

NRC Form 313 I
(12-81)
10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

1. APPLICATION FOR:
(Check and/or complete as appropriate)

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

X a. NEW LICENSE

b. AMENDMENT TO
LICENSE NUMBER

c. RENEWAL OF
LICENSE NUMBER

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety,
Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission,
Washington, DC 20555 or applications may be filed in person at the Commission's office at
1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

2. APPLICANT'S NAME (Institution, firm, person, etc.)

DEPARTMENT OF THE ARMY

ACADEMY OF HEALTH SCIENCES (AHS)

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION
(512) 221-2995/2818

3. NAME AND TITLE OF PERSON TO BE CONTACTED
REGARDING THIS APPLICATION

RADIATION PROTECTION OFFICER (SEE APPENDIX A)

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION
(512) 221- 6632/6011

4. APPLICANT'S MAILING ADDRESS (Include Zip Code)

(Address to which NRC correspondence, notices, bulletins, etc.,
should be sent.) ACADEMY OF HEALTH SCIENCES

ATTN: PREVENTIVE MEDICINE DIVISION HSHA-IPM
RADIATION PROTECTION OFFICER
FORT SAM HOUSTON, TX 78234

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED
(Include Zip Code)

ACADEMY OF HEALTH SCIENCE
FORT SAM HOUSTON, TX 78234
(SEE APPENDIX B)

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL

(See Items 16 and 17 for required training and experience of each individual named below)

FULL NAME

TITLE

a. (SEE APPENDIX C)

b.

c.

7. RADIATION PROTECTION OFFICER

(SEE APPENDIX A)

Attach a resume of person's training and experience as outlined in Items
16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

L I N E NO.	ELEMENT AND MASS NUMBER A	CHEMICAL AND/OR PHYSICAL FORM B	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source) C	MAXIMUM NUMBER OF MILLCURIES AND/OR SEALED SOURCES AND MAXIMUM ACTI- VITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME D
(1)	(SEE APPENDIX D)			
(2)				
(3)				
(4)				

DESCRIBE USE OF LICENSED MATERIAL
E

(1)

(2)

(3)

(4)

8510230348 850826
REG4 LIC30
42-01368-01 PDR

FEE EXEMPT

460720

9. STORAGE OF SEALED SOURCE

LINE NO.	CONTAINER AND/OR DEVICE WHICH EACH SEALED SOURCE WILL BE STORED OR USED.	NAME OF MANUFACTURER	MODEL NUMBER
	A.	B.	C.
(1)	(SEE APPENDIX J)		
(2)			
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT	MANUFACTURER'S NAME	MODEL NUMBER	NUMBER AVAILABLE	RADIATION DETECTED (alpha, beta, gamma, neutron)	SENSITIVITY RANGE (milliroentgens/hour or counts/minute)
	A	B	C	D	E	F
(1)	(SEE APPENDIX E)					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☒ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

(SEE APPENDIX F)

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

(SEE APPENDIX G) 12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
<input type="checkbox"/> (1) FILM BADGE <input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD) <input checked="" type="checkbox"/> (3) OTHER (Specify) <u>SEE APPENDIX G</u>	(SEE APPENDIX G)	<input type="checkbox"/> MONTHLY <input type="checkbox"/> QUARTERLY <input checked="" type="checkbox"/> OTHER (Specify): <u>SEE APPENDIX G</u>

13. FACILITIES AND EQUIPMENT (Check where appropriate and attach annotated sketch(es) and description(s).)

- ☒ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC (SEE APPENDIX I)
☒ b. STORAGE FACILITIES, CONTAINERS SPECIAL SHIELDING (fixed and/or temporary), ETC (SEE APPENDIX J)
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. NA
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC. NA

(SEE APPENDIX J)

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures (if needed), day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

(SEE APPENDIX J)

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc. (RPO: SEE APPENDIX A)

(USER: SEE APPENDIX B)

- a. Principles and practices of radiation protection.
- b. Radioactivity measurement standardization and monitoring techniques and instruments.
- c. Mathematics and calculations basic to the use and measurement of radioactivity.
- d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

(RPO: SEE APPENDIX A)

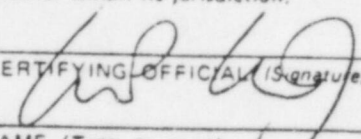
(USER: SEE APPENDIX B)

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, 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.

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.

a. LICENSE FEE REQUIRED (See Section 170.31, 10 CFR 170)	b. CERTIFYING OFFICIAL (Signature) 
EXEMPT 10 CFR 170.11 (a)(4)	c. NAME (Type or print) WILLIAM P. WINKLER, JR., M.D.
(1) LICENSE FEE CATEGORY: EXEMPT	d. TITLE MAJOR GENERAL, MC COMMANDANT
(2) LICENSE FEE ENCLOSED: \$ -0-	e. DATE 8 NOV 1984

LIST OF APPENDICES

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ITEM NUMBER: N/A
DATE OF
APPLICATION: 8 NOV 1984

APPENDIX A

Radiation Protection Officer

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APPENDIX A-1

Appointment Procedure

The Radiation Protection Officer (RPO) will be recommended by the Radiation Control Committee (RCC). The RPO will be appointed by the Commandant, AHS. Duties as RPO shall take priority over all other duties.

Qualification for Consideration for Appointment

The criteria utilized to determine the acceptability of the training and experience of the RPO will be in consonance with the philosophy espoused in NRC Regulatory Guide (draft) OP 722-4 dated April 1982 entitled Qualification for the Radiation Safety Officer in a Large-Scale Non-Fuel-Cycle Radionuclide Program.

APPENDIX A-2

Duties and Responsibilities of the Radiation Protection Officer

1. Advise the Commandant, RCC, and personnel within this organization on the degree of hazards associated with the use of ionizing radiation sources and the effectiveness of measures established to control such hazards.
2. Make periodic surveys of areas where radiation sources are used or stored to ensure that users are complying with the rules and regulations established for radiation protection.
3. Insure that appropriate leak testing of applicable radiation sources is accomplished in a timely fashion in accordance with established procedures.
4. The Assistant RPO (ARPO) will assume the duties of the RPO in his/her absence.

