE WASTE

1. PURPOSE. To prescribe the policies and procedures to be followed in the management of radioactive waste at FAMC in order to insure compliance with pertinent laws and regulations.

2. RESPONSIBILITIES.

a. The Radiation Protection Officer is responsible for the management and control of radioactive waste to include effluents released to the unrestricted environment.

b. Principal Users are responsible for segregation, packaging and delivery of radioactive wastes generated under their control to the areas designated by the Radiation Protection Officer.

c. Individual users are responsible for:

(1) Keeping the inventory of radioactive waste in their possession to a practical minimum.

(2) Providing containers for their radioactive waste.

(3) Properly identifying the contents of their waste, to include radioisotope, approximate activity, date, and Authorization number in the manner prescribed by the Radiation Protection Officer.

3. POLICIES AND PROCEDURES.

a. Radioactive waste is excess or surplus unwanted radioactive material and material contaminated with radioisotopes, including sources and special waste, and property which, while originally non-radioactive, has become contaminated to such an extent that it is economically unsound to decontaminate, or the contamination cannot be reduced to an acceptable level for its intended use.

b. Radioactive waste must be classified and segregated into the following classes:

(1) Solid, combustible.

(2) Solid, non-combustible.

(3) Liquid, combustible.

(4) Liquid, non-combustible.

(5) Gas, combustible.

(6) Gas, non-combustible.

(7) Animal carcasses and/or animal waste.

c. Procedures to be followed by users of radioactive material include:

(1) Segregation of radioactive waste into the above categories.

(2) Limit the non-radioactive waste which is intermixed with the radioactive waste to a practical minimum.

(3) Solid waste shall be placed in plastic bags or a receptacle lined with a plastic bag. The bag, when filled and delivered for disposal, will be taped closed. If plastic bags are used for radioactive waste containing Tritium, they will be placed inside a kraft paper bag.

(4) Liquid waste that is retained for disposal should be collected in plastic bottles or sealed cans to diminish the breakage hazard. However, liquid waste that will chemically react with plastic and liquid waste containing Tritium should be placed in glass bottles. All bottle caps should be taped when presented for disposal.

(5) All radioactive waste containers shall be properly marked with the radiation caution symbol and the words "Caution - Radioactive Waste" and/or "Caution - Radioactive Material."

(6) The inventory of radioactive waste in the possession of individual users will be kept to a practical minimum.

(7) Radioactive waste will be controlled by the user to prevent unauthorized disposal by the custodial service.

(8) Animal carcasses will be packed in two plastic bags of suitable size and strength and kept frozen until disposal.

d. Disposal of Radioactive Waste.

(1) Radioactive waste will be collected by the user and disposed of in accordance with instructions received from the Radiation Protection Officer.

(2) Excreta from patients undergoing medical diagnosis or therapy may be disposed of in the usual manner, providing the toilet is operated twice each time excreta is released during the first 48 hours after administration of therapeutic doses of unsealed radioisotopes. This procedure is necessary to insure complete removal of the material from the ward plumbing, and adequate dilution of the material.

(3) Radioactive material will not be released from holding tanks into the sanitary sewage system without the specific approval of the Radiation Protection Officer, except as provided in para 3d(2), above.

(4) Individual users may be permitted to dispose of radioactive waste via laboratory sinks into the sanitary sewage system under the following conditions:

(a) The user obtains permission from the Radiation Protection Officer.

(b) The sink through which the material is discharged is conspicuously posted with a sign bearing the Radiation Caution Symbol and the words "Caution - Radioactive Material Disposal Sink."

(c) The sink is posted with a notice to the user that the radioactive material discharged through the sink must be readily soluble or dispersible in water and does not contain any substances which are hazardous to health or will result in substantial harm to domestic animals, fish, shellfish, or wildlife.

(d) A record of the identity and activity of material discharged through the sink is maintained by the user.

(e) The material is essentially neutral, i.e., pH of 6 - 8.

(f) The quantity of any material released by the user in any one day does not exceed ten (10) times the amount specified in the Appendix to Annex L of these Regulations. Alternate limits prescribed in 10 CFR 20.303 may be employed only with prior approval of the Radiation Protection Officer, such approval to be valid only for that specific release.

(e) Ultimate disposal of radioactive waste will be accomplished by the Radiation Protection Officer in accordance with AR 755-15 and other pertinent directives.

AP.E-07A (RADIOACTIVE WASTE DISPOSAL SINK DEEP WASTE)

to AP.E-07A (RADIOACTIVE WASTE)

THE RADIOACTIVE MATERIAL DISCHARGED THROUGH THIS SINK MUST BE READILY SOLUBLE OR DISPERSIBLE IN WATER. THE QUANTITIES OF THE COMMONLY-USED RADIONUCLIDES DISCHARGED THROUGH THIS SINK IN ANY ONE DAY MUST NOT EXCEED TEN (10) TIMES THE AMOUNT SPECIFIED BELOW (For isotopes not listed, call Ext. 23201 for limits).

Material	Microcuries
Antimony-124	10.00
Arsenic-74	10.00
Barium-133	10.00
Barium-140	10.00
Bismuth-210	1.00
Bromine-82	10.00
Cadmium-109	10.00
Cadmium-115	100.00
Calcium-45	10.00
Calcium-47	10.00
Carbon-14	100.00
Cerium-141	100.00
Cerium-144	1.00
Cesium-131	1000.00
Cesium-137	10.00
Chlorine-36	10.00
Chromium-51	1000.00
Cobalt-58	10.00
Cobalt-60	1.00
Copper-64	100.00
Fluorine-18	1000.00
Gold-198	100.00
Hydrogen-3	1000.00
Indium-113m	100.00
Iodine-125	1.00
Iodine-129	0.10
Iodine-131	1.00
Iridium-192	10.00
Iron-55	100.00
Iron-59	10.00
Krypton-85	100.00
Manganese-54	10.00
Manganese-56	10.00
Mercury-197	100.00
Mercury-203	10.00
Mobybdenum-99	100.00
Nickel-63	10.00
Phosphorous-32	10.00
Potassium-42	10.00
Radium-226	0.01
Rubidium-86	10.00
Selenium-75	10.00
Sodium-24	10.00
Strontium-85	10.00
Strontium-89	1.00
Strontium-90	0.10
Sulphur-35	100.00
Tantalum-182	10.00
Technetium-99m	100.00
Technetium-99	10.00
Thallium-204	10.00
Thorium (natural)	50.00
Tin-113	10.00
Uranium (natural)	50.00
Xenon-133	100.00
Zinc-65	10.00
Zinc-69m	100.00
Zirconium-95	10.00

ANNEX M: LEAK TESTING SEALED SOURCES

1. PURPOSE. To delineate responsibilities for leak testing of sealed sources of radioactive material at FAMC.

2. DEFINITIONS.

a. Sealed Sources, for the purpose of this Annex, are those which meet all of the following criteria:

(1) Radioactive material, other than Tritium.

(2) Half-life greater than thirty (30) days.

(3) In any physical form other than gas.

(4) In a quantity which is greater than 100 microcuries of beta and/or gamma-emitting material or greater than 10 microcuries of alpha-emitting material.

(5) Inclosed in, and is intended to be used in, a container of durable (not fragile) material in a manner intended to prevent leakage or escape of the radioactive material or any of its daughter products.

b. Leak Test. A nondestructive test in which a sample is taken from the sealed source or from the surfaces of the device in which the sealed source is permanently or semi-permanently mounted or stored, on which one might expect contamination to accumulate. Leak tests may be taken by any of a variety of techniques depending on the source, the radioisotope, the method of analysis, the mounting, etc.

3. RESPONSIBILITY. The Radiation Protection Officer is responsible for performance, analysis, and posting of records of all leak tests performed at FAMC to satisfy the requirements of AR 700-52, USAEC License conditions, and DA Authorizations for the Use of Radioisotopes.

4. CRITERIA FOR LEAK TESTING.

a. Leak tests, when required, will be performed at intervals not to exceed six (6) months, except that each source of alpha-emitting radioisotope will be tested at intervals not to exceed three (3) months.

b. If a source requiring leak testing is supplied with a certificate from the vendor indicating that a leak test has been made within six (6) months (three(3) months for alpha-emitting sources), the source need not be retested until six (6) months (three (3) months for alpha-emitting sources) from the date of the last test and may be issued for immediate use.

c. If no documentary evidence is available to substantiate that a given source has been leak tested within six (6) months (three (3) months for alpha-emitting sources), the source will not be issued until it has been leak tested and the results evaluated.

d. The leak test shall be capable of detecting the presence of 0.005 microcuries of radioactive material on the test sample.

e. Sealed sources will be considered contaminated if a leak test removed 0.005 microcuires of radioactive material of an identifiable quantity of the radioisotope contained within the capsule.

f. All sealed sources found to be contaminated will be immediately withdrawn from use by the Radiation Protection Officer, who will determine whether or not the source is leaking. If it is leaking, he shall direct that it be resealed or disposed of. He shall also render any required reports.

g. The Radiation Protection Officer shall be notified prior to fabrication of a sealed source so that the required leak testing may be accomplished.

ANNEX N: SURVEY OF WORKING AREAS

1. PURPOSE. The purpose of this Annex is to delineate the responsibilities for survey of working areas where radioactive materials are used.

2. RESPONSIBILITIES.

a. The Radiation Protection Officer will perform a formal radiation protection survey in each area where radioactive material is located at least once each month and will provide a written report of the survey to the Principal User.

b. Each Principal User is responsible for radiological safety within his work area. He will cause such readings and evaluation to be made as part of routine procedures as are necessary to insure that unwarranted radiological hazards are not present. The Radiation Protection Officer will, upon request, advise on appropriate procedures and, in some instances provide necessary survey instrumentation.

c. The Radiation Protection Officer will provide additional coverage to users of radioactive materials and radiation producing devices, consistent with their requirements and will, upon request, perform additional studies and evaluations.

3. AREAS OF INTEREST. Radiological protection surveys will include evaluations of the following areas, as appropriate:

a. Surface contamination, both removable and fixed.

b. Dose-rate measurements.

c. Airborne radiological hazard, both particulate and gaseous.

d. Ventilation, including fume hoods.

e. Storage areas for radioactive materials.

f. Radioactive waste management, including radioactive waste disposal sinks.

g. Fire and safety hazards.

h. Radiation safey and contamination control aspects of the working environment and experimental procedures.

i. The familiarity of personnel with radiological safety and emergency procedures.

4. AREA MONITORING.

a. Readings obtained during the surveys will be recorded and retained as a permanent record.

b. Routine monitoring will be done, using a portable PAC3G gas proportional counter with a beta detection probe and immediately decontaminated. If the activity with the GM counter, exceeds a value of 2.0 milliroentgens per hour, the Radiation Protection Officer will be notified. The area will be marked as to reading in milliroentgens/hour and the working time limit.

c. Swipe tests will be conducted during area monitoring and when contamination is suspected. The swipes will be counted in the liquid scintillation counters for quantitative determinations. Any activity above background will be considered a contaminated area. Readings obtained will be recorded as a permanent record and the responsible principle user will be notified.

d. Any areas of previously undetected contamination will be promptly cleaned by those persons responsible for the contamination, under the supervision of the Radiation Protection Officer or his designated representative.

ANNEX O: MACHINE-PRODUCED RADIATION

1. All machines and devices which produce X-Ray radiation will be registered with the Radiation Protection Officer, who will maintain the required registry of such devices in accordance with AR 700-52 and other pertinent directives.

2. All proposed procurements, installations, modifications to installations, and relocations of X-Ray will be coordinated with the Radiation Protection Officer. An evaluation will be made of the planned use of the equipment, its location, and protective barriers, interlocks, etc., prior to final approval to insure the adequacy of the facility prior to commitment of funds.

3. Design or modification of installations shall be accomplished in accordance with TB Med 62 (Diagnostic X-Ray Protection) and the recommendations given in NCRP Reports 33 through 36 and NBS Handbook 93 (Non-Medical X-Ray Protection).

4. Persons having responsibility for these radiation sources will notify the Radiation Protection Officer of their receipt prior to putting them into use.

5. Radiation Protection Officer will conduct a radiation protection survey of all new, modified, or repaired X-Ray installations prior to their routine use. A radiation protection survey is defined as the evaluation of the radiation hazards in and around an installation. It customarily includes a physical survey of the arrangement and use of the equipment and measurements of the exposure rates under expected operating conditions. A full radiation protection survey is not required following repairs if there is no possibility that the output, alignment, shielding, or safety aspects of the equipment have been altered by the repairs.

6. The Radiation Protection Officer will conduct a radiation protection survey of existing installations upon request, to ascertain that equipment, structural shielding, safety devices, and operating procedures are in accordance with pertinent directives, standards, and guides.

7. A written report of the results of the survey will be furnished to the person responsible for the installation.

8. CRITERIA: X-Ray protection surveys will be conducted in accordance with:

(1) NCRP Report Number 33 (Medical X-Ray and Gamma Ray Protection for Energies up to 10 MeV) - Equipment Design and Use.

(2) NCRP Report Number 34 (Medical X-Ray and Gamma Ray Protection).

(3) NCRP Report 35 (Dental X-Ray Protection).

(4) NCRP Report 36 (Radiation Protection in Veterinary Medicine).

(5) NBS Handbook 93 (Safety Standards for Non-Medical X-Ray and Sealed Gamma Ray Sources) - Non-Medical X-Ray and Sealed Sources.

(6) TB Med 62. (Diagnostic X-ray; Therapeutic X-Ray and Gamma Beam Protection for Energies up to 10 MeV).

9. Whenever an X-Ray device or its installation is found to exceed the limits of the appropriate safety standard; or is otherwise potentially hazardous to personnel, the Radiation Protection Officer will recommend suitable corrective action, and will determine if the equipment can continue to be operated pending repairs, modifications, etc, without jeopardizing the health and well-being of patients and/or occupationally exposed personnel. The responsible individual will be advised, in writing, of these recommendations so that appropriate action may be taken.

10. It is the responsibility of the person in charge of the installation to assure that all equipment under his jurisdiction is operated by persons competent in its safe use. When necessary, he will develop an SOP governing the use of the equipment and post it prominently to insure compliance with his instructions.

11. The person in charge of the installation is responsible for the proper education of personnel in safe operating procedures and the nature of injuries resulting from overexposure. He should promulgate rules for working safety, including any restrictions in operating techniques required, to assure safe utililization of equipment.

12. All persons entering an X-Ray area shall comply with all safety instructions which concern or affect their conduct and shall use such safety devices as are furnished for their protection.

ANNEX P: RADIATION PROTECTION ASPECTS OF PATIENT CARE

1. RESPONSIBILITIES

a. The Radiation Protection Officer, FAMC, is responsible for providing full-range Randiation Protection support throughout FAMC.

b. The Commander, FAMC, provides such guidelines as are necessary to insure adequate protection for medical treatment personnel involved in patient care who are occupationally exposed to ionizing radiation.

2. SPECIFIC REQUIREMENTS

a. Individuals who are occupationally exposed to radiation from radioisotopes or X-ray producing devices will wear film badges unless specifically exempted therefrom by the Radiation Protection Officer.

b. Personnel, equipment, linen and facilities will be monitored for radioactive contamination following any procedure in which the possibility of contamination exists.

c. Dressings, etc., destined for disposal will be monitored and disposed of as radioactive waste when warranted.

d. The Radiation Protection Officer will not impede patient care, but are expected to make recommendations to minimize the accumulated dose to medical personnel and patients who are not being treated with radiation.

e. Patients will not normally be discharged from the hospital with more than 30 mCi of radioactive material remaining in the body. The specific requirements of USAEC License 05-00046-13 are given in para 7, Appendix 5 to this Annex.

f. Guidance on various areas of patient care are described below:

(1) Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with SEALED Sources (See Appendix 1 to this Annex).

(2) Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with NON-SEALED Sources (See Appendix 2 to this Annex).

(3) Death-Radiation Protection Procedures (See Appendix 3 to this Annex).

(4) Radiation Protection Aspects of Surgery and Autopsy (See Appendix 4 to this Annex).

(5) Radiation Protection in the Therapeutic Administration of Radioactive Material (See Appendix 5 to this Annex).

(6) Management of Radioactive Casualties (See Annex 5 to these Regulations).

APPENDIX 1: RADIATION PROTECTION ASPECTS OF NURSING CARE OF RADIATION THERAPY PATIENTS WITH SEALED SOURCES

to ANNEX P: RADIATION PROTECTION ASPECTS OF PATIENT CARE

1. PURPOSE. The purpose of this Appendix is to familiarize the nursing staff with their responsibilities to the patient and themselves in the prevention of unnecessary exposure to radiation.

2. GENERAL.

a. This type of radioactive source is encapsulated in a metal tube which is then sealed and therefore is classified as a sealed source. Once this source has been removed from the patient, there is no longer a source of radiation in the patient. Normally, there is no contamination on the linen, utensils, etc.

b. If any of the following should occur, notify the Radiation Protection Officer (Ext 23201/26245) AND the physician who administered the radioactive material:

(1) Major surgery.

(2) Transfer of the patient.

(3) Death of the patient.

3. SPECIFIC GUIDANCE.

a. Whenever possible, place the patient in a private room with the bed near the outside wall of the room. When it is necessary, two radiation therapy patients may be placed in the same room. A non-radiation therapy patient should not be in the same room with a radiation therapy patient.

b. Consistent with adequate care for the patient, carry out only minimal nursing procedures close to the patient. If the patient's clinical status requires constant observation, rotate personnel required to perform adequate nursing care in order to minimize exposure to personnel. The patient's bed should be approached only when required by nursing duties.

c. Wear YOUR film badge when entering the area. DO NOT use the film badge issued to another employee. Film badges may be obtained by calling The Radiation Protection Officer (Ext. 23201)

d. Personnel are not to remain in the room unless engaged in a specific activity. Custodial, utility, maintenance, and food service workers should not enter the room unless they receive permission and instructions from the ward nurse.

e. A television set, telephone, books, etc., may be provided for the patient.

f. Excreta, linens, and other equipment may be handled in the usual manner.

g. Special handling of the food tray is not required.

h. In the event of a suspected loss or dislodgment of the sealed source:

(1) Notify the physician who administered the source.

(2) Notify the Radiation Protection Officer (Ext. 23201).

(3) Do not remove any containers or linen from the room, flush the toilet, or use the sink.

(4) The radioactive source must be handled only with forceps.

i. The Radiation Protection Officer will monitor the patient area and will indicate a "safe distance" line for visitors.

j. The patient may have visitors. Except for the greeting, the visitors should stay on the "safe" side of the line indicated on the floor.

k. If the patient should die, notify the physician who administered the source. The source will be removed before the body is taken to the morgue

APPENDIX 2: RADIATION PROTECTION ASPECTS OF NURSING CARE OF RADIATION THERAPY PATIENTS WITH NON-SEALED SOURCES

to ANNEX P: RADIATION PROTECTION ASPECTS OF PATIENT CARE

1. PURPOSE. The purpose of this Appendix is to familiarize the nursing staff with their responsibility to the patient and themselves in the prevention of unnecessary exposure to radiation.

2. GENERAL.

a. This type of radioactive source is usually administered in liquid form and therefore is classified as a non-sealed source. The source material will remain in the patient until it decays by half-life and/or is excreted; therefore, contamination of linen, etc., is possible.

b. Notify the Radiation Protection Officer (Ext. 23201) AND the physician who administered the radioactive material if any of the following occur:

(1) Major surgery.

(2) Transfer of the patient.

(3) Death of the patient.

3. SPECIFIC GUIDANCE.

a. Whenever possible, place the patient in a private room with the bed near the outside wall of the room. When necessary, two radiation therapy patients may be placed in the same room. A non-radiation therapy patient should not be in the same room with a radiation therapy patient.

b. Consistent with adequate care for the patient, carry out only minimal nursing procedures close to the patient. If the patient's clinical status requires constant observation, rotate personnel required to perform adequate nursing care in order to minimize exposure to personnel. The patient's bed should be approached only when required by nursing duties.

c. Wear YOUR film badge when entering the area. DO NOT use the film badge of another employee. Film badges may be obtained by calling the Radiation Protection Officer (Ext. 23201)

d. Personnel are not to remain in the room unless engaged in a specific activity. Custodial, utility, maintenance, and food service personnel should not enter the room unless they receive permission and instructions from the ward nurse.

e. A television set, telephone, books, etc., may be provided the patient.

f. The food tray will be prepared entirely with disposable components. The tray will be disposed of as waste within the patient's room. Uneaten food WILL NOT be given to other patients or staff members.

g. The Radiation Protection Officer will monitor the patient area and will indicate a "safe distance" line for visitors.

h. The patient may have visitors. Visitors should stay on the "safe" side of the line indicated on the floor.

i. Necessary contamination control measures are very similar to isolation techniques.

j. Cover the mattress and pillow on the bed with plastic or rubber material.

k. Wear gloves when changing bed linen, dressings, etc.

l. The patient must wear hospital pajamas.

m. Place a plastic-lined waste basket and linen hamper in the patient's room.

n. Place waste, soiled linen, etc., in the designated containers for monitoring and disposal by the Radiation Protection Officer.

o. Personal items for patient care (thermometer, bedpan, etc.) will be kept in the patient's room. Bath water may be disposed of in the commode.

p. Ambulatory patients will use the commode in THEIR room.

q. Diagnostic samples of blood, urine, and feces should only be obtained when authorized by the radiotherapist.

r. The urine excreted by the patient is radioactive. Spills, bed-wetting, or any accident with urine are radiation hazards. Wear gloves. In the event of an accidental spill of urine, cover it with absorbent material, then place the material in the designated waste container. Notify the Radiation Protection Officer.

s. Call the Post Engineer AND the Radiation Protection Officer for correction of plumbing problems. Blocked drains may be a radiation hazard.

t. If the patient dies, notify the physician who administered the source <u>AND</u> the Radiation Protection Officer. The body will not be removed

from the ward until the Radiation Protection Officer advises on the appropriate protective measures to be taken during transport of the remains.

u. The room will not be returned to general use (i.e., another patient placed in the room) until cleared by the Radiation Protection Officer.

APPENDIX 3: DEATH - RADIATION PROTECTION PROCEDURES
TO ANNEX F: RADIATION PROTECTION ASPECTS OF PATIENT CARE

1. APPLICABILITY. This Appendix applies to the management of remains of patients who have been undergoing radiation therapy with radioactive implants or unsealed radioisotopes. If the residual quantity within the body is less than 5 mCi (i.e., if there is no Radiation Protection Instruction Card in the patient's Kardex File), the body will be handled without regard for the presence of the radioactive material.

4. ADMINISTRATIVE REQUIREMENTS. To insure the prompt identification of radioactive remains and to facilitate the minimizing of radiation exposure of the staff, the following administrative procedures will be followed.

a. The "CAUTION - RADIOACTIVE MATERIALS" label affixed to the outside of the chart will remain in place until all radioactive material is removed from the body.

b. The tag located in the Kardex File bearing the radiation warning symbol and the words, "CAUTION - RADIOACTIVE MATERIALS, this patient's body contains a significant quantity of radioactive material as specified in Chapter 3, NCRP Report Number 37", will be attached to the body in the same manner as the tag contained in the mortuary pack.

c. A similar tag or label will be attached to the outside of the shroud by the attending Radiation Protection Officer.

d. If the body contains residual quantities of radioactive material, the Radiation Protection Officer or his representative will complete and sign one of the following statements in accordance with Appendix V, NCRP Report Number 37. This statement will be attached to the Death Certificate for transmittal to the Funeral Director by the Registrar, FAMC.

(1) REPORT ON RADIOACTIVITY

TO: Funeral Director

FROM: Radiation Protection Officer
Fitzsimons Army Medical Center
Denver, Colorado 80240

This body contains no significant amount of radioactive material. No special precautions are required if only standard embalming procedures are employed.

RADIATION PROTECTION OFFICER
Fitzsimons Army Medical Center

(2) REPORT ON RADIOACTIVITY

TO: Funeral Director

FROM: Radiation Protection Officer
Fitzsimons Army Medical Center
Denver, Colorado 80240

This body contains a significant amount of radioactive material. The following special precautions are recommended:

_____

_____

_____

RADIATION PROTECTION OFFICER
Fitzsimons Army Medical Center
DATE: _____

6. REFERENCES.

a. NCRP Report Number 37, Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides.

b. Quimby, E.N., and Feitelberg, S., Radioactive Isotopes in Medicine and Biology, Lea and Debiger, Philadelphia, 1963.

APPENDIX 4: RADIATION PROTECTION ASPECTS OF SURGERY AND AUTOPSY
to ANNEX P: RADIATION PROTECTION ASPECTS OF PATIENT CARE

1. GENERAL.

a. The Radiation Protection Officer will provide direct support to surgery and autopsy on patients whose bodies contain radioisotopes.

b. The principal guidance for surgeons, pathologists, and funeral directors on this subject is contained in NCRP Report No. 37, a copy of which will be provided by the Radiation Protection Officer.

c. Radiation Protection support and/or advice regarding radiation protection during surgery or autopsy may be obtained by calling: Duty Hours: Ext. 23201, 26245. After Duty Hours: 422-0554

2. SPECIAL REQUIREMENTS.

a. Prior to the surgery (autopsy) the physician who administered the radioactive material should meet with the assigned surgeon (pathologist) and the Radiation Protection Officer. The probable residual quantity of radioactive material within the body will be estimated. The Radiation Protection aspects of the surgery (autopsy) procedure will be estimated.

b. If the anticipated exposure to the surgeon (prosector) and his assistants is considered to be prohibitive, it may be necessary to delay the procedure to allow for a "cooling off" of the radioactive material in the body, or rotate the personnel performing the procedure to preclude overexposure.

c. Personnel engaged in and supporting surgery (autopsy) will wear film badges if the patient contains radioisotopes, unless exempted by the Radiation Protection Officer.

d. Personnel, equipment, linen and facilities will be monitored for radioactive contamination following the procedure when the possibility of contamination exists.

e. Tissues, dressings, etc., destined for disposal will be monitored and disposed of as radioactive waste, when warranteed.

f. The Radiation Protection Officer will not impede procedures, but is expected to make recommendations to minimize the accumulated dose to the surgeon (pathologist) and other members of the team.

g. Autopsy.

(1) At the completion of the autopsy, the physician who administered the radioactive material will inform the Radiation Protection Officer of the probable residual quantity of radioactive material within the body,

based on the body fluids, tissues, and organs which were removed.

