NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

APPLICATION FOR MATERIAL LICENSE

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

ICTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES F ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

L AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

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

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

U.S. Army Communications-Electronics Command
ATTN: AMSEL-SF
Ft. Monmouth, NJ 07703-5024

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

See Supplement A

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Barry J. Silber, Radiation Protection Officer

TELEPHONE NUMBER: 201-544-4427

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time: See Supplement B

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.
See Supplement C

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE. See Supplement D

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.
See Supplement E

9. FACILITIES AND EQUIPMENT. See Supplement F

10. RADIATION SAFETY PROGRAM.
See Supplement G

11. WASTE MANAGEMENT. See Supplement H

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: Exempt
AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT. FOR THE COMMANDER:

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR 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.

SIGNATURE—CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
[signature]	RAYMOND E. B. KETCHUM, II	Colonel, GS, Chief of Staff	7 May 1987

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

[ ]	<$250K	[ ]	$1M–3.5M
[ ]	$250K–500K	[ ]	$3.5M–7M
[ ]	$500K–750K	[ ]	$7M–10M
[ ]	$50K–1M	[ ]	>$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(Dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence)*

[ ] YES [ ] NO

FOR NRC USE ONLY

APPROVED BY

DATE 5/11

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY:** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S):** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES:** The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

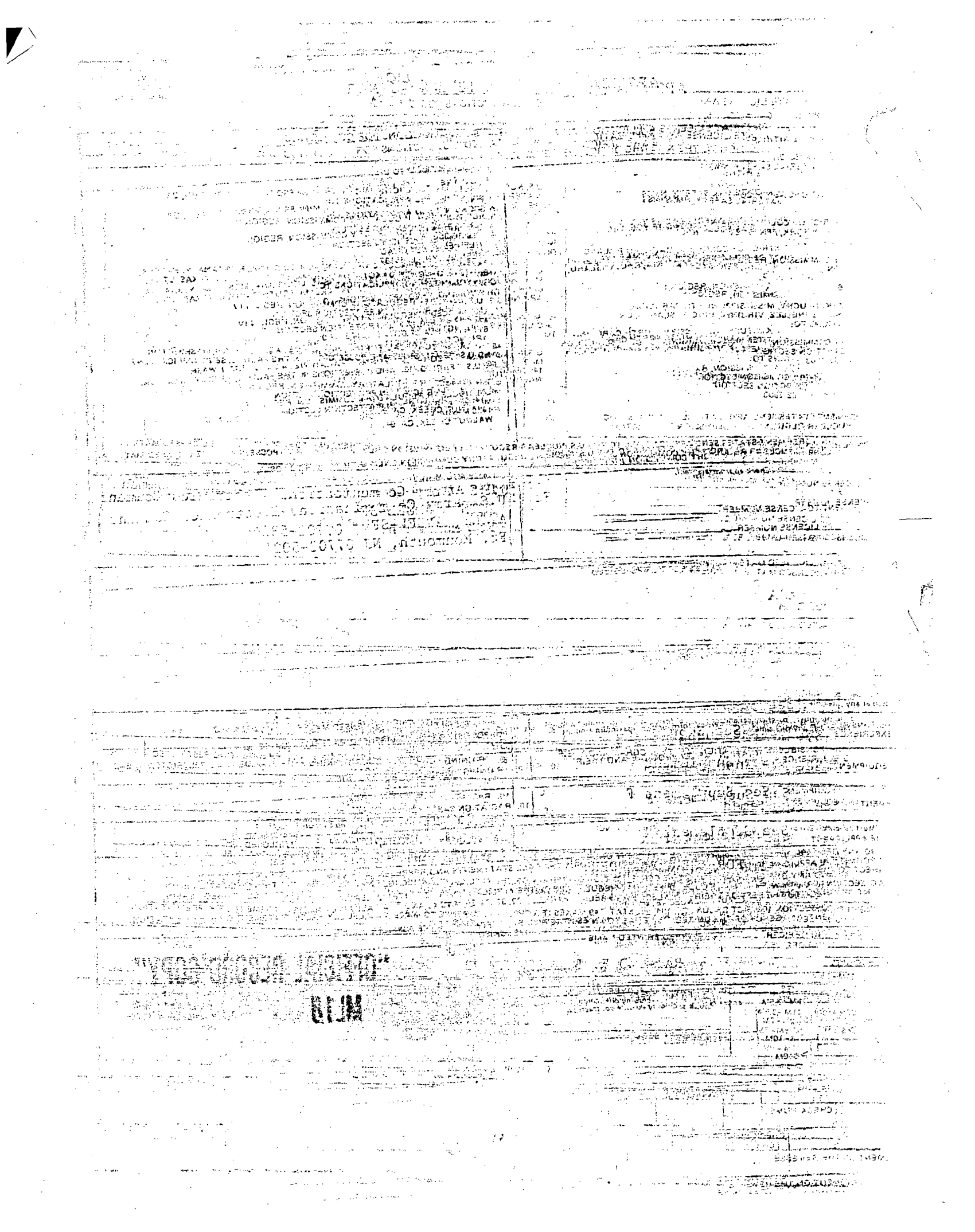
4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION:** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS:** U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

L-01022
030-29741

Executive Summary

The enclosed US Nuclear Regulatory Commission (NRC) Application for Materials License submitted by this headquarters represents a consolidation of seven NRC licenses currently issued to this command, in addition to one newly procured and three transitioned radioactive commodities/materials. The seven NRC licenses are identified as: 29-01022-08 (AN/UDM-2 Radiac Calibrator Set); 29-01022-11 (MX-7338/PDR-27( ) Radioactive Test Sample); SMB-1300 (Thorium Fluoride Coated Optics); SNM-1327 (CS-1 Check Source); SNM-1896 (AN/UDM-7C Radiac Calibrator Set); SNM-1900 (AN/UDM-6 Radiac Calibrator Set) and SUB-1150 (CS-12 and B-1093 Check Sources). The three radioactive commodities/materials that are and/or will be transitioned to this command include the AN/UDM-1 and AN/UDM-1A Radiac Calibrator Sets and the M3A1 Radioactive Source Set. The M3A1 Radioactive Source Set is currently authorized under License Number 12-00722-11 issued to the US Army Armament, Munitions and Chemical Command, Rock Island, IL. The AN/UDM-1 and AN/UDM-1A Radiac Calibrator Sets are authorized under various individual NRC licenses issued to individual user locations. Upon receipt of a consolidated license by the NRC, all the individual NRC licenses issued for the above commodities/materials will be terminated. The only commodity contained within this consolidated license application which has not previously been issued an NRC license is the Amersham Corportion Americium-241 Variable Energy X-ray Source. The enclosed application represents an effort by this command to include all the above licenses/commodities under one consolidated license.



BARRY J. SILBER, Supervisory Health Physicist, US Army Communications-Electronics Command (CECOM), Fort Monmouth, New Jersey

a. Education:

(1) A.A. - Brooklyn College of the City University of New York, Brooklyn, New York [ ] Ex 6

(2) B.S. - Brooklyn College of the City University of New York, Brooklyn, New York - [ ] Major: Chemistry.
Ex 6

b. Professional Experience:

(1) October 1966 - May 1967:
Allen Pharmacal Corporation, 175 Pearl Street, Brooklyn, New York.
Laboratory Technician - Analytical Chemistry Laboratory.
Laboratory analyses of pharmaceuticals at various stages of manufacture to insure compliance with Food and Drug Administration Regulations as well as United States Pharmacopeia and National Formulary Monographs.

(2) June 1967 - March 1970:

EON Corporation, 175 Pearl Street, Brooklyn, New York.
Chemist - Responsible for all health physics activities, including radiation surveys, air sampling and wipe tests, leak testing of sealed sources, decontamination of facilities and equipment, disposal of radioactive wastes, calibration of radiation survey and measurement instrumentation, record-keeping, etc., to insure compliance with US Nuclear Regulatory Commission (NRC) and New York State Regulations; liaison between regulatory agencies and corporate management; authorized radiation worker (user) of multiple types of radioactive materials used in the manufacture of radiation sources for commercial, military and highly specialized (custom-made) use; responsible for all chemistry activities including metallurgical applications on products at various stages of manufacture to meet quality control specifications.

(3) March 1970 - June 1977:

State of New York Department of Labor, Division of Safety and Health, 2 World Trade Center, New York, New York.
Senior Radiophysicist - Radiological Health Unit.
Responsible for the review of applications, including the evaluation of facilities, equipment, personnel and products containing radioactive materials, and in the preparation of State licenses authorizing the possession and use of radioactive materials by persons in industry and related activities in this State; assist in the administration of the licensing program; consult with and assist industrial management personnel and others in establishing radiation protection programs; conduct inspections, special prelicensing investigations, radiation surveys and tests at the sites of licensees and registrants using radiation sources to enforce state requlations and to insure that radiation workers and the general public are fully protected; assemble environmental research data, analyze and interpret this data, assist in the publication of scientific reports, and training of new staff members.

Ex 6

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(4) June 1977 - January 1978:

US Army Electronics Command (ECOM), Fort Monmouth, New Jersey.
Health Physicist - Responsible for health physics functions in the establishment and implementation of the ECOM Safety Program aimed at establishing life cycle controls of CECOM commodities utilizing radioactive material and ionizing radiation producing devices; responsible for the evaluation of radiological protection programs and radiation facilities to determine their adequacy and to insure compliance with DA Authorizations and NRC Licenses; perform studies and evaluations necessary to minimize the health risks to personnel; prepare and review applications for DA Authorizations and NRC Licenses; establish and maintain radiation protection records and files.

(5) January 1978 - April 1981:

US Army Communications and Electronics Materiel Readiness Command (CERCOM), Fort Monmouth, New Jersey.
Duties are the same as in Item b(4) above. Name change from ECOM to CERCOM.

(6) May 1981 - December 1981:

CECOM, Fort Monmouth, New Jersey.
Duties are the same as in Item b(4) above. Name change from CERCOM to CECOM.

(7) December 1981 - Present:

CECOM, Fort Monmouth, New Jersey.
Supervisory Health Physicist and Chief, Radiological Engineering Branch.
Responsible for directing and administrating Health Physics/Radiological Engineering programs for the life cycle management control of radioactive commodities utilized worldwide which includes but is not limited to the various stages of research, development, test, production, deployment and disposal; directs/administers the Fort Monmouth Radiation Protection Program for multiple type and quantities of radioactive material; develops and provides guidance and assistance to the DOD activities and elements world-wide in the radiological safety aspects of handling, storing and disposal of mission items of supply containing radioactive materials, provides guidance for and technical review of NRC license applications and DA Authorizations for use of radioactive materials in CECOM systems or components thereof; manages comprehensive computerized tracking system to ascertain compliance to stipulated licenses and authorizations; develops technical criteria and provides these data and assistance to all DA Major Commands to assure compliance with the life cycle management controls established by the NRC and/or DA Authorization; assures compliance throughout the Command with the requirements of NRC and DA relative to ionizing radiation within facilities, and mission items containing radioactive materials.

c. Formal Training in Radiation Protection Methods, Measurements and Effects:

	Duration of Training	On-The-Job	Formal Course
(1) X-ray Technology for Radiological Health Personnel-Memorial Hospital for Cancer and Allied Diseases, 444 East 68th Street, New York, New York - 11 January - 14 January 1971.	3 Days	No	Yes
(2) Orientation Course in Regulatory Practices and Procedures - NRC, Bethesda, Maryland - 1 March - 19 March 1971.	3 Weeks	No	Yes
(3) Health Physics and Radiation Protection - Special Training Division, Oak Ridge Associated Universities, Oak Ridge, Tennessee - 12 February 1973 to 20 April 1973. Sponsored by NRC for Agreement State regulatory personnel.	10 Weeks	No	Yes
(4) Radiological Safety Course - US Army Ordnance and Chemical Center and School, Aberdeen Proving Ground, Maryland - 25 October - 15 November 1977.	3 Weeks	No	Yes
(5) Internal Dosimetry for Fixed Nuclear Facilities-Oak Ridge Associated Universities, Oak Ridge, Tennessee - 5 November - 9 November 1979.	1 Week	No	Yes
(6) Managers' Environmental Course - US Army Logistics Management Center, Fort Lee, Virginia - 13 July - 17 July 1981.	1 Week	No	Yes
(7) Health Physics in Radiation Accidents - Radiation Emergency Assistance Center/Training Site, Oak Ridge Associated Universities, Oak Ridge, Tennessee - 11 - 15 January 1982.	1 Week	No	Yes

d. Experience with Radiation.