APPENDIX A-3

Current Appointment(s)

Radiation Protection Officer

Walter S. Loring, MS, CPT, MSC

Training and Experience..... A-3-1

Assistant Radiation Protection Officer

Michele S. Stern, Ph.D., CPT, MSC

Training and Experience..... A-3-2

A-3-1

ITEM NUMBER: 7
DATE OF
APPLICATION: 8 Nov 84

Curriculum Vitae of Walter S. Loring

GENERAL INFORMATION

Date of Birth: 28 November 1982
Place of Birth: Cooperstown, New York
Home Address: 5407 Vista Court Drive
San Antonio, Texas 78247
512/657-5269
Office Address: Academy of Health Sciences
Preventive Medicine Division
Fort Sam Houston, Texas 78234
512/221-6632

EDUCATION

College: A.A., Liberal Arts, St. Leo's College, St. Leo, Florida,
1975
B.S., Health Care Services, Southern Illinois University,
Carbondale, Illinois, 1979
Graduate: M.S., Radiological Sciences and Protection, University of
Lowell, Lowell, Massachusetts, 1984
Ten Semester Hours of Graduate Work, Environmental
Management, University of San Francisco, California

PROFESSIONAL DEVELOPMENT COURSES

1974 Engineering Equipment Maintenance Specialist, 9 weeks, Fort
Leonard Wood, Missouri
1976 - 1977 Nuclear Power Plant Operators Course, 52 weeks (16-week
Health Physics Specialty), Fort Belvoir, Virginia
1977 Nuclear Hazards Training Course, 40 hours, Kirtland Air
Force Base, New Mexico
1978 Nuclear Emergency Team Training, 40 hours, Kirtland Air
Force Base, New Mexico

A-3-1-2

ITEM NUMBER: 7
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X60720

1979 Three Mile Island Nuclear Emergency, Contract Health Physics Technologist

1979 NUWAX (National Nuclear Weapons Accident Exercise), Player, US Army Radiological Advisory Medical Team

1979 Medical X-Ray Survey Techniques Course, 80 hours, Fort Sam Houston, Texas

1979 Ionizing and Nonionizing Radiation in Medicine, 40 hours, University of Pennsylvania

1980 Radiation Safety Officers Course, 80 hours, Fort Hueneme, California

1980 Laser-Microwave Hazards Course, 40 hours, US Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland

Transportation and Storage of Hazardous Materials Course, 40 hours, Naval Supply Center, Oakland, California

1981 NUWAX (National Nuclear Weapons Accident Exercise), Member, Radiological Safety Working Group

1984 Medical Effects of Nuclear Weapons Course, 36 hours, Armed Forces Radiology Research Institute, Bethesda, Maryland.

PROFESSIONAL SOCIETY

1979 National Health Physics Society, Plenary Member

PROFESSIONAL REGISTRY

1982 National Registry of Radiation Protection Technologists

EMPLOYMENT HISTORY

Present Nuclear Medical Science Instructor
Nuclear, Biological, and Chemical Sciences Branch
Preventive Medicine Division
Academy of Health Sciences
Fort Sam Houston, Texas 78234

1981 - 1983 Radiation Protection Officer
Madigan Army Medical Center
Tacoma, Washington 98431

A-3-1-3

ITEM NUMBER: 7
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X60720

1979 - 1981 Assistant Radiation Protection Officer
Assistant Health Physics Officer
Department of Radiology
Letterman Army Medical Center
Presidio of San Francisco, California 98129

1977 - 1979 Senior Health Physics Technologist
Health Physics Office
Walter Reed Army Medical Center
Washington, DC 20012

CERTIFICATIONS

1977 Nuclear Power Plant Operator
US Army Facilities Engineering Support Agency
Fort Belvoir, Virginia

1980 Shipper of Hazardous Cargo, US Navy
Transportation Management School
Naval Supply Center, Oakland, California

1985 Certification Eligible, American Board of
Health Physics. (Will sit for Part II of
certification exam 31 May 1985).

A-3-1-4

ITEM NUMBER: 7
DATE OF
APPLICATION: 8 Nov 84

Name: Michele S. Stern

Date and Place of Birth: 17 March 1943; Chicago, Illinois

Address and Telephone:

Office: NBC Branch, Preventive Medicine Division, HSHA-IPM
Academy of Health Sciences, U.S. Army
Fort Sam Houston, Texas 78234-6100 (512/221-6632) AV 471-6632

Home: 11839 Parliament - #124
San Antonio, Texas 78216 (512/366-4642)

Education:

Civilian:

B.S., Zoology, University of Illinois-Urbana, 1964
M.S., Biology (Aquatic Ecology), Tennessee Technological University, 1966
Ph.D., Biology (Cell Biology and Biochemistry), Tulane University, 1969

NSF Chautauqua-Type Short Course: Analysis and Evaluation of Biological Data, 1974-1975

NSF Chautauqua-Type Short Course: Risk-Benefit Analysis, 1978-1979

NSF Chautauqua-Type Short Course: Immunobiology, 1979-1980

Laser Institute of America: Laser Safety, 1983

University of Texas-San Antonio Medical School: Basic Radiological Health, 1983

Harvard School of Public Health: Biological Effects of Ionizing Radiation, 1983

Military:

Army Medical Department Officer Basic Course, 1982

Army Medical Department Officer Advanced Course, 1984

Preventive Medicine Program Management, Fort Sam Houston, TX, 1982

Nuclear, Biological, Chemical Defense Officer/NCO Course, Fort McClellan, AL, 1982

Faculty Development Course, Fort Sam Houston, TX, 1982

Laser/Microwave Hazards Course, Aberdeen Proving Ground, MD, 1983

Army Medical Department Radiation Protection Course, Aberdeen Proving Ground, MD, 1983

Nuclear Hazards Training Course, Kirtland Air Force Base, NM, 1983

Medical Defense Against Biological Warfare Threats and Other Highly Communicable Microorganisms, Fort Detrick, MD, 1983

Medical Management of Chemical Casualties Course, Aberdeen Proving Ground, MD, 1984

Medical X-Ray Survey Techniques Course, Fort Sam Houston, TX, 1984

Thesis and Dissertation Titles:

"A Limnological Investigation of the Invertebrate Fauna of a Tennessee Cold Springbrook," M.S. Thesis

"The Purification and Characterization of a Protease-Esterase Complex from Tomato Leaves," Ph.D. Dissertation

Experience:

- 1982-Present United States Army, CPT, MSC, Nuclear Medicine Science Officer, Preventive Medicine Division, Academy of Health Sciences, Fort Sam Houston, Texas. Instruct Army medical personnel in the medical aspects of nuclear, biological, and chemical defense and the injury potential of ionizing and nonionizing radiation. Made recommendations for changes in policy, and implemented when approved. Acted as scheduling officer and Chemical/Biological Effects section chief. Reviewed and responded to documents concerned with NBC defense.
- 1969-1982 University of Missouri-Kansas City, Department of Biology. Assistant Professor, 1969-1975 and Associate Professor, 1975-Present (military leave of absence). Taught cell biology, advanced cell biology, experimental cell biology, plant physiology, environmental plant physiology, and plant metabolism. Researched in areas of environmental physiology and biochemistry, environmental toxicology, heavy metal toxicity, water pollution and eutrophication, cell biology, and environmental impacts.
- 1968-1969 Graduate Teaching Assistant, Tulane University
- 1964-1966 Graduate Teaching Assistant, Tennessee Technological University

Professional Affiliations:

American Association for the Advancement of Science
American Chemical Society
American Institute of Biological Sciences
American Society of Limnology and Oceanography
Ecological Society of America
Society of Environmental Toxicology and Chemistry
North American Benthological Society

Honors and Special Recognitions:

B.S. with honors and Edmund J. James Scholar, University of Illinois
NASA Fellow, 1966-68
Society of Sigma Xi
Sigma Delta Epsilon - Graduate Women in Science
Who's Who in the Midwest
Who's Who in the Frontiers of Science and Technology
Outstanding Young Women in America - 1978
American Men and Women in Science

Consultant Activities:

Midwest Research Institute, Kansas City, MO, 1972-1982
Langston Laboratories, Kansas City, MO, 1972-73
Kansas City, MO, law firms-environmental litigation, 1970-82.
Kansas City, MO, Department of Aviation, 1977-79
Jackson County Park Department, Jackson County, MO, 1970-71
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Science Advisory Board, City of Kansas City, MO, 1973-74
Citizens Environmental Council of Greater Kansas City - advisory board

Research by M.S. Graduate Students:

- George Attwood - "Protein Degradation and Hydrolytic Activity in Senescing Bean Leaves."
Patrick Rose - "A Benthic Macroinvertebrate Survey of the Lower Missouri River from Saint Joseph, Missouri, to Its Mouth from March through October 1973."
Scott Sanders - "An Electrophoretic Analysis of Total Protein and Hydrolytic Enzymes in the Bivalve Anodonta grandis Say Relative to Season, Temperature, and Starvation."
Lisa Ray - "Citric Acid Enhancement of Copper Sulfate Toxicity to the Blue-Green Algae Aphanizomenon flos-aquae and Microcystis aeruginosa."

Research Support:

1969. \$7,851. Physical, Chemical, Bacterial and Plankton Dynamics of Lake Pontchartrain, Louisiana, Adjacent to New Orleans. Office of Water Resources Research, U.S. Dept. of the Interior.
1969. \$11,590. Three University of Missouri - University-Wide grants to obtain a greenhouse, fraction-collector, environmental chamber, and spectrophotometer to aid in biochemical studies. University of Missouri.
1970. \$4,840. Two University of Missouri - University-Wide grants to purchase a 16-mm motion picture camera and to prepare a color film with sound of pollution in Kansas City as well as an annotated bibliography of environmental pollution. Univ. of Missouri.
1970. \$6,850. The Water Quality and Plankton Dynamics of Lake Jacomo, the Primary Recreational Water for Greater Kansas City. Office of Water Resources Research, U.S. Dept. of the Interior.
1971. \$9,500. The Dynamics of the Benthic Fauna and Its Relationship to the Water Quality and Plankton in Lake Jacomo, the Recreational Reservoir for Greater Kansas City. Office of Water Resources Research, U.S. Dept. of the Interior.
1972. \$13,457. Missouri River Environmental Inventory: Rulo, Nebraska to St. Louis, Missouri. Aquatic biology section. Corps of Engineers, U.S. Army.
1973. \$95,260. A Baseline Environmental Study of the Missouri River: Rulo, Nebraska to St. Louis, Missouri. Aquatic biology section. Corps of Engineers, U.S. Army.
1973. \$4,500. Social, Economic, and Environmental Assessment of the Blue River Basin, Vicinity of Kansas City, Missouri and Kansas. Aquatic biology section. Corps of Engineers, U.S. Army.
1974. \$16,300. A Baseline Study of the Salt Plains Region of Kansas-Oklahoma, specifically Chloride Control Areas I-IV. Aquatic biology and fishery sections. Corps of Engineers, U.S. Army.
1976. \$11,365. Citric Acid Enhancement of Copper Sulfate Toxicity to Blue-Green Algae and Other Nuisance Organisms. Phase I. Office of Water Research and Technology, U.S. Dept. of the Interior.
1976. \$3,353. Continuation of Salt Plains Chloride Control Study. Corps of Engineers, U.S. Army.
1977. \$9,000. Citric Acid Enhancement of Copper Sulfate Toxicity to Blue-Green Algae and Other Nuisance Organisms. Phase II. Office of Water Research and Technology, U.S. Dept. of the Interior.

- Stern, M. S., and D. H. Stern. 1974. Your House, Our House . . . Introductory Ecology. Publication M86. Extension Division, University of Missouri, Columbia. 24 p.
- Stern, M. S. 1974. A baseline environmental study of the lower Missouri River: Rulo, Nebraska to St. Louis, Missouri. Project report, DACW 41-73-C-0112. Corps of Engineers, U.S. Army. 6 volumes. 1,367 p. (Co-Director of aquatic biology and member of project steering committee.)
- Stern, D. H., and M. S. Stern. 1975. An improved inexpensive periphyton sampler. Progressive Fish-Culturist 37: 55-56.
- Stern, M. S., S. W. Sanders, and D. H. Stern. 1976. An isozymic analysis of total protein and hydrolytic enzymes in the bivalve Anodonta grandis relative to season, temperature, and starvation. Amer. Zool. 16: 248.
- Stern, M. S. 1977. Environmental inventory and assessment of Areas I, II, III, and IV, Arkansas River Chloride Control Project, Oklahoma and Kansas. Completion Report, Contract DACW 56-75-C-0069. Corps of Engineers, U.S. Army. 712 p. (Co-Director with D. Stern of aquatic biology and fishery sections.)
- Stern, D. H., and M. S. Stern. 1978. Inventory of the terrestrial higher plants of Platte County, Missouri, the environs of the Kansas City International Airport. K.C.I. Master Plan, Task No. 6.05. Aviation Department, City of Kansas City, Missouri. 130 p.
- Stern, M. S., D. H. Stern, and L. L. Ray. 1978. Citric acid enhancement of copper sulfate toxicity to the blue-green algae Aphanizomenon flos-aquae and Microcystis aeruginosa. Completion Rept., A-099-MO. Missouri Water Resources Research Center, Columbia. 83 p.
- Stern, D. H., and M. S. Stern. 1980. Effects of bank stabilization on the physical and chemical characteristics of streams and small rivers: A synthesis. FWS/OBS-80/11. Biological Services Program, Fish & Wildlife Service, U.S. Dept. of the Interior. 46 p.
- Stern, D. H., and M. S. Stern. 1980. Effects of bank stabilization on the physical and chemical characteristics of streams and small rivers: An annotated bibliography. FWS/OBS-80/12. Biological Services Program, Fish & Wildlife Service, U.S. Dept. of the Interior. 78 p.
- Stern, D. H., and M. S. Stern. 1980. A modified rotary shaker platform for culturing microorganisms. Progressive Fish-Culturist 42: 188-189.
- Stern, M. S., and D. H. Stern. 1980. Effects of fly ash heavy metals on Daphnia magna. Completion Rept., A-120-MO. Missouri Water Resources Research Center, Columbia. 56 p.
- Stern, D. H., and M. S. Stern. 1982. The distribution of heavy metals in the bottom sediments of three streams in the Kansas City, Missouri, metropolitan area. Completion Rept., A-128-MO. Missouri Water Resources Research Center, Columbia. 105 p.
- Mohamed, A., and M. S. Stern. 1984. Induced recessive lethals in the second and third chromosomes of Drosophila fed on fly ash. Environmental Research: In Press.