(2) The Radiation Protection Officer will review the statement which has been executed for delivery to the Funeral Director to determine if the warning is still applicable.

APPENDIX 5: RADIATION PROTECTION IN THE THERAPEUTIC ADMINISTRATION OF RADIOACTIVE MATERIAL.
to ANNEX P: RADIATION PROTECTION ASPECTS OF PATIENT CARE.

1. PURPOSE. The purpose of this Appendix is to specify the duties of the Radiation Protection Officer in the prevention of unwarranted exposure to nursing personnel, visitors, and those who occupy areas adjacent to the patient being treated.

2. NOTIFICATION OF THERAPEUTIC ADMINISTRATION.

a. Sealed Sources.

(1) The Radiotherapist will provide the Radiological Physicist with the following information: The type and quantity of sealed sources, the applicator to be used and its loading arrangement, the patient's name, date of use, and ward number.

(2) The Radiological Physicist will load the applicator.

b. Non-Sealed Sources. The Nuclear Medicine Service will notify the Radiation Protection Officer by telephone of the proposed schedule for the administration of the radioactive material.

c. Notification of Ward Nurse.

(1) The Radiation Protection Officer will notify the appropriate ward nurse of the proposed administration of radioactive material. A copy of Appendix 1 or 2 to Annex P will be furnished to the ward as appropriate.

(2) The Radiation Protection Officer will obtain from the nurse the names and social security numbers of those persons who will be caring for the therapy patient and will issue film badges to them.

(3) A "Radiation Therapy Monitoring Record", will be initiated in duplicate by the Radiation Protection Officer. The names of those persons involved in the patient's care will be entered on this form.

3. PREPARATION OF THE RADIOACTIVE MATERIAL.

a. Sealed Sources. The Radiation Protection Officer and the Radiation Therapy Technician should divide the workload between them in order to keep their exposure to a minimum. A bar graph indicating their whole body and wrist exposure should be maintained in order to visualize the workload distribution.

b. Non-Sealed Sources. Personnel in the Nuclear Medicine Service have specific responsibility for the preparation of non-sealed sources.

4. SEALED SOURCE ADMINISTRATION.

a. The radiotherapist is responsible for the safe handling of the radioactive material from the time it leaves Radiation Therapy until he returns it.

b. The Radiological Physicist (Ext. 23201) will provide assistance.

5. NON-SEALED SOURCE ADMINISTRATION.

a. The Nuclear Medicine Service personnel are responsible for safe delivery of the radioactive material to the ward, and for obtaining sufficient absorbent paper and other protective equipment as indicated by the type of radioactive material.

b. A Radiation Protection Officer will normally be in attendance during therapeutic administration of unsealed radioactive material.

c. The Radiation Protection Officer will:

(1) Ascertain that the protective materials are located to provide protection of medical personnel.

(2) Remain available during the administration for assistance.

d. Following administration, the Radiation Protection Officer will:

(1) Monitor the administering staff and their equipment.

(2) Insure that radioactive laundry and waste containers are in the patient's room and are properly labeled.

(3) Employing a manner which will obtain the desired results without alarming the patient, instruct him (her) in procedures for preventing the spread of contamination.

6. PATIENT CARE ON THE WARD.

a. When the therapeutic application is performed at a location other than the patient's room, the Radiation Protection Officer will go to the ward as soon as practicable after the patient arrives.

b. The Radiation Protection Officer will:

(1) Ascertain that the patient's bed is placed in a position that will reduce any unnecessary exposure of adjacent areas.

(2) Mark on the floor a "safe distance" line of 5 mR/hr.

(3) Advise the patient of the potential hazard to visitors who spend too much time in the room. He will take care not to alarm the patient and will emphasize that the treatment has been prescribed for the patient and not the visitors.

(4) Prepare an information packet to be posted near the doorway to the patient's room. This packet will consist of:

(a) A Radiation Therapy Monitoring Record.

(b) A copy of "Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with Sealed Sources" or a copy of the Radiation Protection Aspects of Nursing Care of Radiation Therapy Patients with Non-Sealed Sources," as appropriate.

(c) A "CAUTION - RADIOACTIVE MATERIALS" sign.

(5) Place a Radiation Protection Identification card in the patient's Kardex File.

(6) Return to the ward at least once each day to insure that personnel are maintaining good Radiation Physics practices.

c. Removal of protective markings.

(1) If the patient was treated with a sealed source, the Radiation Protection restrictions (signs, etc) will be removed after the source has been removed.

(2) If the patient was treated with a non-sealed source of radioactive material, all Radiation Protection restriction will remain in effect until the exposure rate at 1 meter is 2mR/hr or less.

(a) The administering physician, as well as the ward officer, should be notified when Radiation Protection restrictions are removed.

(b) Radioactively-contaminated laundry and waste will be removed from the patient's room and the room will be monitored before it is released for normal occupancy.

d. If the patient is not being discharged from the hospital when the residual activity is acceptable, the Radiation Protection sticker in the Kardex File should be changed to read: "See instructions on reverse side of the "CAUTION-RADIOACTIVE MATERIALS" tag in the patient's chart". This tag should

be changed to read: "This patient's body contains no significant quantity of radioactive material. This patient does not warrant any Radiation Protection precautions except in the following instances:

"(1) In the event of major surgery, notify the Radiation Protection Officer (Ext. 23201) AND the physician who administered the radioactive material. The procedures in Appendix 4 (Radiation Protection Aspects of Surgery and Autopsy) to this Annex apply."

"(2) In the event of eath, notify the Radiation Protection Officer (Ext. 23201) AND the physician who administered the radioactive material. The procedures outlined in Appendix 3 (Death-Radiation Protection Procedures) to this Annex apply."

7. DISCHARGE OF THE THERAPY PATIENT.

a. The US Atomic Energy Commission License for Fitzsimons Army Medical Center provides:

(1) Patients receiving radiotherapy with non-sealed Iodine-131 or Gold-198 shall remain hospitalized until the residual activity in the body is 30 millicruies or less.

(2) Patients containing radioactive implants, except Gold-198 seeds, shall remain hospitalized until the implant is removed.

b. Normally, radiation therapy patients will remain hospitalized until the residual activity in the body is 30 millicuries or less, regardless of the isotope.

c. Clearances for discharge of the patient may be obtained from the Radiation Protection Officer (Ext 23201) or the therapist who administered the material.

d. If the patient is returning to a home where there are young children, an evaluation of the dose to them may be appropriate in determining the discharge date.

e. In no event will a patient be discharged if there is sufficient radioactive material remaining in the body to warrant posting of the patient's room with the radiation warning symbol.

ANNEX Q: MANAGEMENT OF RADIOACTIVE AND CONTAMINATED PATIENTS

1. PURPOSE.

a. To delineate the responsibilities and describe the procedures for management of radioactive and radioactively-contaminated casualties.

b. To prescribe control measures to limit the radiation exposure to the staff treating the radioactive or radioactively-contaminated casualty.

c. To prescribe control measures to limit the spread of radioactive contamination through FAMC resulting from handling a radioactive or radioactively-contaminated casualty.

d. To provide guidance in the management of radioactive or radioactively-contaminated casualty.

2. APPLICABILITY. This Annex is applicable to all individuals and activities at Fitzsimons Army Medical Center in the handling of radioactive and/or radioactively-contaminated casualties.

3. DEFINITIONS.

a. A radioactive patient is a patient who is radioactive because of internal deposition of radioactive material or neutron activation of body tissues. If improperly managed, such a casualty could irradiate medical personnel and/or contaminate personnel, equipment and facilities.

b. A radioactively-contaminated patient is an individual who has external contamination on his clothing and/or body. After removal of radioactive contamination, the individual presents no radiation hazard.

4. GENERAL GUIDANCE.

a. Radioactive patients and contaminated patients will receive all necessary medical care and treatment at the earliest practicable time.

b. Radiation fields and radioactive contamination will not deter medical personnel in efforts to save life or limb, although slightly different techniques may be employed (e.g., rotating medical personnel to minimize exposure of any one individual, etc.)

c. Radioactively-contaminated patients will be decontaminated at the earliest opportunity consistent with their medical needs.

d. Every effort will be made to minimize radiation exposure and the spread of contamination during medical treatment.

e. The Radiation Protection Officer will provide a representative to advise on exposure and contamination control at the site of patient treatment. This representative will not impede patient care, but is expected to make recommendations to minimize personnel exposure and avoid the loss of resources due to radioactive contamination.

f. At the earliest possible time consistent with the medical needs of the patient, the attending physician will allow decontamination to begin. Decontamination will be undertaken by paramedical personnel under the direction and guidance of a representative of the Radiation Protection Officer.

g. All contaminated clothing, equipment and waste materials will be retained by the Radiation Protection Officer.

h. Contaminated valuables will be accounted for using the DA Form 8-178 (Patient's Deposit Record) in the conventional manner. These valuables will be retained by the Radiation Protection Officer, who will account for them and will undertake to decontaminate them as soon as the situation permits, so that they may be returned to the Hospital Treasurer or the patient. Valuables and personal property of the patient will not be diposed of as contaminated waste without the written consent of the patient.

5. RESPONSIBILITIES.

a. The senior medical officer (or senior individual, in the absence of a medical officer) present at the scene of an accident is responsible to:

(1) Apply first aid to the patient (radiation casualty).

(2) Evaluate the injury of the patient to determine if immediate evacuation is required.

(3) Evaluate the contamination of the patient, if practicable.

(4) Decontaminate the patient before evacuation if the condition of the patient permits, and if such decontamination can be performed without aggravating the injuries.

(5) Employ contamination control measures.

(6) Arrange, undertake, or direct evacuation of the casualty to the Emergency Room. FAMC, by the most practical means.

(7) Notify the Emergency Room (Ext. 24130) AND the Radiation Protection Officer (Ext. 23201) that a radiation casualty is being evacuated to the Emergency Room.

b. The Emergency Room Surgeon will:

(1) Notify the Radiation Protection Officer (Ext. 23201) that a potentially radioactive or radioactively-contaminated casualty is enroute and request a support team.

(2) Undertake treatment of the casualty emphasizing life-saving measures only until the Radiation Protection Officer arrives.

(3) Contamination control measures which are appropriate for an Emergency Room are quite similar to isolation techniques employed with a highly contagious patient. The movement of the patient throughout the hospital should be limited as much as possible until decontamination can be undertaken or contamination control measures implemented (e.g., have x-rays taken in the Emergency Room, etc.).

(4) Exposure control measures under Emergency Room conditions are essentially as follows:

(a) Employ the minimum number of medical personnel necessary to evaluate and treat the patient.

(b) Limit the time individuals spend in the proximity of the casualty to the minimum consistent with his needs.

(c) Keep all nonessential personnel as far away from the patient as practicable.

(d) If the patient is highly radioactive, or contaminated, rotate or replace staff personnel frequently to limit individual exposure. Keep a record of all personnel who attended the patient including the length of time they were near the patient.

c. The Radiation Protection Officer, FAMC, is responsible to:

(1) Provide a team, supplies, and equipment to support the care of radioactive or contaminated casualties.

(2) Provide exposure control and monitoring of staff personnel attending the casualty.

(3) Advise, direct or conduct decontamination of the casualty at the earliest time consistent with medical needs of the patient.

(4) Direct contamination control measures to limit the spread of contamination throughout the hospital.

(5) Survey the nospital areas for radioactive contamination.

(6) Advise on decontamination of hospital areas as early as possible following treatment of the casualty.

(7) Notify the members of the FAMC Radioisotope Committee of the radioactive or radioactively-contaminated casualty and assemble them so that they may make appropriate recommendations regarding the medical management of the casualty and parameters to be examined on a suspected or actual overexposure.

(8) Notify the Public Affairs Officer (Ext. 25292) promptly of the incident and provide updated information periodically.

(9) Make appropriate reports to the Surgeon General, the Atomic Energy Commission, and other agencies in accordance with pertinent directives.

(10) Make a prompt investigation of the incident.

(11) Prepare and submit necessary reports of the incidents.

6. Specific guidance on the management of a radioactive or radioactively-contaminated patient to minimize exposure of the staff or the spread of contamination depends on the prevailing situation. Such guidance will be developed on the scene by the Radiation Protection representative. The recommendations of this representative should be heeded whenever possible, since radioactive contamination can necessitate very costly decontamination operations and result in the loss of facilities for many days.

7. Reference: NCRP Report Number 37 (Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides).

ANNEX R: CONTAMINATION CONTROL AND DECONTAMINATION PROCEDURES

1. PURPOSE. To delineate responsibilities relating to contamination control and decontamination procedures at FAMC.

2. RESPONSIBILITIES.

a. The Radiation Protection Officer is responsible for control of radioactive contamination procedures.

b. Each Principal User is responsible for assisting the Radiation Protection Officer in the accomplishment of his mission by:

(1) Controlling contamination within his area of responsibility.

(2) Reporting all spills, releases, accidents, incidents, or unusual occurrences involving radioactive material promptly, so that contamination control may be initiated.

(3) Providing the resources for decontamination operations.

c. In general, the individual who causes contamination to occur performs the decontamination required. In cases where adequate resouces are not available to perform the decontamination, the Radiation Protection Officer will, upon request, coordinate with other activities to secure the needed resources.

3. The contamination limits prescribed by Department of the Army are shown in the Appendix (Permissible Levels of Radioactive Contamination) to this Annex.

4. GENERAL. Air or water that contains radioactive material in excess of the concentrations specified in Appendix B, Table II, 10 CFR 20, shall be considered to be contaminated and shall be controlled and disposed of in accordance with instructions of the Radiation Protection Officer.

5. Methods of controlling contamination which may be employed to minimize the spread of radioactive contamination include:

a. Use of personal protective clothing and devices, such as rubber or plastic gloves, laboratory coats, shoe covers, head covers, face masks, respirators, etc.

b. Providing and frequently using an exposure rate meter capable of detecting and monitoring contamination from the radioisotope(s) in use.

c. Using separate, specially-marked radioactive waste containers.

d. Limiting traffic and occupancy of work areas where radioactive materials are in use.

e. Patterning work flow and procedures to minimize transfers and manipulations of radioactive material.

f. Conducting procedures which generate radioactive aerosols, dusts, or gaseous products in fume hoods, glove boxes, or other suitable closed systems.

g. Designating and posting of contaminated and potentially contaminated areas during procedures which are likely to produce contamination.

h. Covering working surfaces with polyethylene and absorbent disposable material.

i. Using trays capable of containing a total spill of liquid radioactive material under experiments of this type.

j. Using double containers for vessels of radioactive materials which are easily upset, e.g., volumetric flasks.

k. Using polyethylene bags to contain waste and to line waste containers. If Tritium is used, the polyethylene should be replaced by or contained in kraft paper bags, since Tritium easily penetrates polyethylene and is retarded by paper.

l. Avoiding the use of house vacuum lines with radioactive materials.

m. Rigorously posting cabinets, refrigerators, ovens, etc., where radioactive material is used, so that all personnel will be advised of its presence. When the item is not used exclusively for radioactive material, the radioactive material should be separated from the other contents and conspicuously posted.

n. Establishing control points outside contaminated areas where personnel will monitor themselves for contamination with a suitable instrument before leaving the area.

o. Promptly cleaning up and monitoring all spills of radioactive material.

6. Decontamination methods are many and varied. The Radiation Protection Officer will supervise and advise on decontamination procedures.

a. Personnel Decontamination.

(1) Individuals with contaminated clothing should remove their clothing at the earliest opportunity.

(2) Decontamination of the skin should be attempted promptly after discovery of contamination. The skin should be washed thoroughly and repeatedly with a mild soap or detergent worked to a good lather with a soft brush. Care should be taken not to abrade the skin.

(3) Special decontamination of individuals beyond that described above will be under the supervision of the Radiation Protection Officer.

b. Surface decontamination will be undertaken only by personnel who are wearing protective gloves and, in some cases, protective clothing. Material used in decontamination will be disposed of as radioactive waste in accordance with instructions received from the Radiation Protection Officer.

7. HANDLING OF CONTAMINATED LAUNDRY.

a. Clothing and bedding contaminated with less than 2 mR/h at 1 foot will be collected by the Radiation Protection Officer personnel at the site of the contamination and taken to the Laundry Facility at FAMC.

b. Clothing and bedding shall be placed in an isolated washing machine by the Radiation Protection Officer.

NOTE: The Laundry Manager (Ext. 21221) will be notified by the Radiation Protection Officer of the number and description of the contaminated articles prior to their delivery to the laundry facility.

c. Contaminated clothing and bedding will not be placed in a washing machine with uncontaminated articles.

d. Grossly contaminated article (greater than 2 mR/h at 1 foot) shall be packaged and sent to the Radiation Protection Officer for retention and decay prior to laundering. An estimate of the activity, the radionuclide, and the date shall be marked on a tag marked "CAUTION - CONTAMINATED LAUNDRY."

ANNEX S: RADIATION PROTECTION ASPECTS OF FIRE FIGHTING

1. PURPOSE. To prescribe general measures to be followed to minimize radiological hazards associated with fire protection.

2. FIRE PREVENTION.

a. Whenever possible, flammable materials will not be stored with radioactive materials. When flammable materials must be stored in conjunction with radioactive materials, the manner of storage will be coordinated with the FAMC Fire Prevention Branch (Ext. 21218) to insure that the fire hazard is minimized.

b. Every effort will be made by the user to eliminate fire hazards within his area of responsibility.

c. During routine inspections by fire prevention personnel, the location of radioactive material will be made known to the inspector. The "CAUTION - RADIOACTIVE MATERIALS" warning which is to be posted on containers and rooms in accordance with instructions contained in Annex D to these Regulations will assist in meeting this requirement.

3. FIRE FIGHTING. Whenever firemen respond to a call in an area posted "CAUTION - RADIOACTIVE MATERIALS", the following protective measures will be employed to minimize radiological hazards:

a. Firemen will wear self-contained apparatus, protective coat and boots.

b. The Radiation Protection Officer (Ext. 23201) will be notified that there is a fire in a posted area.

c. Personnel will stay in the area the shortest period of time necessary to accomplish the fire-fighting mission. Firemen will avoid unnecessary contact with equipment, opening of containers, or handling of debris.

d. Personnel who have entered the area will remain in the vicinity until surveyed and released by the Radiation Protection Officer personnel. This measure is prescribed to avoid unnecessary spread of radioactive contamination. In the event of personal injury, the provisions of Annex T to this SOP will be followed in lieu of this provision.

4. SPECIAL CONSIDERATIONS. During fire fighting in areas where large radioactive sources are located (e.g., teletherapy unit) every effort will be made to cool the source with a stream of water if the heat of the fire might cause the lead shielding to melt. When the lead shielding melts, it may escape or change shape in such a way that a serious radiation hazard could result.

ANNEX T: RADIOLOGICAL EMERGENCIES.

1. PURPOSE.

a. The primary purpose of this Annex is to insure that an individual who is known or suspected to have been involved in a radiation accident and/or incident that could have resulted in an internal and/or external exposure to ionizing radiation receives proper medical care, and that the possible radiation exposure is evaluated.

b. A secondary purpose of this Annex is to insure that the source of the accidental radiation exposure is contained, so that further exposure of personnel will be controlled.

2. GENERAL GUIDANCE.

a. It is assumed that radioactive material will be handled by qualified persons and in accordance with existing regulations and policies. It is expected that this Annex will be interpreted by those persons in the light of their knowledge of the relative radiotoxicity of the various radioactive materials (radionuclides) in their possession.

b. A radiation accident may be defined as an unforeseen occurrence, either actual or suspected, involving exposure or contamination of humans and the environment by ionizing radiation. The accident will be considered as occurring over a short period of time, from seconds up to several days. Chronic occupational or other long-term exposure will not be considered.

c. There are two ways in which humans can be exposed to ionizing radiation:

(1) External. The source of ionizing radiation may be outside of the body, so that the radiation strikes the individual and is absorbed, depending upon its physical characteristics. Radiation from X-ray generators, particle accelerators, sealed sources of radionuclides and reactors are examples of this type. The radiation may be beta, gamma, or neutrons. Alpha emitters present no significant external hazard. Particle accelerators may produce other particles such a deuterons, mesons, etc. All persons who are known or suspected to have been externally exposed to an acute dose (within a twenty-four (24) hour period) in excess of:

(a) Whole body, head and trunk, active blood-forming organs, gonads or lens of the eye -- 3 rem.

(b) Skin of the whole body and thyroid -- 10 rem.

(c) Hands and forearms, feet and ankles -- 30 rem.

shall be reported immediately to the Radiation Protection Officer, FAMC (Ext. 23201).

(2) Internal. The source of ionizing radiation may gain entrance into the human body by inhalation, ingestion, injection or absorption through the intact or injured body surface. Radionuclides may also be formed within the body following exposure to an external source of neutrons. All persons who are known or suspected to have been internally exposed to activities of radioactive material in excess of 1/10 of the amounts specified in Appendix C, 10 CFR 20 (See the Appendix to this Annex) shall be reported to the Radiation Protection Officer, FAMC.

d. There should be no undue delay in the evacuation of the victim to the treatment facility, but there is seldom a need for unusual haste.

3. In the event of an emergency, the most senior knowledgeable individual present will assume control of the situation and direct activities until relieved by proper authority. The exact actions and sequence of actions to be taken will be determined by the nature of the emergency. The following actions are typical responses to emergency situations (The sequence of these actions is highly variable.):

a. Dismiss nonessential personnel.

b. Limit or eliminate the condition, if undue hazard to personnel does not result. For example:

(1) Return sources to shielded containers.

(2) Place absorbent material on spills.

(3) Turn off ventilation.

(4) Extinguish flames, heaters, etc.

(5) Turn off equipment.

c. Evacuate ALL personnel from the area.

d. Make certain that all personnel have left the area.

e. Restrict access to the area.

f. Restrict personnel associated with the emergency to a controlled

safe area in the vicinity of the emergency to insure their availability and to limit the spread of contamination.

g. Call the Fire Department, if necessary. Ext. 17.

h. Render First Aid to the injured.

(1) Stop bleeding.

(2) Restore breathing.

(3) Protect from shock.

i. Evacuate casualties requiring immediate emergency medical aid to the Emergency Room by the most practical and expedient means consistent with the medical needs of the patient.

(1) Remove outer clothing of patient, if contaminated with radioactive material.

(2) Secure the person's film badge and place it in a labeled envelope.

(3) Wrap every patient evacuated in a blanket, sheet, plastic, etc., (except for the face) to contain any contamination.

(4) Notify the Emergency Room (Ext. 24130) that a contaminated patient is enroute, giving an estimated time of arrival at the Emergency Room, and advise the Attending Surgeon of all facts relating to the individual's radiation exposure.

(5) Accompany the exposed persons to the Emergency Room, FAMC.

j. Notify the Radiation Protection Officer of the emergency and advise whether any patients have been evacuated to the Emergency Room.

4. The Radiation Protection Officer will respond to all radiological emergencies and will:

a. Provide technical advice as necessary.

b. Furnish additional resources (personnel, supplies, and equipment).

c. Supervise the reduction of radiological hazards.

d. Monitor the persons who were in the vicinity of the accident if there is a reasonable probability that they may have been exposed and/or contaminated.

e. Take action to prevent further contamination of personnel and equipment.

f. Make and/or coordinate all appropriate follow-up measures, reports, investigations, etc.

5. The Commander, FAMC, will develop procedures to:

a. Insure the proper treatment of patients who may have been accidentally exposed to ionizing radiation.

b. Assure effective control of radiation contamination and radiation exposure to personnel.

c. The Radiation Protection Officer will provide direct support of patient care activities involving contaminated and/or radioactive patients to minimize occupational radiation exposure to medical personnel.