Isotope	Maximum Amount	Duration of Experience	Type of Use
(1) ^{14}C	60 mCi	3 years	For items 1 through 10-manufacture of sealed sources, health physics surveys and wipe tests.
(2) ^{32}P	10 mCi	3 years	
(3) ^{36}Cl	10 mCi	3 years	
(4) ^{63}Ni	10 mCi	3 years	
(5) $^{90}Sr/^{90}Y$	50 mCi	3 years	For items 11 and 14-calibration of radiation instrumentation, health physics surveys and wipe tests.
(6) ^{99}Tc	100 mCi	3 years	
(7) $^{106}Ru/^{106}Rh$	50 mCi	3 years	
(8) $^{144}Ce/^{144}Pr$	500 mCi	3 years	
(9) ^{147}Pm	500 mCi	3 years	For items 12 and 13-health physics surveys and wipe tests.
(10) ^{204}Tl	50 mCi	3 years	
(11) ^{60}Co	10 mCi	3 years	
(12) ^{60}Co	200 Ci	3 years	
(13) ^{137}Cs	250 Ci	3 years	
(14) ^{226}Ra	20 mCi	3 years	

JOSEPH M. SANTARSIERO, Health Physicist, US Army Communications-Electronics Command, Fort Monmouth, New Jersey 07703

a. Education:

(1) Seton Hall University, East Orange, New Jersey

Biology program 1972-1973.

(2) Brookdale Community College, Lincroft, New Jersey

(3) Rutgers, The State University, New Brunswick, New Jersey

BS degree in Biology, [ ] Ex 6

(4) Middlesex General Hospital, New Brunswick, New Jersey

Certification in Nuclear Medicine Technology, May 1978.

(a) American Registry of Radiologic Technologists (ARRT).

(b) Certifying Board of Nuclear Medicine Technology (CBNMT).

(c) State of New Jersey Certification - Nuclear Medicine Technology.

(5) Rutgers, the State University, New Brunswick, New Jersey

Presently completing program of graduate study in Radiation Science (Masters Program).

b. Professional Experience:

(1) May 1978-August 1982:

Monmouth Medical Center, 3rd and Pavillon Avenues, Long Branch, New Jersey.

Senior Nuclear Medicine Technologist-Department of Nuclear Medicine. Licensed to prepare and administer radiopharmaceuticals for diagnostic imaging of disease in or on human beings. Responsible for the quality control of imaging systems and computers, dose calculation and assay prior to administration, patient orientation to procedures and on-call emergency procedures. Performed various health physics activities including radiation surveys, air sampling and wipe tests, leak testing of sealed sources, decontamination of facilities and equipment, disposal of radioactive wastes, calibration of radiation survey and measurement instrumentation, record-keeping, etc., to insure compliance with US Nuclear Regulatory Commission (NRC) and New Jersey State Regulations.

(2) August 1982-September 1983:

Bio-Med Associates, Inc., 753 Boulevard, Kenilworth, New Jersey.

Provide consultation to hospitals, doctors, administrators, etc., regarding the safe and proper use of radiation and radioactive materials. Determine the requirements of, and design the shielding for X-ray installations and nuclear medicine departments. Prepare applications for the use of radioac-

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tive materials for both USNRC and State regulated radioactive materials. Amend licenses as requested and required. Evaluate radiation safety programs, prepare and give lectures to physicians, nurses, administrators, etc., regarding radiation and radioactivity. Design areas where radioactive materials are stored and/or used. Perform quality control procedures on X-ray machines and nuclear medicine instruments. Instruct X-ray students. Review personnel monitoring records and methods, evaluate personnel performance regarding radiation and its use, perform sealed source leak tests on various radionuclides.

(3) September 1983-February 1984:

State of New Jersey, Department of Environmental Protection, Bureau of Radiation Protection, 380 Scotch Road, Trenton, New Jersey.

Radiation Physicist.

Approved or rejected licenses or amendments for possession and use of radioactive materials, in the State of New Jersey, after assessment of user qualification, radiation safety program, and compliance with State rules and regulations. Reorganized program format and developed inspection procedures, criteria and forms. Evaluated and provided recommendations for quality assurance of radiopharmaceuticals and instruments at user facilities. Performed inspections and violation investigations of facilities utilizing State licensable materials, initiated legal proceedings for areas found to be in non-compliance, and issued letters of compliance. Authorized to impound non-compliant units to prevent usage that may be detrimental to public and/or occupational safety. Conducted special projects evaluating radiation hazards and development of procedures for control and reduction of unnecessary radiation. Investigated violations and incidents post notification of radiation hazard with authority to establish improved radiation safety requirements. Registered NRC licensable materials. Registered accelerators and reviewed radiation hazard with licensable materials. Registered accelerators and reviewed radiation safety surveys. Member of emergency response team with authority to make immediate decisions relative to public health and safety regarding the control of radiation. Responsible for monthly report and statistic preparation involving radioactive material users, inspections, violations, NRC registrations, and accelerators. Responded to all public and private inquiries involving radioactive materials or non-ionizing radiations. Proposed regulations for NJ Administrative Code adoption.

(4) February 1984-present

US Army Communications-Electronics Command (CECOM), Fort Monmouth, New Jersey.

Health Physicist - Responsible for health physics functions in the establishment and implementation of the CECOM Safety Program aimed at establishing life cycle controls of CECOM commodities utilizing radioactive material and ionizing radiation producing devices; responsible for the evaluation of radiological protection programs and radiation facilities to determine their adequacy and to insure compliance with DA Authorizations and NRC Licenses; perform studies and evaluations necessary to minimize the health risks to personnel; prepare and review applications for DA Authorizations and NRC Licenses; establish and maintain radiation protection records and files.

c. Formal Training in Radiation Protection Methods, Measurements and Effects:

Topic	Duration of Training	On-The-Job	Formal Course
(1) Internship in Radiation Health Sciences; Rutgers University, New Brunswick, NJ (1977-1978)*	1 year	Yes	Yes
(2) Radiation and Radioactivity; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Sep - Dec, 1981)	1 semester	No	Yes
(3) Radioactivity and the Environment; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Jan-Apr, 1982)	1 semester	No	Yes
(4) Special Topics in Radiological Health; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Jan-Apr, 1982)	1 semester	Yes	Yes
(5) Radiation Dosimetry; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Sep-Dec, 1982)	1 semester	No	Yes
(6) Radiation Biophysics; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Jan-Apr, 1983)	1 semester	No	Yes
(7) Radiation Chemistry; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Sep-Dec, 1983)	1 semester	No	Yes
(8) Nuclear Emergency Response, State of NJ, Department of Environmental Protection (27, 28 Sep, 1983)	16 hours	No	Yes
(9) Instrumentation and Radiation; Rutgers Graduate School of Radiation Science, New Brunswick, NJ (Jan-Apr, 1984)	1 semester	No	Yes
(10) Radioactive Materials Transportation; Department of Energy; Chicago, IL (20-24 Aug, 1984)	40 hours	No	Yes

*Course work included: Radiation Detection and Measurement; Nuclear Instrumentation; Radionuclide Chemistry; Radiation Protection; Radiation Biology;

Radiation Biochemistry; Interactions of Radiation with Matter; Atomic Theory and Structure; Nuclear Physics.

d. Experience with Radioactive Materials:

	Maximum Isotope	Amount	Experience	Type of Use
1.	$^{99}Mo/^{99m}Tc$	2 Ci	5 years	For items 1 through 18, radiopharmaceutical preparation, dose injection, and/or related diagnostic/therapeutic procedures, health physics surveys, wipe test analysis, and instrument calibration.
2.	^{131}I	20 mCi	5 years	
3.	^{75}Se	5 mCi	5 years	
4.	^{67}Ga	50 mCi	5 years	
5.	^{201}Tl	30 mCi	5 years	
6.	^{32}P	40 mCi	5 years	
7.	^{133}Xe	200 mCi	5 years	
8.	$^{81}Rb/^{81m}Kr$	25 mCi	5 years	
9.	^{125}I	50 mCi	5 years	
10.	^{123}I	10 mCi	5 years	
11.	^{137}Cs	5 Ci	5 years	
12.	^{226}Ra	800 mg	5 years	
13.	^{192}Ir	80 Ci	6 months	
14.	^{57}Co	30 mCi	5 years	
15.	^{133}Ba	10 mCi	5 years	
16.	^{51}Cr	25 mCi	5 years	
17.	^{59}Fe	20 mCi	1 year	
18.	^{111}In	3 mCi	5 years	
19.	^{85}Kr	6 mCi	2 years	For items 19 through 21 experience consisted of wipe tests, experiments and evaluations utilizing these sources.
20.	^{90}Sr	200 uCi	2 years	
21.	^{60}Co	100 Ci	2 years	

STEVEN A. HORNE, Supervisory Safety Engineer, US Army Communications-Electronics Command (CECOM), Fort Monmouth, New Jersey

1. Educational Background:

Old Dominion University Norfolk, Virginia	3 Years	[ ] - Associate in Applied Science
The Catholic University of America Washington, DC	2 Years	[ ] - BSE Nuclear Science and Engineering
The Catholic University of America Washington, DC	-	1975 - Graduate Work in Nuclear Science and Engineering

2. Formal Training and Experience in Radiation Protection Methods, Measurements and Effects:

	Duration of Training	On The Job	Formal Course
a. Fifty-six semester hours pertaining to radiation, including college physics, Environmental Aspects of Nuclear Power Plant Management, Environmental Radioactivity, Nucleonic Fundamentals, Nuclear Properties and Interactions, Nuclear Physics, Nuclear Radiation Detection, Nuclear Reactor Physics, Radiation Biology, Radioisotope Techniques and Radiological Physics - Old Dominion University and The Catholic University of America.	1961-1975	No	Yes
b. Radiation Detection Effects and Devices Utilizing various type of high energy accelerators - Virginia Associated Research Center Newport News, Virginia, and NASA Langley Research Center, Langley, Virginia.	1 Year	Yes	No
c. Radiation safety, detection instrumentation and isotopic handling equipment - Flow Corp, Fort Belvoir, Virginia.	2 Months	Yes	No

	Duration of Training	On The Job	Formal Course
d. Radiological Safety Course pertaining to Nuclear Moisture/ Density Instrumentation - Seaman Nuclear Corporation, Milwaukee, Wisconsin.	24 hours	No	Yes
e. Occupational Radiation Protection Course 212 - Public Health Services, Las Vegas, Nevada.	80 Hours	No	Yes
f. Fundamentals of Non-Ionizing Radiation Protection Course 264 - Public Health Service, Rockville, Maryland.	40 Hours	No	Yes
g. Laser Safety Course - University of Cincinnati, Ohio	40 Hours	No	Yes
h. Radionuclide Analysis by Gamma Spectrocopy Course 208 - Public Health Services, Winchester, Massachusetts.	80 Hours	No	Yes
i. Radiation Guides and Dose Assessment Course 272 - Environmental Protection Agency, Las Vegas, Nevada.	80 Hours	No	Yes
j. Boiling Water Reactor Technology Course - Public Service Gas and Electric Company, Salem, New Jersey.	64 Hours	No	Yes

3. Experience with Radioisotopes:

Isotope	Maximum Activities in Curies	Duration of Experience	Type of Experience
^{241}Am	1	3 Years	For all radionuclides listed, experience consisted of laboratory analysis, wipe tests, experiments and evaluations utilizing these sources.
^{252}Cf	.27	3 Years	
^{57}Co	0.1	4 Years	
^{60}Co	1200	8 Years	
^{137}Cs	1	8 Years	
^{3}H	20	8 Years	
^{192}Ir	100	8 Years	

Isotope	Maximum Activities in Curies	Duration of Experience	Type of Experience
^{147}Pm	1	8 Years	
$^{226}RaBe$	1	5 Years	
$^{239}PuBe$	1	1 Year	
^{90}Sr	0.1	2 Years	

4. Experience with other Radiation Producing Machines:

Radiation Machine	Duration of Experience	Type of Experience
a. NASA Langley Research Center, and Virginia Associated Research Center's, Space Radiation Effects Laboratory consisting of a 2 MeV Van de Graaff accelerator, 3 MeV Dynamitron accelerator, 10 MeV Linear Electron Accelerator, a 600 MeV Proton Synchrocyclotron Accelerator and a 14 MeV Neutron Generator.	1.5 Year	Radiation damage Shielding Experiments and Related Health Physics Studies.
b. 250 KeV General Electric Corporation X-ray machine	8 Years	Health Physics and laboratory experiments.
c. Various energy dispersive and wave length X-ray fluorence spectrometry with X-ray generators up to 50 KeV.	8 Years	Health Physics and laboratory experiments.

5. Experience with radiation:

1964-1965 - Virginia Associated Research Center, NASA, Langley Research Center, Virginia as health physics technologist.

1965-1966 - E.R. Squibb, New Brunswick, New Jersey as radiochemist isotope technologist

1966-1968 - Flow Corporation, Nuclear Division, Fort Belvoir, Virginia as radiation engineer.

1968-1976 - US Army Mobility Equipment Research and Development Command, Fort Belvoir, Virginia as health physicist.

1976-1978 - US Army Electronics Command, Fort Monmouth, New Jersey as health physicist.

1978-1983 - CECOM, Fort Monmouth, New Jersey as Superisory Health Physicist.

1983-1986 - CECOM, Fort Monmouth, New Jersey as Supervisory Safety Engineer.

Mr. Horne is designated as the alternate license manager of Nuclear Regulatory Commission Licenses and Department of the Army Authorizations.