Professional Meetings Attended:

- American Institute of Biological Sciences; annual meeting; Bloomington, Indiana. August 1970.
- American Interprofessional Institute; annual meeting; St. Joseph, Missouri. October 1970.
- American Association for the Advancement of Science; annual meeting; Chicago, Illinois. December 1970.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1971.
- Ecological Society of America in conjunction with the American Association for the Advancement of Science; annual meeting; Philadelphia, Pennsylvania. December 1971.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1972.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1973.
- Midwest Benthological Society; annual meeting; Cincinnati, Ohio. March 1974.
- Ecological Society of America in conjunction with the American Institute of Biological Sciences; annual meeting; Tempe, Arizona. June 1974.
- North American Benthological Society; annual meeting; Springfield, Illinois. March 1975.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1975.
- Ecological Society of America, American Society of Plant Physiologists, and the American Society of Zoologists were all in conjunction with the American Institute of Biological Sciences; annual meetings; New Orleans, Louisiana. June 1976.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1977.
- American Water Works Association; annual meeting; Kansas City, Missouri. October 1977.
- Invited participant in Algal Assay Workshop, March 21-22, 1978, sponsored by the U.S. Environmental Protection Agency, National Environmental Research Laboratory, Corvallis, Oregon.
- Missouri Water Resources Research Conference; annual meeting; Columbia, Missouri. May 1978.
- 12th Annual Environmental Trace Substances Conference; Columbia, Missouri. June 1978. International meeting.
- Missouri Water Resources Research & Missouri Department of Natural Resources Conference; "Some Emerging Water Issues;" Columbia, Missouri. November 1979.
- Medical symposium entitled, "Combat Medicine in a Toxic Environment" sponsored by 102d ARCOM, U.S. Army, St. Louis, Missouri, 16-17 October 1981.

Presentations:

- Water quality, plankton, and bacterial dynamics of Lake Pontchartrain, Louisiana. Annual meeting of the Ecological Society of America held at Bloomington, Indiana, 1970.
- The purification and characterization of a protease-esterase complex from tomato leaves. Annual meeting of the American Society of Plant Physiologists held at Bloomington, Indiana, 1970.
- Eulimnadia diversa Mattox: Occurrence, morphological variation, and laboratory

- culture of two Louisiana populations. Annual meeting of the American Society of Zoologists held at Chicago, Illinois, 1970.
- Limnology of Lake Jacomo, the recreational lake serving Kansas city. Missouri Water Resources Research Conference on Small Reservoirs held at Columbia, Missouri, 1971.
- The limnology of Lake Jacomo, Missouri: Water quality dynamics. Annual meeting of the Ecological Society of America held at Philadelphia, Pennsylvania, 1971.
- The limnology of Lake Jacomo, Missouri: Plankton dynamics. Annual meeting of the Ecological Society of America held at Philadelphia, PA, 1971.
- The dynamics of the benthic fauna and its relationship to the water quality and plankton in Lake Jacomo. Missouri Water Resources Research Conference, 1972.
- Periphyton and chlorophyll a in the lower Missouri River during 1973. Annual meeting of the North American Benthological Society held at Cincinnati, Ohio, 1974.
- The macroinvertebrates of the lower Missouri River during 1973. Annual meeting of the North American Benthological Society held at Cincinnati, Ohio, 1974.
- Plankton dynamics of the lower Missouri River during 1973. Annual meeting of the Ecological Society of America held at Tempe, Arizona, 1974.
- Macrobenthic dynamics of the Lower Missouri River during 1973. Annual Meeting of the Ecological Society of America held at Tempe, Arizona, 1974.
- Biology of the Missouri River. Missouri Water Resources Research Conf., 1975.
- An isozymic analysis of total protein and hydrolytic enzymes in the bivalve Anodonta grandis relative to season, temperature, and starvation. Annual meeting of the American Society of Zoologists held at New Orleans, Louisiana, 1976.

University of Missouri Committee Service:

Water Resources Committee, U-Wide, 1972-73 and 1974-80
Vice-Chairperson, 1974-75; Chairperson, 1975-78
Doctoral Committee, U-Wide, 1975-present

Student Conduct Committee, UMKC campus, 1971-80
Neighborhood Advisory Committee, UMKC campus, 1972-73
Faculty Committee on Equal Employment, UMKC campus, 1973-74

Search Committee for the A&S Dean, Coll. of A&S (elected), 1974-75
Ad hoc Committee to work with UMKC medical school, Coll. of A&S, 1975-76
A&S Curriculum Committee, College of A&S (elected), 1976-79

Graduate Affairs Committee, Biology, 1972-73
Promotion and Tenure Committee, Biology, 1977-1981
Committee to hire a physiologist, Biology, Chairperson, 1972-73
Committee to hire a microbial geneticist, Biology, Chairperson, 1974-75
Curriculum Committee, Biology, 1969-70; 1972-80; Chairperson, 1975-78; 1979-80

Night School Committee, Biology, 1981-82
Teaching Evaluation Committee, Biology, 1981-82

APPENDIX B

Street Address Where Licensed Material Will Be Used

1. Radioactive materials will be used in specified locations within the facilities of the Academy of Health Sciences (AHS), US Army, Fort Sam Houston, Texas, as recommended by the AHS Radiation Control Committee (RCC) and approved by the Commandant. This requirement is due to the unique nature of this institution. The AHS is the largest Allied Health School in the free world in terms of the annual output of students, providing instruction for 120 medical specialties at Fort Sam Houston, Texas 78234.
2. Principle use of radioactive material will be in building 2785, Fort Sam Houston, Texas 78234-6100 (see Appendix I).
3. Recommendation by the RCC of a specific use location will be contingent upon the following:
 - a. Submittal of an application by an individual requesting authorization to directly supervise or use specific radioactive material (nuclide(s), quantities, form, and procedures) for a specific location.
 - b. Availability of the required resources (i.e., personnel, instruments, and adequate space for use and storage) to ensure the safe use of the radioactive materials and to ensure conformance with the philosophy of ALARA.
4. Approval of such application will designate the approved location (i.e., building number, room number) for use and storage. Copies of each approval will be maintained by the RPO.

APPENDIX C

Individual(s) Who Will Use or Directly Supervise the Use
of Licensed Material

Criteria For Approval of Individual Users.....	C-1
Duties and Responsibilities of the Radiation Control Committee.....	C-2

APPENDIX C-1

Individuals Who Will Use or Directly Supervise the Use of Licensed Material

The Radiation Protection Officer, Class Advisor or Assistant Class Advisor to the 311-91X20 Health Physics Specialist Course will directly supervise the use of licensed material in greater than exempt quantities. At a minimum these individuals will meet the training and experience criteria specified in 10 CFR 33.15.