APPENDIX (APPENDIX C, TITLE 10, CODE OF FEDERAL REGULATIONS, PART 20)
to ANNEX T (RADIOLOGICAL EMERGENCIES)

MATERIAL	MICROCURIES	MATERIAL	MICROCURIES
Americium-241	0.01	Europium-154	1.00
Antimony-122	100.00	Europium-155	10.00
Antimony-124	10.00	Fluorine-18	1,000.00
Antimony-125	10.00	Gadolinium-153	10.00
Arsenic-73	100.00	Gadolinium-159	100.00
Arsenic-74	10.00	Gallium-72	10.00
Arsenic-76	10.00	Germanium-71	100.00
Arsenic-77	100.00	Gold-198	100.00
Barium-131	10.00	Gold-199	100.00
Barium-133	10.00	Hafnium-181	10.00
Barium-140	10.00	Holmium-166	100.00
Bismuth-210	1.00	Hydrogen-3	1,000.00
Bromine-82	10.00	Indium-113m	100.00
Cadmium-109	10.00	Indium-114m	10.00
Cadmium-115m	10.00	Indium-115m	100.00
Cadmium-115	100.00	Indium-115	10.00
Calcium-45	10.00	Iodine-125	1.00
Calcium-47	10.00	Iodine-126	1.00
Carbon-14	100.00	Iodine-129	0.10
Cerium-141	100.00	Iodine-131	1.00
Cerium-143	100.00	Iodine-132	10.00
Cerium-144	1.00	Iodine-133	1.00
Cesium-131	1,000.00	Iodine-134	10.00
Cesium-134m	100.00	Iodine-135	10.00
Cesium-134	1.00	Iridium-192	10.00
Cesium-135	10.00	Iridium-194	100.00
Cesium-136	10.00	Iron-55	100.00
Cesium-137	10.00	Iron-59	10.00
Chlorine-36	10.00	Krypton-85	100.00
Chlorine-38	10.00	Krypton-87	10.00
Chromium-51	1,000.00	Lanthanum-140	10.00
Cobalt-58m	10.00	Lutetium-177	100.00
Cobalt-58	10.00	Manganese-52	10.00
Cobalt-60	1.00	Manganese-54	10.00
Copper-64	100.00	Manganese-56	10.00
Dysprosium-165	10.00	Mercury-197m	100.00
Dysprosium-166	100.00	Mercury-197	100.00
Erbium-169	100.00	Mercury-203	10.00
Erbium-171	100.00	Molybdenum-99	100.00
Europium-152 (9.2 h)	100.00	Neodymium-147	100.00
Europium-152 (13 y)	1.00	Neodymium-149	100.00

MATERIAL	MICROCURIES
Nickel-59	100.00
Nickel-63	10.00
Nickel-65	100.00
Niobium-93m	10.00
Niobium-95	10.00
Niobium-97	10.00
Osmium-185	10.00
Osmium-191m	100.00
Osmium-191	100.00
Osmium-193	100.00
Palladium-103	100.00
Palladium-109	100.00
Phosphorous-32	10.00
Platinum-191	100.00
Platinum-193m	100.00
Platinum-193	100.00
Platinum-197m	100.00
Platinum-197	100.00
Plutonium-239	0.01
Polonium-210	0.10
Potassium-42	10.00
Praseodymium-142	100.00
Praseodymium-143	100.00
Promethium-147	10.00
Promethium-149	10.00
Radium-226	0.01
Rhenium-186	100.00
Rhenium-188	100.00
Rhodium-103m	100.00
Rhodium-105	100.00
Rubidium-86	10.00
Rubidium-87	10.00
Ruthenium-97	100.00
Ruthenium-103	10.00
Ruthenium-105	10.00
Ruthenium-106	1.00
Samarium-151	10.00
Samarium-153	100.00
Scandium-46	10.00
Scandium-47	100.00
Scandium-48	10.00
Selenium-75	10.00
Silicon-31	100.00
Silver-105	10.00
Silver-110m	1.00
Silver-111	100.00
Sodium-24	10.00
Strontium-85	10.00
Strontium-89	1.00
Strontium-90	0.10
Strontium-91	10.00
Strontium-92	10.00
Sulfur-35	100.00
Tantalum-182	10.00
Technetium-96	10.00
Technetium-97m	100.00
Technetium-97	100.00
Technetium-99m	100.00
Technetium-99	10.00
Tellurium-125m	10.00
Tellurium-127m	10.00
Tellurium-127	100.00
Tellurium-129m	10.00
Tellurium-129	100.00
Tellurium-131m	10.00
Tellurium-132	10.00
Terbium-160	10.00
Thallium-200	100.00
Thallium-201	100.00
Thallium-202	100.00
Thallium-204	10.00
Thorium (natural)	50.00
Thullium-170	10.00
Thullium-171	10.00
Tin-113	10.00
Tin-125	10.00
Tungsten-181	10.00
Tungsten-185	10.00
Tungsten-187	100.00
Uranium (natural)	50.00
Uranium-233	0.01
Uranium-234	0.01
Uranium-235	0.01
Vanadium-48	10.00
Xenon-131m	1,000.00
Xenon-133	100.00
Xenon-135	100.00
Ytterbium-175	100.00

MATERIAL	MICROCURIES	MATERIAL	MICROCURIES
Yttrium-90	10.00	Zinc-69m	100.00
Yttriun-91	10.00	Zinc-69	1,000.00
Yttrium-92	100.00	Zirconium-93	10.00
Yttrium-93	100.00	Zirconium-95	10.00
Zinc-65	10.00	Zirconium-97	10.00

Any alpha-emitting radionuclide not listed previously in the above table, or mixtures of alpha emitters of unknown composition---------- 0.01 µCi

Any radionuclide other than alpha-emitting radionuclides, not listed previously in the above table, or mixtures of beta emitters of unknown composition---------- 0.10 µCi

NOTE: For purposes of 10 CFR 20.203 and 10 CFR 20.304, where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" (i.e., "unity"). Example: For purposes of 10 CFR 20.304, if a particular batch contains 20,000 µCi of ^{198}Au and 50,000 µCi of ^{14}C, it may also include not more than 300 µCi of ^{131}I. This limit was determined as follows:

$$\frac{20{,}000\ \mu Ci\ ^{198}Au}{100{,}000\ \mu Ci} + \frac{50{,}000\ \mu Ci\ ^{14}C}{100{,}000\ \mu Ci} + \frac{300\ \mu Ci\ ^{131}I}{1{,}000\ \mu Ci} = \frac{1}{1} = 1$$

The denominator in each of the above ratios was obtained by multiplying the figure in the table by 1,000 as provided in 10 CFR 20.304.

ANNEX U: RADIATION PROTECTION SUPPORT AFTER DUTY HOURS

1. PURPOSE. To describe the Radiation Protection Officer's support capabilities available after duty hours and the procedures to be followed to obtain this support.

2. RESPONSIBILITIES.

a. The Radiation Protection Officer will:

(1) Develop procedures for notification of the Radiation Protection Officer when Radiation Protection support is required after duty hours.

(2) Advise all users of radiation-producing devices and radioisotopes, Duty Officers, Fire Department, and Military Police of the method of contacting the Radiation Protection Officer or his alternate after duty hours.

(3) Provide, in easily accessible locations, stocks of emergency supplies and survey instruments which may be needed in the event of radiological emergency.

b. Military Police will:

(1) Contact the Radiation Protection Officer in the event of any requirement for after duty hours support in accordance with the procedures developed by the Radiation Protection Officer.

(2) Contact the Radiation Protection Officer in the event of burglary, vandalism, etc., in any area marked as containing radioactive materials.

c. The Fire Department will:

(1) Notify the Radiation Protection Officer of any fires in areas marked as containing radioactive materials.

(2) Follow precautionary procedures for fire fighting in areas marked as containing radioactive materials (See Annex S to this SOP).

d. Administrative Officers of the Day for FAMC will seek the advice and assistance of the Radiation Protection Officer on matters relating to radioactive material when necessary.

APPENDIX 1: RADIATION PROTECTION INSTRUCTION TO MILITARY POLICE
to ANNEX U: RADIATION PROTECTION SUPPORT AFTER DUTY HOURS.

1. GENERAL.

a. Since the FAMC Military Police are not supplied with radiac instruments, they should not enter areas that are posted as Radiation Areas unless the Radiation Protection Officer is present.

b. Military Police should recognize the Radiation Area and High Radiation Area signs and know the significance of the signs.

c. They should know how to contact the Radiation Protection Officer.

d. The principle role of the Military Police in radiological emergencies is to control crowds and traffic.

2. MILITARY POLICE NOTIFICATION OF THE RADIATION PROTECTION OFFICER.

a. During Duty Hours, call ext. 23201 or 26245 for Radiation Protection Officer support.

b. If the Radiation Protection Officer is required after Duty Hours, contact the Radiation Protection Officer at 422-0554 or the alternate Radiation Protection Officer at 341-2243.

APPENDIX 2: INSTRUCTIONS TO DUTY OFFICERS
to ANNEX U: RADIATION PROTECTION SUPPORT AFTER DUTY HOURS

1. Radiation Protection support may be obtained at any time by calling Ext. 23201 or 422-0554 (after duty hours) and requesting Physics support.

2. Any matter relating to radiation safety or a radiological emergency (e.g., radiation exposure, release of radioactive material, fire with radioactive materials present, spills, or radioactive contamination, etc.) should be referred to the Radiation Protection Officer.

3. Incoming shipments of radioactive material which arrive after duty hours will be delivered to the technician on duty in the Department of Radiology, who will provide proper storage accomodations for this material.

ANNEX V: REFERENCES

The following listed references are general in nature and pertain to these Regulations as a whole; additional references which are more specific are cited in the ANNEXES.

AR 11-21	Environmental Pollution Abatement
AR 40-7	Use of Investigational Drugs in Humans
AR 40-13	Radiological Emergency Medical Team
AR 40-14	Control and Recording Procedures, Occupational Exposure to Ionizing Radiation
AR 40-27	Personnel Radiation Exposure
AR 40-37	Radioisotope License Program (Human Use)
AR 40-61	Medical Material Policies and Procedures
AR 40-403	Health Records
AR 50-5	Nuclear Surety
AR 55-55	Transportation of Radioactive and Fissile Materials Other Than Weapons
AR 55-355	Military Traffic Management Regulation
AR 70-25	Use of Volunteers as Subjects of Research
AR 385-30	Safety Color-Code Markings and Signs
AR 385-80	Nuclear Reactor Health and Safety Program
AR 700-52	Licensing and Control of Sources of Ionizing Radiation
AR 700-58	Report of Packaging and Handling Deficiencies
AR 700-64	Radioactive Commodities in the DOD Supply Systems
AR 725-1	Special Authorization and Procedures for Issue, Sales, and Loans
AR 755-15	Disposal of Unwanted Radioactive Material
SB 11-206	Film Badge (Photodosimetry) Supply and Service fo Technical Radiation Exposure Control.
TB MED 62	Diagnostic X-Ray Protection
TB MED 223	Respiratory Protective Devices
TB MED 232	Protective Measures for Radioactive Material Used in Self-Luminous Light Sources
TB MED 267	Guidelines for Medical Evaluation of Applicants and Personnel in the Army Nuclear Power Program
TB MED 270	Control of Hazards to Health from Microwave Radiation
TB MED 279	Control of Hazards to Health from Laser Radiation
TB 750-237	Identification of Radioactive Items in the Army Supply System
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 3-261	Handling and Disposal of Unwanted Radioactive Material
TM 55-315	Transportability Guidance for Safe Transport of Radioactive Materials.
Title 10	Code of Federal Regulations - Rules and Regulations of the USAEC

Title 49 Code of Federal Regulations - Rules and Regulations of the DOT

Reports of the Federal Radiation Council (FRC)

Reports of the National Council on Radiation Protection and Measurement (NCRP)

Reports of the International Commission on Radiation Units and Measurements (ICRU)

Handbooks of the National Bureau of Standards (NBS)

Recommendations of the International Commission on Radiological Protection (ICRP)

ITEM 6 BYPRODUCT MATERIAL

A. Any byproduct material listed in Groups I and II of schedule A Section 35.100 of CFR 35	A. Any Radio pharmaceutical listed in Groups I and II of Schedule A, Section 35.100 of CFR 35	A. As necessary for uses authorized in Item 7A
B. Iodine 131	B. Iodide	B. 250 millicuries
C. Iodine 131	C. Iodinated Human Serum Albumin	C. 5 millicuries
D. Iodine 131	D. Tyroxine	D. 2 millicuries
E. Iodine 125	E. Iodide	E. 1 millicurie
F. Iodine 125	F. Thyroxine	F. 1 millicurie
G. I-125 or 131	G. Any	G. 5 millicuries
H. Phosphorus 32	H. Soluble Phosphate	H. 50 millicuries
I. Phosphorus 32	I. Colloidal Chromic Phosphate	I. 50 millicuries
J. Gold 198	J. Colloidal	J. 250 millicuries
K. Chromium 51	K. Sodium chromate and Chromic Chloride	K. 10 millicuries
L. Hydrogen 3	L. Water	L. 25 millicuries
M. Sodium 24	M. Sodium Chloride	M. 1 millicurie
N. Xenon 133	N. Free gas or in saline	N. 2 curies
O. Technetium 99m	O. Labeled albumin microspheres (human) prepared by the licensee using the 3M kit (see application dated 22 June 1972; ltr dated 9 Nov 1972)	O. 150 millicuries
P. Technetium 99m	P. Sulfur colloid (See application dated 17 October 1969)	P. 150 millicuries
Q. Technetium 99m	Q. Pertechnetate (See application and ltr dated 2 July 70)	Q. 500 millicuries
R. Technetium 99m	R. Labeled polyphosphates prepared by the licensee using NEN Kit (See application dated 9 March 1973)	R. 150 millicuries

ITEM 6 continued

S.	Technetium 99m	S. Disodium Etifronate prepared by Licensee using Proctor and Gamble Osteoscan Kit. (See application dated 5 Feb 74)	S. 150 millicuries
T.	Molybdenum 99	T. Contained in one of the following AEC approved generators. Manufacturers instructions for eluting will be followed in each case under the supervision of the Chief, Nuclear Medicine and the RPO. Maximum quantity of Mo 99 on hand at any one time not to exceed 2 curies. (1) New England Nuclear: NRP-19b. Tc-99m Sterile generator: In 50,100,150, 200, 300, 400 mCi models. (2) Mallinckrodt: Ultra-Techekow Sterile Tc-99m generator; In 50, 100, 150, 200, 300, 400, 500 mCi models (3) Mallinckrodt: Ultra-TechneKow FM Sterile Tc-99m Generator in 50, 100, 200, 300, 400 mCi models. (4) Squibb: Technetope II Sterile Tc-99m Generator (5) Squibb: Technetope HiCon sterile Tc-99m Generator (6) Squibb: Minitec Tc-99m Generator	T. 2 curie
U.	Strontium 90	U. Tracerlab Model RA-1 Sealed Medical Applicator	U. 50 millicuries
V.	Any byproduct material with Atomic Nos. 1-83, Inclusive	V. Any (See Item 7U)	V. 500 millicuries of each, except: Hydrogen 3 - 5 curies Total not to exceed 10 curies.
W.	Cesium 137	W. Any (See item V)	V. 1 millicurie
X.	Cesium 137	X. Sealed sources (Amersham/Searle) (See application dated 12 April 1973 - control 35871)	X. 626 millicuries

ITEM 6 continued

Y. Technetium-99m	Y. Iron-Ascorbate diethylenetriamine pentaacetic acid (prepared by Licensee using Squibb kit) see application dated 31 October 1973	Y. 50 millicuries

7. Authorized Use.

A. Any diagnostic procedure listed in Groups I and II of Schedule A, Section 35.100 of Title 10, Code of Federal Regulations.
B. Treatment of hyperthyroidism, cardiac dysfunction, and thyroid carcinoma. Diagnosis of functioning metastases from thyroid carcinoma.
C. Placenta localization. Cisternography and ventriculography.
D. Determination of thyroxine turnover.
E. Thyroid imaging.
F. Determination of thyroxine turnover.
G. In-vitro studies, tests.
H. Treatment of polycythemia vera, leukemia, and bone metastases.
I. Intracavitary treatment of malignant effusions.
J. Intracavitary treatment of malignant effusions. Interstitial treatment and general treatment of prostatic carcinoma.
K. Determination of gastrointestinal bleeding. Spleen imaging.
L. Determination of total body water.
M. Determination of total exchangeable sodium.
N. Pulmonary function studies. Blood flow studies.
O. Lung imaging.
P. Liver and spleen imaging (See application dated 17 October 1969).
Q. Joint imaging in accordance with protocol dated 20 April 1970. (See letter dated 2 July 1970. Placental scan.)
R. Bone imaging.
S. Bone imaging.
T. Production of Tc-99m Pertechnetate.
U. Treatment of Superficial Eye Conditions.
V. Laboratory research in vitro and in lower animals; in vitro testing.
W. Standard for assay of molybdenum content of eluate of Molybdenum generator.
X. Interstitial treatment of carcinoma. For use in medical applicators for the intracavitary treatment of carcinoma.
Y. Kidney imaging.

ITEM 12

All personnel involved with the radioactive material covered by this license are equipped with U. S. Army Film Badges. Badges are processed monthly by the U. S. Army Film Badge Service, Bluegrass Army Depot, Lexington, Kentucky. Victoreen Pocket Dosimeters, Model 541A are available for use at the discretion of the R.S.O. For specialized applications, the use of themoluminescent dosimetry is available using Lif TLD-100 high sensitivity ribbon and Eberline TLD System TLR-5.

APPENDIX III
RADIATION DETECTION INSTRUMENTS

TYPE OF INSTRUMENT	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (Mr/hr)	WINDOW Thick, Mg/cm^2	USE
1. Victoreen 440	1	Beta, gamma	0-300	3.0	Monitoring
2. Victoreen Thyac III					
GM Probe	2	Beta, gamma	0-200	-	Monitoring
Alpha Probe	1	Alpha	0-200	3.0	Monitoring
3. Victoreen Cond "R" Meter- 570					
Probe 651	1	gamma, X	250R	6.6	Measuring
Probe 130	1	gamma, X	0.25R	212	Measuring
Probe 70-5	1	gamma, X	25R	67	Measuring
Probe 131	1	gamma, X	100R	89	Measuring
Probe 621	1	gamma, X	100R	576	Measuring
4. Victoreen Radocon II-555					
Probe 555-100 HA	1	gamma, X	0.0974	643	Measuring
Probe 555-0.1 MA	1	gamma, X	97.40	212	Measuring
Probe 555-100MA	1	gamma, X	0.9740	144	Measuring

F INSTRUMENT	NUMBER AVAILABLE	RADIATION DETECTED	SENS. RANGE	USE
5) PHO/GAMMA CAMERA II NUCLEAR CHICAGO Model #6401 with strip chart recorder attachment N.C. model #3445	1	Gamma		Measur
6) Nuclear Chicago Uptake Unit includes:				
Analyzer Input Model #8742	1			
Ultrascaler II model #8276	1			
Sample Changer Model #813050	1			
Autosubtract Model #8721	2			
7) Picker Nuclear Magnascanner II (3 inch crystal)	1	Gamma		Measur
8) Picker Nuclear Magnascanner V (5 inch crystal)	1	Gamma		Measur
9) Picker Nuclear Twinscaler II (Model #600-125) with floor model well	1	Gamma		Measur
10) Picker Nuclear Autowell with Twinscaler II model #600-125	1	Gamma		Measur
11) Picker Nuclear Dual Probe System includes:				
Dual Rate Computer model #60082	1			
Dual Channel Analyzer model #600145	1			
Strip Chart Recorder model #PWD 600-092	1			
Digitape 4 (tape recorder) #626155	1			
Monroe Data/log model #MC10-40	1			
12) Ames Atomium Volemetron with memory unit	1	Gamma		Measur
13) Mediac Nuclear Chicago Dose Calibrator model #6362	1	Gamma	75KEV-3MEV	Measur & Assa
14) Picker Nuclear Laboratory Monitor model #600081 with GM tube	1	Gamma	up to 30,000 cpm	Surveyin Monitori
15) Radiac Survey Meter 203/PDR-27R	1	Beta, Gamma	up to 500 mr/hr	Surveyin Monitori
16) Packard TM-Care Liquid Scintillation Spectrometer	1	Alpha, Beta Gamma		Measur
17) Packard Gamma Scintillation Spectrometer	2	Alpha, Beta Gamma		Measur
18) Eberline Radiation Monitor RM-14	1	Beta	0-50K	30. Monito
Probe HP-177		Gamma	CPM	
		Gamma	CPM	

Items 1-4, 15, 18 are calibrated quarterly by the Sacramento Army Depot, Sacramento, California.

All other items are calibrated at use using manufacturers prescribed techniques with locally available standard sources.

APPENDIX IV
Locations, Facilities, Laboratories

1. Attached as inclosures to this annex are floor plans of locations on this installation where radioactive material authorized by this license will be used. Facilities and equipment are indicated on the diagrams.

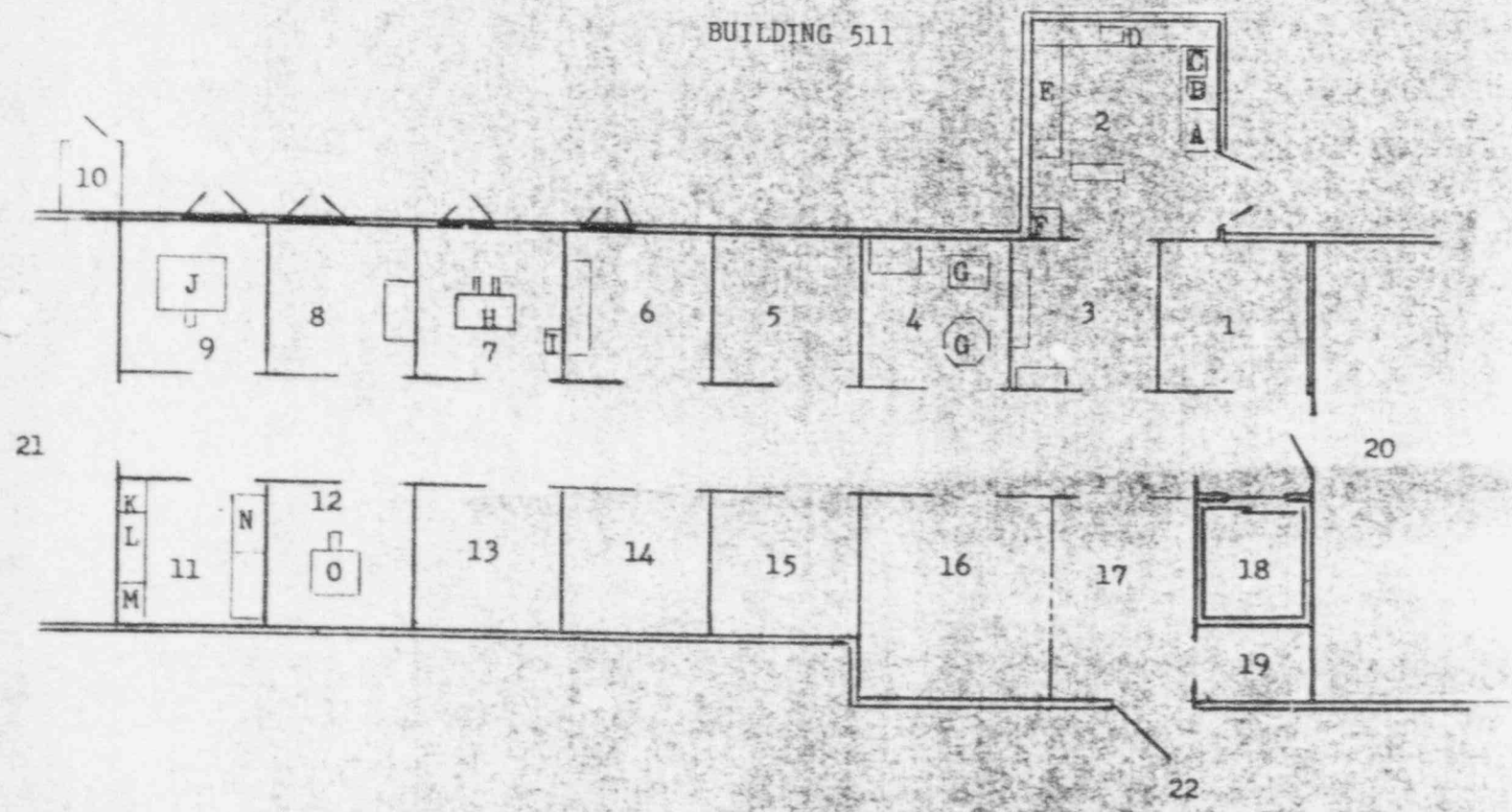
a. Nuclear Medicine Service (Human Use).
b. Department of Pathology (In-vitro Tests)
c. Clinical Investigational Service (In-vitro Research)

2. Therapy patients involving both sealed and non-sealed sources are housed on appropriate wards in private isolated rooms in Building 500, the main hospital. (See annex of the Radiation Health and Safety Standing Operating Procedure, Appendix II to this application.) Approval of the individual room for therapy use is given by the RPO after a survey of the surrounding area.

3. In accordance with, Amendment 30 of the existing AEC license 05-0046-13, approval of additional locations and the facilities contained therein for in-vitro use of radioactive material for diagnostic and research procedures is granted locally by the Fitzsimons Army Medical Center Radioisotope Committee. The Committee's action is based on recommendations of the RPO following an extensive survey of the facility.

NUCLEAR MEDICINE SERVICE

BUILDING 511



LEGEND FOR FLOOR PLAN OF DIAGNOSTIC RADIOISOTOPE SECTION

Room 1 - Scan room

Room 2 - Laboratory
- A - Hood
- B - Hot sink
- C - Radioisotope storage (lead brick enclosure with lead sheet bottom)
- D - Dose Calibrator
- E - Cold sink
- F - Cold storage radioisotopes. Radioisotopes to be refrigerated are kept in original shipping lead containers

Room 3 - Laboratory Office

Room 4 - Camera room
- G - Pho/Gamma Camera

Room 5 - Latrine

Room 6 - Store room

Room 7 - Renogram room
- H - Dual probe machine
- I - Tape recorder attachment

Room 8 - Uptake room Nuclear Chicago Radiation Counting System

Room 9 - Scan room
- J - Magnascanner V

Room 10 - Decay storage

Room 11 - Well counting
- K - Volemetron
- L - Autowell
- M - Refrigerator
- N - Dual channel scaler and floor model well

Room 12 - Doctors Office - Residents

Room 13 - Scan room
- O - Magnascanner II

Room 14 - Chief, Nuclear Medicine Service

Room 15 - Supervisors Office

Room 16 - Administration

Room 17 - Reception and Patient waiting area

Room 18 - Elevator

Room 19 - Office supplies

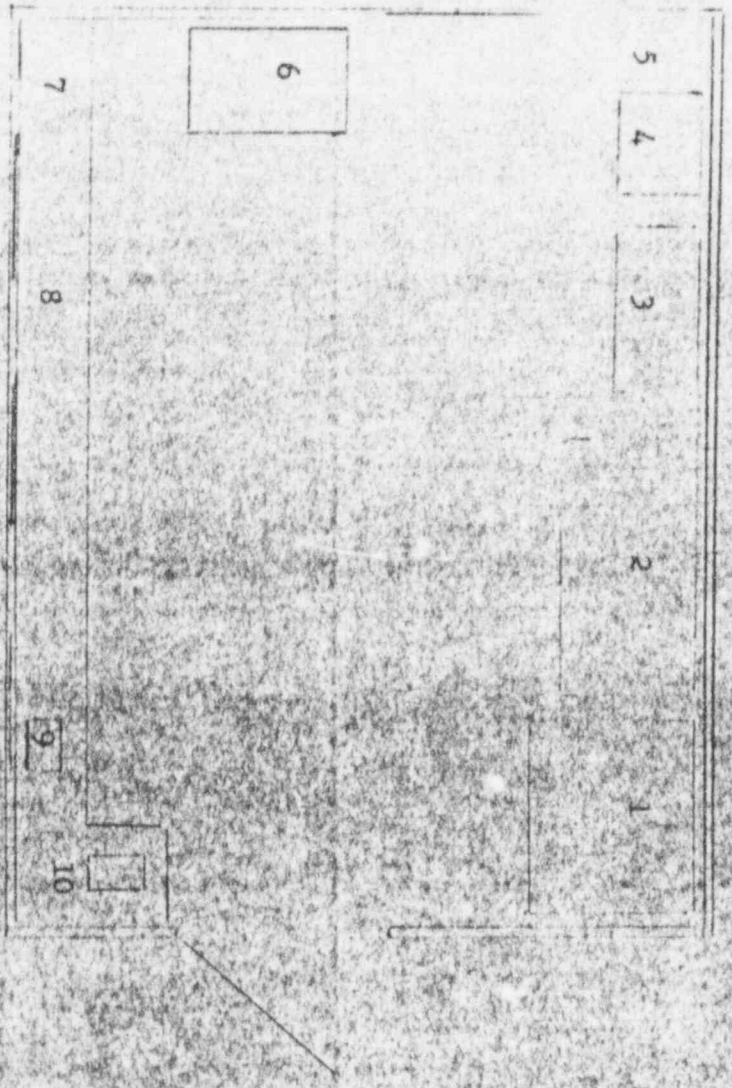
Room 20 - Library (door closed)

Room 21 - Endocrine Clinic

The floor plan and accompanying legend details space and instrumentation as of 21 February 1974. All radiopharmaceuticals are procured and received according to HR 20-602 and stored in designated area in laboratory. All doses are prepared and administered in laboratory area. Books are kept on each radioisotope for procurement, use and disposal. The decay storage room is kept locked at all times. All other doors are kept locked when no one is in attendance.