1986-Present - CECOM, Fort Monmouth, New Jersey, as Acting Chief, Safety Office.

PROGRAM OF INSTRUCTION

NUMBER 4J-F1/493-F3 SEPTEMBER 1983

RADIAC CALIBRATOR CUSTODIAN COURSE

MOS: NONE

THIS IS A PEACETIME POI
LENGTH: 5 DAYS

APPROVED BY
COMMANDING GENERAL
UNITED STATES ARMY TRAINING
AND DOCTRINE COMMAND
19 SEPTEMBER 1983

US ARMY CHEMICAL SCHOOL
FORT MCCLELLAN, ALABAMA

Encl 1

PREFACE PAGE

NUMBER: 4J-F1/493-F3

TITLE: RADIAC Calibrator Custodian

PURPOSE: To train commissioned officers, warrant officers, enlisted personnel, and civilians to serve as calibrator custodians/ Radiation Protection Officer (RPO). SSI/MOS for which trained: None.

PREREQUISITES: a. Active Army or Reserve Component. Commissioned officers, warrant officers, enlisted personnel, or DA civilian personnel.

b. All: Must be assigned or be under orders for assignment to a duty position requiring training as a calibration custodian or RPO. Security clearance required: None. Obligated service: None.

SCOPE: Instruction for calibration custodians and RPO to include radiological safety, RADIAC Calibration, principles, of nuclear radiation, basics of radiation detection, specific RADIAC instruments, and medical aspects of radiation.

LENGTH:	PEACETIME	MOBILIZATION
	1 Week	None

TRAINING LOCATION: US Army Chemical School
Fort McClellan, AL 36205

COURSE SUMMARY

COURSE TITLE: RADIAC Calibrator Custodian

SPECIALTY TRAINED: None

	PEACETIME	MOBILIZATION
HOURS:	43	NA

SUMMARY:

TASK CLUSTER ANNEXES	HOURS		ANNEX	PAGE
	PEACETIME	MOBILIZATION		
Radiological Safety and RADIAC Calibration	40	NA	A	A-1
SUBTOTAL	40			
ADMINISTRATIVE TIME				
INPROCESSING	0			
OUTPROCESSING	0			
COMMANDANT'S TIME	0			
OPEN TIME	0			
PHYSICAL READINESS TRAINING	3			
SUBTOTAL	3			
TOTAL	43			

RECAPITULATION	HOURS	
	PEACETIME	MOBILIZATION
SECURITY CLASSIFICATION		
Unclassified	43	
TOTAL	43	
TYPE OF INSTRUCTION		
Conference	13	
Examination 3	3	
Practical Exercise 1	14	

	HOURS	
	PEACETIME	MOBILIZATION
Practical Exercise 3	9	
Seminar	1	
Nonacademic	3	
TOTAL	43	

TASK CLUSTER ANNEXES

TASK CLUSTER ANNEX: A - Radiological Safety and RADIAC Calibration

PURPOSE: To qualify the custodians/RPOs for RADIAC Calibrators AN/UDM-2, AN/UDM-6 or AN/UDM-7C, and M3A1 Radioactive Source Set, or their replacements, as outlined in TM 3-6665-203-10, TM 3-6665-214-15 w/C3, TM 11-6665-227-12, and TB 11-6665-227-12. Basic nuclear radiations and their hazards, radiation units, medical aspects of ionizing radiation and shielding principles associated with RADIAC calibration. Basics of radiation detection, RADIAC theory, operation and operator's maintenance involved with standard Army radiacmeters. The Army RADIAC calibration system and the role of the RADIAC calibrators AN/UDM-2, AN/UDM-6, or AN/UDM-7C, and M3A1 Radioactive Source Set or their replacements. Use of the RADIAC calibrators in performing calibration. Safety requirements and regulations, to include exposure guidance, area posting, reports and records, storage, film badges required, disposal, monitoring and wipe test, and transportation of RADIAC calibrators. Accident procedures and decontamination.

	PEACETIME	MOBILIZATION
TOTAL HOURS:	40	NA

POI FILE: A-1 Course Orientation (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	NA

SCOPE: Present policies and procedures pertaining to course, introduce course counselor and instructors, complete film badge forms and explain requirement to complete DA Form 1952 for privacy act requirements.

LESSON REFERENCES: AR 40-14 and A-1 Handouts.

POI FILE: A-2 Principles of Nuclear Radiation (U)

TYPE OF INSTRUCTION: 1C, 1PE3

	PEACETIME	MOBILIZATION
HOURS:	2	NA

TRAINING OBJECTIVE:

TASK: Student will outline the basic fundamentals of nuclear radiation to include basic structure of matter; nature and type of radioactivity; dose, dose rate, dose rate versus time relations; concepts of radioactive decay and half-life, and solve single isotope decay problems.

CONDITIONS: Given ST 3-155, in a classroom environment.

STANDARDS: With 70 percent accuracy, in accordance with ST 3-155, para 2.1-2.7, 3.4, 3.6, and 3.7.

LESSON REFERENCES: ST 3-155; Glasstone, Sourcebook on Atomic Energy; Evans, The Atomic Nucleus; A-2 Handouts.

POI FILE: A-3 Radiation Units (U)

TYPE OF INSTRUCTION: 1PE3

	PEACETIME	MOBILIZATION
HOURS:	1	NA

TRAINING OBJECTIVE:

TASK: Student will identify, define, and use the radiation dose units used in radiological safety, to include roentgen, rem (sievert), and rad (gray); define and explain activity units to include curie (becquerel), rad per hr at 1 meter (rhm), and related units; convert rad (gray) to rem (sievert) and determine dose rate at various distances from radioactive sources.

CONDITIONS: In a classroom environment, given ST 3-155.

STANDARDS: Solutions completed with 70 percent accuracy, in accordance with ST 3-155, Chapter 3.

LESSON REFERENCES: National Bureau of Standards Handbooks; National Council on Radiation Protection and Measurements Reports on Radiation Units; A-3 Handouts; ST 3-155.

POI FILE: A-4 Basics of Radiation Detection (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	NA

TRAINING OBJECTIVE:

TASK: Student will explain the principles of radiation detection; the nomenclature system for radiacmeters; theory and purpose of the US Army standard meters calibrated by the RADIAC calibrators AN/UDM-2, AN/UDM-6 or AN/UDM-7C, and M3A1 Radioactive Source Set or their replacements; explain the radiological safety precautions required while using the RADIAC calibrators and apply dose, dose rate and units of measurement.

CONDITIONS: In a classroom/radiation laboratory environment; given ST 3-155.

STANDARDS: In accordance with ST 3-155, para 3.4, 3.5, 4.1, 4.3, 4.5, and Chapter 7-8; with 70 percent accuracy.

LESSON REFERENCES: TM 11-5543, w/C1 and 4-6; TM 11-6665-213-12; TM 11-6665-214-10; TM 3-6665-203-10; TM 11-6665-209-15; ST 3-155; A-4 Handouts.

POI FILE: A-5 RADIAC Instruments (U)

TYPE OF INSTRUCTION: 2C, 2PE1

	PEACETIME	MOBILIZATION
HOURS:	4	NA

TRAINING OBJECTIVE:

TASK: Student will participate in a practical exercise covering operation, maintenance, and use of US Army Standard Field Radiacmeters calibrated by the AN/UDM-2; practical exercise in operation and operator/organizational maintenance, basic radiation detection, and common faults found in these RADIAC instruments.

CONDITIONS: Given required TMs, TBs, ST 3-155, Radiological Safety Handbook (RSH), DF 140, in a classroom/radiation laboratory environment.

STANDARDS: In accordance with ST 3-155, Chapters 6 and 14; with 70 percent accuracy.

LESSON REFERENCES: TM 11-5543 w/C1 and 4-6; TM 11-6665-213-12; TM 11-6665-214-10; TM 38-750; TM 11-6665-209-15; TM 11-5514A; ST 3-155; TB Sig 226-8; Radiological Safety Handbook, DF 140; NBC Div Safety SOP; A-5 Handouts.

POI FILE: A-6 Shielding of Ionizing Radiation (U)

TYPE OF INSTRUCTION: 1C, 2PE3

	PEACETIME	MOBILIZATION
HOURS:	3	NA

TRAINING OBJECTIVE:

TASK: Student will explain the method of absorption of alpha, beta, and other charged particles; the method of absorption of X and gamma radiation; nature and method of production of bremsstrahlung radiation; comparison of gamma and bremsstrahlung radiation; and shielding consideration of RADIAC calibration and solve basic shielding problems.

CONDITIONS: Given ST 3-155, in a classroom environment.

STANDARDS: In accordance with ST 3-155, para 4.1-4.3, 4.5, 4.6, 4.9, 4.10; with 70 percent accuracy.

LESSON REFERENCES: ST 3-155; Evans, The Atomic Nucleus, A-6 Handouts.

POI FILE: A-7 Medical Aspects of Ionizing Radiation (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	NA

TRAINING OBJECTIVE:

TASK: Student will describe the varied effects of nuclear radiation on body tissue to include somatic and genetic damage.

CONDITIONS: In a classroom environment, given A-7 Handouts.

STANDARDS: In accordance with school solution, with 70 percent accuracy.

LESSON REFERENCES: A-7 Handouts and Elizabeth Latorre Travis, Primer of Medical Radiobiology.

POI FILE: A-8 Exposure Guidance and Control (U)

TYPE OF INSTRUCTION: 1C, 2PE3

	PEACETIME	MOBILIZATION
HOURS:	3	NA

TRAINING OBJECTIVE:

TASK: Student will explain and use Federal and military safety regulations to include permissible radiation doses and levels; permissible concentrations of radioactive material, precautionary procedures; reports, records, and notifications; posting of radiation areas; precautionary measures to limit exposures.

CONDITIONS: In a classroom environment; given Title 10, parts 19 and 20; Radiological Safety Handbook Supplement; Code of Federal Regulations (CFR).

STANDARDS: With 70 percent accuracy, in accordance with Title 10, parts 19 and 20; CFR; Radiological Safety Handbook Supplement.

LESSON REFERENCES: AR 40-14; Title 10, parts 19 and 20; Radiological Safety Handbook Supplement; CFR; A-8 Handouts.

POI FILE: A-9 Alpha Instruments (U)

TYPE OF INSTRUCTION: 2PE1

	PEACETIME	MOBILIZATION
HOURS:	2	NA

TRAINING OBJECTIVE:

TASK: Student will use available alpha instruments (AN/PDR-60 and AN/PDR-56A), and conduct alpha monitoring, to include measurement techniques.

CONDITIONS: In a classroom/radiation laboratory environment, given alpha instruments and required training manuals.

STANDARDS: With 70 percent accuracy, in accordance with ST 3-155, Chapter 10.

LESSON REFERENCES: TM 11-6665-208-15; TM 3-6665-203-10; ST 3-155; A-9 Handouts.

POI FILE: A-10 Monitoring, Wipe Test, and Transportation (U)

TYPE OF INSTRUCTION: 1C, 1PE3

	PEACETIME	MOBILIZATION
HOURS:	2	NA

TRAINING OBJECTIVE:

TASK: Student will describe the sealed sources, leakage, and hazards associated with RADIAC calibrators and RADIAC instruments to include methods and requirements for leak testing. Define terms and terminology involved in transport of radioactive materials; explain precautions and requirements involved in preparing shipment, actual movement, and receipt of shipment of RADIAC calibrators; use Federal and military regulations on transportation; and perform leakage test for sealed radiological sources.

CONDITIONS: In a classroom environment, given required TMs, and a mock sealed radiological source.

STANDARDS: With 70 percent accuracy, IAW AR 385-11; TM 11-6665-227-12; TM 55-315; TB 11-6665-227-12.

LESSON REFERENCES: AR 385-11; TM 11-6665-227-12; TM 55-315; TM 11-6665-247-10; TM 3-6665-203-10; TB 11-6665-227-12; current BOE Tariff; A-10 Handouts.

POI FILE: A-11 Storage, Reporting, and Disposal (U)

TYPE OF INSTRUCTION: 1C, 1PE3

	PEACETIME	MOBILIZATION
HOURS:	2	NA

TRAINING OBJECTIVE:

TASK: Student will explain safe practices for handling radioactive material; describe requirements for storage of RADIAC calibrators and considerations in selecting storage sites; explain caution signs and labels; discuss the Department of the Army controls on radioactive materials licensed by other agencies; describe reports required; methods of completing these reports; explain procedures for controlling use of radioactive materials; and describe the Department of the Army disposal program to include regulations covering disposal of RADIAC calibrators.

CONDITIONS: In a classroom environment, given A-11 Handouts; TM 11-6665-227-12; TB 11-6665-227-12.

STANDARDS: With 70 percent accuracy, in accordance with school solution.

LESSON REFERENCES: AR 385-11; AR 725-1, Chapter 3; TM 11-6665-227-12; TB 11-6665-227-12; A-11 Handouts.