C-1-1

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APPENDIX C-2

Duties and Responsibilities of the Radiation Control Committee

1. PURPOSE: To review and recommend rules and procedures necessary to minimize the hazards due to radiation and to ensure compliance with regulations and standards established by regulatory bodies. Specifically, the Committee will:

- a. Advise the Commandant on radiation hazards.
- b. Review and recommend rules and regulations pertaining to receipt, possession, use, storage, transfer, release, and/or disposal of radioactive materials and/or radiation producing devices.
- c. Provide for the review and approval of all uses of radioactive materials and/or radiation producing devices.
- d. Review incidents involving the use of radioactive materials and/or radiation producing devices which result in either overexposure or unwarranted exposure to personnel.
- e. Recommend appropriate action(s) to be taken when there is a failure to observe radiation protection recommendations, rules, or regulations.

2. MEMBERSHIP AND HOW APPOINTED

a. The Committee is composed of the following staff members or their designated representatives:

Chief, Preventive Medicine Division	Chairperson/Commandant's Representative
Radiation Protection Officer, AHS	Member
Safety Officer, AHS	Member
Chief, Dental Science Division	Member
Chief, Laboratory Science Division	Member
Chief, Logistics Division	Member
Chief, Medicine and Surgery Division	Member
Commander, Academy Brigade	Member
Alternate RPO	Member/Recorder
Additional members as designated by the Commandant	

b. Each member may designate to the chairperson an alternate to represent them (nonvoting) in the member's absence.

c. Quorum: A simple majority of the voting members present shall constitute a quorum. For approval of any Committee action, an affirmative vote, by a simple majority of voting members present, shall be required. When in the opinion of the Committee Chairman, an item on the agenda is particularly sensitive or requires detailed technical and/or medical review, the Chairman may designate Committee members and/or request consultants with specialized training or special competence to review specific aspects of the issue. This review will be submitted to the Committee verbally or in writing as designated by the Chairman prior to the final approval/disapproval by the committee.

3. OFFICE OF RECORD: Office of AHS RPO.

4. MINUTES: A written record of Committee proceedings will be prepared by the Recorder for submission by the Chairman through channels to the Commandant, AHS, for approval. These minutes shall be submitted within 15 calendar days of the Committee meeting. Copies of the training and experience record of all individuals appointed as Radiation Protection Officer (RPO) and/or Assistant RPO and documentation of each Committee member's medical/professional specialty, specific training, and/or clinical experience with radioactive materials will be included as appropriate. After the initial record of a member is submitted, subsequent minutes will document an individual's change in qualifications. Additionally included will be information on unsolved problems, unusual occurrences, accidents, user approvals, developments, or comments on the support rendered by elements of AHS.

5. APPROVING AUTHORITY: Commandant, AHS.

6. DISTRIBUTION OF MINUTES: Distribution is made to each member.

7. SCHEDULE OF MEETINGS: Quarterly or as called by the Chairperson.

8. AUTHORITY FOR APPOINTMENT: AR 40-14, *Control and Recording Procedures for Exposure to Ionizing Radiation and Radioactive Materials*, 15 March 1982, paragraph 5e(4).

APPENDIX D

Chemical and/or Physical Form and Maximum Amount of Radioactive Material

A	B	C	D	E
<u>ELEMENT AND MASS NUMBER</u>	<u>CHEMICAL AND/OR PHYSICAL FORM</u>	<u>NAME OF MANUFACTURER/ MODEL NUMBER</u>	<u>MAXIMUM ACTIVITY PER SOURCE (mCi)</u>	<u>TOTAL ACTIVITY TO BE POSSESSED AT ONE TIME (mCi)</u>
Hydrogen-3	Sealed	New England Nuclear NES Series or Equivalent	0.50	5.00
Carbon-14	Sealed	New England Nuclear NES Series or Equivalent	0.50	5.00
Sodium-22	Sealed	New England Nuclear NES Series or Equivalent	0.01	0.10
Chromium-51	Sealed	New England Nuclear NES Series or Equivalent	0.01	0.10
Manganese-54	Sealed	New England Nuclear NES Series or Equivalent	0.01	0.10
Cobalt-60	Sealed	New England Nuclear NES Series or Equivalent	0.01	0.10
Cadmium-109	Sealed	New England Nuclear NES Series or Equivalent	0.10	1.00
Barium-133	Sealed	New England Nuclear NES Series or Equivalent	0.01	0.10
Cesium-137	Sealed	New England Nuclear NES Series or Equivalent	0.25	2.50

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A	B	C	D	E
<u>ELEMENT AND MASS NUMBER</u>	<u>CHEMICAL AND/OR PHYSICAL FORM</u>	<u>NAME OF MANUFACTURER/ MODEL NUMBER</u>	<u>MAXIMUM ACTIVITY PER SOURCE (mCi)</u>	<u>TOTAL ACTIVITY TO BE POSSESSED AT ONE TIME (mCi)</u>
Thallium-204	Sealed	New England Nuclear NES Series or Equivalent	0.10	1.00
Americium-241	Sealed	New England Nuclear NES Series or Equivalent	0.05	0.50

Use of Licensed Material

Licensed material will be used during training of health physics technicians in the fundamental principles and practices of radiation protection.

APPENDIX E

Radiation Detection Instruments

1. Areas with potential for significant contamination or radiation levels, as determined by the RPO, will have available appropriate instrumentation.

2. The following instruments, or equivalent, will be available for the performance of surveys:

a. MANUFACTURER'S NAME: Ludlum

MANUFACTURER'S MODEL NUMBER: Model 18 Analyzer

PROBES: Model 43-5--Alpha Scintillation Probe

ZnS(Ag) scintillator, 1 mg/cm² aluminized mylar window

Radiation Detected--Alpha above 2.0 MeV

Model 44-1--Beta Scintillator

NE/102 plastic crystal, 0.01 inch thick with 1 mg/cm² aluminized mylar window

Radiation Detected--Beta above 0.158 MeV

Model 44-3--Low Energy Gamma Scintillator

NaI(Tl) scintillator, 1mm x 1 inch diameter with 7 mg/cm² aluminum window plus 25 mg/cm² removable shield

Radiation Detected--Gamma above 10 keV

Model 44-9--Pancake Geiger-Mueller Probe with 1.5 to 2 mg/cm² mica window

Radiation Detected--Gamma above 30 keV

Beta above 0.158 MeV

SENSITIVITY RANGE: Low Scale--0 through 500 cpm
High Scale--0 through 500,000 cpm

b. MANUFACTURER'S NAME: Ludlum

MANUFACTURER'S MODEL NUMBER: Model 14C/Geiger Counter

INTERNAL CHAMBER: Radiation Detected--Gamma above 60 keV

Sensitivity range--0 through 2000 mR/hr

EXTERNAL PROBE: Type, Model 44-6 thin wall G-M probe, 30 mg/cm² stainless steel

Radiation detected--Gamma above 60 keV

Beta above 0.292 MeV

Sensitivity range--Low Scale--0 through 0.2 mR/hr

High Scale--0 through 200 mR/hr

- c. MANUFACTURER'S NAME: Victoreen
MANUFACTURER'S MODEL NUMBER: Model 440
PROBE TYPE: Ion Chamber
RADIATION DETECTED: Gamma above 40 keV
Beta above 200 keV
SENSITIVITY RANGE: Low Scale--0 through 3 mR/hr
High scale--0 through 300 mR/hr
- d. MANUFACTURER'S NAME: Searle
MANUFACTURER'S MODEL NUMBER: 1185
PROBE TYPE; Scintillation Detector
RADIATION DETECTED: Gamma/x-ray
SCALER/ANALYZER SYSTEM
- e. MANUFACTURER'S NAME: Nuclear Chicago
MANUFACTURER'S MODEL NUMBER: 6872
LIQUID SCINTILLATION COUNTER
RADIATION DETECTED: Beta, low energy gamma/x-ray