RADIOIMMUNOASSAY LABORATORY

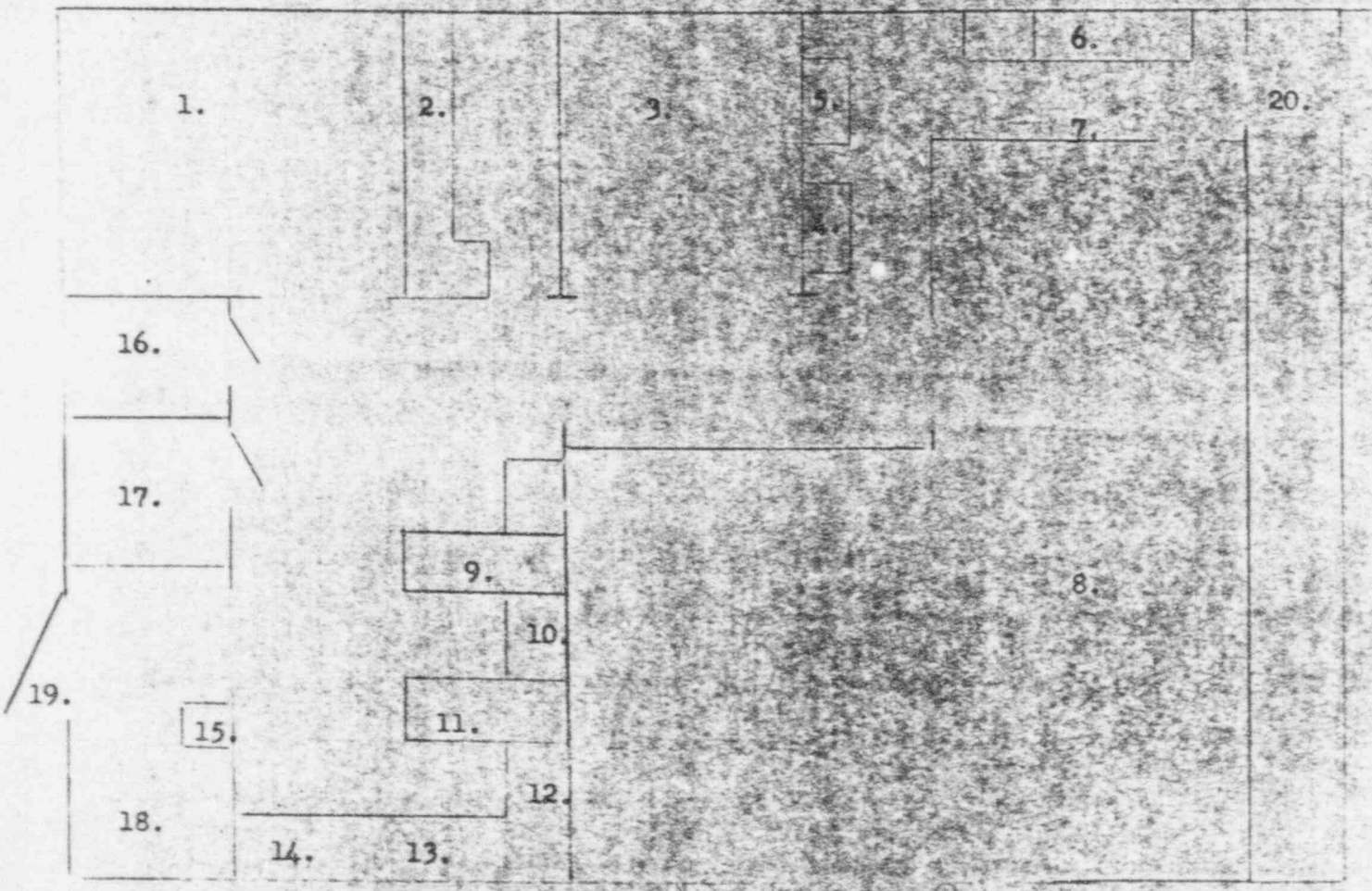
Building 511 Floor 2 North Exterior



1. Centrifuge.
2. Desk.
3. Packard Auto-Gamma.
4. Refrigerator.
5. Waste.
6. Freezer
7. Laboratory Bench
8. Laboratory Bench (Isotope work area)
9. Sink 1 (not hot)
10. Sink 2 (not hot)

CLINICAL INVESTIGATIONAL SERVICE

BIOCHEMISTRY LABORATORY



APPENDIX V

RADIATION WASTE DISPOSAL

SUPPLEMENTAL INSTRUCTIONS

47842

1. General Investigators Office.
2. Storage.
3. Lounge and Study Area.
4. Packard Tri-Carb Liquid Scintillation Spectrometer.
5. Packard Gamma Scintillation Spectrometer.
6. Na-22 Storage.
7. Waste Storage Area.
8. Animal Room.
9. Laboratory Bench, (no radioactivity).
10. Laboratory Hood.
11. Laboratory Bench, (C-14; H_3).
12. Laboratory Bench, (no radioactivity).
13. Laboratory Bench, (no radioactivity).
14. Laboratory Bench, (no radioactivity).
15. Freezer, storage of all isotopes other than Na-22.
16. Dark room.
17. Latrine.
18. Technician's station.
19. Entrance.
20. To Post FAMC Veterinarian.

1. Liquid Waste disposition

a. Contaminated liquid waste may be disposed of in the "hot" sink provided the quantity which, if diluted by the average daily quantity of sewage (sanitary sewage flow per 24 hours is 525,000 gallons) released into the sewer by the licensee, will not result in an average concentration in excess of values specified in Appendix B, Table 1, Column 2 of CFR, Title 10, Part 20; (extracted applicable portion listed below); or

b. Ten times the quantity of such material specified in Appendix C of same; and

c. The gross quantity of licensed and other radioactive material released into the sewage system by the licensee does not exceed one curie per year.

Listed below is the quantity of any single radioactive isotope that may be released into the sewer in any one day. In accordance with the Code of Federal Regulations, title 10, part 20, if more than one isotope is released on the same day, the fractions of the maxima for the isotopes released must sum to one or less.

Radioactive Material	Microcuries
Bromine-82	100
Calcium-45	100
Carbon-14	500
Chromium-51	500
Cobalt-60	10
Gold-198	100
Hydrogen-3	2500
Iodine-131	100
Iron-55	500
Iron-59	10
Phosphorus-32	100
Selenium-75	100
Strontium-85	10
Strontium-89	10
Strontium-90	1
Sulfur-35	500
Zinc-65	100

d. Sewage disposal of liquid radioactive isotopes will be disposed of from the Radioisotope Section, Radiology Service, Fitzsimons General Hospital on Tuesdays and Fridays only, with other days reserved for Radioisotope Branch, USAMRNL. Any deviation from this policy by either section will be cleared with the other Radiation Protection Officer.

e. All liquid radioactive waste disposal through the sanitary sewer at FAMC will be logged in Liquid Waste Disposal Log Book and activity listed in microcuries.

2. Solid Waste Disposition

a. Under no circumstances will waste be incinerated.

b. Solid waste will be segregated into combustible and non-combustible waste and placed in properly labelled and lined fifty-five gallon sealable drums. These drums will comply with the requirements of the specific isotopes contained therein. See Code of Fed. Reg., Title 49, Jan 1969.

c. Drums containing solid perishable waste, i.e., carcasses, tissues, etc., will be stored in a freezer prior to shipment.

d. Instructions for shipping radioactive waste for proper disposition will be requested from:

Commander
US Army Edgewood Arsenal
ATTN: SMUEA-ISDO
Edgewood, Maryland 21010

3. Logs and Records.

a. AEC Form 3 (Notice to Employees - Standards for Protection Against Radiation) will be posted in a conspicuous location.

b. DD Form 1141 in accordance with AR 40-14 are prepared and maintained by the custodian of medical records, Fitzsimons Army Medical Center.

c. The joint AEC license and U.S. Army authorization will be posted and readily available.

d. Radioisotope inventroy balance will be audited monthly. (Radioisotope inventory records are kept on Forms DA 8-235 and DA 8-212).

e. Instrument logs will be maintained indicating calibration and maintenance of the portable survey instruments.

f. Records of surveys (including swipe tests) will be kept.

g. Caution signs, labels, and signals will be utilized according to CFR, Title 10, Part 20, para. 20.203.

h. A report covering the period of each calendar quarter is prepared by the Commander of Fitzsimons Army Medical Center in accordance with AR 40-37. This report is dispatched to The Surgeon General, ATTN: MEDPS-PO, by the fifteenth working day following the close of the report period and contains the following information as a minimum:

(1) Copy of minutes of each Radioisotope Committee meeting, including a record of all actions taken by the Committee.

(2) Copy of training and experience of each newly approved user of radioisotopes or any change in qualifications or certifications of previously approved users (for human use, AEC Form 313a, page 3).

(3) Radioisotope inventory, including data on quantities of radioisotopes procured, used, or disposed of, or currently in storage.

(4) Information on unsolved problems, new or improved developments, or other comments of interest to, or having a bearing on, support rendered by The Surgeon General.

(5) Notification of all changes in membership of Radioisotope Committee.

Form AEC-313a (2-73) 10 CFR 30 PAGE 1	UNITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL** SUPPLEMENT A—HUMAN USE	Form approved. Budget Bureau No. 38-R0080

If byproduct material is for "human use" (internal administration of byproduct material, or the radiation therefrom to human beings), complete this supplement and attach to the application for byproduct material license.

1. (a) USING PHYSICIAN'S NAME

See item 7, AEC Form

(b) NAME AND ADDRESS OF APPLICANT (If different from 1(a). Include ZIP Code.)

Fitzsimons Army Medical Center
12101 East Colfax Avenue
Aurora, Colorado 80240

2. THE USING PHYSICIAN NOMINATED ABOVE IS LICENSED TO DISPENSE DRUGS IN THE PRACTICE OF MEDICINE BY A STATE OR TERRITORY OF THE UNITED STATES, THE DISTRICT OF COLUMBIA, OR THE COMMONWEALTH OF PUERTO RICO. CIRCLE ANSWER	(YES)	NO
3. A STATEMENT OF USING PHYSICIAN'S CLINICAL RADIOISOTOPE EXPERIENCE (PAGE 3 OF THIS SUPPLEMENT) IS SUBMITTED IN SUPPORT OF THIS APPLICATION. IF ANSWER IS NO, USE PAGE 2 OF THIS SUPPLEMENT TO EXPLAIN OR REFER TO OTHER APPLICATION OR RELATED DOCUMENTS ON WHICH THIS INFORMATION APPEARS. See item 4, AEC Form 313 and Appendix I CIRCLE ANSWER	YES	NO
4. A DESCRIPTION OF THE USING PHYSICIAN'S TRAINING AND EXPERIENCE IN BASIC RADIOISOTOPE HANDLING TECHNIQUES AND/OR RADIOPHARMACEUTICAL PREPARATION IS APPENDED. See item 4, AEC Form 313 and Appendix I CIRCLE ANSWER	YES	NO

5. (a) DESCRIBE PURPOSE FOR WHICH MATERIAL WILL BE USED INCLUDING SPECIFIC CONDITIONS OR DISEASES TO BE DIAGNOSED OR TREATED (*Use page 2 if necessary*)

See item 7, AEC Form 313

(b) CHEMICAL FORM ADMINISTERED

See item 6, AEC Form 313

(c) DOSAGE SCHEDULE FOR EACH CONDITION TO BE DIAGNOSED OR TREATED

See supplemental sheet to AEC Form 313A

6. INVESTIGATIVE PROPOSAL FOR EXPERIMENTAL OR NON-ROUTINE USE IS APPENDED (*See Appendix F of AEC Licensing Guide for items to be submitted*) N/A CIRCLE ANSWER	YES	NO

7. IF BYPRODUCT MATERIAL WILL NOT BE OBTAINED IN PRECALIBRATED FORM FOR ORAL ADMINISTRATION OR IN PRECALIBRATED FORM FOR PARENTERAL ADMINISTRATION, DESCRIBE IDENTIFICATION, PROCESSING, AND STANDARDIZATION PROCEDURES

N/A

8. THE PROPOSED USE OF BYPRODUCT MATERIAL HAS BEEN, OR WILL BE, APPROVED BY THE MEDICAL ISOTOPE COMMITTEE CIRCLE ANSWER	(YES)	NO

HOSPITAL FACILITIES FOR INDIVIDUAL PRACTICE USE ONLY

9. (a) THE APPLICANT HAS COMPLETED ARRANGEMENTS FOR A HOSPITAL TO ADMIT RADIOACTIVE PATIENTS WHENEVER ADVISABLE. CIRCLE ANSWER	YES	NO
(b) A COPY OF INSTRUCTIONS TO BE FURNISHED TO THE HOSPITAL AS TO RADIOLOGICAL SAFETY PRECAUTIONS TO BE TAKEN AND AVAILABLE RADIATION INSTRUMENTATION IS ATTACHED. CIRCLE ANSWER	YES	NO

COMMON DOSAGE SCHEDULE
NUCLEAR MEDICINE SERVICE
FITZSIMONS ARMY MEDICAL CENTER

ISOTOPE	DOSE	FORM	PROCEDURES
I-131	10 uCi	NaI	Thyroid uptake
I-131	100 uCi	NaI	Thyroid Scan
I-131	20 mCi	NaI	Treatment of Hyperthyroidism
I-131	100 uCi	NaI	Conversion Ratio & PBI 131
I-131	15 mCi	NaI	Treatment of Graves Disease
I-131	100-150 mCi	NaI	Treatment of Thyroid Malignancy
I-131	1 mCi	NaI	Chest Scan
I-131	300 uCi	Macroaggregated Albumin	Lung Scan
I-131	0.5 uCi/kg body wt.	Hippuran	Renogram
I-131	150 uCi	Rose Bengal	Liver Scan
I-131	5 uCi	Albumin	Blood Volume
I-131	100 mCi	R.I.S.A.	Cisternography & Ventriculography
I-131	2 mCi	NaI	Diagnosis of thyroid Carcinoma
I-125	0.5 uCi	NaI	T-3 In-Vitro
I-125	0.1 uCi	NaI	T-4 In-Vitro
Tc99m	15 mCi	Pertechnetate	Brain Scan
Tc99m		Pertechnetate	Placental Scan
Tc99m	5 mCi	Sulfur Colloid	Liver Scan
Tc99m	3 mCi	Pertechnetate	Joint Scan
Tc99m	4 mCi	Microspheres'	Lung Scan
Tc99m	15 mCi	DTPA	Renal Scan
Tc99m	15 mCi	Polyphosphates	Bone Scan
Tc99m	15 mCi	Disodium Etidronate	Bone Scan
Au-198	150 uCi	Colloidal	Liver Scan
Cr-51	50 uCi	Sodium Chromate	Blood Volume
Cr-51	150 uCi	Sodium Chromate	Red Blood Cell & Platelet Sur
Cr-51	200 uCi	Sodium Chromate	Spleen Scan
Cr-51	50 uCi	Sodium Chromate Albumin & Chromic Chloride	Determination of gastrointestinal bleeding.
Co-57	0.5 uCi	Vitamin B-12	Schilling Test
Hg-197	150 uCi	Chlormerodrin	Renal Scan
Hg-197	150 uCi	Chlormerodrin	Renal Uptake
Hg-197	1 mCi	Chlormerodrin	Brain Scan
Sr-85	100 uCi	Nitrate	Bone Scan
P-32	25 mCi	Soluble Phosphate	Treatment of Polycythemia ver.
		Colloidal Chromic Phosphate	Leukemia & bone metastases
Xe-133	15 mCi	Gas or Gas dissolved in saline	Pulmonary Function &Measurement of myocardial blood flow
Hydrogen 3		Water	Total Body Water
Na24		Sodium Chloride	Total exchangeable sodium

APPENDIX I

RADIOISOTOPE COMMITTEE

The Fitzsimons Army Medical Center Radioisotope Committee is established under the provisions of AR 40-37 and implemented by FAMC HR 15-1, Boards, Commissions and Committees, Professional Boards and Committees, dated 28 September 1973, A copy of which is attached as inclosure 1 to this appendix. Reference to membership of personnel from the U. S. Army Medical Research and Nutrition Laboratory should be deleted. The USAMRNL, a tennant activity at FAMC, will be relocated during the Summer of 1974 and will not be involved further with the FAMC Radioisotope Committee. Use of isotopes, within the limitations of the AEC license is controlled by the FAMC Radioisotope Committee. The Committee

1. is responsible for proper handling, storage and disposal of radioactive materials.
2. recommends changes to the SOP concerning periodic monitoring and enforcement of safety measures in the handling of radioactive material.
3. reviews and grants permission for, or disapproval of, the use of radioactive material.
4. certifies individual users for each type of procedure with each individual radioisotope and insure that a copy of such certification is placed in the appropriate users' 201 file. Current records of these approved users, documenting the qualifications and limitations of each, will be maintained.
5. prescribes special conditions which may be necessary to include and give advice concerning proposed studies where it is needed.

RADIOISOTOPE COMMITTEE

6. reviews records and receives reports from the Radiological Protection Officer and recommends corrective action when indicated.
7. makes recommendations for improvement of present laboratory facilities and for expansion of the laboratories in accordance with needs.
8. Holds meetings at the call of the Chairman and reports in writing to the Commander, the results of its deliberation. The committee will prepare Report RCS Med-197 Radioisotopes in Human Use Activities as required in para 4a, AR 40-37.

FITZSIMONS GENERAL HOSPITAL
Denver, Colorado 80240

*HOSPITAL REGULATION
NUMBER 15-1

28 September 1972

BOARDS, COMMISSIONS AND COMMITTEES

PROFESSIONAL BOARDS AND COMMITTEES

1. Purpose. To establish the professional boards and committees necessary for the efficient operation of this installation.

2. Composition. The senior officer is Chairman unless otherwise specified.

a. Profile Classification Board ("On Call").
Assistant Chief, Department of Medicine
Assistant Chief, Department of Surgery
Chief, Department of Clinics and Community Health Care Services
Chief, Personnel Management Section, Military Personnel Branch
Unit Commanding Officer of individual concerned

b. Rabies Control Board ("On Call" - 5th Army Memo 40-30).
Chief and Assistant Chief, Department of Clinics & Community Health Care Services
Chief, Department of Pediatrics and designated representatives
Assistant Chief, Department of Medicine
Assistant Chief, Department of Surgery
Post Veterinarian
Preventive Medicine Officer - RECORDER

c. Therapeutic Agents Board (2 times per year at least - AR 40-2).
Chief, Professional Services - CHAIRMAN
Chief, Department of Surgery
Chief, Department of Medicine
Chief, Department of Psychiatry
Chief, Department of Clinics and Community Health Care Services
Chief, Department of Obstetrics-Gynecology
Chief, Department of Nursing
Chief, Department of Pediatrics
Chief, Pharmacy Service - RECORDER & COORDINATOR
Chief, Anesthesia & Operative Service
Chief, Oral Surgery Service

*This Hospital Regulation supersedes HR 15-1, 19 February 1971 with Change 1, 26 February 1971, Change 2, 24 March 1971, Change 3, 20 July 1971, Change 4, 22 September 1971, Change 5, 16 November 1971 and Change 6, 1 February 1972.

d. Tumor Board (2d & 4th Friday at 1530 hours-HR 40-201).
Chief, Department of Surgery
Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Radiology
Chief, Department of Pathology
Chief, Department of Dentistry (dental cases only)
Chief, Department of Pediatrics
Attending physician concerned

e. Clinical Research Committee ("On Call" - HR 15-2).
Chief, Professional Services
Chief, Department of Surgery or Research Coordinator
Chief, Department of Medicine or Research Coordinator
Chief, Department of Obstetrics-Gynecology or Research Coordinator
Chief, Department of Dentistry or Research Coordinator
Chief, Department of Clinics and Community Health Care Services or Research Coordinator
Chief, Department of Psychiatry or Research Coordinator
Chief, Department of Pathology or Research Coordinator
Chief, Department of Radiology or Research Coordinator
Commanding Officer, USAMR&NL or representative
Research Associate Consultants as required
Chief, Clinical Research Service - RECORDER
Chief, Pharmacy Service

f. Dental Education Committee (1st Monday of month at 1230 hours).
Chief, Department of Dentistry
Chief, Oral Surgery Service
Chief, Periodontia Service
Chief, Operative Service

g. Hospital Education Committee (3d Tuesday each month at 1300 hours).
Commanding General
Deputy Commander/Director of Medical Education - CHAIRMAN
Executive Officer/Coordinator, Health Care Residents Program
Chief, Department of Surgery
Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Psychiatry
Chief, Department of Clinics and Community Health Care Services
Chief, Department of Pathology
Chief, Department of Pediatrics

g. Hospital Education Committee (Cont'd)
Chief, Department of Radiology
Chief, Department of Dentistry
Chief, Department of Nursing
Chief, Pharmacy Service
Chief, Cardiology Service
Chief, Dermatology Service
Chief, General Medicine Service
Chief, Pulmonary Disease Service
Chief, Otolaryngology Service
Chief, Allergy Service
Chief, Anesthesia & Operative Service
Chief, Ophthalmology Service
Chief, General Surgery Service
Chief, Orthopedic Service
Chief, Neurosurgery Service
Chief, Thoracic Surgery Service
Chief, Urology Service
Chief, Neurology Service
Chief, Physical Medicine Service
Chief, Clinical Research Service
Chief, Gastroenterology Service
Chief, Plastic Surgery Service
Chief, Endocrinology Service
Chief, Hematology Service
Assistant Chief, Department of Medicine
Assistant Chief, Department of Pediatrics
Commanding Officer, USAMR&NL
Educational Coordinator, Department of Nursing
Intern Co-Advisors
Civilian Education Consultant (on call)
Post Chaplain

h. Hugh Mahon Lectureship Award Committee (Annually - April or May, Admin Files, Deputy Commander's Office).
Chief, Department of Medicine
Chief, Department of Surgery
Chief, Department of Obstetrics-Gynecology
Chief, Department of Dentistry
Chief, Department of Pathology
Chief, Department of Radiology
Chief, Clinical Research Service
Secretary to Chief, Professional Services - COORDINATOR

i. Infections Committee (2d Monday - OTSG Med Bulletin #3).
Chief, Department of Surgery - CHAIRMAN
Chief, Department of Clinics and Community Health Care Services
Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Pathology
Chief, Microbiology Sub-Section, Department of Pathology
Chief, Anesthesia and Operative Service
Chief, Department of Pediatrics
Chief, Department of Nursing
Nursing Methods Analyst
Preventive Medicine Officer - RECORDER

j. Medical Library Committee (Quarterly, 2d Tuesday, 1st month of new quarter at 1400 hrs, Jan, Apr, Jul & Oct, AR 40-2).
Chief, Professional Services - CHAIRMAN
Executive Officer
Chief, Department of Surgery
Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Dentistry
Chief, Department of Pathology
Chief, Department of Radiology
Chief, Department of Nursing
Chief, Department of Psychiatry
Chief, Clinical Research Service
Medical Librarian - SECRETARY AND COORDINATOR

k. Medical Records Committee (Last Tuesday each month at 1300 hours, Bulletin 41, JCHA Mar 66).
Chief, Professional Services
*Chief, Department of Surgery
*Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Pediatrics
Chief, Department of Psychiatry
*Chief, Department of Pathology
Chief, Department of Clinics and Community Health Care Services
Chief, Department of Nursing
Chief, Department of Dentistry
Medical Records Librarian
Chief, Patient Administration Division - RECORDER

*These members will also comprise a Tissue and Blood Transfusion Practice Committee. The Chairman will be the Chief, Department of Pathology. This committee will present its report during the regularly scheduled meetings of the Medical Records Committee.

*(1) Tissue Committee.
Chief, Department of Pathology - CHAIRMAN
Chief, Department of Medicine
Chief, Department of Surgery

*(2) Blood Transfusion Committee.
Director of Blood Bank, Department of Pathology
Hematologist - Department of Medicine
Chief, Department of Surgery
Chief, Anesthesia & Operative Service

*These committees will present their report during the regularly scheduled meetings of M.R.C.

l. Hospital Utilization Board (Monthly - Bulletin 41, JCHA Mar 66).
Chief, Professional Services - CHAIRMAN
Chief, Department of Surgery
Chief, Department of Medicine
Chief, Department of Obstetrics-Gynecology
Chief, Department of Psychiatry
Chief, Department of Pathology
Chief, Department of Clinics and Community Health Care Services
Chief, Department of Nursing
Chief, Department of Dentistry
Medical Records Librarian
Chief, Patient Administration Division - RECORDER

m. Radioisotope Committee (1st Tuesday each quarter, unless falls on 1st day, then on 8th, AR 40-37, HR 40-604).
Chief, Department of Radiology - CHAIRMAN
Chief, Department of Medicine
Chief, Department of Surgery
Chief, Department of Pathology
Chief, Radioisotope Section
Chief, Clinical Research Service
Radiation Safety Officer
Commanding Officer, USAMR&NL
Chief, Radioisotope Branch, Administrative Division, USAMR&NL
Chief, Purchasing & Contracting Branch, Logistics Division (non-voting member)

n. Perinatal Mortality Committee.
Chief, Department of Obstetrics-Gynecology - CHAIRMAN
Chief, Department of Pediatrics
Assistant Chief, Department of Pathology

o. Inhalation Therapy Committee.
Chief, Anesthesia & Operative Service - CHAIRMAN
Chief, Department of Medicine
Chief, Department of Surgery

p. Cardio-Pulmonary Resuscitation Committee.
Chief, Department of Surgery - CHAIRMAN
Chief, Anesthesia & Operative Service
Chief, Cardiology Service
Chief, Department of Nursing
Chief, Pulmonary Disease Service
Chief, Thoracic Surgery Service

3. References.

a. AR 40-2.
b. AR 40-37.
c. OTSG Med Bul #3.
d. HR 15-2.
e. HR 40-201.
f. HR 40-604.
g. HR 40-953.
h. JCHA Bul 41, Mar 66.