POI FILE: A-12 Alpha Instrument Calibration (U)

TYPE OF INSTRUCTION: 2PE1

	PEACETIME	MOBILIZATION
HOURS:	2	NA

TRAINING OBJECTIVE:

TASK: Student will explain methods of calibration of alpha RADIAC instruments using the AN/UDM-6 or its replacement (AN/UDM-7C) and perform the required calibration.

CONDITIONS: Given ST 3-155, A-12 Handouts, in a classroom/radiation laboratory environment.

STANDARDS: With 70 percent accuracy IAW ST 3-155, Chapter 10 and 14.

LESSON REFERENCES: TM 11-6665-247-10; TM 3-6665-203-10; TB 3-6665-203-12; ST 3-155; A-12 Handouts.

POI FILE: A-13 Calibration Techniques and Safety (U)

TYPE OF INSTRUCTION: 8PE1

	PEACETIME	MOBILIZATION
HOURS:	8	NA

TRAINING OBJECTIVE:

TASK: Student will describe the Army system for calibration of RADIAC instruments; perform operations involving equipment used in the calibration of standard Army RADIAC instruments; techniques of calibration; safety requirements and procedures involved in handling of the calibration equipment; calibrate standard RADIAC instruments using the AN/UDM-2 and AN/UDM-6 or AN/UDM-7C RADIAC calibrator.

CONDITIONS: Given A-13 Handouts; required TMs; TBs; in a classroom/radiation laboratory environment.

STANDARDS: With 70 percent accuracy, IAW A-13 Handouts, and school solution.

LESSON REFERENCES: TM 11-6665-247-10; TM 11-6665-227-12; TM 3-6665-214-15, w/C3; TM 3-6665-203-10; TB 11-6665-227-12; TB SIG 226-8; A-13 Handouts.

POI FILE: A-14 Radiation Accidents and Decontamination (U)

TYPE OF INSTRUCTION: 1PE3

	PEACETIME	MOBILIZATION
HOURS:	1	NA

TRAINING OBJECTIVE:

TASK: Student will develop emergency action procedures appropriate to accidents that may involve the RADIAC calibrator; enumerate actions to control and minimize the hazards involved; and outline basic decontamination principles and methods to be used to return the area involved to operational status.

CONDITIONS: In a classroom environment, given TM 3-220.

STANDARDS: With 70 percent accuracy in accordance with TM 3-220, and school solution.

LESSON REFERENCES: TM 3-220; all previous instructions.

POI FILE: A-15 Written Examination - RADIAC Instrument Calibration and Safety (U)

TYPE OF INSTRUCTION: 3E3

	PEACETIME	MOBILIZATION
HOURS:	3	NA

TRAINING OBJECTIVE:

TASK: To evaluate student achievement and ability to apply knowledges and skills learned to solve the problems and to evaluate effectiveness of the instruction.

CONDITIONS: Given examination, 150 minutes, with references during problem-solving portion only.

STANDARDS: With 70 percent accuracy in accordance with school solution.

LESSON REFERENCES: All references in RADIAC Calibrator Custodian Course subannexes.

POI FILE: A-16 Seminar - RADIAC Instrument Calibration and Safety (U)

TYPE OF INSTRUCTION: 1S

HOURS:	PEACETIME	MOBILIZATION
	1	NA

SCOPE: Student will be provided the opportunity to evaluate and discuss problems encountered from the class.

LESSON REFERENCES: All previous instruction.

POI FILE: A-17 Course Critique and Closing (U)

TYPE OF INSTRUCTION: 3C

HOURS:	PEACETIME	MOBILIZATION
	3	NA

SCOPE: Student will critique the course of instruction and resolve any problems concerning material presented in the course.

LESSON REFERENCES: All previous instruction.

TASK/SUBJECT INFORMATION SHEETS

A. TRAINERS GUIDE OR "OFFICER CRITICAL" TASKS LISTED FOR RESIDENT TRAINING FOR: RADIAC Calibrator Custodian Course.

TASK NUMBER	TITLE	POI FILE NUMBER	TRAINED TO JOB PERFORMANCE STANDARD		REMARKS
			PEACETIME	MOBILIZATION	
	Course Orientation	A-1	Yes	NA	
	Principles of Nuclear Radiation	A-2	Yes	NA	
	Radiation Units	A-3	Yes	NA	
	Basics of Radiation Detection	A-4	Yes	NA	
	RADIAC Instruments	A-5	Yes	NA	
	Shielding of Ionizing Radiation	A-6	Yes	NA	
	Medical Aspects of Ionizing Radiation	A-7	Yes	NA	
	Exposure Guidance and Control	A-8	Yes	NA	
	Alpha Instruments	A-9	Yes	NA	
	Monitoring Wipe Test and Transporation	A-10	Yes	NA	
	Storage Reporting and Disposal	A-11	Yes	NA	
	Alpha Instrument Calibration	A-12	Yes	NA	
	Calibration Techniques and Safety	A-13	Yes	NA	

TASK/SUBJECT INFORMATION SHEETS

A. TRAINERS GUIDE OR "OFFICER CRITICAL" TASKS LISTED FOR RESIDENT TRAINING FOR: RADIAC Calibrator Custodian Course.

TASK NUMBER	TITLE	POI FILE NUMBER	TRAINED TO JOB PERFORMANCE STANDARD		REMARKS
			PEACETIME	MOBILIZATION	
	Radiation Accidents and Decontamination	A-14	Yes	NA	
	Written Exam	A-15	Yes	NA	
	Seminar - RADIAC Instrument Calibration and Safety	A-16	Yes	NA	
	Course Critique and Closing	A-17	Yes	NA	

B. OTHER TASKS AND SUBJECTS TAUGHT IN RESIDENT TRAINING: NA

C. ADDITIONAL REMARKS/RATIONALE FOR TRAINING THE TASKS LISTED IN A AND B (IF REQUIRED): NA

PROGRAM OF INSTRUCTION

NUMBER 7K-F3

MAY 1983

RADIOLOGICAL SAFETY COURSE

MOS: NONE

THIS IS A PEACETIME AND MOBILIZATION POI
LENGTH: PEACETIME - 3 WEEKS
MOBILIZATION - 3 WEEKS

APPROVED BY
COMMANDING GENERAL
UNITED STATES ARMY TRAINING
AND DOCTRINE COMMAND
19 MAY 1983

US ARMY CHEMICAL SCHOOL
FORT MCCLELLAN, ALABAMA

Encl 2

PREFACE

A. COURSE NUMBER: 7K-F3
COURSE TITLE: Radiological Safety

B. PURPOSE: To provide commissioned officers, warrant officers, enlisted personnel, and civilians with the skills and knowledge pertaining to radiological safety principles and procedures required to qualify them to perform the duties of a radiological protection or control officer. MOS for which trained: None.

C. PREREQUISITES: Prior to reporting for this course, each student is required to demonstrate a working knowledge of basic mathematics and radiation physics by completing US Army Correspondence Subcourse Cml 9100 Radiological Safety I - Fundamentals.

1. Commissioned officers and warrant officers - a member of the Active Army or of a Reserve component who is assigned or under orders for assignment to a duty involving radiological safety. No security clearance required. Obligated service for Active Army officers - None.

2. Enlisted personnel - selected enlisted personnel may attend this course upon application to Commandant, USACMLS, Fort McClellan, AL 36205. Enlisted personnel will have a minimum GT score of 110 and anticipated assignment as radiological protection officers as specified in TB 11-6665-204-12. No security clearance is required.

3. Civilian personnel - must be assigned or under orders for assignment to a position requiring training in radiological safety. No security clearance required.

4. Special information: Application for enrollment in the Correspondence Course, Cml 9100 Radiological Safety I - Fundamentals, should be sent to the Army Institute for Professional Development, Newport News, VA 23628 on DA Form 145, not less than 60 days prior to anticipated reporting date for this course.

D. SCOPE: Students will receive training in tasks necessary to perform duties in radiological safety.

E. LENGTH:

PEACETIME	MOBILIZATION
3 Weeks	3 Weeks

F. TRAINING LOCATIONS:

PEACETIME	MOBILIZATION
US Army Chemical School Fort McClellan, AL 36205	US Army Chemical School Fort McClellan, AL 36205

COURSE SUMMARY

COURSE TITLE: Radiological Safety

SPECIALTY TRAINED: None

HOURS:	PEACETIME 128	MOBILIZATION 128

SUMMARY:

TASK CLUSTER ANNEXES	HOURS PEACETIME	HOURS MOBILIZATION	ANNEX	PAGE
Technical Aspects of Radiological Safety	117	117	A	4
SUBTOTAL	117	117		
ADMINISTRATIVE TIME				
INPROCESSING				
OUTPROCESSING				
COMMANDANT'S TIME	2	2		
OPEN TIME				
PHYSICAL FITNESS TRAINING	9	9		
SUBTOTAL	11	11		
TOTAL	128	128		

RECAPITULATION	HOURS PEACETIME	HOURS MOBILIZATION
SECURITY CLASSIFICATION		
All material in this POI is Unclassified	128	128
TOTAL	128	128

COURSE SUMMARY (Continued)

TYPE OF INSTRUCTION

Conference	32.2	32.2
Case Study	9.5	9.5
Demonstration	1.0	1.0
Examination - 2	10.0	10.0
Seminar	1.0	1.0
Television	2.3	2.3
Practical Exercise 1	32.0	32.0
Practical Exercise 2	29.0	29.0
Nonacademic	11.0	11.0
TOTAL	128.0	128.0

TASK CLUSTER ANNEX: A Technical Aspects of Radiological Safety

PURPOSE: To provide a working knowledge of fundamental radiological safety principles for ionizing and nonionizing radiation, to include storage, handling, transportation, disposal, reporting, control, and general safety for radioisotopes, neutronic sources, microwave, laser and machine-produced radiation; to qualify as radiological protection or control officer.

	PEACETIME	MOBILIZATION
TOTAL HOURS:	117	117

POI FILE: DB 001 Course Orientation (U)

TYPE OF INSTRUCTION: 2C

	PEACETIME	MOBILIZATION
HOURS:	2	2

SCOPE: Outline the purpose and major subject areas of the course; describe the instruction and training procedures; identify the safety hazards of the course; receive texts and references used during the course.

LESSON REFERENCES: AR 220-58; TRADOC and FORSCOM Supplement 1 to AR 220-58; Instructor Notes.

POI FILE: DB 010 Structure of Matter (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	1

TRAINING OBJECTIVE:

TASK: Identify and describe the following:

a. Characteristics and location of the proton, neutron, and electron related to atomic structure and an isotope as related to atomic structure.

b. Unknown isotopes and the number of protons, neutrons, and electrons using A and Z number notations.

c. A and Z number notation for any specific element.

CONDITIONS: Given ST 3-155 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DB010.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Chase and Rabinowitz, Principles of Radioisotope Methodology.

POI FILE: DB 040 Radioactivity (U)

TYPE OF INSTRUCTION: 1C, 1PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVES:

TASK 1: Identify the characteristics of ionizing radiation; define radioactive nuclide and the origin of radiation from the nucleus of an atom; explain the phenomena of induced radiation.

CONDITIONS: Given ST 3-155, Radiological Safety Handbook, and Radiological Safety Handbook Supplement.

STANDARDS: IAW Radiological Safety Handbook DB040.

TASK 2: Execute the following:

a. Write and balance nuclear equations.

b. Apply the proper radiation units.

c. Identify the concepts of radioactive decay and half-life.

d. Apply the mathematical solution in solving half-life problems.

CONDITIONS: Given problems and Radiological Safety Handbook.

STANDARDS: Equations and half-life problems solved with 100 percent accuracy IAW Radiological Safety Handbook DB040.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Radiological Safety Handbook Supplement.

POI FILE: DF 020 Radiation Units (U)

TYPE OF INSTRUCTION: 1C, 1PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVES:

TASK 1: Identify, define, and use the radiation units roentgen, rad, rem, dose equivalent, absorbed dose, conversion RBE, quality factors, distribution factors, and activity units.

CONDITIONS: Given ST 3-155 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF020.

TASK 2: Solve equation $R=S/d^2$ for unknown value and solve problems on SI units.

CONDITIONS: Given problems and Radiological Safety Handbook.

STANDARDS: Solutions completed with 100 percent accuracy IAW Radiological Safety Handbook DF020.

LESSON REFERENCES: ST 3-155; NCRP Reports 13 and 19; Radiological Safety Handbook.

POI FILE: DF 040 Nature of X and Gamma Radiation (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	1

TRAINING OBJECTIVE:

TASK: Describe the following:

a. Nature and different types of electromagnetic energy.

b. Production of X and gamma rays, to include Bremstrahlung, electron, and nuclear de-excitation.

c. Biological hazards with respect to X and gamma rays.

CONDITIONS: Given Radiological Safety Handbook and ST 3-155.

STANDARDS: IAW Radiological Safety Handbook DF040.

LESSON REFERENCES: Radiological Safety Handbook; ST 3-155; Leighton, Principles of Modern Physics; Sproull, Modern Physics; Sproull, X-ray in Practice.