APPENDIX F

Calibration of Radiation Detection Instruments

1. To be done by one of the following facilities:
 - a. Department of the Army
US Army Calibration and Repair Center - Sacramento
Sacramento Army Depot
Sacramento, California 95813
NRC License Number 04-04279-01
Expiration Date: 30 November 1983
Timely Renewal Docket Number 030-03628
Dated: 9 November 1983
SNM License Number SNM-507
Expiration Date: 30 June 1987
 - b. Department of the Army
US Army Calibration and Repair Center - Lexington
ATTN: DRXTM-CA-LX
Lexington, Kentucky 40511
NRC License Number 16-05033-01
Expiration Date: 31 October 1987
2. Appendix D, parts A and B of Section 1 of Regulatory Guide 10.8 dated October 1980 to be the minimum standards acceptable. Calibration procedures for use at facilities listed in paragraph 1 are on file with the Commission.
3. CALIBRATION FREQUENCY: Every three months per Army regulation.

APPENDIX G

Personnel Monitoring Devices

1. CURRENT MONITORING DEVICES

- a. Whole body: Film badge.
- b. Extremity: Thermoluminescence dosimeter.

NOTE: The US Army Ionizing Radiation Dosimetry Center is preparing to convert from whole body film badges to the thermoluminescent dosimeters. The AHS will change to thermoluminescent dosimeters for whole body monitoring at the same time.

2. SUPPLIER: US Army Ionizing Radiation Dosimetry Center, Lexington, Kentucky 40511.

3. EXCHANGE FREQUENCY: Monthly.

4. BIOASSAY: A routine bioassay program will not be required; licensed material will be in the form of low activity sealed sources.

APPENDIX H

Management Commitment to ALARA

PROGRAM FOR MAINTAINING OCCUPATIONAL RADIATION EXPOSURES ALARA

ACADEMY OF HEALTH SCIENCES

08 NOV 1984

(DATE)

1. MANAGEMENT COMMITMENT

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

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

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

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

2. RADIATION CONTROL COMMITTEE (RCC)

a. Review of Proposed Users and Uses

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

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

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

b. Delegation of Authority. The judicious delegation of RCC authority is essential to the enforcement of an ALARA program.

(1) The RCC will delegate authority to the RPO for enforcement of the ALARA concept.

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

c. Review of ALARA Program

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

(2) The RCC will perform a quarterly review of occupational radiation exposure with particular attention to instances where investigational levels in Table O-1 (page H-5) are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when investigational levels are exceeded (see Section 6).

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

3. RADIATION PROTECTION OFFICER (RPO)

a. Annual and Quarterly Review

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

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

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

b. Education Responsibilities for ALARA Program

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

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

c. Cooperative Efforts for Development of ALARA Procedures. Radiation workers will be given opportunities to participate in formulation of the procedures that they will be required to follow.

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

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

d. Reviewing Instances of Deviation from Good ALARA Practices. The RPO will investigate all known instances of deviation from good ALARA practices and, if possible, will determine the causes. When the cause is known, the RPO will require changes in the program to maintain exposures ALARA.

4. AUTHORIZED USERS

a. Procedures Involving Potential Radiation Exposures

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

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

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

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

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

5. PERSONS WHO RECEIVE OCCUPATIONAL RADIATION EXPOSURE

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

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

6. ESTABLISHMENT OF INVESTIGATIONAL LEVELS IN ORDER TO MONITOR INDIVIDUAL OCCUPATIONAL EXTERNAL RADIATION EXPOSURES

This institution hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the RCC and/or the RPO. The Investigational Levels that we have adopted are listed in Table O-1 (page H-5). These levels apply to the exposure of individual workers.

TABLE 0-1

	Investigational Levels (mrem per calendar quarter)	
	Level I	Level II
1. Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	125	375
2. Hands and forearms; feet and ankles	1,875	5,625
3. Skin of whole body	750	2,250

The Radiation Protection Officer will review and record on DA Form 1141, Occupational Record for Radiation Exposures, or an equivalent form (e.g., dosimeter processor's report) results of personnel monitoring not less than once in any calendar quarter as required by 20.401 of 10 CFR, Part 20. The following actions will be taken at the investigational levels as stated in Table 0-1.

a. Quarterly Exposure of Individuals to Less Than Investigational Level I. Except when deemed appropriate by the RPO, no further action will be taken in those cases where an individual's exposure is less than Table 0-1 values for the Investigational Level I.

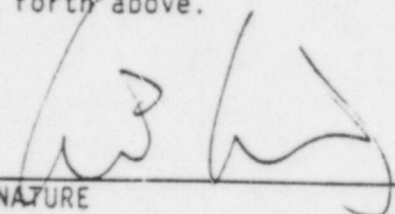
b. Personnel Exposures Equal To or Greater Than Investigational Level I But Less Than Investigational Level II. The RPO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I and will report the results of the reviews at the first RCC meeting following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

c. Exposure Equal To or Greater Than Investigational Level II. The RPO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, will take action. A report of the investigation, actions taken, if any, and a copy of the individual's DA Form 1141 will be presented to the RCC at the first RCC meeting following completion of the investigation. The details of these reports will be recorded in the RCC minutes. Committee minutes will be sent to the management of this institution for review. The minutes, containing details of the investigation, will be made available to NRC inspectors for review at the time of the next inspection.

d. Reestablishment of an Individual Occupational Worker's Investigational Level II to a Level Above That Listed in Table O-1. In cases where a worker's or a group of workers' exposures need to exceed Investigational Level II a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented. The RCC will review the justification for and will approve all revisions of Investigational Level II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions listed in paragraph 6c above will be followed.

7. SIGNATURE OF CERTIFYING OFFICIAL

I hereby certify that this institution has implemented the ALARA Program set forth above.