MEDEO-DC

FOR THE COMMANDER:

B. F. BLACK
Major, MSC
Adjutant

DISTRIBUTION:
"B" & "C"
Plus 10 ea - Deputy Commander

DEPARTMENT OF THE ARMY
FITZSIMONS ARMY MEDICAL CENTER
Denver, Colorado 80240

*CHANGE 1 TO
MEDICAL CENTER
REGULATION 15-1

19 April 1973

BOARDS, COMMISSIONS AND COMMITTEES

PROFESSIONAL BOARDS AND COMMITTEES

*Hospital Regulation 15-1, 28 September 1972, is changed as follows:

So much as reads "Hospital Regulation" is changed to read "Medical Center Regulation."

* * * * *

2. Composition. The senior officer is Chairman unless otherwise specified.

* * * * *

b. Rabies Control Board ("On Call" - 5th Army Memo 40-30). As reads "Preventive Medicine Officer - RECORDER" is changed to read "Health Environment Officer - RECORDER."

* * * * *

d. Tumor Board (2d & 4th Friday at 1530 hours-HR 40-201). Change to read: "Tumor Board (every Tuesday at 1400 hours-HR 40-201."

* * * * *

i. Infections Committee (2d Monday - OTSG Med Bulletin #3). As reads "Preventive Medicine Officer - RECORDER" is changed to read "Health Environment Officer - RECORDER."

* * * * *

MEDEO-DC

FOR THE COMMANDER:

OFFICIAL:

POE R. CORN
Major, MSC
Adjutant

WADE A. DOROTHY
Captain, MSC
Asst Adjutant

DISTRIBUTION:
"B" & "C"
Plus 10 ea - Deputy Commander

47342

MEMBERS OF THE RADIOISOTOPE COMMITTEE
FITZSIMONS ARMY MEDICAL CENTER

The following list of members is effective the date of the application to which it is attached. The curriculum vitae of each member is attached immediately following the list. Members 8, 9 are presently representing the US Army Medical Research and Nutrition Laboratory. They will be deleted as members of the FAMC Radioisotope Committee during the second quarter calendar year 1974 when the USAMRNL is moved to Letterman Army Medical Center, San Francisco, California.

1. HERBERT F. COWGILL, Col, MC (Chairman)
   Chief, Department fo Radiology

2. JAMES J. BERGIN, Col, MC
   Chief, Department of Medicine

3. JOSEPH H. BAUGH, Col, MC
   Chief, Department of Surgery

4. GUY C. GLENN, Col, MC
   Chief, Department of Pathology

5. NASSER V. GHAED, LTC, MC
   Chief, Nuclear Medicine Service

6. DONALD G. CORBY, LTC, MC
   Chief, Clinical Research Service

7. CHARLES E. WHITE, LTC, MSC
   Radiation Safety Officer

8. JOHN E. CANHAM, Col, MC
   Commander, USAMR&NL

9. ROBERT L. MORRISSEY, CPT, VC
   Chief, Radioisotope Branch, USAMR&NL

10. WILLIAM B. KERR, MAJ, MSC
    Chief, Purchasing & Contracting Branch,
    Logistics Division.
    (NON-VOTING MEMBER)

CURRICULUM VITAE

HERBERT F. COWGILL, M.D., Chief, Dept of Radiology, Fitzsimons General Hospital

1. Medical Education:
   University of Cincinnati, Sept 1940 - Dec 1943, M.D. Degree
   St. Louis City Hospital, St. Louis, Mo, Jan - Sept 1944, Internship
   Christ Hospital Cincinnati, Cincinnati, Ohio, Jul 1946 - June 1947
   St. Joseph Hospital, Marshfield, Wisc, Jul 1947 - June 1948

2. General Practice of Medicine:
   Wadsworth, Ohio, Jul 1948 - Dec 1954

3. General Radiology Resident, Walter Reed Army Hospital, Jul 1955 - Dec 1958
   Nuclear Medicine, U. S. Naval Hospital, Bethesda, Md., Aug 1957 - Jan 1958
   American Board of Radiology with Nuclear Medicine Medallion, Dec 1958

4. Active Duty Military:
   a. 10 Oct 44 - 15 Jul 47, USNR, LT(jg), MC, Pacific Theater
   b. Chief, Dept of Radiology, 98th General Hospital, Germany, Jun 59 - Aug 62
   c. Chief, Dept of Radiology, US Army Hospital, Ft. Leonard Wood, Mo., Sep 62 - Aug 63
   d. Chief, Radiology, Chief, Professional Services, US Army Hospital, Ft. Sill, Okla, Jul 65 - Jun 67
   e. Chief, Diagnostic Service, Dept of Radiology, Letterman General Hospital, Jul 67 - Aug 68
   f. Chief, Radiology, Chief, Professional Services, 121st Evac Hospital, Korea, Sep 68 - Aug 69
   g. Chief, Dept of Radiology, Madigan General Hospital, Ft. Lewis, Wash., Sep 69 - Jul 71
   h. Chief, Dept of Radiology, Fitzsimons General Hospital, Denver, Colo., Aug 71 to present

5. Military Schooling:
   a. Company Grade Medical Officers Course, Ft. Sam Houston, Jan - Jun 55
   b. AMEDS Career Course, Ft. Sam Houston, Jan - June 59

6. U. S. Army Military Awards:
   a. Certificate of Achievement, Ft. Sill, Okla, 1965 - 1967
   b. Meritorious Service Award, Korea, Sep 68 - Aug 69
   c. Meritorious Service Award, Madigan General Hospital, Sep 69 - Jul 71
   d. Honorary Prefix to MOS, Aug 69

Form AEC 313 a (3-56) Page 3

U. S. ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

SUPPLEMENT A — HUMAN USE

Form approved Budget Bureau No. 38-R080

This page may be completed by the physician's preceptor (if any) in the medical use of radioisotopes. When the information is not furnished by the preceptor, the name and present address of the preceptor (if any) should be shown in item 12 below.

9 (a) USING PHYSICIAN'S NAME

Herbert F. Cowgill, M.D.

(b) NAME AND ADDRESS OF APPLICANT (If different from 9.a))

MAJ Herbert F. Cowgill, MC, USA, Dept. of Radiology
U. S. Army Hospital, Walter Reed Army Medical Center
Washington 25, D. C.

10 CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN WHO WILL USE BYPRODUCT MATERIAL

(A) ISOTOPE	(B) CONDITION(S) DIAGNOSED OR TREATED	(C) NUMBER OF CASES	(D) TYPE OF PARTICIPATION FOR ALL CASES IN COLUMN D (circle applicable numbers of items in accordance with key set forth below)
I-131	Diagnosis of thyroid function	177	1 2 3 4
	Treatment of hyperthyroidism	16	1 2 3 4
	Treatment of thyroid cancer	3	1 2 3 4
	Treatment of cardiac conditions	5	1 2 3 4
	Brain tumor localization		1 2 3 4
	Blood determinations		1 2 3 4
	Others: Triolein & Oleic Acid I^{131}	20	1 2 3 4
	Cardiac Output	9	1 2 3 4
P-32 Sodium	Treatment of polycythemia and leukemia	13	1 2 3 4
	Brain tumor localization		1 2 3 4
	Treatment of bone metastases	9	1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
P-32 $CrPO_4$	Treatment of prostatic cancer		1 2 3 4
	Treatment of cervical cancer		1 2 3 4
	Treatment of pleural effusions and/or ascites		1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
Au-198 Colloid	Treatment of prostatic cancer		1 2 3 4
	Treatment of cervical cancer		1 2 3 4
	Treatment of pleural effusions and/or ascites	3	1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
Cr-51	Blood determinations	128	1 2 3 4
	Others: Red Cell Survival	13	1 2 3 4
			1 2 3 4
Other isotopes	As^{74} Cu^{64} Brain Tumor	37	1 2 3 4
	Co^{60} Shilling Test	17	1 2 3 4
	I^{131} Rose Bengal	15	1 2 3 4

1, 2, 3 and 4 applies to each type of case.

Key to above numbers (column D) Active Participation and Discussion

1 Examination of patients to determine suitability for radioisotope diagnosis and/or treatment and recommendations on dosage to be prescribed.
2 Collaboration in calibration and administration of dosages including related measurements and plotting of data.
3 Active period of training and experience of sufficient duration to permit followup of patients through treatment and posttreatment period including reevaluation as to effectiveness and complications.
4 Study and discussion of case histories to establish most efficacious diagnostic and/or therapeutic techniques for this radioisotope use.

11 TOTAL NUMBER OF HOURS OF PARTICIPATION IN CLINICAL TRAINING _____ hours. Attended four month course in Radioisotope Techniques.

12 THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OR GUIDANCE OF

CAPT E. A. King, MC, USN (Name of physician (preceptor)) AT U.S. Naval Hospital, NNMC Bethesda 14, Maryland

Acting (Signature)

CERTIFIED TO BE A TRUE COPY R. F. Williams Capt. MC, USN

Form AEC-313 a
(3-56)
Page 4

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

SUPPLEMENT A—HUMAN USE

Form approved
Budget Bureau No. 38-R002

This page may be used for providing additional information.

Fe^{59}	Plasma Volume & Turnover	19 cases
Na^{24}	Space	4 "
K^{42}	Space	5 "

May 12, 1964 - U. S. Naval Hospital, National Naval Medical Center, Bethesda, Maryland.

This is to certify that the foregoing is a true copy of Form AEC-313a (pages 3 & 4) issued to Herbert F. Cowgill, M.D. by this hospital in 1957.

Virginia H. McLean

Virginia H. McLean, Wheaton, Maryland
Notary Public of Montgomery County in
and for the State of Maryland.
My commission expires May 6, 1965.

U. S. GOVERNMENT PRINTING OFFICE 1956 O - 381810

SP
201

18 July 1966

C E R T I F I C A T E

The Radioisotope Committee certifies that HERBERT F. COWGILL, LTC, MC can perform the following procedures in the Radioisotope Laboratory:

Byproduct (element and mass number)	Chemical and/or physical form	Maximum amount of radioactivity which licensee may possess at any one time
A. Iodine 131	A. Iodide	A. 35 millicuries
B. Iodine 131	B. Iodinated Human Serum Albumin	B. 1 millicurie
C. Iodine 131	C. Triolein and/or Oleic Acid	C. 2 millicuries
D. Iodine 131	D. Triiodothyronine	D. 0.1 millicurie
E. Phosphorus 32	E. Solube, Phosphate	E. 25 millicuries
F. Phosphorus 32	F. Colloidal Chromic Phosphate	F. 25 millicuries
G. Gold 198	G. Colloidal	G. 2 millicuries
H. Chromium 51	H. Sodium Chromate	H. 3 millicuries
I. Chromium 51	I. Chromic Chloride	I. 1 millicurie
J. Cobalt 60	J. Vitamin B12	J. 10 microcuries
K. Mercury 203	K. Chlormerodrin	K. 10 millicuries

Authorized use

A. Diagnosis of thyroid function, thyroid scanning, and scanning for metastases from thyroid carcinoma. Treatment of hyperthryoidism.
B. Determination of plasma volume.
C. Determination of fat absorption.
D. In vitro determination of red blood cell uptake.
E. Treatment of polycythemia vera and leukemia.
F. Intracavitary treatment of malignant effusions.
G. Liver scanning.
H. Determination of red cell mass and red cell survival time.
I. Determination of plasma volume.
J. Diagnosis of pernicious anemia.
K. Brain and kidney scanning.

Herbert F. Cowgill

HERBERT F. COWGILL
LTC, MC
Chairman, Radioisotope Committee

CURRICULUM VITAE

HERBERT F. COWGILL, M.D., Chief, Dept of Radiology, Fitzsimons General Hospital

1. Medical Education:
   University of Cincinnati, Sept 1940 - Dec 1943, M.D. Degree
   St. Louis City Hospital, St. Louis, Mo, Jan - Sept 1944, Internship
   Christ Hospital Cincinnati, Cincinnati, Ohio, Jul 1946 - June 1947
   St. Joseph Hospital, Marshfield, Wisc, Jul 1947 - June 1948

2. General Practice of Medicine:
   Wadsworth, Ohio, Jul 1948 - Dec 1954

3. General Radiology Resident, Walter Reed Army Hospital, Jul 1955 - Dec 1958
   Nuclear Medicine, U. S. Naval Hospital, Bethesda, Md., Aug 1957 - Jan 1958
   American Board of Radiology with Nuclear Medicine Medallion, Dec 1958

4. Active Duty Military:
   a. 10 Oct 44 - 15 Jul 47, USNR, LT(jg), MC, Pacific Theater
   b. Chief, Dept of Radiology, 98th General Hospital, Germany, Jun 59 - Aug 62
   c. Chief, Dept of Radiology, US Army Hospital, Ft. Leonard Wood, Mo., Sep 62 - Aug 63
   d. Chief, Radiology, Chief, Professional Services, US Army Hospital, Ft. Sill, Okla, Jul 65 - Jun 67
   e. Chief, Diagnostic Service, Dept of Radiology, Letterman General Hospital, Jul 67 - Aug 68
   f. Chief, Radiology, Chief, Professional Services, 121st Evac Hospital, Korea, Sep 68 - Aug 69
   g. Chief, Dept of Radiology, Madigan General Hospital, Ft. Lewis, Wash., Sep 69 - Jul 71
   h. Chief, Dept of Radiology, Fitzsimons General Hospital, Denver, Colo., Aug 71 to present

5. Military Schooling:
   a. Company Grade Medical Officers Course, Ft. Sam Houston, Jan - Jun 55
   b. AMEDS Career Course, Ft. Sam Houston, Jan - June 59

6. U. S. Army Military Awards:
   a. Certificate of Achievement, Ft. Sill, Okla, 1965 - 1967
   b. Meritorious Service Award, Korea, Sep 68 - Aug 69
   c. Meritorious Service Award, Madigan General Hospital, Sep 69 - Jul 71
   d. Honorary Prefix to MOS, Aug 69

EDUCATION cont'd:

INTERNSHIP (ROTATING)	Valley Forge Army Hospital, July 1954 - June 1955 Phoenixville, Pennsylvania
RESIDENCY	Letterman General Hospital San Francisco, California Internal Medicine, 1955-1958 Chief Resident and Acting Assistant Chief, Department of Medicine, 1958-1959
SHORT POSTGRADUATE COURSES ATTENDED	American Society of Hematology, December 1966 New Orleans, Louisiana
	American College of Physicians Current Concepts in Blood Diseases, January 1967 Miami, Florida
	American College of Physicians Advances in Gastroenterology, March 1968 Philadelphia, Pennsylvania
	American College of Physicians Office Psychiatry for Internists, October 1969 Boston, Massachusetts
	Present Concepts in Internal Medicine, 1965, 1966, 1968, 1969 Letterman General Hospital San Francisco, California
	Pulmonary Disease Symposium, 1964, 1965, 1966, 1967, 1968, Fitzsimons General Hospital 1969, 1970, and 1971 Denver, Colorado
	The Hospital Medical Staff Conference, 1965, 1966, 1967, University of Colorado 1968, 1969, and 1970 Estes Park, Colorado
	Topics in Clinical Medicine, May 1971 The Johns Hopkins Hospital Baltimore, Maryland
	American College of Cardiology Long-Term Prognosis Following Valve and Heart Replacement, Aspen, Colorado January 1971
	American Society of Hematology, December 1971 San Francisco, California
	American College of Cardiology Myocardial Infarction: A New Look at an Old Subject, Aspen, Colorado January 1972

ASSIGNMENTS (MILITARY)	Internship, July 1954 - June 1955 Valley Forge General Hospital Phoenixville, Pennsylvania
	Residency, Internal Medicine, 1955-1959 Letterman General Hospital San Francisco, California
	Chief, Department of Medicine, 1959-1963 Deputy Commander, 1963 Commanding Officer, Feb and Mar 1963 Consultant in Internal Medicine to the Navy and Air Force of the Antilles, 1959-1963 Military Representative to Schistosomiasis Board of Puerto Rico, 1959-1963 Rodriquez Army Hospital San Juan, Puerto Rico
	Fellow in Hematology, 1963-1964 Walter Reed Army Institute of Research Assistant Chief, Hematology Service, 1963-1964 Walter Reed General Hospital Washington, D. C.
	Chief, Department of Medicine, 1969 to Present Assistant Chief, Department of Medicine, 1961-1969 Chief, General Medicine Service, 1964-1966 Chief, Hematology Section, 1961-1971 Research Coordinator, Department of Medicine, 1964-1969 Fitzsimons General Hospital Denver, Colorado
AWARDS (MILITARY)	Certificate of Achievement, 1963, Rodriquez Army Hospital San Juan, Puerto Rico
	Certificate of Achievement, 1964, from The Surgeon General for Hematology Consultation on General Douglas A. MacArthur
	"A" Rating to the Military Occupational Specialty 3139 from The Surgeon General, 30 June 1970
CERTIFICATION BY SPECIALTY BOARDS	American Board of Internal Medicine, 1963
MEMBERSHIP IN PROFESSIONAL SOCIETIES	American Medical Association Associate, American College of Physicians, 1964 Fellow, American College of Physicians, 1966 Member, American Society of Hematology, 1966 Member, Colorado Society of Internal Medicine, 1969 Member, Colorado Heart Association, 1964

CIVILIAN TEACHING POSITIONS	Assistant Clinical Professor of Medicine, 1964 Associate Clinical Professor of Medicine, 1970 University of Colorado School of Medicine Denver, Colorado
MEDICAL LICENSURE	State of California, 1958 State of Colorado, 1968 (Separate Basic Science Examination) Diplomate, National Board of Medical Examiners, 1955
RECOGNITIONS	Listed in Marquis Who's Who, Inc. 200 East Ohio Street Chicago, Illinois Listed in Dictionary of International Biography Eighth Edition Artillery Mansions Victoria Street London, S. W. 1, England
LIST OF PUBLICATIONS	Attached
PARTICIPATION IN NATIONAL AND REGIONAL MEETINGS	Attached

PUBLICATIONS

1. Crone, R. I., and Bergin, J. J.: Gaucher's Disease in Identical Twins. Ann. Intern. Med., 49:4, 1958.

2. Skipworth, C. B., and Bergin, J. J.: Coccidioidal Granulomas of Skin and Conjunctiva Treated with Intravenous Amphotericin B. Arch. Dermat., 82:605, 1960.

3. Bergin, J. J.: Massive Bleeding with Fibrinolysis: Management with Heparin an Epsilon Amino Caproic Acid. The Surgeon General (Technical Bulletin), 8-13:13, March 1966.

4. Bergin, J. J.: The Blood Transfusion Committee. The Medical Staff in the Modern Hospital. Ed., C. Wesley Eisele, M.D., Blakiston Division of McGraw Hill, Chapter 28, January 15, 1967.

5. Bergin, J. J.: The Complications of Therapy with Epsilon Aminocaproic Acid. Medical Clinics of North America, November 1966.

6. Bergin, J. J., Crosby, W. H., and Jahnke, E. J.: Massive Bleeding with Fibrinolysis: Management with Heparin and Epsilon Aminocaproic Acid. Military Medicine, 131:340, April 1966.

7. Bergin, J. J., Shambaugh, E. E., Haglund, R. B., and Overholt, E. L: Embolization and Nonbacterial Thrombotic Endocarditis. Postgraduate Medicine, November 1966.

8. Bergin, J. J., Chapman, R., Ward, H., and Hamstra, R.: Pulmonary Manifestations of Hematologic Disease; Nineteenth Annual Symposium on Pulmonary Diseases, Fitzsimons General Hospital, September 1966.

9. Helmly, R. B., Bergin, J. J., and Shulman, N. R.: Quinine-Induced Purpura: Observation on Antibody Titers. Arch. Intern. Med., 120:59, July 1967.

10. Bergin, J. J.: Malaria and the Lung. Military Medicine, 132:522, July 1967.

11. Bergin, J. J.: Malaria and the Lung. United States Navy Medical News Letter, 50:12, October 1967.

12. Everett, E. D., Volpe, J. A., and Bergin, J. J.: Pancreatitis in Infectious Mononucleosis. Southern Medical Journal, 62:359, March 1969.

13. Bergin, J. J., and Crosby, W. H.: The Acute Analog of Polycythemia Vera. Military Medicine, 133:601, August 1968.

PUBLICATIONS continued:

14. Knospe, W. H., Bergin, J. J., Conrad, M. E., and Jacobson, C. B.: Cytogenetic Studies in Chronic Granulocytic Leukemia During Blast Crisis: Additional Cytogenic Findings in Two Ph1 Chromosomes. Amer. J. Med. Sci., 66:816, December 1967.

15. Weber, W. C., DeNardo, G. L., and Bergin, J. J.: Scintiscanning in Malignant Lymphomatous Involvement of Bone. Arch. Intern. Med., 121:432, May 1968.

16. Foley, G. P., Bergin, J. J., Pastore, E. A., Everett, E. D., and Cline, E. C.: Pregnancy Following Metastatic Trophoblastic Disease, A Case Report. OB-GYN Abstract, 1968.

17. Stutz, F. B., and Bergin, J. J.: Priapism in Leukemia, Experience at Fitzsimons General Hospital with Two Case Reports. Military Medicine, 135:44, January 1970.

18. Volpe, J. A., Bergin, J. J., and Overholt, E. L.: Chronic Budd-Chiari Syndrome as a Result of Visceral Thrombophlebitis Migrans Associated with Factor VII Deficiency. Amer. J. Digest. Dis., 15:469, May 1970.

19. Wilson, F. E., and Bergin, J. J.: Recurrent Sunlight Induced Intravascular Hemolysis. Southern Medical Journal, 63:460, April 1970.

20. Everett, E. D., Newcomer, K., Anderson, J. W., Bergin, J. J., and Overholt, E. L.: Goodpasture's Syndrome: Response to Mercaptopurine and Prednisone. JAMA, 213:1849, September 14, 1970.

21. Bergin, J. J.: Malaria. Current Diagnosis, 3rd Ed., 1970.

22. Zuck, T. F., and Bergin, J. J.: Heparin-Exchange Phenomenon. Lancet, 2:210, July 25, 1970.

23. Bergin, J. J.: The Blood Transfusion Committee. Syllabus to Seventh Annual Hospital Medical Staff Conference, Estes Park, Colorado, October 1970.

24. Bergin, J. J.: Clinical Research in a Teaching Hospital. Military Medicine, 136:796, October 1971.

25. Zuck, T. F., Bergin, J. J., Raymond, J. M., and Dwyre, W. R.: Implications of Depressed Antithrombin-III Activity Associated with Oral Contraceptives. Surgery, Gynec. & Obstet., 133:609, October 1971.

26. Zuck, T. F., Bergin, J. J., Raymond, J. M., Dwyre, W. R., and Corby, D. G.: Platelet Adhesiveness in Symptomatic Women Taking Oral Contraceptives, accepted for publication, Thromb. et Diath. Hemorrh.

PUBLICATIONS continued:

27. Bethlenfalvay, N. J., and Bergin, J. J.: Severe Cerebral Toxicity after Intravenous Nitrogen Mustard Therapy. Cancer, 29:366, February 1972.

28. DeVillez, R. L., Lufkin, E. G., and Bergin, J. J.: Symmetrical Enlargement of Breasts and Testes due to Lymphocytic Infiltration. S. Med. J., 65:341, March 1972.

29. Goodman, E. L., Hazlett, D. R., Bergin, J. J., Flannery, E., and Schwartz, M.: Sickle Cell Trait and Loss of Pulmonary Function at 5,280 Feet and at Sea Level, accepted for publication by Thromb. et Diath. Haemorrh.

30. Hagler, L., Pastore, R. A., and Bergin, J. J.: Aplastic Anemia Following Viral Hepatitis: Report of Two Fatal Cases and Literature Review, accepted for publication by Ann. Internal Med.

31. Bergin, J. J., Zuck, T. F., and Miller, R. F.: Compelling Splenectomy in Medically Compromised Patients, submitted to Ann. Surg.

32. Bergin, J. J.: Physical Health of the Chaplain. The Apostolate to the Sick, A Guide for the Catholic Chaplain in Health Care Facilities, 1972.

33. Lufkin, E. G., Ellis, G. J., Hartman, G. R., Hofeldt, F. D., Freck, M. D., and Bergin, J. J.: Improved Diagnosis of Hyperparathyroidism: Use of Serum Ionized Calcium and Tubular Reabsorption of Calcium, submitted to Military Medicine.

34. Zuck, T. F., and Bergin, J. J.: Shifts in Thrombin Kinetics Induced by Conjugated Equine Estrogens, accepted for publication by Obstet. & Gynec.

35. Zuck, T. F., and Bergin, J. J.: Thrombotic Predisposition Associated with Oral Contraceptives, accepted for publication by Obstet. & Gynec.

PARTICIPATION IN NATIONAL AND REGIONAL MEETINGS

Regional Meeting American College of Physicians, 1965, Massive Bleeding with Fibrinolysis: Management with Heparin and Epsilon Aminocaproic Acid.

Regional Meeting American College of Physicians, 1966, Embolization and Nonbacterial Thrombotic Endocarditis.

Regional Meeting American College of Physicians, 1967, The Complications of Therapy with Epsilon Aminocaproic Acid.

Regional Meeting American College of Physicians, 1967, Chronic Budd-Chiari Syndrome as a Result of Visceral Thrombophlebitis Migrans Associated with Factor VII Deficiency.

Regional Meeting American College of Physicians, 1968, Goodpasture's Syndrome.

Regional Meeting American College of Physicians, 1968, Platelet Antibodies and Splenectomy.

National American College of Physicians Meeting, 1967, Cytogenetic Studies in Chronic Granulocytic Leukemia During Blast Crisis: An Unusual Cytogenic Finding with Two Ph_1 Chromosomes.

The Hospital Medical Staff Conference, University of Colorado, 1965, The Blood Transfusion Committee.