POI FILE: DF 050 Table of Isotopes (U)

TYPE OF INSTRUCTION: 3PE2

HOURS:	PEACETIME	MOBILIZATION
	3	3

TRAINING OBJECTIVE:

TASK: Locate and apply pertinent information contained in the table of isotopes, including, but not limited to:

a. Nuclide under consideration.

b. Half-life.

c. Type of decay.

d. Percent abundance.

e. Energies of both particulate and electromagnetic emissions.

f. Means of production.

g. Use of decay schemes.

CONDITIONS: Given problems, Pam 25, and Radiological Safety Handbook.

STANDARDS: Table of isotopes used with 100 percent accuracy IAW Radiological Safety Handbook DF050 and Pam 25 exercise.

LESSON REFERENCES: Pam 25; Radiological Safety Handbook.

POI FILE: DF 060 Shielding of Charged Particles (U)

TYPE OF INSTRUCTION: 1PE2

HOURS:	PEACETIME	MOBILIZATION
	1	1

TRAINING OBJECTIVES:

TASK 1: Identify the characteristics of alpha and beta radiation, to include hazards and penetration power.

CONDITIONS: Given Pam 25 and Radiological Safety Handbook.

STANDARDS: IAW Pam 25 and Radiological Safety Handbook DF060.

TASK 2: Calculate the penetration power of the beta particle.

CONDITIONS: Given problems, Radiological Safety Handbook, and Pam 25.

STANDARDS: Calculations completed with 100 percent accuracy IAW Radiological Safety Handbook DF060 exercise.

LESSON REFERENCES: Pam 25; Radiological Safety Handbook; ST 3-155.

POI FILE: DF 070 Special Hazards (U)

TYPE OF INSTRUCTION: 2C

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Describe the following:

a. Special hazards associated with commonly used radiation sources and items containing radioactive materials.

b. Methods of protecting radiation workers from hazards.

c. Special procedures for decontamination.

CONDITIONS: Given Radiological Safety Handbook and Pam 25.

STANDARDS: IAW Radiological Safety Handbook DF070.

LESSON REFERENCES: DA Pam 39-3; TM 3-220; Pam 25; Radiological Safety Handbook; S. L. Sawyer, Medical Aspects of Radiation Accidents.

POI FILE: DF 100 Shielding of X and Gamma Radiation (U)

TYPE OF INSTRUCTION: 1C, 2PE2

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Define and/or describe the following:

a. Nature and origin of X and gamma radiation and production of these radiations to include Bremstrahlung.

b. Gamma radiation absorption.

c. Factors influencing absorption efficiency.

d. Mass and linear absorption coefficients.

e. Half-thickness.

CONDITIONS: Given Radiological Safety Handbook, Pam 25, and Radiological Safety Handbook Supplement.

STANDARDS: IAW Pam 25, Radiological Safety Handbook DF100, and Radiological Safety Handbook Supplement.

TASK 2: Determine the following:

a. Mass and linear attenuation coefficients for given energies and shielding material.

b. Half-thickness for given energies and shielding material.

CONDITIONS: Given problems, Radiological Safety Handbook, Radiological Safety Handbook Supplement, and Pam 25.

STANDARDS: Problems solved with 100 percent accuracy IAW Radiological Safety Handbook DF100.

LESSON REFERENCES: Pam 25; Radiological Safety Handbook; ST 3-155; Radiological Safety Handbook Supplement; Evans, The Atomic Nucleus; Friedlander and Kennedy, Nuclear and Radiochemistry.

POI FILE: DF 110 Basics of Radiation Detection (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	1

SCOPE: Provide student a safety orientation on procedures to be followed in the radiological laboratory.

TRAINING OBJECTIVE:

TASK: Identify the basics of operations used in radiation detection and absorption, and describe the principles of operation of basic radiac instruments.

CONDITIONS: Given ST 3-155 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF110.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook.

POI FILE: DF 130 Computational Procedures in Physical Sciences (U)

TYPE OF INSTRUCTION: 2PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Solve practical problems related to material covered in subannexes B01-2 through B01-11.

CONDITIONS: Given practical problems, all references and instructor assistance.

STANDARDS: Problems solved with 100 percent accuracy IAW Radiological Safety Handbook DF130.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Radiological Safety Handbook Supplement; Pam 25.

POI FILE: DF 138 Examination Radiological Safety I (U)

TYPE OF INSTRUCTION: 3E2

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVE:

TASK: Apply radiological safety procedures.

CONDITIONS: Given examination and 150 minutes, with references during problem-solving portion only.

STANDARDS: 70 percent accuracy IAW school solution.

LESSON REFERENCES: All references in Radiological Safety I subannexes.

POI FILE: DF 140 Radiac Instruments (U)

TYPE OF INSTRUCTION: 4PE1

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVE:

TASK: Operate and perform operator maintenance on selected radiac instruments.

CONDITIONS: In a radiological laboratory, given requirement and IM-9E, IM-147, IM-93(), IM-174 series, AN/PDR-27() radiac instruments, and PP-1578A/PD.

STANDARDS: IAW procedures outlined in Radiological Safety Handbook DF140 and applicable technical manuals.

LESSON REFERENCES: TM 11-6665-209-20; TM 11-6665-213-12; TM 11-6665-214-10; TM 11-6665-224-15; TM 11-6665-232-12; TM 38-750; TB 750-242-3; TB SIG 226-8; TB SIG 226-9; ST 3-155; Radiological Safety Handbook; CD Handbook FGE 519; Handbook for Radiological Monitors; Rad Div Safety SOP.

POI FILE: DF 170 Standards for Protection (U)

TYPE OF INSTRUCTION: 1C, 2PE2

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Describe and use terminology related to exposure guidance and control.

CONDITIONS: Given Pam 25, Radiological Safety Handbook, and Radiological Safety Handbook Supplement.

STANDARDS: IAW AR 40-14, AR 385-11, and Title 10, Part 19 and 20 CFR.

TASK 2: Execute the following:

a. Control allowable doses and record these doses.

b. Restrict areas as necessary to include use of Title 10, Part 20, App B, CFR.

c. Apply procedures required for safety program.

d. Post areas as necessary.

CONDITIONS: Given requirement and use of Pam 25, Radiological Safety Handbook, and Radiological Safety Handbook Supplement.

STANDARDS: Actions completed IAW AR 40-14, AR 385-11, Title 10, Part 19 and 20 CFR, and Radiological Safety Handbook DF170.

LESSON REFERENCES: AR 40-14; AR 385-11; Title 10, Part 19 and 20, CFR; Pam 25; Radiological Safety Handbook; Radiological Safety Handbook Supplement.

POI FILE: DF 180 Safe Handling and Storage of Radioactive Material (U)

TYPE OF INSTRUCTION: 1C, 1PE2

HOURS:	PEACETIME	MOBILIZATION
	2	2

TRAINING OBJECTIVES:

TASK 1: Identify the following:

a. Seven methods of exposure and contamination control.

b. Application of all forms of handling techniques.

c. Storage and maintenance of all forms of radioactive material limiting the exposure dose to operating personnel to as low as practical.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF180.

TASK 2: Calculate source strength for radioactive sources and dose rates at any distance from a source point.

CONDITIONS: Given problems, Pam 25, Radiological Safety Handbook, and Radiological Safety Handbook Supplement.

STANDARDS: Calculations completed with 100 percent accuracy IAW Radiological Safety Handbook DF180.

LESSON REFERENCES: AR 385-11; AR 700-64; TM 3-260; TM 3-261; Radiological Safety Handbook.

POI FILE: DF 200 Introduction to Scaler Counting (U)

TYPE OF INSTRUCTION: 1PE2, 3PE1

HOURS:	PEACETIME	MOBILIZATION
	4	4

TRAINING OBJECTIVES:

TASK 1: Describe the main components of the scaler assembly, the function of each, and calculate data required in the operation of a scaler system.

CONDITIONS: Given problems, pertinent data, and Radiological Safety Handbook.

STANDARDS: Descriptions and calculations completed IAW Radiological Safety Handbook DF200.

TASK 2: Determine resolving time, operating voltage and dead time of a scaler system.

CONDITIONS: In a radiological laboratory, given scaler system, radioactive source, and Radiological Safety Handbook.

STANDARDS: Procedures applied and data derived with 100 percent accuracy IAW Radiological Safety Handbook DF200.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Overman and Clark, Radioisotope Techniques; Chase and Rabinowitz, Principles of Radioisotope Methodology.

POI FILE: DF 212 Characteristics and Detection of Neutrons (U)

TYPE OF INSTRUCTION: 1C, 2PE1

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Identify terminology and principles of neutron detection and shielding.

CONDITIONS: Given ST 3-155 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF212.

TASK 2: Perform neutron monitoring and calculate neutron production, determine neutron dose, and calculate neutron dose and rem.

CONDITIONS: In a radiological laboratory, given problems, neutron source and neutron monitoring instruments.

STANDARDS: Actions completed with 100 percent accuracy IAW Radiological Safety Handbook DF 212.

LESSON REFERENCES: DA Pam 39-3; ST 3-155; Radiological Safety Handbook; Kaplan, Nuclear Physics; Radiation Safety Course, Part 1, Argonne National Laboratory.

POI FILE: DF 230 Shielding Properties of Material (U)

TYPE OF INSTRUCTION: 1PE2, 2PE1

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Calculate the thickness of shielding materials necessary to reduce the dose rate to a given level.

CONDITIONS: Given Pam 25, Radiological Safety Handbook, and Radiological Safety Handbook Supplement.

STANDARDS: Calculations completed with 100 percent accuracy IAW Radiological Safety Handbook DF230.

TASK 2: Perform laboratory measurements to determine the half-thickness of shielding materials and solve shielding problems.

CONDITIONS: In a radiological laboratory, given radioactive source, eight shields, AN/PDR-27(), and Radiological Safety Handbook.

STANDARDS: Requirements completed with 100 percent accuracy IAW Radiological Safety Handbook DF230.

LESSON REFERENCES: ST 3-155; TM 11-6665-209-20; Radiological Safety Handbook; Radiological Safety Handbook Supplement; Rad Div Safety SOP.

POI FILE: DF 241 Introduction to Gamma Analysis (U)

TYPE OF INSTRUCTION: 1C, 3PE1

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVES:

TASK 1: Describe the scintillation process, its use in radiation detection, and the capabilities and limitations of scintillation instruments.

CONDITIONS: Given ST 3-155 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF241.

TASK 2: Use the mechanism for energy transfer in a liquid scintillation system, and operate the pulse height channel analyzer and proportional system.

CONDITIONS: In a radiological laboratory, given requirement and scintillation systems.

STANDARDS: Requirement completed IAW prescribed operational procedures.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; W. J. Price, Radiation Detection; FPA Gamma Spectro-Analysis Handbook; E. Schram, Organic Scintillation Detectors; S. C. Curran, Luminesence and the Scintillation Counter.

POI FILE: DF 250 Alpha Instruments (U)

TYPE OF INSTRUCTION: 1C, 1PE1

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVES:

TASK 1: Describe the nature of alpha particles, their physical components, range in air, velocity, ionization potential, penetration ability, and monitoring requirements.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF250.

TASK 2: Describe theory and demonstrate operation, preoperational checks, maintenance, and decontamination of alpha instruments.

CONDITIONS: Given requirement, AN/PDR-54, AN/PDR-56, and AN/PDR-60.

STANDARDS: IAW prescribed operation and maintenance procedures of applicable technical manuals.

TASK 3: Monitor for alpha radiation and convert meter readings to microgram Pu-239 per square meter.

CONDITIONS: In a radiological laboratory, given requirement, AN/UDM-6, radiac source set and AN/PDR-60.

STANDARDS: Exercise completed with 100 percent accuracy IAW Radiological Safety Handbook DF250.

LESSON REFERENCES: TM 3-6665-203-10; TM 11-6665-208-15; TM 11-6665-221-15; TM 11-6665-245-12; ST 3-155; Radiological Safety Handbook; NAVSHIPS 94433.

POI FILE: DF 290 Beta Particle Considerations (U)

TYPE OF INSTRUCTION: 5PE2

	PEACETIME	MOBILIZATION
HOURS:	5	5

TRAINING OBJECTIVE:

TASK: Calculate source strength and compute shielding requirements for beta and positron emitters, including all associated gamma and X-rays.

CONDITIONS: Given problems, Radiological Safety Handbook, Pam 25, and Radiological Safety Handbook Supplement.

STANDARDS: Calculations completed with 100 percent accuracy IAW Radiological Safety Handbook DF290.

LESSON REFERENCES: Radiological Safety Handbook; Radiological Safety Handbook Supplement; Pam 25; Kaplan, Nuclear Physics; Price, Nuclear Radiation Detection.

POI FILE: DF 310 Radiac Instrument Calibration Techniques and Equipment (U)

TYPE OF INSTRUCTION: 1C, 7PE1

	PEACETIME	MOBILIZATION
HOURS:	8	8

TRAINING OBJECTIVES:

TASK 1: Describe the following:

a. Sources of calibration error.

b. The Army's Radiac Calibration System.

c. Prerequisites for radiological protection officer to qualify as a custodian.

d. Characteristics, unpacking procedures, and safety requirements for radiac calibrators.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF310.