SIGNATURE

WILLIAM P. WINKLER, JR., M.D.
NAME (PRINT OR TYPE)

Major General, Medical Corps
Commandant
TITLE

INSTITUTION NAME AND ADDRESS:

Department of The Army
Academy of Health Sciences
ATTN: Preventive Medicine Division (HSHA-IPM)
Radiation Protection Officer
Fort Sam Houston, Texas 78234

H-6

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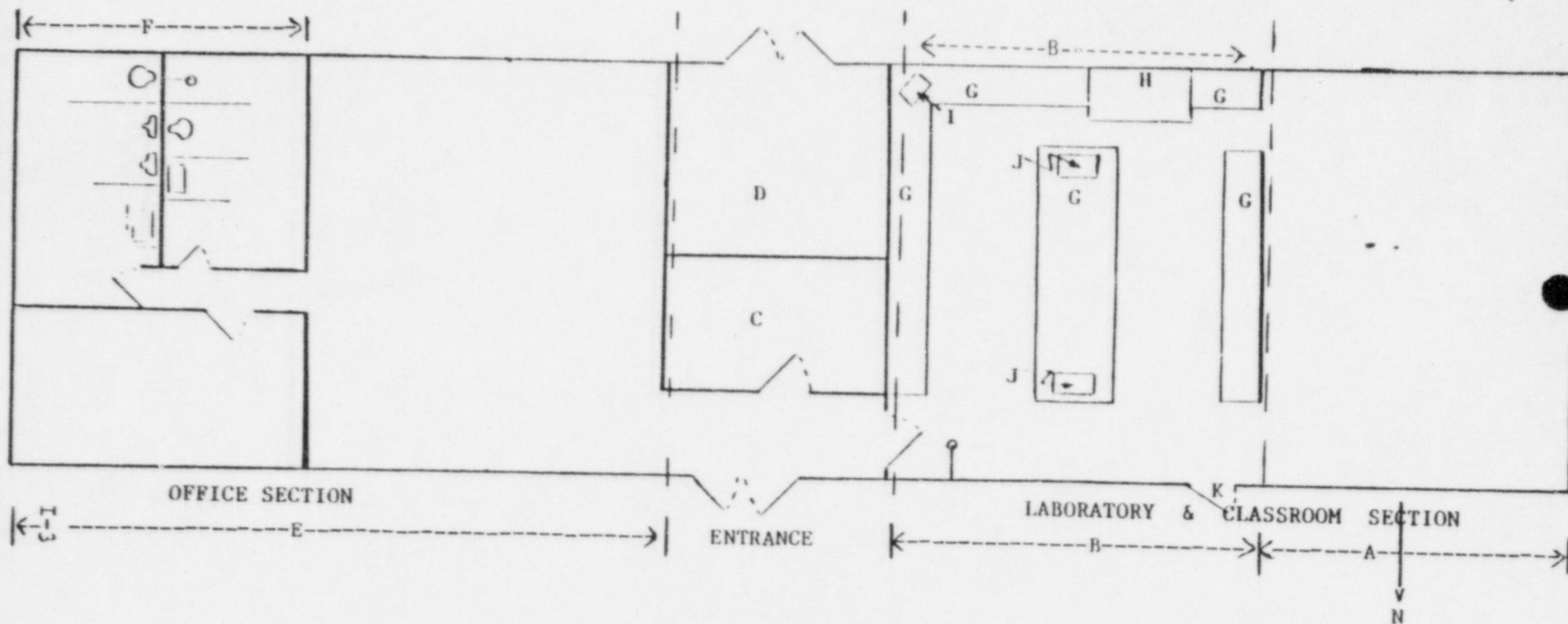
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APPENDIX I

Facilities and Equipment

1. Building 2785 is scheduled to undergo renovation to meet the facility requirements for the Health Physics Specialists Course (311-91X20) for usage of radioactive materials. Building 2785 will successfully undergo a complete physical security inspection by the Office of the Provost Marshal, Fort Sam Houston, Texas, prior to acquisition of radioactive materials in greater than exempt quantities.
2. Radioactive materials will be used in that part of building 2785 designated as Area B on the enclosed floorplan (see page I-3).
3. Current plans call only for the use of sealed sources of radiation; routine radioactive waste will not be produced in building 2785. Any future request to amend this license to allow use of dispersible radioactive material will include designation of authorized radioactive waste receptacles and consideration of protective clothing. Radioactive waste procedures are outlined in Appendix J.

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BUILDING 2785

- NOTES:
1. All exterior doors are metal with at least one (1) inch dead bolt locks.
 2. Door to storage is solid wood core.
 3. All walls are at least three (3) inch ceramic (hollow) tile.
 4. All exterior windows have security grating.
 5. Entrance to (D) does not provide access to the remainder of the building.

A Classroom	F Toilet
B Laboratory	G Lab. Bench
C Storage	H Fume Hood
D Mechanical Equipment Room	I Sink (Hot)
E Administrative Offices	J Sink (Cold)
	K Fire Exit

APPENDIX J

Radiation Protection Program

Posting of Documents.....	J-1
Procurement, Receipt, and Storage of Licensed Material.....	J-2
Radioactive Waste Disposal.....	J-3
Radiation Safety Training.....	J-4
Leak Testing of Sealed Sources.....	J-5
Radioisotope Laboratory Routing Safety Procedures.....	J-6
Radiation Accidents.....	J-7
Transportation of Radioactive Materials.....	J-8

APPENDIX J-1

Posting of Documents

The following documents will be posted or information describing their location and availability will be posted in laboratory areas where licensed radioactive materials are used:

- a. 10 CFR 19, 20, 21, 30, and 31.
- b. Energy Reorganization Act, Section 206.
- c. Form NRC-3, Notice to Employees.
- d. License (to include supporting documentation).
- e. Operating procedures.
- f. Any notice of violation and related documents.

APPENDIX J-2

Procurement, Receipt, and Storage of Licensed Material

1. Only radioactive materials which have been authorized by the RCC may be procured.
2. The AHS RPO shall review all purchase request(s) for radioactive materials to ensure compliance with the conditions of the NRC License and/or Department of the Army Authorization.
3. All radioactive materials will be delivered to the Logistics receiving element, unless other arrangements have been made and approved by the RPO.
4. Radioactive materials will be received only during normal duty hours, unless other arrangements have been made and approved by the RPO.
5. Packages containing nonexempt amounts of radioactive materials will be handled in accordance with the provisions of 10 CFR 20.205.
6. Radioactive materials shall be stored in areas authorized by the RPO.
7. Source storage containers will be such that the radiation level at the external surface of the container is not in excess of two milliroentgen per hour.

J-2-1

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APPENDIX J-3

Radioactive Waste Disposal

1. The RPO will be notified as soon as radioactive material is slated for disposal. Notification shall be made in writing and contain, as a minimum:

- a. Radionuclide(s) involved.
- b. Physical form.
- c. Physical volume.

2. Radioactive material with a physical half-life of less than 65 days will be decayed in storage, as specified in user application and authorization. This radioactive material shall:

- a. Be held until its radioactivity cannot be distinguished from background with an appropriate low-level survey instrument.
- b. Have all radiation labels removed or obliterated.
- c. Be disposed of as normal trash.