The Hospital Medical Staff Conference, University of Colorado, 1966, The Blood Transfusion Committee.

The Hospital Medical Staff Conference, University of Colorado, 1967, The Blood Transfusion Committee.

Pulmonary Disease Symposium, Fitzsimons General Hospital, 1965, Pulmonary Manifestations of Hematologic Disease.

Pulmonary Disease Symposium, Fitzsimons General Hospital, 1966, Malaria and the Lung.

Pulmonary Disease Symposium, Fitzsimons General Hospital, 1967, Treatment of Auto-immune Disease.

Pulmonary Disease Symposium, Fitzsimons General Hospital, 1968, Chest Wall Tumors (Panel).

Pulmonary Disease Symposium, Fitzsimons General Hospital, 1969, Pulmonary Infections Related to the Use of Immunosuppressive Agents .

PARTICIPATION IN NATIONAL AND REGIONAL MEETINGS continued:

Pulmonary Disease Symposium, Fitzsimons General Hospital, Etiology, Pathophysiology and Diagnosis of Pulmonary Embolism (Panel), 1969.

Fifth Hospital Medical Staff Conference, University of Colorado, 1968, Transfusion Committee.

Sixth Hospital Medical Staff Conference, University of Colorado, 1969, Transfusion Committee.

Regional Meeting American College of Physicians, 1969, Splenectomy in Poor Risk Patient, and Treatment of Hodgkin's Disease.

Clinical Convention of American Medical Association, December 1969, Medical Lessons from Vietnam.

Pulmonary Disease Symposium, Fitzsimons General Hospital, The Pulmonary Manifestations of Lymphoproliferative Disease, 1970.

Seventh Hospital Medical Staff Conference, University of Colorado, 1970, The Blood Transfusion Committee.

National Meeting of American College of Physicians, Denver, Colorado, April 1971, Color Television, Moderator, Amputees on Skiis.

National Meeting of American College of Physicians, Denver, Colorado, April 1971, Member of Panel Selection, Program Committee.

National Association of Military Surgeons, Washington, D. C., December 1970, Panel on Clinical Research in a Teaching Hospital.

Regional Meeting of American College of Physicians, 1969, 1970, 1971, Member of Program Committee.

Pulmonary Disease Symposium , Fitzsimons General Hospital, Infections in the Altered Host (Panel), and Unusual Pulmonary Diseases (Panel Chairman), 1971.

Twentieth Annual Blood Symposium, Wayne State University, Detroit, Michigan, Loss of Pulmonary Function in Subjects with Sickle Cell Trait at Sea Level, 1971.

American College of Chest Physicians, Philadelphia, Sickle Cell Trait and Loss of Pulmonary Function at 5,280 Feet and Sea Level, October 1971.

American Society of Blood Banks, Chicago, Illinois, Continuous Platelet Infusion in Immune Thrombocytopenia, and Double Draw Technique for Platelet Harvesting, September 1971.

PARTICIPATION IN NATIONAL AND REGIONAL MEETINGS continued:

Regional Meeting of American College of Physicians, Colorado Springs, Colorado, 1972, Continuous Platelet Infusion in Immune Thrombocytopenia, and Hypercoagulability, the Pill and Testing.

Annual Meeting American Society of Hematology, San Francisco, California, 1971, The Effect of Conjugated Equine Estrogens on Thrombin Generation and Serum Thrombin Neutralization.

III Congress, International Society of Thrombosis and Haemostasis, Washington, D. C., 1972, Shifts in Thrombin Kinetics Induced by Conjugated Equine Estrogens, and Adequacy of Oral Iron to Support Erythropoiesis During Intensive Phlebotomy for Autologous Transfusions.

The Hospital Medical Staff Conference, University of Colorado, 1972, The Blood Transfusion Committee.

CURRICULUM VITAE

JOSEPH H. BAUGH, M.D.
Colonel, MC, USA
Chief, Department of Surgery
Fitzsimons General Hospital
Denver, Colorado 80240

Office Phone: 366-5311
Ext: 21116

Education

School	Degree	Grade - Date
Wilmington High School Wilmington, Ohio	Diploma	1944
Wilmington College Wilmington, Ohio	BS	1949
St. Louis University School of Medicine	MD	1953

Post-Graduate Training

Internship, rotating Fitzsimons General Hospital, Denver, Colorado	1953 - 1954
General Surgery Resident VA Hospital, St. Louis, Missouri	1954 - 1955
General Surgery Residency Letterman General Hospital, San Francisco, Calif.	1956 - 1959
Thoracic Surgery Residency Letterman General Hospital, San Francisco, Calif.	1960 - 1962

Organizations:

Diplomate, American Board of Surgery	1960
Diplomate, American Board of Thoracic Surgery	1961
Fellow, American College of Surgeons	1966
Alpha Omega Alpha Honorary Medical Society	1953
Fellow, American College of Chest Physicians	1966
Fellow, The Southeastern Surgical Congress	1966

Military Service (Other than training) — United States Army

Continued on page 2

Military Service (other than [illegible])	United States Army
European Theater	1944 - 1946
Brooke Army Medical Center	1955 - 1956
U.S. Army Medical Advisory Team	
Jordan Arab Army, Amman, Jordan	1962
Asst Chief, General Surgery Svc	
& Chief, Peripheral Vascular Surgery Section	
Walter Reed General Hospital, Washington, DC	1962 - 1965
Chief, General Surgery Service and Asst	
Chief, Dept of Surgery, Walter Reed GH	1965 - 1971
Chief, Department of Surgery, Fitzsimons	
General Hospital, Denver, Colorado	July 1971 to present

BIBLIOGRAPHY

1. Extraperitoneal approach to the abdominal aorta. J. Nat Med Ass. 56: 1-6, Nov 64.

2. Non-atherosclerotic arterial lesions and their management. I. Trau... Curr Probl Surg 3 - 46, Feb 67 (79 ref.)

3. Non-atherosclerotic arterial lesions and their management. II. Inflammatory lesions of arteries. Curr Probl Surg 46-76, Feb 67 (85 ref.)

4. Non-atherosclerotic arterial lesions and their management. 3. Congenital lesions. IV. Miscellaneous arterial lesions. Curr Probl Surg 1 - 47, Mar 67.

5. Perforation and peritonitis in regional enteritis. Amer J Surg. 115-956-60, Jun 68.

6. Circulatory volume changes associated with chronic sepsis. Amer J Surg 115: 599 - 604, May 68

7. Diagnosis & treatment of blood cell mass deficit secondary to trauma with superimposed infection. J. Trauma 8: 140-4, Mar 68.

8. Tissue necrosis due to norepinephrine. Amer J. Surg. 115: 408 - 12, Mar 68.

9. Successful repair of a traumatic aneurysm of the abdominal aorta. Surgery 66: 492 - 6, Sep 69.

10. Significance of complications associated with vascular repairs performed in Vietnam. Arch Surg (Chicago) 100: 646-51, June 70.

11. Unilateral Raynaud's phenomenon caused by cervical - first rib anomalies. Amer J Med 48: 404 - 7, Mar 70.

12. Value of the ultrasonic flow detector in the management of peripheral vascular disease. Am J Surg 120: 522-6, Oct 70.

13. Management of Venous Injuries. Annals of Surg, Vol 171, No. 5, May 70.

14. Popliteal Artery Injuries in Vietnam, Amer Journal of Surgery, Vol 118, No. 4, pages 531-534, Oct 69.

15. A review of the late General Eisenhower's Operations: Epilog to a footnote to history. Annals of Surgery, Vol. 173, No. 5, May 1971.

16. Postoperative serum enzyme patterns, Journal Mil Medicine, Vol 136, pp 624, July 71.

17. Gastric perforation secondary to alkali injestion, Amer J of Surg, June 70.

PUBLICATIONS:

1. A Simple Method for Preparation of Dural Homografts Laryngoscope, 1966.
2. Decalcification of Bone in Two Hours with the Autotechnicon American Journal of Clinical Pathology 1967
3. Pathologic Changes Associated with Intravenous Use of Sephadex American Journal of Clinical Pathology 1969
4. Primary Immunologic Deficiency Diseases, Laboratory Medicine 1969
5. Pulmonary Cytology, Present Concepts of Internal Medicine 1969 (Letterman General Hospital in-house-journal)
6. Alcoholic Hepatitis, Present Concepts of Internal Medicine 1970 Military Medicine 1972. World Medical Tribune (In Press)
7. Biochemical Sequelae of Rhesus Inoculation, American Journal of Clinical Pathology 1972.

Form AEC 313 (11-57) Part 1

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE - MEDICAL

SUPPLEMENT A -- PRECEPTOR STATEMENT

This page is to be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each. Back of page may be used for comments.

9. NAME AND ADDRESS OF APPLICANT PHYSICIAN

original not legible NTK

10. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 9 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
I-131	Diagnosis of thyroid function	30	
	Uptake studies		
	Excretion studies		
	Brain tumor localization		15
	Scanning studies		100
	Treatment of hyperthyroidism	2	
	Treatment of cardiac conditions		
	Treatment of thyroid carcinoma		
P-32	Treatment of polycythemia	2	
Soluble	Treatment of leukemia		
	Treatment of bone metastases		
	Tumor localization		
	Intracavitary treatment		
	Interstitial treatment		
Au-198	Intracavitary treatment		
	Interstitial treatment		
	Scanning studies Liver		2
Cr-51	Blood determinations		
	Scanning studies		
Co-58 or Co-60	Diagnosis of pernicious anemia		20
Co-60	Interstitial treatment		
Ir-192	Intracavitary treatment		
Co-60 or Cs-137	Teletherapy treatment		
Sr-90	Treatment of superficial diseases of the eye		
Other Isotopes Use back of page	99 Tc - Pulmonary Scans		64

KEY TO COLUMNS C AND D

1. Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.

2. Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed, (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements, and plotting of data, and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.

11. DATES AND TOTAL NUMBER OF HOURS OF CLINICAL RADIOISOTOPE TRAINING July 1967 - April 1968

12. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF John Flume, M.D.

AT Holy Family Hospital
Lidgerwood Drive
Spokane, Washington 99220

(Institution Name and Address) (Byproduct Material License Number) (Signature of Preceptor)

1. Bone Scanning with Orally Administered ^{18}F Journal of Nuclear Medicine, June 1971

2. Clinical evaluation of Orally Administered ^{18}F For Bone Scanning. Radiology, March 1973

3. Pitfalls in the Use of ^{18}F Polyphosphate For Bone Scanning. Journal of Nuclear Medicine, June 1971.

TRAINING AND EXPERIENCE OF HUMAN USERS
(CR 40-10)

DATE

1. USING PHYSICIAN'S NAME, RANK, SERVICE NUMBER, SSAN

PHONE

2. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 1 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) NO. CASES OBSERVED	(D) NO. CASES INVOLVING PERSONAL PARTICIPATION
I-131 and/or I-125	Diagnosis of thyroid function	304	328
	Dilution studies	8	3
	Excretion studies		
	Brain tumor localization		
	Scanning studies	117	87
I-131	Treatment of hyperthyroidism	67 n	27
	Treatment of cardiac conditions		
	Treatment of thyroid carcinoma	26	7
P-32 Soluble	Treatment of polycythemia	14	7
	Treatment of leukemia	11	7
	Treatment of bone metastases	43	23
	Tumor localization	21	9
	Intracavitary treatment		
	Interstitial treatment		
Au-198	Intracavitary treatment		
	Interstitial treatment		
	Scanning studies		
Cr-51	Blood determinations	107	43
	Scanning studies	31	28
Co-58 or Co-60	Diagnosis of pernicious anemia		
Cs-137	Interstitial treatment		
	Intracavitary treatment		
Co-60 or Cs-137	Teletherapy treatment		
Sr-90	Treatment of superficial diseases of the eye		
Other Isotopes	See attached sheet		

3. CLINICAL RADIOISOTOPE TRAINING AND EXPERIENCE

DATES	HOURS	NAME & ADDRESS OF INSTITUTION	SUPERVISING PHYSICIAN
1 Jul - [illegible]	1760	Nuclear Medicine Service Walter Reed Army Medical Center Washington, D.C. 20012	

AEC LIC # 09-01736-02

MERRILL C JOHNSON, MD
COL, MC
SIGNATURE

WRAMC FORM 0965-OT
1 NOV 68

FORM AEC-313a (Continuation)

ISOTOPE	CONDITIONS DIAGNOSED OR TREATED	C	D
99mTc	Scanning Studies	7438	6127
75 Se	Scanning Studies	17	14
57 Co	Diagnosis of Pernicious Anemia	118	87
59 Fe	Erythrokinetics	11	2
125 I	Dilution Studies Excretion Studies	9	9
85 Sr	Bone Metastases Survey	0	0
18 F	Bone Metastases Survey	51	51
45 or 47 Ca	Calcium Absorption	3	3
197 or 203 Hg	Scanning Studies	24	24
24 Na	Body Content Sodium Chloride	11	11
42 K	Body Content Potassium	31	31
3 H	Total Body Water	19	19
131 Cs	Diagnosis of Myocardial Infarcts	0	0
82 Br	Scanning studies	0	0
64 Cu	Copper Clearance	0	0
133 Xe	Pulmonary Function Studies	42	42
113 In	Scanning Studies	0	0

The following radiopharmaceuticals were compounded with 99m Technetium: Macroaggregated serum albumin, human serum albumin, dtpa, sulfur colloid, minicolloid, polyphosphate, diphosphonate .

POSTGRADUATE CONT'D

RESIDENCY	Pediatrics, 1960-1961 Children's Memorial Hospital Chicago, Illinois
	Pediatrics Brooke General Hospital, 1963-1965 Ft. Sam Houston, Texas
FELLOWSHIP	Pediatric Hematology University of Illinois, 1968-1970 Chicago, Illinois
ASSIGNMENTS (MILITARY)	Chief of Pediatrics 225th Station Hospital, USAREUR 1961-1963, Europe
	Assistant Chief of Pediatrics William Beaumont General Hospital, 1965-1968 El Paso, Texas
	Director, Special Education and Clinical Research, Pediatric Service August-December 1970 Fitzsimons General Hospital Denver, Colorado
	Chief, Clinical Research Service Fitzsimons General Hospital, January 1971 to present Denver, Colorado
AWARDS (MILITARY)	Certificate of Achievement, 1968 William Beaumont General Hospital El Paso, Texas
	Army Commendation Medal, 1968 William Beaumont General Hospital El Paso, Texas
CERTIFICATION BY SPECIALTY BOARDS	American Board of Pediatrics, 1965
MEMBERSHIP IN PROFESSIONAL SOCIETIES	American Medical Association, 1961 Fellow, American Academy of Pediatrics, 1967 American Association for the Advance of Science, 1968 Member, American Academy of Clinical Toxicology (Member of the Literature Review Committee, 1968 Member of Board of Directors, 1971) Member, Rocky Mountain Pediatric Society, 1970 Member, Colorado Chapter American Academy of Pediatrics, 1970 Western Society of Pediatric Research, 1971

MEMBERSHIP IN PROFESSIONAL SOCIETIES CONT'D	American Federation of Clinical Research, 1971 American Society of Hematology, 1972 Theta Chi Fraternity P. Beta Phi Medical Fraternity
CIVILIAN TEACHING POSITIONS	Assistant Clinical Professor of Pediatrics, University of Colorado School of Medicine, Sep 70 to present
MEMBERSHIP ON PROFESSIONAL ADVISORY COMMITTEES	
CURRENT	Authority in Specialized Subtopics in Toxicology. Toxicology Information Program, National Library of Medicine, 1970
PAST	Medical Board of Directors, United Cerebral Palsy Center El Paso, Texas, 1965-1968 Membership, Medical Board of Directors El Paso Rehabilitation Center, 1965-1968 El Paso, Texas Member, Special Education Placement Committee El Paso Public Schools, 1966-1968 El Paso, Texas
MEDICAL LICENSURE	National Board of Medical Examiners, 1961 State of Illinois
LIST OF PUBLICATIONS	Attached

PUBLICATIONS

1. Corby, D.G., Lisciandro, R.C., Lehman, R.H. & Decker, W.J.: Efficiency of methods used to evacuate the stomach after acute ingestions, Pediat, 40:871, 1967.

2. Corby, D.G. & Decker, W.J.: Antidote for propoxyphene, JAMA, 204:549, 196

3. Decker, W.J., Corby, D.G. & Ibanez, J.D.: Aspirin adsorption with activat charcoal, ltr to Editor, Lancet, 6 Apr 1968, page 754-755.

4. Corby, D.G., Decker, W.J.: Treatment of propoxyphene poisoning, JAMA, 205:110-111, 1968.

5. Corby, D.G., Decker, W.J., Moran, M.J. & Payne, C.E.: Clinical comparison of pharmacologic emetics in children, Pediat, 42:361, Aug 1968.

6. Decker, W.J., Combs, H.F. & Corby, D.G.: Adsorption of drugs and poisons activated charcoal, Toxicology & Applied Pharmacology, 13:454-460, 1968.

7. Decker, W.J., Shpall, R.A., Corby, D.G., Combs, H.F. & Payne, C.E.: Inhibition of aspirin absorption by activated charcoal and apomorphine, Clin Pharm & Ther, 10:710, 1969.

8. Corby, D.G. & Decker, W.J.: Treatment of Salicylate poisoning, Journal of Pediatrics, 75:1083, 1969.

9. Corby, D.G., Oquendo-Cabrera, A. & Louro, J.M.: Thrombocytopenia in a patient with a relatively small facial hemangioma, Clinical Pediatrics, 8:12, Dec 1969.

10. Blain, C., Corby, D., Anderson, T., Schulman, I. & Gunnar, R.: Bacteremia and shock in man, Abstract (read by title only), AFCR, Clinical Research 17:230, 1969.

11. Decker, W.J. & Corby, D.G.: Activated charcoal as a gastrointestinal decontaminant; Experiences with experimental animals and human subjects, Clinical Toxicology, 3:1-4, Mar 1970.

12. Corby, D.G., Fiser, R.H. & Decker, W.J.: Re-evaluation of the use of activated charcoal in the treatment of acute poisoning, Ped Clin North Amer, 17:3, Aug 1970.

13. Corby, D.G. & Schulman, I.: Thrombasthenia, Amer J. Dis Child, 121:140-14 Feb 1971.

14. Corby, D.G., Lowe, R.S., Haskins, R.C. & Hebertson, L.M.: Congenital trichomegaly, pigmentary degeneration of the retina and sustained growth retardation in utero, AJDC, 121:344-345, 1971.

15. Corby, D.G. & Schulman, I.: The effects of antenatal drug administration aggregation of platelets of newborn infants, J. Pediat., 79:307-313, 19

16. Calvert, W.E., Corby, D.G., Hebertson, L.M. & Decker, W.J.: Acceptance o orally administered charcoal by children, JAMA, 215:641, 1971.

PUBLICATIONS - CONT'D

17. Corby, D.G. & Schulman, I.: Platelet defect in glycogen storage disease, Abstract (read by title only), Western Society of Pediatric Research, Clin Res, 19:207, 1971.

18. Corby, D.G. & Schulman, I.: Platelet function in experimental hyperbilirul Abstract, (read by title only), Western Society of Pediatric Research, Clin Res, 19:206, 1971.

19. Zuck, T.F., Bergin, J.J., Raymond, J.M., Dwyre, W.R. & Corby, D.G.: Platel adhesiveness in symptomatic women taking oral contraceptives, Thromb. et Diasthes. Haemorr., Vol XXVI, No. 3: 426-430, 1971.

20. Baum, E.S., Koch, H.F., Corby, D.G. & Plunket, D.C.: Neurologic complicati secondary to intrathecal methotrexate, Lancet, 1:649, 1971.

21. Zuck, T.F., Bergin, J.J. & Corby, D.G.: Effect of conjugated equine estrog on thrombin generation and serum thrombin neutralization, Abstract, (read title only), Program, American Society of Hematology, pg 266, 1971.

22. Corby, D.G., Shigeta, F.H. & Zuck, T.F.: Impaired ADP release from platele of normal term newborns, Abstract, (read by title only), Pediatric Resear 6:108, 1972.

PAPERS PRESENTED AT NATIONAL MEETINGS

1. Clinical comparison of pharmacologic emetics in children. 10th Annual Meeting, American Association of Poison Control Centers, Washington, DC, 23 Oct 1967.

2. Rabies control in the military community. International Rabies Symposium, El Paso, Texas, 1967.

3. Management of learning disabilities in the military setting. 4th Uniformed Services Pediatric Seminar, Washington, DC, 5 Mar 1968.

4. Adsorption of drugs and poisons by activated charcoal. 7th Annual Meeting Society of Toxicology, Washington, DC, 4 Mar 1968.

5. Activated charcoal as a gastrointestinal decontaminant; experiences with experimental animals and human subjects. Symposium on Gastrointestinal Decontamination, 2nd Annual Meeting, American Academy of Clinical Toxicology, Chicago, 1969.

6. Effect of antenatal drug administration on aggregation of platelets in newborn infants. 40th Annual Meeting, Society of Pediatric Research, Atlantic City, N.J., May 1970.

7. Acceptance of orally administered charcoal by children. Western Society of Pediatric Research, Carmel, California, Jan 1971.

8. Speculations on the implications of newborn platelet defects. III Congress International Society on Thrombosis and Haemostasis, Washington, DC, 1972

	Jul 1961 - 31 Oct 1964	Chief of Metabolic Div.,USAMRNL, FGH, Denver (included in this period, was on loan to ICNND to participate in a nutrition survey in Uruguay, S.A., Feb 1962-May 1962)
	Dec 1962 - Jun 1963	Monitor, Utilization Group, Surgeon General's Intravenous Nutriment Group
	Jun 1963 - 1966	Monitor, Surgeon General's Intravenous Nutriment Program
	31 Oct 1964 - Aug 1966	Commanding Officer, USAMRNL, FGH, Denvery Colorado
	6 Jan 1966 - 13 May 66	TDY, Associate Course, Command & Gen. Staff College, Ft. Leavenworth, Kansas
	Aug 1966 - Aug 1967	Commanding Officer, 121 Evac Hosp, Korea
	Sep 1967 - present	Commanding Officer, USAMRNL, FGH, Denver, Col
Education:		Elementary and High School, Barker Central School, Barker, New York
	1943 - 1944	The Military College of South Carolina (The Citadel), Charleston, S. Carolina Two semesters, ASTP
	1944	The Johns Hopkins University, Baltimore, Maryland, ASTP, 3 semesters
	Oct 1945 - Jun 1949	Columbia University's College of Physicians and Surgeons, New York, N. Y.
	Sep 1960 - Jun 1961	Vanderbilt University's School of Medicine, Nashville, Tenn. (Dept. of Biochem., - Nutrit and Metabolism)
	Jan 66 - May 66	Assoc Course Comd & Gen Staff College, Ft. Leavenworth, Kansas
Boards:	Certified as a Specialist in Clinical Nutrition by the American Board of Nutrition	

Special Activities:

1. Clinician for the ICNND Nutrition Survey - Uruguay, Feb-May 1962
2. Associate Guest Editor, Symp. on I.V.Fats - Am. J. Clin. Nutr. Jan. 1965.
3. The Surgeon General's Liaison Representative to:
   a. Nutrition Study Section, NIH (Sep 64 - present)
   b. Food & Nutrition Board, NRC-NAS (Oct 64 - present)
4. Member, Subcommittee on Vitamin B_6 of the Committee on Dietary Allowances of the Food & Nutrition Board, NAS-NRC (1965 to 1968)
5. Member, CSU Radiation Institute, Human Uses Radioisotope Committee, Colorado State University, Ft. Collins, Colo. (1964 to present)
6. Member of special advisory panel to Dr. J. M. May's project, "Studies in Medical Geography - The Ecology of Malnutrition"
7. DOD representative to the White House Committee on Nutrition - Dr. J. Mayer, Chairman
8. Perform staff advisory and consultant duties for the Nutrition Branch, Preventive Medicine Division, Office of The Surgeon General
9. Invited participant in various Ad Hoc meetings conducted by FASEB under funding from ARO

Academic Appointments:	1 July 1964	Affiliate Professor of Chemistry, Colorado State University, Fort Collins, Colorado
	1 July 1969	Affiliate Professor, Food Science & Nutriti Colo. State Univ., Ft. Collins, Colo.

Membership in Societies: Diplomate of the American Board of Medical Examiners; American Association for the Advancement of Science; American Medical Association; American Institute of Nutrition, American Society for Clinical Nutrition; American College of Clinical Nutrition; Association of Military Surgeons; International Society of Parenteral Nutrition; American Board of Nutrition

Publications:

1. Consolazio, C. F., Matoush, L. O., Nelson, R. A., Harding, R. S., and Canham, J. E.: The Dermal Excretion of Minerals and Its Possible Relation to Mineral Balance and Requirements. U. S. Army Medical Research and Nutrition Laboratory Report No. 271, Oct 1962.
2. Consolazio, C. F., Nelson, R. A., Matoush, L. O., Harding, R. S. and Canham, J. E.: The Sweat Excretion of Nitrogen in Relation to Balance, Environment and Physical Activity. U. S. Army Medical Research and Nutrition Laboratory Report No. 270, Oct 1962.

3. Consolazio, C. F., Nelson, R. A., Matoush, L. O., Harding, R. S. and Canham, J. E. Nitrogen Excretion in Sweat and Its Relation to Nitrogen Balance Requirements. J. of Nutr., 79: 399, 1963.

4. Consolazio, C. F., Matoush, L. O., Nelson, R. A., Harding, R. S. and Canham, J. E.: Excretion of Sodium, Potassium, Magnesium and Iron in Human Sweat and the Relation of Each to Balance and Requirements. J. of Nutr., 79: 407, 1963.

5. Nunes, W. T. and Canham, J. E.: The Effect of Varied Periodicity of Eating on Serum Lipid and Carbohydrate Tolerance in Man. Am. J. Clin. Nutr., 12: 334, 1963 (Abstract)

6. Baker, E. M., Sauberlich, H. E. and Canham, J. E.: Vitamin B_6 Requirement of the Human, Fed. Proc., 22: 322, 1963 (Abstract)

7. Canham, J. E., Nunes, W. T. and Eberlin, E. W.: Central Nervous System Manifestations of B_6 Deficiency in Normal Human Adults, Fed. Proc., 22: 322, 1963 (Abstract)

8. Consolazio, C. F., Matoush, L. O., Nelson, R. A., Harding, R. S., and Canham, J. E.: The Excretion of Nitrogen and Minerals in Sweat and Their Relationship to Balance and Requirements. Fed. Proc., 22: 550, 1963 (Abstract)

9. A report by the Interdepartmental Committee on Nutrition for National Defense: Nutrition Survey of the Republic of Uruguay, 1962. United States Government Printing Office, Washington, D. C.