TASK 2: Supervise safety and operate radiac calibrators.

CONDITIONS: In a radiological laboratory, given requirement, IM-9E, IM-174, IM-174A, AN/PDR-27, AN/PDR-60, PP-1578A/PD, AN/UDM-2, AN/UDM-6, M3A1 Source Set, and laboratory accessories.

STANDARDS: Actions completed IAW Radiological Safety Handbook DF310 and applicable technical manuals.

LESSON REFERENCES: AR 750-25; FM 29-27; TM 3-6665-202-10; TM 3-6665-203-10; TM 11-6665-209-20; TM 11-6665-213-12; TM 11-6665-214-10; TM 11-6665-221-15; TM 11-6665-224-15; TM 11-6665-232-12; TB SIG 226-8; TB SIG 226-9; TB 11-6665-215-12/1; TB 11-6665-227-12; TB 750-242-3.

POI FILE: DF 320 Computational Procedures in Physical Sciences (U)

TYPE OF INSTRUCTION: 2PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Solve practical problems related to material covered in subannexes B01-15 through B01-24.

CONDITIONS: Given practical problems, all references and instructor assistance.

STANDARDS: Problems solved with 100 percent accuracy IAW Radiological Safety Handbook DF320.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Radiological Safety Handbook Supplement; Pam 25.

POI FILE: DF 328 Examination Radiological Safety II (U)

TYPE OF INSTRUCTION: 3E2

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVE:

TASK: Demonstrate proficiency in performing radiological safety procedures.

CONDITIONS: Given examination and 150 minutes, with references during problem-solving portion only.

STANDARDS: 70 percent accuracy IAW school solution.

LESSON REFERENCES: All references in Radiological Safety II subannexes.

POI FILE: DF 340 Leakage Test (U)

TYPE OF INSTRUCTION: 1C

HOURS:	PEACETIME	MOBILIZATION
	1	1

TRAINING OBJECTIVE:

TASK: Describe the following:

a. Purpose, methods, and procedures for performing leakage tests.

b. Determination of acceptable level of contamination.

c. Environmental monitoring.

d. Bio-assay sampling.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW TM 3-260, TM 3-261, and Radiological Safety Handbook DF340.

LESSON REFERENCES: TM 3-260; TM 3-261; Radiological Safety Handbook; NBS Handbook 73.

POI FILE: DF 350 Control and Reporting of Radioactive Material (U)

TYPE OF INSTRUCTION: 1C, 1PE2

HOURS:	PEACETIME	MOBILIZATION
	2	2

TRAINING OBJECTIVE:

TASK 1: Identify procedures for obtaining DA authorization and written permission for issue of radioactive material and use of radioactive substances on the RPO's installation.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW procedures prescribed in AR 385-11.

TASK 2: Describe supervision and operation of the installation radioactive material control point.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW procedures prescribed in AR 385-11 and Radiological Safety Handbook DF350.

TASK 3: Prepare reports and records from leakage test data.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: Exercise completed with 100 percent accuracy IAW Radiological Safety Handbook DF350.

LESSON REFERENCES: AR 385-11; TM 3-260; TM 3-261; Radiological Safety Handbook DF350.

POI FILE: DF 370 Licensing and SOP Writing (U)

TYPE OF INSTRUCTION: 2C

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Describe procedures for:

a. Preparing application for an NRC license.

b. Preparing application for renewal and amendments.

c. Routing and staffing of application requests.

d. DA controlling and reporting of nonlicensed radioactive material.

e. Preparing and administering SOPs.

CONDITIONS: Given Radiological Safety Handbook, Radiological Safety Handbook Supplement, Rad Div SOP, and Health Physics Safety SOP.

STANDARDS: IAW AR 385-11, Title 10 CFR, and NRC Regulatory Guide.

LESSON REFERENCES: AR 385-11; Title 10, CFR; Health Physics Safety SOP; Radiological Safety Handbook; Rad Div SOP; NRC Regulatory Guide.

POI FILE: DF 380 Air Sampling (U)

TYPE OF INSTRUCTION: 2PE1

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Organize, establish, and conduct routine air sampling operations to include:

a. Removing, cutting, and preparing the air sample for counting.

b. Performing required radiation counting on the air sample.

c. Performing required calculations to determine long lived activity of the air sample.

CONDITIONS: In a radiological laboratory, given air sampler, scaler system, laboratory accessories, and sampling problems.

STANDARDS: Sampling and calculations completed with 100 percent accuracy IAW TM 3-260, TM 3-261, and Radiological Safety Handbook DF380.

LESSON REFERENCES: TM 3-260; TM 3-261; Radiological Safety Handbook.

POI FILE: DF 400 Transportation of Radioactive Material (U)

TYPE OF INSTRUCTION: .7C, .3T, 3PE2

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVES:

TASK 1: Define and use terms pertinent to transportation of radioactive materials.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF400.

TASK 2: Perform the following:

a. Apply regulations on packaging, marking, labeling, and sending/receiving radioactive material.

b. Brief drivers, furnish written instructions, and placard vehicles.

c. Calculate required shielding problems.

CONDITIONS: Given practical problems and Radiological Safety Handbook.

STANDARDS: Actions completed IAW AR 385-11, Titles 10 and 49 CFR, and Radiological Safety Handbook DF400.

LESSON REFERENCES: AR 385-11; TM 55-315; TM 38-250; Title 10, Part 19 and 20 and Title 49, CFR; BOI Tariff 600B; Radiological Safety Handbook; TV Tape OCS 1104.

POI FILE: DF 410 Disposal of Radioactive Waste Material (U)

TYPE OF INSTRUCTION: 1C, 1PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVES:

TASK 1: Identify and describe the following:

a. Disposal terminology.

b. Responsibilities and duties of all levels in CONUS regarding the Army's radioactive material procedures.

c. Actions of organizations with disposable radioactive material.

d. Requirements for the escort of radioactive material.

e. Requirements for the use of the sanitary sewage system.

f. Advantages and limitations of ultimate disposal methods.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW AR 385-11, Title 10 CFR, and Radiological Safety Handbook.

TASK 2: Perform computations on use of sanitary sewage system and disposal requests.

CONDITIONS: Given problems and Radiological Safety Handbook.

STANDARDS: Computations completed with 100 percent accuracy IAW Radiological Safety Handbook DF410.

LESSON REFERENCES: AR 385-11; TM 3-260; TM 3-261; Title 10, Part 20, CFR; Radiological Safety Handbook.

POI FILE: DF 420 Radiological Decontamination (U)

TYPE OF INSTRUCTION: 1C, 3PE1

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVES:

TASK 1: Identify the following:

a. Definition and procedure for calculating residual number.

b. Principles of radiological decontamination.

c. Three conditions which must exist before decontamination is undertaken.

d. Categories of control of a contaminated area.

e. Principal methods of radiological decontamination.

CONDITIONS: Given Pam 25 and Radiological Safety Handbook.

STANDARDS: IAW Radiological Safety Handbook DF420.

TASK 2: Decontaminate various surfaces.

CONDITIONS: In a radiological laboratory, given contaminated surfaces, AN/PDR-27(), scaler system, handling tools, protective gear, water, soap, wetting agent, and organic solvent.

STANDARDS: Perform decontamination procedures IAW Radiological Safety Handbook DF420 and established safety requirements.

LESSON REFERENCES: FM 3-15; TM 3-220; TM 11-6665-209-20; General Dynamics Health Physics Handbook; Pam 25; Radiological Safety Handbook.

POI FILE: DF 430 Health Physics Environmental Survey (U)

TYPE OF INSTRUCTION: 2PE1

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Perform environmental surveys, to include planning considerations and evaluation of contamination levels.

CONDITIONS: In a laboratory environment, given AN/PDR-27(), scaler system, smears, data collection material, and protective gear.

STANDARDS: Survey performed with 100 percent accuracy IAW AR 385-11, Title 10 CFR, and Radiological Safety Handbook DF430.

LESSON REFERENCES: AR 385-11; TM 11-6665-209-20; Title 10, Part 20, CFR; Rad Div SOP; Radiological Safety Handbook.

POI FILE: DF 440 Radiological Safety Involving X-Rays (U)

TYPE OF INSTRUCTION: 1C, 2PE1

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Describe the following:

a. Principles of operation of an X-ray generator.

b. Safety requirements for X-ray operators and technicians.

c. Operation of survey instruments used for X-ray surveys.

d. Procedure for requesting X-ray surveys.

e. Procedure for inspecting and determining whether existing facilities meet requirements.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW Pam 25 and Radiological Safety Handbook DF440.

TASK 2: Execute the following:

a. Calculate shielding.

b. Determine the effects of shielding.

c. Charge X-ray survey instruments.

d. Operate neutron moisture density gauge.

CONDITIONS: In a radiological laboratory, given Victoreen Model 471 radiacmeter, Victoreen condensor "R" system, neutron moisture density gauge, and shielding problems.

STANDARDS: IAW procedures prescribed in Radiological Safety Handbook.

LESSON REFERENCES: TM 5-805-12; Pam 25; Radiological Safety Handbook; PHS Handbooks, Basic Radiological Health and Occupational Radiation Protection.

POI FILE: DF 450 Lasers - Operation and Safety (U)

TYPE OF INSTRUCTION: 2C, 1D

	PEACETIME	MOBILIZATION
HOURS:	3	3

TRAINING OBJECTIVES:

TASK 1: Describe the following:

a. Operation of a laser system.

b. Hazards associated with lasers.

c. Application of regulations to hazard situations.

d. Agencies where aid in evaluation of hazards can be obtained.

CONDITONS: Given Radiological Safety Handbook.

STANDARDS: IAW AR 40-16 and Radiological Safety Handbook DF450.

TASK 2: Demonstrate operation of lasers, to include hologram and related safety equipment.

CONDITIONS: In a radiological laboratory, with lasers and optical system, hologram, associated laboratory equipment, and goggles.

STANDARDS: IAW laser operations procedures and Radiological Safety Handbook DF450.

LESSON REFERENCES: AR 40-46; TB Med 279; Radiological Safety Handbook; L. Goldman, Biomedical Aspects of the Laser; K. Stebbry, Lasers and Their Applications.

POI FILE: DF 460 Microwave Radiation and Safety Procedures (U)

TYPE OF INSTRUCTION: 1C, 1PE1

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVES:

TASK 1: Describe the following:

a. Procedures for microwave generation and transmission.

b. Uses of microwave radiation.

c. Physiological effects and protective measures used with microwave radiation.

d. Military and federal exposure criteria.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW guidelines prescribed in AR 40-583, TB Med 523, Pam 25, Lasers and Microwave Hazards, and Radiological Safety Handbook DF460.

TASK 2: Perform microwave oven surveys.

CONDITIONS: In a radiological laboratory, given Narda 8100 and 8200 series instruments, microwave oven, and associated laboratory equipment.

STANDARDS: Monitoring procedures performed IAW AR 40-583 and Radiological Safety Handbook DF460.

LESSON REFERENCES: AR 40-583; TB Med 523; Course Manual, Lasers and Microwave Hazards; USAEHA-EA, Biological Effects of Microwave Radiation, Vol 1; Pam 25; Radiological Safety Handbook.

POI FILE: DF 470 Radiation Protection Officer Case Studies (U)

TYPE OF INSTRUCTION: 4CS

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVE:

TASK: Solve problems concerning radiological protection officer (RPO) duties.

CONDITIONS: Given case studies and all previous student references.

STANDARDS: Solutions IAW all governing regulations and Radiological Safety Handbook DF470.

LESSON REFERENCES: All references in radiological safety subannexes.

POI FILE: DF 490 NAICP Orientation (U)

TYPE OF INSTRUCTION: 1C

	PEACETIME	MOBILIZATION
HOURS:	1	1

TRAINING OBJECTIVES:

TASK 1: Identify DOD, DA, and other agency policies and responsibilities governing procedures for response to a nuclear accident/ incident.

CONDITIONS: Given situations involving hypothetical nuclear accidents/ incidents.

STANDARDS: IAW AR 50-5, FM 3-15, and Nuclear Weapons Accident Response Procedure (Draft).

TASK 2: Determine responsibilities and actions of personnel and response teams for nuclear accidents/incidents.

CONDITIONS: Given a situation concerning organization and functioning of response teams, NAIC, and division staffs, control measures and monitoring, survey, and decontamination procedures.

STANDARDS: IAW FM 3-15.

LESSON REFERENCES: AR 50-5; FM 3-15; Nuclear Weapons Accident Response Procedures (Draft); TVT NVWAX 79.

POI FILE: DF 501 SL-1 Accidents (U)

TYPE OF INSTRUCTION: 2T

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Describe all required operations and controls at accident sites involving radioactive materials.

CONDITIONS: Provided NRC TV tapes on SL-1 accidents.

STANDARDS: IAW military and federal guidelines for operations and control at SL-1 accident sites.