3. Radioactive material with a physical half-life of 65 days or greater will have control transferred to the RPO. The RPO will initiate disposal proceedings per AR 385-11 (which specifies compliance with NRC and Department of Transportation regulations and with Army Armament Material Readiness Command Instructions).

4. These procedures do not apply to exempt quantities of radioactive material used under Nuclear Regulatory Commission Registration Certificate 6634.

NOTE: The US Army Armament, Munitions, and Chemical Command located at Rock Island, Illinois, is responsible for coordinating radioactive waste shipments for all Army facilities. They utilize various licensed commercial waste disposal facilities.

APPENDIX J-4

Radiation Safety Training

1. Radiation safety training of workers will be in accordance with 19.12 of 10 CFR 19.
2. All individuals working in or frequenting any portion of a restricted area:
 - a. Shall be kept informed of the storage, transfer, or use of radioactive materials or of radiation in such portions of the restricted area.
 - b. Shall be instructed in the health protection problems associated with such materials or radiation, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed.
 - c. Shall be instructed in and instructed to observe, to the extent within the worker's control, the applicable provisions of Commission regulations and licenses for the protection of personnel from exposures to radiation or radioactive materials occurring in such areas.
 - d. Shall be instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation or to radioactive material.
 - e. Shall be instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material and shall be advised as to the radiation exposure reports which workers may request pursuant to 19.13 of 10 CFR 19.
3. The extent of these instructions shall be commensurate with potential radiological health protection problems in the restricted area.

APPENDIX J-5

Leak Testing of Sealed Sources

1. The RPO is responsible for the performance, analyses, and posting of records of all leak tests of sealed radioactive sources to AHS to satisfy the requirements of pertinent Army regulations and the conditions of the NRC license and Department of the Army Authorization.
2. Each sealed source with an activity greater than 100 microcuries (10 microcuries for an alpha emitter), with a half-life greater than 30 days, and in any form other than gas shall be tested for leakage or contamination prior to use or transfer to another licensee and at least once every six months, except that each source designed for the purpose of emitting alpha particles shall be tested at intervals not exceeding three months.
3. The leak testing procedure shall be capable of detecting the presence of 0.005 microcuries on the test sample. The test sample will consist of a paper filter, such as that used in quantitative chemical analysis. The filter will be wiped over the entire surface of the source, and then analyzed.
4. If the leak test reveals the presence of 0.005 microcuries or more removable contamination, the sealed source shall be immediately withdrawn from use and shall be decontaminated, repaired, or disposed of in accordance with current regulations. The RPO shall render the required reports.
5. Leak test analysis will be performed on a Searle Model 1185K Gamma Scintillation Well Counter or equivalent for gamma emitters, and on a Nuclear Chicago Model 6872 Liquid Scintillation Counter or equivalent for beta emitters. (Analytical equipment is located at Brooke Army Medical Center, Fort Sam Houston, Texas, an NRC licensed facility.)
6. Calibration (optimization of window settings) is accomplished monthly for analytical equipment, and verified on a daily basis. Chi-squared reliability tests and efficiency calculations are also accomplished monthly. All check sources used are traceable to the National Bureau of Standards. Gamma standards are New England Nuclear Sources Model NES-100S or equivalent. Beta standards (liquid scintillation) are Beckman quenched standards set CSS4 or equivalent.

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7. Calculations

- a. Minimum Detectable Activity (MDA) will be calculated as follows:

$$MDA = 3 \sqrt{\frac{N_B}{T_B}}$$

N_B = Background Countrate

T_B = Background Counting Time

- b. Minimum sensitivity (MS) will be calculated as follows:

$$MS = \frac{MDA}{EC}$$

E = Counting Efficiency

C = Conversion Factor

- c. Activity (A) will be calculated as follows:

$$A = \frac{GCPM - BCPM}{E \cdot C}$$

GCPM = Gross Counts Per Minute

BCPM = Background Counts Per Minute

APPENDIX J-6
Instructions to Workers/Students
Radioisotope Laboratory Routine Safety Procedures

1. Licensed material in greater than exempt quantities will be used only under the supervision of the RPO, Class Advisor, or Assistant Class Advisor 311-91X20 Course.
2. Eating, drinking, storing, or preparing food; smoking; or applying cosmetics is prohibited in areas where radioactive materials are used or stored.
3. All spills of radioactive materials or damage to sealed sources shall be reported to the RPO and decontaminated immediately.
4. Licensed material will be returned to a properly labeled storage container promptly after use.
5. At the close of the work period, the laboratory work surfaces should be carefully monitored.
6. Before leaving the laboratory after working with radioactive materials, each person should wash his hands thoroughly and check them with a laboratory monitor for contamination.
7. If issued a film badge, ring badge, and/or dosimeter, it (they) will be worn at all times during duty hours except for medical and dental x-ray appointments.
 - a. Dosimeters will be placed in a designated location (approved by the RPO) at the end of the duty day, not taken home.
 - b. Dosimeters issued by AHS will not be utilized at places of employment other than AHS.
8. Report any injury or unusual incident so that the possibility of an overexposure or internal deposition of radioactive material can be investigated.

J-6-1

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APPENDIX J-7

Radiation Accidents

In view of the complicating factors that may arise in an accident, it is impossible to establish simple rules of procedure to cover all situations in a radiation accident. However, in any radiation accident, the primary concern must always be the protection of personnel from radiation hazards. The secondary concern is confinement of contamination to the immediate environment so that further exposure of personnel will be controlled.

1. Any accident involving radiation sources shall be reported to the supervisor having administrative control of the source and to the RPO IAW AR 385-40 and 10 CFR 19, 20, and 21.
2. In the event of an accident, the senior, most knowledgeable radiation worker present shall assume control of the situation and direct activities until relieved by proper authority.
3. In the event of a radiation accident resulting in contamination and/or injury of personnel, the following actions should be taken:
 - a. Evacuate all personnel from the involved area, confine the contamination, and give necessary first aid.
 - b. Notify the AHS RPO:
 - (1) During duty hours: 221-2995/2818.
 - (2) After duty hours: Contact the AHS Staff Duty Officer (SDO) at 221-3406/5329/3604.
 - c. Casualties shall be taken to the Brooke Army Medical Center (BAMC) Emergency Room (BAMC ER) for treatment if deemed necessary and advisable. In this situation, the BAMC ER should be notified of the nature and extent of any radioactive contamination. The BAMC ER should be instructed to notify the BAMC RPO/SDO.
4. The AHS RPO shall respond to all radiation accidents and will:
 - a. Provide technical advice as necessary.
 - b. Monitor the individual(s) who was (were) in the vicinity of the accident if there is a reasonable possibility that they may have been exposed and/or contaminated.
 - c. Take action to prevent further contamination of personnel and equipment.

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

e. Submit appropriate recommendations to the RCC to help preclude similar future events.

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APPENDIX J-8

Transportation of Radioactive Materials

Transportation of radioactive materials will be in accordance with Title 10 of the Code of Federal Regulations, Part 71.

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