10. Canham, J. E. and Sauberlich, H. E.: Chapter 15 entitled, "Vitamin B6" for "Handbook of Nutrition" compiled by the Council on Foods and Nutrition of the AMA initially scheduled for publication in 1965 - still unpublished.

11. Canham, J.E., Nunes, W. T. and Eberlin, E. W.: Electroencephalographic and Central Nervous System Manifestations of B6 Deficiency and Induced B6 Dependency in Normal Human Adults. Proceedings of the 6th International Congress of Nutrition, C. F. Mills & R. Passmore, Eds., Page 587 (abstract), published by Messrs. E & S. Livingstone, Ltd., Edinburgh, Scotland, 1964.

12. Sauberlich, H. E., Baker, E. M., Canham, J. E. and Raica, N. Jr.: Vitamin B6 Requirement of the Human, Proceedings of 6th International Congress of Nutrition, C. F. Mills & R. Passmore, Eds., Page 538 (Abstract), published by Messrs. E. & S. Livingstone, Ltd., Teviot Pl, Edinburgh, Scotland, 1964.

13. Levandoski, N. G., Baker, E. M. and Canham, J. E.: Studies on the Auto-Oxidation of L-Ascorbic Acid. (Abstract). Sixth International Congress of Biochemistry, New York City, N. Y., July 1964., Pub I.U.B., Vol. 32, Sect. V, G 176, p432, 1964.

14. Levandoski, N. G., Baker, E. M. and Canham, J. E.: A monodehydro Form of Ascorbic Acid in the Auto-Oxidation of Ascorbic Acid to Dehydroascorbic Acid. Biochemistry, 3: 1465-1469, Oct, 1964.

15. Baker, E. M., Canham, J. E., Nunes, W. T., Sauberlich, H. E. and McDowell, M. E.: Vitamin B_6 Requirement for Adult Men, Am. J. Clin. Nutr., 15: 59-66, 1964.

16. Jones, L. D., Castleberry, M. W., Canham, J. E., King, N. W.: Toxicity Testing of Fat Emulsions for Intravenous Administration Am. J. Clin. Nutrition, Jan, 1965, Vol 16: 68-74.

17. Levine, R. A., King, N. W. and Canham, J. E.: Hemodynamic Alterations Produced by Artificial Fat Emulsion Perfused Through the Isolated Fat Liver. Vol II, Fette in der Medizin, pp27-31, H. Henning, Ed., Pub. Pallas Verlag, Munich, 1965.

18. Canham, J. E., Jones, L. D., King, N. W. and Levine, R. A.: Metabolic and Toxicity Studies of Intravenously Administered Fat Emulsions, World Fat Congress, Hamburg, Germany, Oct 1964, Abstracts of Papers, pp 256-259, Published by Aschendorffsche, Buchdruckerei, Munster, Westf., Germany, 1964.

19. Baker, E. M., Canham, J. E. and Sauberlich, H. E. : Further Studies on the Vitamin B_6 Requirement for the Young Adult Male. (Abstract) Proc. 35th Ann. Meeting, Colorado-Wyoming Acad. Sci., 1964

20. Harding, R. S., Canham, J. E. and Sauberlich, H. E.: The Free Amino Acids in the Plasma and Urine of Human Subjects on a Vitamin B_6 Deficient Diet. (Ibid.)

21. Guest Editor "Symposium on Intravenous Fat Emulsions": Am. J. Clin. Nutrition, 16: 1-224, 1965.

22. Mueller, J. F. and Canham, J. E.: Editorial - Symposium on Intravenous Fat Emulsions. Am. J. Clin. Nutrition, 16: 1-3, 1965.

23. Canham, J. E., Harding, R. S., Consolazio, C. F. and Witt, N. F.: Gastrointestinal Degradations of Cellulose in the Human. Fed. Proc., 24: 314, 1965 (abstract).

24. Harding, R. S., Canham, J. E. and Sauberlich, H. E.: The Free Amino Acids in the Plasma and Urine of Human Subjects on a Vitamin B_6 Deficient Diet. In "Automations in Analytical Chemistry", Ed. - Leonard T. Skeggs, Jr., pp 643-647. Mediad, Inc. Publishers, 1966.

25. Consolazio, C. F., Matoush, L. O., Nelson, R. A. and Canham, J. E.: Comparisons of Nitrogen, Calcium and Iodine Excretion in Arm and Total Body Sweat. Fed. Proc. 24: 312, 1965 (abstract).

26. Matoush, L. O., Nelson, R. A., Consolazio, C. F. and Canham, J. E.: Sweat Losses in Relation to Trace Mineral Balances. Fed. Proc., 24: 312, 1965 (abstract).

27. Baker, E. M. and Canham, J. E.: Xanthurenic Acid Excretions after Loading with Various Forms of Tryptophane in the Evaluation of Vitamin B_6 Status. Fed. Proc., 24: 624, 1965 (abstract).

28. Canham, J. E. and Consolazio, C. F.: Nutrition and Stress. Proceedings of the VIIth National Conference on the Medical Aspects of Sports (1965), published by AMA, Chicago, Ill., 1967.

29. Surks, M. D. and Canham, J. E.: Albumin Metabolism in Men at High Altitud Fed. Proc. 25: 399, 1966 (abstract).

30. Consolazio, C. F., Matoush, L. O., Nelson, R. A., Harding, R. S. and Canham, J. E.: Nutrition Survey - Ranger Department, Fort Benning, Georgia, USAMRNL Report No. 291, January 1966, Denver, Colorado.

31. Canham, J. E., Baker, E. M., Raica, N., Jr. and Sauberlich, H. E.: Vitamin B_6 Requirement of Adult Men. Proceedings of VII International Congress of Nutrition, Hamburg, Germany, August 1966 (abstract).

32. Consolazio, C. F., Matoush, L. O., Nelson, R. A., Isaac, G. J. and Canham, J. E.: Comparison of Nitrogen, Calcium, and Iodine Excretions in Arm and Total Body Sweat. Am. J. of Clin. Nutrition, 18: 443-448, 1966.

33. Tillotson, J. A., Sauberlich, H. E., Baker, E. M. and Canham, J. E.:: Use of Carbon^{14} Labeled Vitamins in Human Nutrition Studies. In Proceedi of the Seventh International Congress of Nutrition - Hamburg, 1966, Vol. 5, Physiology and Biochemistry of Food Components: 554 - 557, Pergamon Press, Inc., Long Island City, N. Y., 1967.

34. Canham, J. E., Baker, E. M., Raica, N. Jr. and Sauberlich, H. E.: Vitamin B_6 Requirement of Adult Men. Ibid., pp 558-562.

35. Canham, J. E.: Relationship of Physical Performance to Nutrition Status. Proceedings of the Third Far East Symposium on Nutrition. Manila, Philippines, Feb. 14-21, 1967, U.S. Govt Printing Office, Wash., D.C., 1968., pp 181-189.

36. Canham, J. E., Baker, E. M., Harding, R. S., Sauberlich, H. E. and Hoogh, I. C.: Dietary Protein - Its Relationship to Vitamin B_6 Requirements and Function. New York Acad. of Sciences, Vol. 166, Art. 1, pp 16-29, Sept. 1969.

37. Canham, J. E.: Chairman's Introductory Remarks and Summary of Session IV - Fat Emulsions. Proceedings of an International Symposium on Parenteral Nutrition. H. C. Meng, Ed., C. C. Thomas, Publisher - 1970.

38. Hood, J., Hodges, R. E., Canham, J. E., Sauberlich, H. E. and Baker, E. M.: Manifestations of Experimental Scurvy. Am. J. Clin. Nutr. 23: 664, 1970 (abstract).

39. Hood, J., Hodges, R. E., Canham, J. E., March, S. C., Davenport, R. E., Baker, E. M.: Clinical Manifestations of Experimental Scurvy. Fed. Proc. 29: 279, 1970 (abstract).

40. Sauberlich, H. E., Canham, J. E., Baker, E. M., Raica, N. and Herman, Y. F.: Human Vitamin B_6 Nutriture. For publication in Symp. Issue in honor of the 50th Anniv. Nutr. Res. Institute, Hyderabad, India, May 1970 and Am. J. Clin. Nutr. (in press).

41. Canham, J. E.: Nutrition Program at the U. S. Army Med. Res. and Nutr. Lab. Presented at 3rd Nutr. Symposium, Walter Reed Army Institute of Res. Submitted for publication in Proceedings, May 1970.

42. Hodges, R. E., Hood, J., Canham, J. E., Davenport, R. E., Sauberlich, H. E. and Baker, E. M.: Clinical Manifestations of Vitamin C Deficiency in Man. Am. J. Clin. Nutr. (in press - April 1971).

43. Hodges, R. E. and Canham, J. E.: Studies of Experimental Vitamin C Deficiency in Man. Submitted to Fed. Proc. for publication.

44. Baker, E. M., Hodges, R. E., Hood, J., Sauberlich, H. E., March, S. C. and Canham, J. E.: Metabolism of ^{14}C and ^{3}H Labeled L-Ascorbic Acid in Human Scurvy. Am. J. Clin. Nutr. (in press - April 1971).

45. Canham, J. E., Consolazio, C. F. and Sauberlich, H. E.: Nutrient Intake and Nutritional Status of Selected Military Populations. Presented at AIN, FASEB Symposium entitled "Nutrition Problems, USA", April 1969. Manuscript to be submitted to Military Medicine for publication.

Areas of Research: Areas of research acitivty has been in the following fields:

1. The effects of periodicity of eating upon normal intermediate metabolism in humans.

2. The degradation and possible utilization of cellulose in humans.

3. Have supervised the conduct and collaborated with other investigators in the performance of six studies on Vitamin B_6 metabolism in the normal adult male human inclucing deficiency studies. These studies resulted in the original observation that vitamin B_6 deficiency in the adult can produce electroencephalographic abnormalities and convulsive seizures plus the original observation that excessive intake of vitamin B_6 can produce electroencephalographic abnormalities in the adult.

4. Have also participated in studies to determine the usability utilization and toxicity of various intravenous fat preparations.

5. Additional activities include participation with C. F. Consolazio in studies aimed at defining the extent of nutrient loss in perspiration of active adult males living in various environmental temperatures.

6. Have been responsible for the planning, coordination and supervision of Army nutrition surveys which involved various divisions of the Laboratory.

7. Additional areas of research activity have included the auto-oxidation of ascorbic acid in aqueous solutions and the relationship of these products to the normal metabolic function of ascorbic acid.

John E. Canham, , M.C

ISOTOPE STUDIES INVOLVING THE USE OF ^{14}CARBON OR ^{3}TRITIUM IN HUMANS, PERFORMED SINCE 1961 TO DATE

1. Tracer studies of vitamin C utilization in man, using L-Ascorbic-1-^{14}C acid. (Use of 7 subjects) 1961-62 (30 μc per subject)

2. Effect of INH on oxolate, tryptophan and ascorbic acid metabolism. (Used ^{14}C-labeled ascorbate in 1 subject) 1962 (50 μc)

3. Metabolism of Glycine-1-^{14}C and Glycine 2-^{14}C. (Use of 7 subjects) 1962 (30 μc per subject)

4. Respiratory catabolism in man of the degradative intermediates of L-Ascorbic-1-^{14}C acid (use of 3 subjects) 1963 (36 μc per subject)

5. Studies of Vitamin B_6 - ascorbic acid interrelationship utilizing L-Ascorbic-1-^{14}C acid (used 3 subjects) 1965 (50 μc per subject)

6. Metabolism of ^{14}C - labeled pyridoxine (vitamin B_6) in man (used 2 subjects) 1965 (45 - 50 μc per subject)

7. Metabolism of ^{14}C - labeled thiamine (vitamin B_1) in man (used 1 subject) 1965 (46 μc)

8. Metabolism of L-Ascorbic-4-^{3}H acid in man (used 1 subject) 1966 (100 μc)

9. Metabolism of ^{14}C-labeled cellulose in man (one subject studied) May 1966

10. Metabolism of ^{14}C-labeled thiamine (vitamin B_1) in man (used 1 subject) 1967 (43 μc)

11. Metabolism of L-Ascorbic-1-^{14}C acid and L-Ascorbic-4-^{3}H acid in human scurvy (3 subjects received ^{14}C and 2 subjects received both ^{14}C and ^{3}H label at Univ. of Iowa) 1967-68 (150 μc ^{14}C on initial label, 160 μc ^{3}H per subject, 100 μc ^{14}C during 100 day repletion period at rate of 1 μc/day. Total 250 μc ^{14}C administered over an 8-month period)

12. Vitamin A-15-^{14}C acetate administered to 9 subjects. Total dose was 130 μc/man (label administered at Univ. of Iowa, Medical School, Iowa City, Feb. 1969)

13. Study of body composition with measurement of whole body water by administration of Tritiated water containing 600 μc H^3 each to 104 men, Ft. Carson, Colo., Nov. '6[illegible]

Form AEC-313 a (10-61) Page 3

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

SUPPLEMENT A—HUMAN USE

Form approved Budget Bureau No. 38-R08

This page may be completed by the physician's preceptor (if any) in the medical use of radioisotopes. When the information is not furnished by the preceptor, the name and present address of the preceptor (if any) should be shown in item 12 below.

9 (a) USING PHYSICIAN'S NAME

John E. Canham, MC

(b) NAME AND ADDRESS OF APPLICANT (If different from 9(a))

Commanding Officer
U. S. Army Medical Research and Nutrition Laborator
Fitzsimons General Hospital, Denver, Colorado [illegible]

10 CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN WHO WILL USE BYPRODUCT MATERIAL

(A) ISOTOPE	(B) CONDITION(S) DIAGNOSED OR TREATED	(C) NUMBER OF CASES	(D) TYPE OF PARTICIPATION FOR ALL CASES IN COLUMN B (circle applicable numbers of items in accordance with key set forth below)
I-131	Diagnosis of thyroid function	20-25	(1) 2 3 4
	Treatment of hyperthyroidism		1 2 3 4
	Treatment of thyroid cancer		1 2 3 4
	Treatment of cardiac conditions		1 2 3 4
	Brain tumor localization		1 2 3 4
	Blood determinations		1 2 3 4
	Kidney function		1 2 3 4
	Others:		1 2 3 4
P-32 Soluble	Treatment of polycythemia and leukemia	2	(1) 2 3 4
	Brain tumor localization		1 2 3 4
	Treatment of bone metastases		1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
P-32 $CrPO_4$	Treatment of prostatic cancer		1 2 3 4
	Treatment of cervical cancer		1 2 3 4
	Treatment of pleural effusions and/or ascites		1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
Au-198 Colloid	Treatment of prostatic cancer		1 2 3 4
	Treatment of cervical cancer		1 2 3 4
	Treatment of pleural effusions and/or ascites		1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
Cr-51	Blood determinations		1 2 3 4
	Others:		1 2 3 4
			1 2 3 4
Other Isotopes			1 2 3 4
			1 2 3 4
	Co^{60} and Vitamin B^{12}	24	(1) (2) 3 (4)

Key to above numbers (column D)

Active Participation and Discussion in the

1. Examination of patients to determine suitability for radioisotope diagnosis and/or treatment and recommendations on dosage to be prescribed
2. Calibration and administration of dosages including related measurements and plotting of data.
3. Active period of training and experience of sufficient duration to permit followup of patients through treatment and posttreatment period including reevaluation as to effectiveness and complications.
4. Study and discussion of case histories to establish most efficacious diagnostic and/or therapeutic techniques for this radioisotope use.

11 TOTAL NUMBER OF HOURS OF PARTICIPATION IN CLINICAL TRAINING [illegible] hours

12 THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OR GUIDANCE OF

[illegible] USA Med Res & Nutr Lab
" " " " "

[illegible], Ph.D., AT [illegible]
(Name of physician (preceptor)) (Institution)

John E. Canham
(Signature of physician (preceptor))

Form AEC-313 (5-58)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	U.S. Army Hosp, Wurzburg & Ft. Sam Houston; Vanderbilt Univ. School of Med.	2½ yrs 13½ mos	Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Vanderbilt University School of Medicine	4½ mos formal 9 mos on job	Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Same as b. above		Yes No	Yes No
d. Biological effects of radiation	Same as b. above		Yes No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co^{60}	0.5uc/patient or subject	Nutr Cl, Vanderbilt Univ	9 mos	Studies on Vit. B12 requirements & half life in humans
Co^{60}		Dept. Biochem., Vanderbilt	4 mos	" " "
	See	Attached Sheet		

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, survey, ...ring)

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

John E. Cannham

JOHN E. CANNHAM, COL, MC

Applicant named in item 1

Date 10 December 1969

By: J. E. Henderson

J. E. HENDERSON, COL, VC

Chief, Radioisotope Br., USAMRIL

Title of certifying official

WARNING.—18 U. S. C., Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U.S. GOVERNMENT PRINTING OFFICE 1961 O—613943

Form AEC-313 (5-55) Page

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	U.S. Army Hosp. Nurnberg & Ft. San Vanderbilt Univ. School of Med.	2½ yrs 12½ mo	(Yes) No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Vanderorbilt University School of Medicine	1½ mo formal 9 mo on job	(Yes) No	(Yes) No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Same as b. above		(Yes) No	Yes No
d. Biological effects of radiation	Same as b. above		Yes No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co^{60}	0.5uc/patient or subject	Nutrition Clinic, Vanderbilt University.	9 months	Studies on Vitamin B requirements½ half l in humans.
Co^{60}		Dept. Biochemistry Vanderbilt University.	4 months	Relationship B12 to Calcium in B_{12} absor
C-14, Cr-51, I-131 Fe-59, Mn-52		" " "	4 months	Laboratory experiments

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

CERTIFICATE (This item must be completed by applicant)

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John E. Canham
Applicant named in item 1

Date _____ By: _____

47342
Title of certifying official

WARNING.—18 U. S. C., Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

CURRICULUM VITAE

NAME: Morrissey, Robert L.

ADDRESS: USAMRIID, Radioisotope Branch
Box 327
Fitzsimons General Hospital
Denver, Colorado 80240

PHONE: 303--366-5311, Ext. 26111 (Work)

MARITAL STATUS: Married

NUMBER CHILDREN: 4

CITIZENSHIP: American

Education

High School - I graduated from Erie Community High School at Erie, Illinois in June of 19[illegible], ranking 7th in a class of 56.

College - I received the B.S. (Veterinary Medicine) on June 15, 1963 and the D.V.M. on June 19, 1965 from the University of Illinois, ranking 5th in a class of 33.

Post Doctoral - I received the Ph.D degree in Physical Biology, with minor in Biochemistry and Animal Physiology from Cornell University in June of 1970.

Military

From October 1968 to August 1970, I was stationed at the U. S. Army Medical Research Laboratory at Fort Knox, Kentucky. I was assigned to the Pathology Division under the supervision of MAJ D. K. Hysell, who is a board certified Veterinary Laboratory Animal Medicine Specialist with a M.S. in Veterinary Pathology. My duties included clinical work on laboratory animals, supervision of the clinical pathology laboratory and the conception, proposal and accomplishment of in house independent research projects.

College Awards, Fellowships, Honors, etc.

1. Hunter Scholarship ($1800) during 1958-60.
2. Work Scholarship (tuition) during 1961-62.
3. Illinois Trotters Association Award ($500) during 1962-63.
4. Pfizer Award ($400) during 1964-65.
5. Recognized as "student of the month" in the College of Agriculture newsletter sometime during 1959.
6. Appointed to the Illinois Veterinarian staff during my 2nd, 3rd, and 4th years of veterinary training, serving as co-editor during the final year.
7. Elected as class representative to the student loan fund board during 1964 and 1965.
8. Received into the MU Chapter of Phi-Zeta (Veterinary scholastic honor society in 1964.
9. Received an NIH post doctoral fellowship which started in June of 1967 and continued through August of 1968, during which time I completed most of the requirements for the Ph.D. degree.

Research Experience

1. I first became involved in research while working for Prof. Kenton A. Kendall, who was studying the metabolic factors affecting the parturient paresis syndrome in dairy cattle. My duties included collection of specimens (mainly blood and urine) and assaying them for a variety of compounds or electrolytes, including calcium, inorganic phosphate, sodium, potassium, glucose, galactose, alkaline and acid phosphatase, vitamin A, and paper chromatography of carbohydrates. I also did some library research for the project. I worked in this capacity between June of 1962 and June of 1965, receiving $1.60 per hour at the start, and $2.40 per hour at the finish of the period.

2. In [illegible] under Dr. A. R. Twardock, [illegible] placental [illegible] calcium [illegible] the placental transfer [illegible] and placental [illegible] against strontium [illegible] these studies provided the basis for the NIH fellowship [illegible].

3. In September of 1965, I transferred the NIH fellowship to Cornell University where I eventually became involved in the study of intestinal calcium absorption under the sponsorship of Dr. Robert H. Wasserman. My thesis was entitled "Regulation of Intestinal Calcium Absorption" and a summary of the research is enclosed.

Other Experience

During my earlier college career I held part time and(or) summer jobs at the Poultry Farm, Dairy Farm, and Large Animal Veterinary Clinic.

Professional References

1. Dr. Robert H. Wasserman, Dept. of Physical Biology, NYS Veterinary College, Cornell University, Ithaca, N.Y. 14850.

2. Dr. Cyril L. Comar, Dept. of Physical Biology, NYS Veterinary College, Cornell University, Ithaca, N.Y. 14850.

3. Dr. Charles E. Stevens, Dept. of Veterinary Physiology, NYS Veterinary College, Cornell University, Ithaca, N.Y. 14850.

4. Dr. Walter L. Nelson, Dept. of Biochemistry, Cornell University, Ithaca N.Y. 14850.

5. Major David K. Hysell, USAMRL, Pathology Division, Fort Knox, Ky. 40121

6. Dr. A. Robert Twardock, Dept. of Physiology, College of Veterinary Medicine, University of Illinois, Urbana, Illinois 61801.

7. Dr. Roger P. Link, Dept. of Physiology, College of Veterinary Medicine, University of Illinois, Urbana, Ill. 61801.

8. Dr. Erwin Small, Small Animal Clinic, College of Veterinary Medicine, University of Illinois, Urbana, Ill. 61801.

9. Dr. Kenton A. Kendall, Dept. of Dairy Science, College of Agriculture, University of Illinois, Urbana, Ill. 61801.

10. Dr. H. S. Scott, Poultry Science Division, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

11. Dr. Harry Hardenbrook, Large Animal Clinic, College of Veterinary Medicine, University of Illinois, Urbana, Ill. 61801.

1. Dr. [illegible], [illegible], Erie, [illegible]

2. Peter Forman Eckelmann, 117 Christopher Circle, Ithaca, New York 148

3. Mr. James Skinner, 446 Southland Drive, Radcliff, Ky. 40160.

Community Activities

1. I was Treasurer of Faith Bible Church (117 Christopher Circle, Ithaca, N.Y. 14850) during 1967 and 1968 and also Sunday School Superintendent during 1968.

2. From August 1969 to August 1970, served on the Board of Directors for Military Missionary Fellowship of Kentucky (446 Southland Drive, Radcliff, Ky.) and also as Treasurer for the Youth Activity Center which the mission was building.

Publications

1. Regulation of intestinal calcium absorption. R. L. Morrissey. Cornell University Ph.D thesis, June 1970.

2. Adaptation, calcium binding protein (CaBP) and the intestinal absorption of calcium. R. L. Morrissey and R. H. Wasserman. Federation Proceedings 29: 847 Abs. 3405, 1970.

3. Calcium binding protein: Endogenous induction. R. L. Morrissey, D. K. Bysell and W. L. Janik. USAMRL Report No. 859, March 1970.

4. Control of calcium absorption: Influence of vitamin D_3 hydroxylation on the calcium binding activity of chick duodenal mucosa. R. L. Morrissey, D. K. Bysell and W. L. Janik. USAMRL Report No. [illegible], July 1970.

5. Effect of heparinized saline infusion and hypotension on calcium homeostasis in the dog. R. L. Morrissey, R. I. Hinderer, C. E. Shields and D. K. Bysell. USAMRL Report No. [illegible], July 1970.

6. A case of multiple parasitism in a sooty mangabey (Cercocebus torquatus atys). D. K. Bysell, F. L. Del Greco, W. L. Janik and R. L. Morrissey. USAMRL Report No. 859.

Papers Submitted for Publication

1. Adaptation, calcium binding protein (CaBP) and the intestinal absorption of calcium. R. L. Morrissey and R. H. Wasserman. Amer. J. Physiol.

2. Transferrin of the Sooty Mangabey (Cercocebus torquatus atys). R. L. Morrissey, D. K. Bysell and W. L. Janik. USAMRL Report No. [illegible], August 1

Form 1

TRAINING AND EXPERIENCE OF [illegible]

	WHERE TRAINED	DURATION (Hrs/Wks)	CERTIFICATE (Yes/No)	FORMAL COURSE (Yes/No)
a. Principles and practices of radiation protection	Univ. of Illinois	1 yr	(Yes) No	Yes No
b. Radiation measurement, standardization and monitoring techniques and instruments	Cornell Univ.	3 yrs	(Yes) No	(Yes) No
c. Mathematics and calculations basic to the use and measurement of radioactivity	USAMRL, Ft. Knox, KY	2 yrs	(Yes) No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. (Attach supplemental sheet if additional experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE USED	DURATION OF EXPERIENCE	TYPE OF USE
45Ca	.1 mc	U of Ill[illegible], Cornell U	4 yrs.	Ca & Sr metabolism
85Sr	.1 mc	U of Ill[illegible], Cornell U	4 yrs.	" " "
47Ca	.1 mc	Cornell U	3 yrs.	Ca absorption
3H	.01 mc	USAMRL, Ft. Knox, KY	6 mo.	Vit. D_3 metabolism

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, survey, or measuring)

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier)

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Exploratory sketch of facility is attached. (Circle answer) Yes No

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

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Robert L. Morrissey
Applicant named in Item 1

Date 6 Sept 1970

By: [signature]
Title of certifying official

JOHN E. CANHAM, COL, MC, Commanding

WARNING: 18 U. S. C. Section 1001, Act of June 25, 1948; 62 Stat. 749, makes it a crime for any person knowingly and willfully to make to any Department or Agency

APPENDIX II

RADIATION PROTECTION

1. Hospital Regulation 40-604, dated 15 November 1972. Radiation Safety (Incl 1).

2. Special Order 218, Fitzsimons Army Medical Center, dated 29 September 1970 (Incl 2).

3. Radiation Protection Standing Operating Procedure Manual.

FITZSIMONS GENERAL HOSPITAL
Denver, Colorado 80240

*HOSPITAL REGULATION
NUMBER 40-604

15 November 1972

MEDICAL SERVICES

RADIATION SAFETY

1. Purpose. To outline the duties and responsibilities of the Radiation Protection Officer at this installation.

2. General. The term "radiation" as used herein encompasses all forms of ionizing radiation (x-ray machines, radioisotopes and other by-products and/or fissionable materials).