LESSON REFERENCES: AR 385-11; Title 10, Part 19 and 20, CFR; NRC TV Tapes 1108, 1109, and 1110.

POI FILE: DF 510 Management of Radiation Accidents (U)

TYPE OF INSTRUCTION: .5C, 5.5CS

	PEACETIME	MOBILIZATION
HOURS:	6	6

TRAINING OBJECTIVES:

TASK 1: Describe the following:

a. Radiation accidents and incidents involving nonweapon material.

b. Causes of accidents/incidents and influencing factors.

c. Guidelines for emergency planning.

d. Accident/incident reporting.

e. Handling radiation accidents in safe and expeditious manner.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: In compliance with applicable regulations and Radiological Safety Handbook DF510.

TASK 2: Solve problems concerning the management of radiation accidents.

CONDITIONS: Given case studies and all previous student references.

STANDARDS: Solutions IAW all governing regulations and Radiological Safety Handbook DF510.

LESSON REFERENCES: AR 385-11; AR 385-40; Title 10, Part 19 and 20, CFR; NCRP Report No. 29; PHS Training Manual, Management of Radiation Accidents; Radiological Safety Handbook.

POI FILE: DF 530 Medical Aspects of Ionizing Radiation (U)

TYPE OF INSTRUCTION: 2C

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Describe the following:

a. Mechanism of the interaction of ionizing radiation with matter.

b. Manifestation of genetic damage at the cellular level, to include lethal and nonlethal effects, mutations, and relative radiosensitivity.

c. Clinical picture of radiation injury from both acute and chronic exposures.

CONDITIONS: Given Radiological Safety Handbook.

STANDARDS: IAW NRC Regulatory Guide No. 8-29 and Radiological Safety Handbook DF530.

LESSON REFERENCES: NRC Regulatory Guide No. 8-29; Radiological Safety Handbook.

POI FILE: DF 540 Computational Procedures in Physical Sciences (U)

TYPE OF INSTRUCTION: 2PE2

	PEACETIME	MOBILIZATION
HOURS:	2	2

TRAINING OBJECTIVE:

TASK: Solve practical problems related to material covered in subannexes B01-28 through B01-42.

CONDITIONS: Given practical problems, all references, and instructor assistance.

STANDARDS: Problems solved with 100 percent accuracy IAW Radiological Safety Handbook DF540.

LESSON REFERENCES: ST 3-155; Radiological Safety Handbook; Radiological Safety Handbook Supplement; Pam 25.

POI FILE: DF 548 Examination Radiological Safety III (U)

TYPE OF INSTRUCTION: 4E2

	PEACETIME	MOBILIZATION
HOURS:	4	4

TRAINING OBJECTIVE:

TASK: Demonstrate proficiency in performing radiological safety procedures.

CONDITIONS: Given examination and 200 minutes, with references during problem-solving portion only.

STANDARDS: 70 percent accuracy IAW school solution.

LESSON REFERENCES: All references in Radiological Safety III subannexes.

POI FILE: DZ 040 Seminar - Radiological Safety (U)

TYPE OF INSTRUCTION: 1S

	PEACETIME	MOBILIZATION
HOURS:	1	1

SCOPE: Provide student with an opportunity to evaluate and discuss the course of instruction and various problems offered from the class.

LESSON REFERENCES: All references in Radiological Safety III portion of instruction.

POI FILE: DZ 900 Course Critique and Closing (U)

TYPE OF INSTRUCTION: 2C

	PEACETIME	MOBILIZATION
HOURS:	2	2

SCOPE: Student will be able to critique the course of instruction; turn in texts and reference manuals; resolve problems concerning material presented.

LESSON REFERENCES: All previous instruction.

EQUIPMENT SUMMARY

LIN/NSN	NOMENCLATURE	TOTAL REQUIRED PER SINGLE COURSE ITERATION PEACETIME	TOTAL REQUIRED PER SINGLE COURSE ITERATION MOBILIZATION	AVERAGE STUDENT TO EQUIP RATIO PEACETIME	AVERAGE STUDENT TO EQUIP RATIO MOBILIZATION	REMARKS
--	Scales W/Pig W/GM2	12	12	2:1	2:1	
--	Standard Sources	2	2	12:1	12:1	
--	Hand and Foot Monitor	1	1	24:1	24:1	
--	External Monitor AN/PDR-27	3	3	8:1	8:1	
--	Neutron Rem Counter, Eberline Rascal Model PRS-2P/NRD	1	1	24:1	24:1	
--	Neutron Instrument, Eberline BF_3 Counter	2	2	12:1	12:1	
--	Neutron Dosimeter	2	2	12:1	12:1	
--	Bonner Sphere Neutron Detector	1	1	24:1	24:1	
--	Liquid Scintillation System	1	1	24:1	24:1	
--	Multichannel Analyzer	1	1	24:1	24:1	

LIN/NSN	NOMENCLATURE	TOTAL REQUIRED PER SINGLE COURSE ITERATION PEACETIME	TOTAL REQUIRED PER SINGLE COURSE ITERATION MOBILIZATION	AVERAGE STUDENT TO EQUIP RATIO PEACETIME	AVERAGE STUDENT TO EQUIP RATIO MOBILIZATION	REMARKS
--	Single Channel Analyzer	1	1	24:1	24:1	
--	Scintillation Heads	2	2	12:1	12:1	
--	24V Staplex Air Sampler	1	1	24:1	24:1	
--	110V Staplex Air Sampler	1	1	24:1	24:1	
--	Victoreen Module 471 Radiacmeter	2	2	12:1	12:1	
--	Victoreen Condenser "R" Instrument W/Chamber	2	2	12:1	12:1	
--	Laser Eye Protective Goggles	2	2	12:1	12:1	
--	Laser and Optical System (He-Ne)	1	1	24:1	24:1	
--	Hologram	2	2	12:1	12:1	
--	Microwave Oven	1	1	24:1	24:1	
--	NARDA 8100 Series Microwave Instrument	2	2	12:1	12:1	
--	NARDA 8200 Series Microwave Instrument	2	2	12:1	12:1	
Q93303 6665-00-856-8235	M3A1 Source Set	1	1	24:1	24:1	

LIN/NSN	NOMENCLATURE	TOTAL REQUIRED PER SINGLE COURSE ITERATION PEACETIME	TOTAL REQUIRED PER SINGLE COURSE ITERATION MOBILIZATION	AVERAGE STUDENT TO EQUIP RATIO PEACETIME	AVERAGE STUDENT TO EQUIP RATIO MOBILIZATION	REMARKS
Q19613 6665-00-542-1587	AN/PDR-54 Radiac Set	1	1	24:1	24:1	
Q19681 6665-00-211-6895	AN/PDR-56 Radiac Set	12	12	2:1	2:1	
Q19750 6665-00-965-1516	AN/PDR-60 Radiac Set	14	14	2:1	2:1	Note 1
Q19339	AN/PDR-27 ( ) Radiac Set	14	14	2:1	2:1	Note 1
C75606 6665-00-179-9037	AD/UDM-2 Radiac Calibrator	12	12	2:1	2:1	
C74507 6665-00-767-7497	AN/UDM-6 Radiac Calibrator	12	12	2:1	2:1	
Q20798 6665-00-243-8199	IM-9E/PD Radiacmeter	24	24	1:1	1:1	
Q20935 6665-00-752-7759	IM-93 ( )/UD Radiacmeter	8	8	3:1	3:1	
Q21209 6665-00-542-0729	IM-147/PD Raciacmeter	2	2	12:1	12:1	

LIN/NSN	NOMENCLATURE	TOTAL REQUIRED PER SINGLE COURSE ITERATION PEACETIME	TOTAL REQUIRED PER SINGLE COURSE ITERATION MOBILIZATION	AVERAGE STUDENT TO EQUIP RATIO PEACETIME	AVERAGE STUDENT TO EQUIP RATIO MOBILIZATION	REMARKS
Q21483 6665-00-856-8037	IM-174/PD Radiacmeter	12	12	2:1	2:1	
Q21483 6665-00-999-5145	IM-174A/PD Radiacmeter	12	12	2:1	2:1	
E00533 6665-00-542-1177	PP-1578A/PD Radiac Detector Charger	8	8	3:1	3:1	

Note 1: Total equipment requirements that exceed the student to equipment ratio is for instructor and/or safety usage.

*AR 40–14
*DLAR 1000.28

ARMY REGULATION
No. 40–14
DEFENSE LOGISTICS
AGENCY REGULATION
No. 1000.28

DEPARTMENT OF THE ARMY AND
DEFENSE LOGISTICS AGENCY
WASHINGTON, DC, *15 March 1982*

MEDICAL SERVICES

CONTROL AND RECORDING PROCEDURES FOR EXPOSURE TO IONIZING RADIATION AND RADIOACTIVE MATERIALS

This revision requires that the Radiation Control Committee, Radiation Protection Officers, and individuals who maintain DD Forms 1141 and DD Forms 1952 will be designated in writing. It also includes the requirements for the investigation and evaluation of alleged or actual overexposures to ionizing radiation.

Local limited supplementation of this regulation is permitted but is not required. If supplements are issued, HQDA agencies and major Army commands will furnish two copies of each supplement to HQDA(DASG-PSP), WASH DC 20310; other commands will furnish one copy of each to their next higher headquarters.

Interim changes to this regulation are not official unless they are authenticated by The Adjutant General. Users will destroy interim changes on their expiration dates unless sooner superseded or rescinded.

The words "he," "his," and "him," when used in this regulation, represent both the masculine and feminine genders unless otherwise specifically stated.

This publication may be released to foreign governments (sec 1719, title 44, US Code).

Encl 1

*This regulation supersedes AR 40–14/DLAR 4145.24, 20 May 1975, including all changes.

1. Purpose. This regulation prescribes procedures and responsibilities for the control and recording of exposures to ionizing radiation from radiation producing devices and radioactive materials. It implements the rules and regulations set forth in Title 10, Code of Federal Regulations (CFR), Parts 19 and 20; 29 CFR 570.57; and 29 CFR 1910.96.

2. Applicability. *a.* This regulation applies to the Active Army, Army National Guard (ARNG), the US Army Reserve (USAR), persons employed by the Department of the Army (DA), and the Defense Logistics Agency (DLA). Except as specified by formal written agreement, it also applies to Federal and non-Federal agencies, including civilian contractors, whose personnel are occupationally exposed to ionizing radiation on an Army or DLA installation or activity.

b. This regulation does not apply to the following:

(1) Personnel exposed to ionizing radiation and radioactive materials resulting from the use of nuclear or thermonuclear weapons in combat military operations.

(2) Personnel exposed to ionizing radiation while being examined or treated for medical or dental purposes.

c. For DA and DLA installations or activities holding US Nuclear Regulatory Commission (NRC) licenses, the appropriate provisions of 10 CFR apply. However, the DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation) and DD Form 1952 (Dosimeter Application and Record of Occupational Radiation Exposure) will be used in lieu of Form NRC-4 (Occupational External Radiation Exposure History) and Form NRC-5 (Current Occupational External Radiation Exposure).

3. Explanation of terms. *a. Absorbed Dose (D).* The amount of energy imparted by ionizing radiation to the matter in a volume element divided by the mass of the matter in that volume element. It is commonly expressed in rads. One rad equals 0.01 joule per kilogram (J/kg) or 100 ergs per gram. (In the International System of Units (SI), the unit for absorbed dose is the gray (Gy). One Gy is equal to 1 J/kg which is equal to 100 rad.) See rem and roentgen.

b. Bioassay. The determination of kinds, amounts or concentrations, and locations of radioactive materials in the human body. This may be by in vivo counting (e.g., whole-body counting, selected organ counting) or by analysis of materials excreted or removed from the human body.

c. Calendar quarter. A period of not less than 12 consecutive weeks nor more than 14 consecutive weeks. The first calendar quarter of each year will begin in January. Subsequent calendar quarters will be such that no day is included in more than one calendar quarter or omitted from a calendar quarter (10 CFR 20.3).

d. Controlled (restricted) area. Any area to which access is controlled for the purpose of protecting persons from exposure to ionizing radiation or radioactive materials. This means that a controlled (restricted) area requires control of access, occupancy, working conditions, and egress. Areas not included are those used as residential quarters or areas where food is stored, prepared, or served. However, a separate room or rooms in a residential building or a building in which food is stored, prepared, or served may be set apart as a controlled (restricted) area. This does not apply to facilities which use ionizing radiation sources for food preservation.

e. Critical organ. That organ which will receive the greatest exposure and whose damage by a radionuclide entering the human body will result in the greatest potential impairment to the body.

f. Curie. A unit of activity, or degree of radioactivity, of a radioactive substance. One curie (Ci) equals 3.70×10^{10} nuclear transformations per second.

g. Dose (D). A general term denoting the quantity of radiation absorbed, or energy absorbed per unit of mass, by the body or any portion of the body. For special purposes, it must be appropriately qualified. The special unit of absorbed dose is the rad. See absorbed dose.

h. Dose commitment.