3. Responsibilities.

a. The Installation Commander is ultimately responsible for insuring safe usage, storage and disposal of all sources of ionizing radiation and for enforcing measures as prescribed by The Surgeon General, the Atomic Energy Commission and other technical services. Specific references are cited in paragraph 4 and in various Department of the Army and SGO Circulars.

b. It will be the responsibility of the Radiation Protection Officer to advise the Commander on matters of radiation safety and to point out hazardous situations or practices contrary to accepted operating procedures and regulations. To fulfill this requirement, the Radiation Protection Officer has the authority to inspect any facility on this post where ionizing radiation hazards could exist. His specific duties are as follows:

(1) Insure that a high level of instruction exists for new personnel relative to safe working practices.

(2) Investigate the nature and degree of radiation injuries or abnormal exposure to determine the cause and make recommendations to prevent recurrence.

(3) Observe operational procedures to insure that radiation exposure of personnel is kept as far below the radiation protection guides as possible.

(4) Assure that personnel monitoring devices are used where prescribed and that permanent records are kept of the results.

---

*This Hospital Regulation supersedes HR 40-604, 18 January 1971.

(5) Assure that warning signs are in place when and wherever required.

(6) Review and countersign procurement requests for radioactive material and maintain records of the amount and location of all sources of ionizing radiation, as outlined in paragraph 2, Hospital Regulation 40-602.

(7) Review radiation surveys and records of such surveys maintained in the isotope laboratories, including descriptions of recommended corrective measures.

(8) Review protocols of radioisotope studies, procedures or treatments at this installation.

(9) Assay radiation hazards and give radiologic clearance prior to post-mortem examinations, or embalming by the mortician, in cases of all persons dying within six months after radioisotope therapy.

(10) Call special meeting of the Isotope Committee of Fitzsimons General Hospital when discrepancies are uncovered in the handling of radioactive materials.

4. References.

a. AR 40-14.

b. AR 40-37.

c. AR 700-52.

d. AR 755-15.

e. TB MED 62.

f. TB MED 249.

g. TB MED 254.

h. Fed Reg, Vol 22 #19, Title 10, Chapter 1, Part 20.

MEDEO-X

FOR THE COMMANDER:

B. F. BLACK
Major, MSC
Adjutant

DISTRIBUTION:
"B"
Plus 1 ea - B50

Para 28, SO 218, 29 Sep 70, FGH, Cont

Effective date: 29 Sep 70
Special Instructions: (c) Agent will be notified of payday and time of payroll pickup through the installation Daily Bulletin. Individual appointment orders and ID Card must be presented to the F&A Officer or Deputy at the time of obtaining unit payrolls and funds. Agents obtaining cash must be accompanied by an armed guard prior to the release of funds. It is suggested that check agents be armed. Funds will not be commingled or entrusted to others for any purpose. Additional instructions will be provided on receipt of funds.

FOR THE COMMANDER:

B F BLACK
Major, MSC
Adjutant

OFFICIAL:

D I HOST
Major, MSC
Asst Adjutant

DISTRIBUTION:
33 - Off (Para 25 & 26 & 28) 3 ea
20 - Pers Actions
22 - Off 201
10 - CO MHC
11 - F&AO
6 - Str Actg
2 - APO
2 - Adj
1 - Enl Eval
1 - Msg Ofc
1 - Plans & Tng (SGM Lesser)

APPENDIX III
RADIATION DETECTION INSTRUMENTS

TYPE OF INSTRUMENT	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (Mr/nr)	WINDOW Thick, Mg/cm^2	USE
1. Victoreen 440	1	Beta, gamma	0-300	3.0	Monitoring
2. Victoreen Thyac III					
GM Probe	2	Beta, gamma	0-200	-	Monitoring
Alpha Probe	1	Alpha	0-200	3.0	Monitoring
3. Victoreen Cond "R" Meter- 570					
Probe 651	1	gamma, X	250R	6.6	Measuring
Probe 130	1	gamma, X	0.25R	212	Measuring
Probe 70-5	1	gamma, X	25R	67	Measuring
Probe 131	1	gamma, X	100R	89	Measuring
Probe 621	1	gamma, X	100R	576	Measuring
4. Victoreen Radocon II-555					
Probe 555-100 HA	1	gamma, X	0.0974	643	Measuring
Probe 555-0.1 MA	1	gamma, X	97.40	212	Measuring
Probe 555-100MA	1	gamma, X	0.9740	144	Measuring

TYPE OF INSTRUMENT	NUMBER AVAILABLE	RADIATION DETECTED	SENS. RANGE	USE
5) PHO/GAMMA CAMERA II NUCLEAR CHICAGO Model #6401 with strip chart recorder attachment N.C. model #3445	1	Gamma		Measu
6) Nuclear Chicago Uptake Unit includes:				
Analyzer Input Model #8742	1			
Ultrascaler II model #8276	1			
Sample Changer Model #813050	1			
Autosubtract Model #8721	2			
7) Picker Nuclear Magnascanner II (3 inch crystal)	1	Gamma		Measu
8) Picker Nuclear Magnascanner V (5 inch crystal)	1	Gamma		Measu
9) Picker Nuclear Twinscaler II (Model #600-125) with floor model well	1	Gamma		Measu
10) Picker Nuclear Autowell with Twinscaler II model #600-125	1	Gamma		Measu
11) Picker Nuclear Dual Probe System includes:				
Dual Rate Computer model #60082	1			
Dual Channel Analyzer model #600145	1			
Strip Chart Recorder model #PWD 600-092	1			
Digitape 4 (tape recorder) #626155	1			
Monroe Data/log model #MC10-40	1			
12) Ames Atomium Volemetron with memory unit	1	Gamma		Measu
13) Mediac Nuclear Chicago Dose Calibrator model #6362	1	Gamma	75KEV-3MEV	Measu & Assa
14) Picker Nuclear Laboratory Monitor model #600081 with GM tube	1	Gamma	up to 30,000 cpm	Surveyir Monitori
15) Radiac Survey Meter 203/PDR-27R	1	Beta, Gamma	up to 500 mr/hr	Surveyir Monitori
16) Packard TM-Care Liquid Scintillation Spectrometer	1	Alpha, Beta Gamma		Measu
17) Packard Gamma Scintillation Spectrometer	2	Alpha, Beta Gamma		Measu
18) Eberline Radiation Monitor RM-14	1	Beta	0-50K 30.	Monit
Probe HP-177		Gamma	CPM	
		Gamma	CPM	

Items 1-4, 15, 18 are calibrated quarterly by the Sacramento Army Depot, Sacramento, California.

All other items are calibrated at use using manufacturers prescribed techniques with locally available standard sources.

APPENDIX IV

Locations, Facilities, Laboratories

1. Attached as inclosures to this annex are floor plans of locations on this installation where radioactive material authorized by this license will be used. Facilities and equipment are indicated on the diagrams.

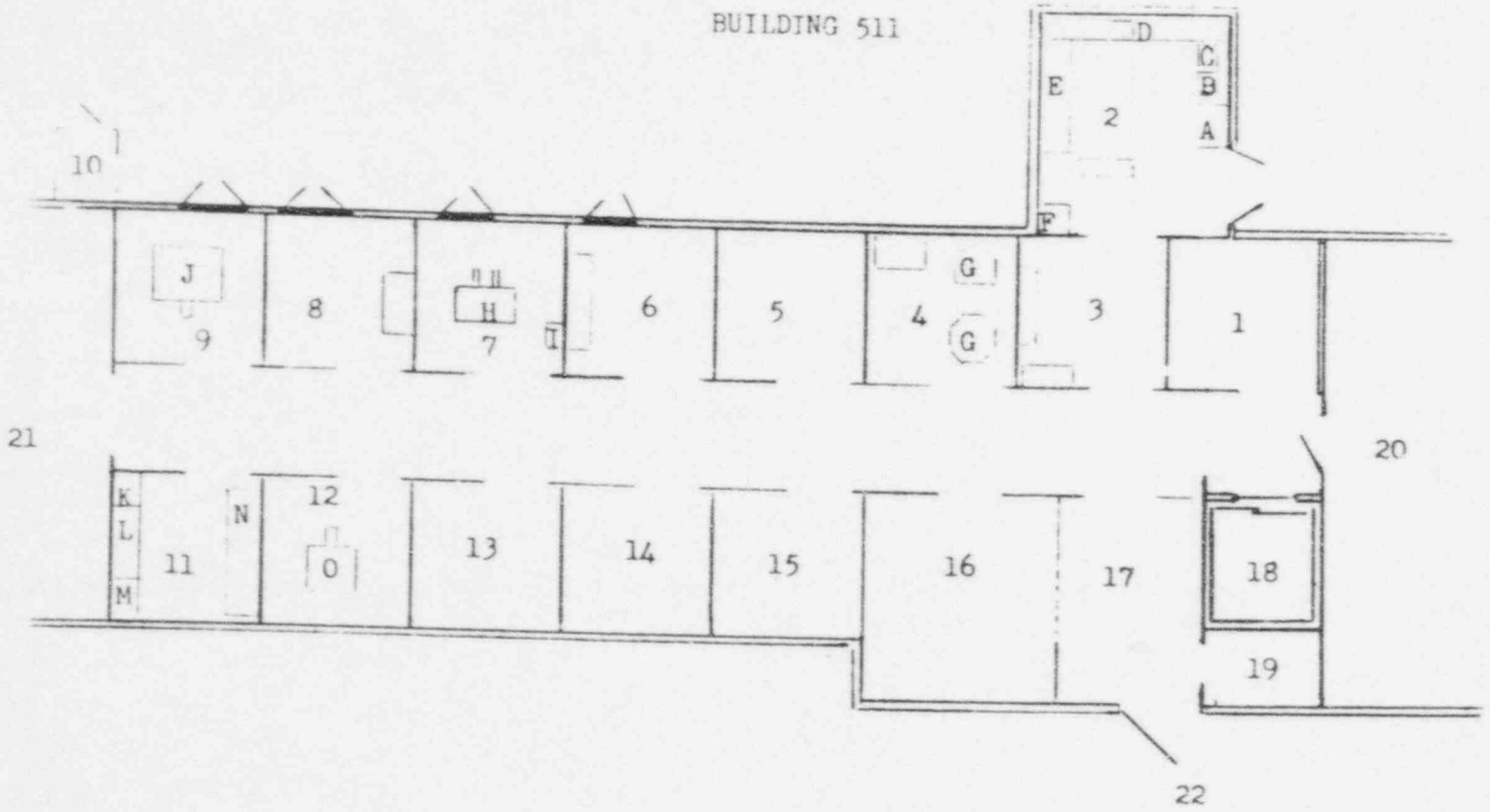
a. Nuclear Medicine Service (Human Use).
b. Department of Pathology (In-vitro Tests)
c. Clinical Investigational Service (In-vitro Research)

2. Therapy patients involving both sealed and non-sealed sources are housed on appropriate wards in private isolated rooms in Building 500, the main hospital. (See annex of the Radiation Health and Safety Standing Operating Procedure, Appendix II to this application.) Approval of the individual room for therapy use is given by the RPO after a survey of the surrounding area.

3. In accordance with, Amendment 30 of the existing AEC license 05-0046-13, approval of additional locations and the facilities contained therein for in-vitro use of radioactive material for diagnostic and research procedures is granted locally by the Fitzsimons Army Medical Center Radioisotope Committee. The Committee's action is based on recommendations of the RPO following an extensive survey of the facility.

NUCLEAR MEDICINE SERVICE

BUILDING 511



LEGEND FOR FLOOR PLAN OF DIAGNOSTIC RADIOISOTOPE SECTION

Room 1 - Scan room

Room 2 - Laboratory
- A - Hood
- B - Hot sink
- C - Radioisotope storage (lead brick enclosure with lead sheet bottom)
- D - Dose Calibrator
- E - Cold sink
- F - Cold storage radioisotopes. Radioisotopes to be refrigerated are kept in original shipping lead containers

Room 3 - Laboratory Office

Room 4 - Camera room
- G - Pho/Gamma Camera

Room 5 - Latrine

Room 6 - Store room

Room 7 - Renogram room
- H - Dual probe machine
- I - Tape recorder attachment

Room 8 - Uptake room Nuclear Chicago Radiation Counting System

Room 9 - Scan room
- J - Magnascanner V

Room 10 - Decay storage

Room 11 - Well counting
- K - Volemetron
- L - Autowell
- M - Refrigerator
- N - Dual channel scaler and floor model well

Room 12 - Doctors Office - Residents

Room 13 - Scan room
- O - Magnascanner II

Room 14 - Chief, Nuclear Medicine Service

Room 15 - Supervisors Office

Room 16 - Administration

Room 17 - Reception and Patient waiting area

Room 18 - Elevator

Room 19 - Office supplies

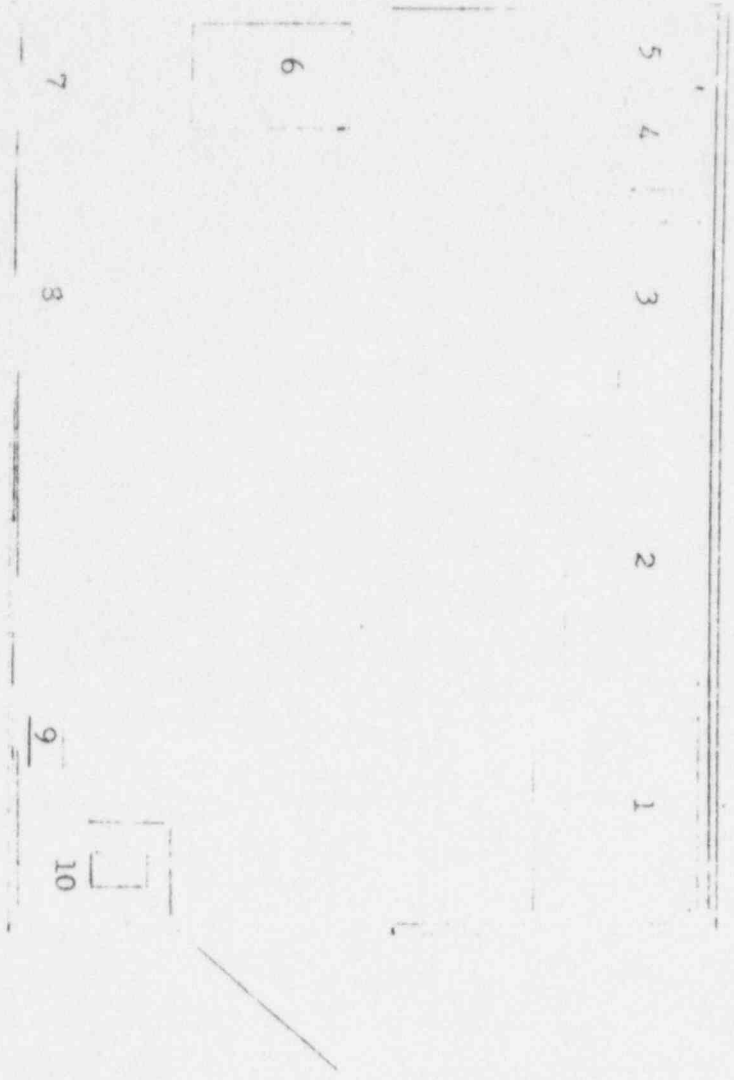
Room 20 - Library (door closed)

Room 21 - Endocrine Clinic

The floor plan and accompanying legend details space and instrumentation as of 21 February 1974. All radiopharmaceuticals are procured and received according to HR 20-602 and stored in designated area in laboratory. All doses are prepared and administered in laboratory area. Books are kept on each radioisotope for procurement, use and disposal. The decay storage room is kept locked at all times. All other doors are kept locked when no one is in attendance.

RADIOIMMUNOASSAY LABORATORY

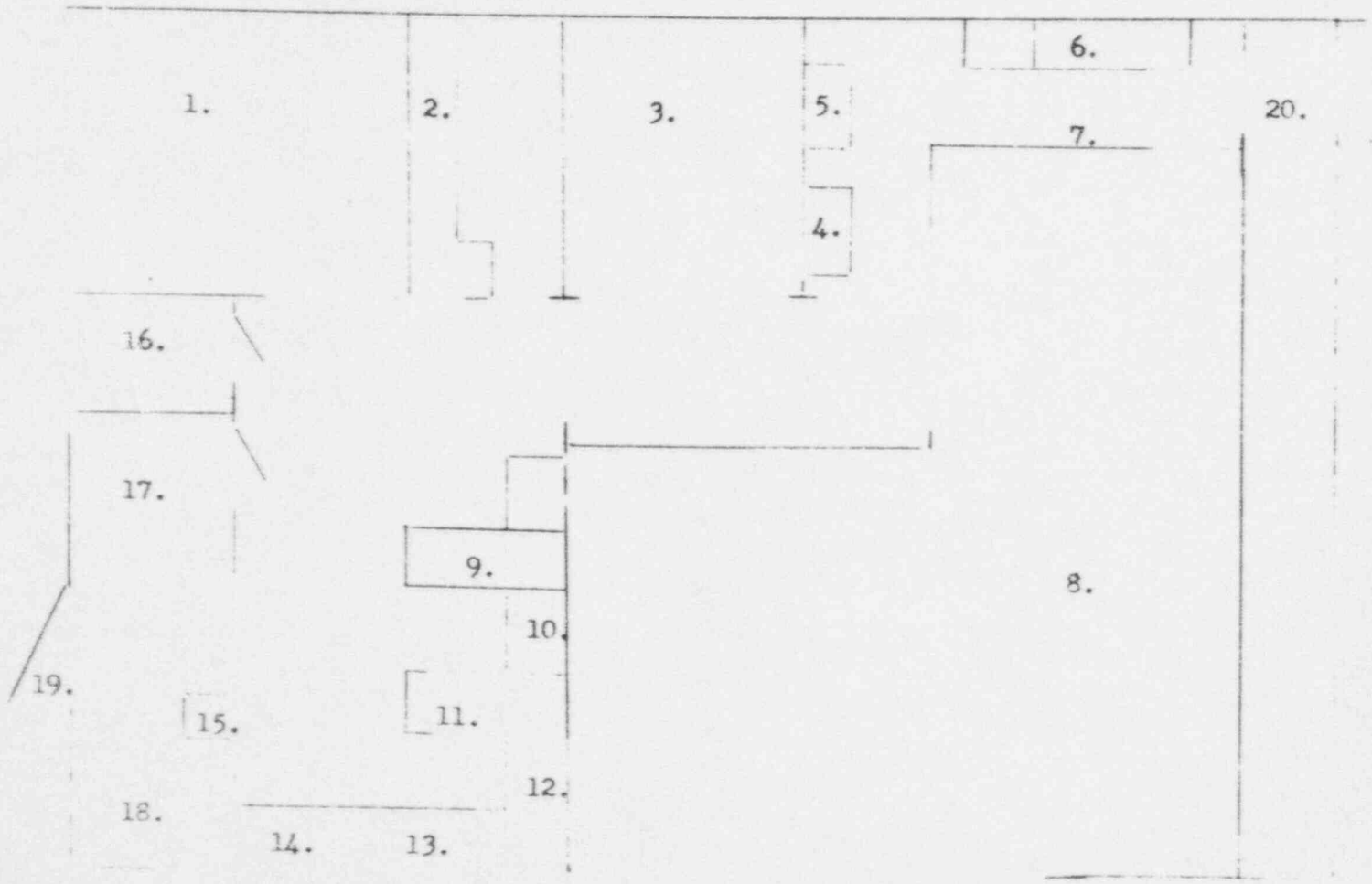
Building 511 Floor 2 North Exterior



1. Centrifuge.
2. Desk.
3. Packard Auto-Gamma.
4. Refrigerator.
5. Waste.
6. Freezer
7. Laboratory Bench
8. Laboratory Bench (Isotope work area)
9. Sink 1 (not hot)
10. Sink 2 (not hot)

CLINICAL INVESTIGATIONAL SERVICE

BIOCHEMISTRY LABORATORY



1. General Investigators Office.
2. Storage.
3. Lounge and Study Area.
4. Packard Tri-Carb Liquid Scintillation Spectrometer.
5. Packard Gamma Scintillation Spectrometer.
6. Na-22 Storage.
7. Waste Storage Area.
8. Animal Room.
9. Laboratory Bench, (no radioactivity).
10. Laboratory Hood.
11. Laboratory Bench, (C-14; H_3).
12. Laboratory Bench, (no radioactivity).
13. Laboratory Bench, (no radioactivity).
14. Laboratory Bench, (no radioactivity).
15. Freezer, storage of all isotopes other than Na-22.
16. Dark room.
17. Latrine.
18. Technician's station.
19. Entrance.
20. To Post FAMC Veterinarian.

APPENDIX V

RADIATION WASTE DISPOSAL

SUPPLEMENTAL INSTRUCTIONS

1. Liquid Waste disposition

a. Contaminated liquid waste may be disposed of in the "hot" sink provided the quantity which, if diluted by the average daily quantity of sewage (sanitary sewage flow per 24 hours is 525,000 gallons) released into the sewer by the licensee, will not result in an average concentration in excess of values specified in Appendix B, Table 1, Column 2 of CFR, Title 10, Part 20; (extracted applicable portion listed below); or

b. Ten times the quantity of such material specified in Appendix C of same; and

c. The gross quantity of licensed and other radioactive material released into the sewage system by the licensee does not exceed one curie per year.

Listed below is the quantity of any single radioactive isotope that may be released into the sewer in any one day. In accordance with the Code of Federal Regulations, title 10, part 20, if more than one isotope is released on the same day, the fractions of the maxima for the isotopes released must sum to one or less.

Radioactive Material	Microcuries
Bromine-82	100
Calcium-45	100
Carbon-14	500
Chromium-51	500
Cobalt-60	10
Gold-198	100
Hydrogen-3	2500
Iodine-131	100
Iron-55	500
Iron-59	10
Phosphorus-32	100
Selenium-75	100
Strontium-85	10
Strontium-89	10
Strontium-90	1
Sulfur-35	500
Zinc-65	100

d. Sewage disposal of liquid radioactive isotopes will be disposed of from the Radioisotope Section, Radiology Service, Fitzsimons General Hospital on Tuesdays and Fridays only, with other days reserved for Radioisotope Branch, USAMRNL. Any deviation from this policy by either section will be cleared with the other Radiation Protection Officer.

e. All liquid radioactive waste disposal through the sanitary sewer at FAMC will be logged in Liquid Waste Disposal Log Book and activity listed in microcuries.

2. Solid Waste Disposition

a. Under no circumstances will waste be incinerated.

b. Solid waste will be segregated into combustible and non-combustible waste and placed in properly labelled and lined fifty-five gallon sealable drums. These drums will comply with the requirements of the specific isotopes contained therein. See Code of Fed. Reg., Title 49, Jan 1969.

c. Drums containing solid perishable waste, i.e., carcasses, tissues, etc., will be stored in a freezer prior to shipment.

d. Instructions for shipping radioactive waste for proper disposition will be requested from:

Commander
US Army Edgewood Arsenal
ATTN: SMUEA-ISDO
Edgewood, Maryland 21010

3. Logs and Records.

a. AEC Form 3 (Notice to Employees - Standards for Protection Against Radiation) will be posted in a conspicuous location.

b. DD Form 1141 in accordance with AR 40-14 are prepared and maintained by the custodian of medical records, Fitzsimons Army Medical Center.

c. The joint AEC license and U.S. Army authorization will be posted and readily available.

d. Radioisotope inventroy balance will be audited monthly. (Radioisotope inventory records are kept on Forms DA 8-235 and DA 8-212).

e. Instrument logs will be maintained indicating calibration and maintenance of the portable survey instruments.

f. Records of surveys (including swipe tests) will be kept.

g. Caution signs, labels, and signals will be utilized according to CFR, Title 10, Part 20, para. 20.203.

h. A report covering the period of each calendar quarter is prepared by the Commander of Fitzsimons Army Medical Center in accordance with AR 40-37. This report is dispatched to The Surgeon General, ATTN: MEDPS-PO, by the fifteenth working day following the close of the report period and contains the following information as a minimum:

(1) Copy of minutes of each Radioisotope Committee meeting, including a record of all actions taken by the Committee.

(2) Copy of training and experience of each newly approved user of radioisotopes or any change in qualifications or certifications of previously approved users (for human use, AEC Form 313a, page 3).

(3) Radioisotope inventory, including data on quantities of radioisotopes procured, used, or disposed of, or currently in storage.

(4) Information on unsolved problems, new or improved developments, or other comments of interest to, or having a bearing on, support rendered by The Surgeon General.

(5) Notification of all changes in membership of Radioisotope Committee.

DEPARTMENT OF THE ARMY
FITZSIMONS ARMY MEDICAL CENTER
DENVER, COLORADO 80240

MEDEO-X

22 February 1974

SUBJECT: Renewal, AEC Byproduct Material License 05-00046-13

THRU: Commander
Health Services Command
ATTN: HSC-PA-H
Fort Sam Houston, Texas 78234

TO: HQ DA (DASG-HEP-O)
Wash DC 20314

1. Attached as inclosure 1 are six copies of this Headquarter's application for renewal of AEC Byproduct Material License 05-00046-13.

2. It is requested that you review the application and forward it to the AEC prior to 1 April 1974.

1 Incl
as

JAMES A. WIER, M.D.
Major General, MC
Commanding

A/96

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