(1) *Individual dose commitment.* The total dose equivalent to a part of the human body that results from radioactive material having entered the human body. In estimating the dose commitment, the period of exposure to retained radioactive material is assumed not to exceed 50 years from the time of intake (10 CFR 32.2).

(2) *Environmental dose commitment.* The sum of all radiation dose equivalents to persons over the entire time period the radioactive material can adversely affect humans. The unit of measure for this total population dose is the person-rem.

i. Dose equivalent (H). The product of absorbed dose (D), quality factor (Q), and other modifying factors (N). It is a measure of the effects of radiation

received by exposed persons, taking into account different radiation characteristics and external and internal exposure. The special name for the unit of dose equivalent is the sievert (Sv). The special unit of dose equivalent, rem, may be used temporarily. (One Sv is equal to 1 J/kg which is equal to 100 rem.)

j. Dose to whole-body. The dose equivalent to the whole-body, gonads, active blood-forming organs, head and trunk, or lens of the eye.

k. Dosimeter. A device for measuring exposure to radiation.

l. Exposure.

(1) A measure of the ionization produced in air by x or gamma radiation. It is the sum of the electrical charges on all of the ions of one sign produced in air when all electrons liberated by photons (x or gamma radiation) in a suitably small element of volume of air are completely stopped in air, divided by the mass of the air in the volume element. The special unit of exposure is the röentgen (R).

(2) The condition of being irradiated by ionizing radiation.

m. High radiation area. Any area, accessible to personnel, where ionizing radiation exists at such levels that a major portion of the body could receive in any 1 hour a dose equivalent in excess of 100 millirems (mrem).

n. Investigation level. The amount of radioactive material incorporated into the human body which justifies further investigation or inquiry. This may be a review of the circumstances or the assessment of the consequences.

o. Ionizing radiation. Electromagnetic or particulate radiation capable of producing ions as it passes through matter. Alpha and beta particles, gamma rays, X-rays, and neutrons are examples of ionizing radiation.

p. Ionizing radiation Protection Program. The management effort by command that includes monitoring the use of ionizing radiation producing devices and radioactive materials. The purpose of this program is to ensure that the exposure to persons from ionizing radiation and the release of radioactive effluents to the environment is as low as is reasonably achievable (ALARA) (as far below specified radiation exposure standards as is practicable).

q. Occasionally exposed individual. An individual whose work is not normally performed in a controlled (restricted) area and whose duties do not normally involve exposure to ionizing radiation or radioactive material. However, such individuals may have reason to enter a controlled (restricted) area in the performance of their duties. Examples are messengers, deliverymen, and maintenance workers. These individuals will not be permitted to receive an exposure to ionizing radiation in excess of that allowed to any individual in the population at large. See paragraph 7*b*.

r. Occupational exposure to ionizing radiation. Exposure to ionizing radiation that is incurred as a result of an individual's (military or civilian) employment or duties which are in direct support of the use of radioactive materials or equipment capable of producing ionizing radiation. Occupational exposure does not include the exposure of an individual, as a patient, to sources of ionizing radiation or radioactive material for the purpose of medical or dental diagnosis or therapy of that person. Occupational exposure does not include exposure to naturally occurring ionizing radiation.

s. Occupationally exposed individual (radiation worker). An individual whose work is performed in a controlled (restricted) area and who might be exposed to more than 10 percent of the radiation exposure standards in paragaph 7*a*(1) as a result of employment or duties in a controlled (restricted) area. The term "occupationally exposed individual" is synonymous with the term "radiation worker."

t. Person-rem. The product of the mean individual whole-body dose equivalent in a population times the number of individuals in the population. The term "person-rem" is synonymous with the term "man-rem."

u. Quality factor (Q). A number by which the absorbed dose is multiplied to obtain the dose equivalent. The magnitude of this number is determined by the effect on the body of different kinds of radiation. For beta particles, gamma rays, and X-rays, the quality factor is 1. For neutrons and protons having energies up to 10 million electron volts (MeV), the quality factor is 10. For alpha particles and other particles heavier than protons, the quality factor is 20.

v. Personnel monitoring device. A device designed to be worn or carried by a person for measuring radiation exposure. Examples are film badges, thermoluminescent dosimeters (TLD), self-reading pocket dosimeters, pocket chambers, and finger dosimeters. The term "personnel monitoring device" is synonymous with the term "personnel dosi-

meter."

w. Rad. The special unit of absorbed dose. One rad equals 0.01 J/kg or 100 ergs per gram. See rem and roentgen.

x. Radiation area. Any area, accessible to personnel, where radiation exists at such levels that a major portion of the body could receive in any 1 hour a dose equivalent in excess of 5 millirems (mrem), or in any 5 consecutive days a dose equivalent in excess of 100 mrem. Practically, this would be any area in which the exposure rate is greater than 2 milliroentgens per hour (mR/hr) but less than 100 mR/hr. See also "high radiation area."

y. Radiation sources. These are materiel, equipment, or devices which generate or are capable of generating ionizing radiation. They include the following:

(1) Nuclear reactors.

(2) Radiographic or fluoroscopic x-ray systems.

(3) Particle generators and accelerators.

(4) Klystron, magnetron, rectifier, cold-cathode, and other electron tubes operating at potentials above 10 kilovolts (kV).

(5) X-ray diffraction and spectrographic equipment.

(6) Electron microscopes.

(7) Electron-beam welding, melting, and cutting equipment.

(8) Radioactive materials.

(*a*) Natural or accelerator produced radioactive materials.

(*b*) Byproduct materials.

(*c*) Source materials.

(*d*) Special nuclear materials.

(*e*) Fission products.

(*f*) Materials containing induced or deposited radioactivity.

(*g*) Radioactive commodities.

z. Radiation Work Permit (RWP). A locally developed form completed by the area supervisor and countersigned by the Radiation Protection Officer (RPO) prior to the start of any work in a controlled (restricted) area. It describes the potential radiation hazards and protective clothing and equipment requirements for a given work assignment. It also provides a record of radiation exposures received by persons during a given work assignment. The RWP will be initiated by the area supervisor or the RPO when required to minimize the exposure of the radiation worker.

aa. Radiation worker. The term "radiation worker" is synonymous with the term "occupationally exposed individual."

ab. Radiation Protection Officer (RPO). A person designated by the commander and tasked with the supervision of the radiation protection program. The RPO ensures compliance with current directives for radiation protection. This person will be technically qualified by education, training, and professional experience commensurate with the responsibilities of the assignment. The RPO will provide consultation and advice on the degree of hazards associated with radiation and the effectiveness of measures to control these hazards. The term "radiation protection officer" is not intended to denote a commissioned status. The RPO may be military or civilian of any grade.

ac. Rem. The special unit of dose equivalent. The dose equivalent (H) in rems is numerically equal to the absorbed dose (D) in rads multiplied by the quality factor (Q) and other modifying factors (N). For the purposes of this regulation, N equals 1. One rem is equal to 0.01 Sv.

ad. Roentgen (R). The special unit of exposure. One roentgen (R) equals 2.58×10^{-4} coulombs per kilogram of air. See "exposure."

ae. Termination. The end of employment with DA, ARNG, USAR or DLA; also, the end of a work assignment in a controlled (restricted) area. The expectation or specific scheduling of reentry into a controlled (restricted) area would not be permitted during the remainder of the terminating calendar quarter (10 CFR 20.3).

af. User. A person who has been delegated the authority for the use, operation, or storage of radiation sources.

4. Regulatory authority. *a.* The concepts in this regulation are based in part on the recommendations of the following:

(1) The National Council on Radiation Protection and Measurements (NCRP) Report No. 39, Basic Radiation Protection Criteria.

(2) The International Commission on Radiological Protection (ICRP) Report No. 9, Recommendations of the ICRP.

(3) ICRP Report No. 12, General Principles of Monitoring for Radiation Protection for Workers.

(4) Federal Radiation Council Report No. 1, Background Material for the Development of Radiation Protection Standards.

b. Where more precise definitions are required, those provided in the following will be used:

(1) The International Commission on Radiation Units and Measurements (ICRU) Report No. 19, Radiation Quantities and Units.

(2) Supplement to ICUR Report No. 19, Dose Equivalent.

(3) ICRU Report No. 25, Conceptual Basis for the Determination of Dose Equivalent.

5. Responsibilities. *a. The Surgeon General (TSG).*

(1) Approve all Army radiation exposure standards less restrictive than those in paragraph 7 before implementation of such standards.

(2) Provide information resulting from the investigation of alleged or actual overexposure of a person to ionizing radiation and radioactive materials. This information and appropriate recommendations are sent to the following:

(*a*) The Central Dosimetry Record Repository (SB 11-206).

(*b*) The commander of the installation or activity to which the person is assigned or attached.

(*c*) The commander of the organization possessing either the NRC license or DA radiation authorization (DARA) for the radioactive material or ionizing radiation producing device which caused the alleged overexposure.

(3) Provide DA staff supervision on the medical aspects of the personnel dosimetry program.

b. The Commanding General, US Army Materiel Development and Readiness Command (CG, DARCOM).

(1) Provide personnel monitoring devices for the Army.

(2) Establish a Central Dosimetry Record Repository. This office will maintain an ionizing radiation exposure history for each person employed by DA, ARNG, USAR, and DLA who is issued an Army personnel monitoring device.

c. The Central Dosimetry Record Repository.

(1) Prepare separate automated annual consolidated statistical summary reports (RCS NRC-1007) for DA, ARNG, USAR and DLA personnel occupationally exposed to ionizing radiation and radioactive material. Prepare a statistical summary report for each occupational code. These summary reports will contain the information specified in paragraph 15. A copy of these reports will be forwarded through command channels to HQDA (DASG-PSP), WASH DC 20310, by 1 March of each calendar year.

(2) Prepare a separate annual personnel dosimetry report for each employee of DA, ARNG, USAR, and DLA.

(3) Prepare requested histories from current or former employees.

(4) Prepare termination exposure history for each employee.

(5) Provide a flexible computer program. It must be possible to separate total occupational exposure from medical (diagnostic and therapeutic) exposure. The computer program must provide for the following:

(*a*) Additional information such as outside employment (moonlighting), medical exposure, and other radiation exposures.

(*b*) Occupational codes.

(*c*) The identity of radiation sources and other hazardous substances to which the worker is exposed.

Note. The Automated Dosimetry Record will be consistent with the requirements of the Form NRC-5 and DD Form 1141.

d. Director, DLA (DLA-WH).

(1) Approve all DLA radiation exposure standards less restrictive than those in paragraph 7 before such standards are implemented.

(2) Provide information based on the results of investigations of alleged overexposure of persons to ionizing radiation and radioactive materials. This requirement is exempt in accordance with paragraph 7-2*k*, AR 335-15. This information and appropriate recommendations are sent to the following:

(*a*) The Central Dosimetry Record Repository (SB 11-206).

(*b*) The commander of the installation or activity to which the person is assigned or attached.

(*c*) The commander of the organization possessing either the NRC license or DARA for the radioactive material or ionizing radiation producing device causing the alleged overexposure.

e. Commanders of installations or activities which possess or use a radiation source.

(1) Establish appropriate and adequate measures to control ionizing radiation so that the total radiation exposure of each person will be maintained as low as is reasonably achievable. This will be as far below the radiation exposure standards in paragraph 7 as is practicable.

Note. In applying the term "as low as is reasonably achievable," the current state of technology and the economics of improvements in relation to the benefits to safety and health of per-

sonnel, the utilization of nuclear (atomic) energy in the public interest, and other societal and socioeconomic considerations, must be taken into account. (See NRC Regulatory Guides 8.8, 8.10, and 8.18, which are available from USNRC, ATTN: Publications Sales Manager, WASH DC 20555.)

(2) Ensure that personnel radiation exposure is monitored and recorded.

(3) Ensure that when there are operations involving occupational exposure to radiation sources, an adequately trained and qualified RPO and an alternate RPO are designated in writing. The RPO or the alternate will supervise the radiation protection program and advise on the control of hazards to health and safety. If the assignment as RPO is an additional duty, then adequate time will be given to perform these duties.

Note. When a civilian employee is performing the duties of RPO, his job description should be appropriately modified to reflect this additional duty for that time period in which the duty is performed. The job description will be returned to its normal state following termination of the individual's assignment as the RPO.

(4) When an installation or activity possesses radioactive material under a specific NRC license or DARA, designate a Radiation Control Committee (RCC) in writing (unless otherwise specifically exempt). The RCC will review proposals for the use of ionizing radiation sources and recommend protective measures to the commander. An RCC is not required for the use of radioactive check sources or smoke detectors or for in vitro studies. The committee will not exercise the functions of a clinical board or any function in nuclear reactor or nuclear weapons programs administered by DA or DLA. Specific responsibilities of the RCC for US Army Medical Center/Medical Department Activities (MEDCEN/MEDDAC) are given in AR 40-37.

The RCC will include the following:

(*a*) The commander/director or his designated representative, who will serve as chairperson.

(*b*) The RPO.

(*c*) The staff medical officer or his designated representative.

(*d*) The safety manager or his designated representative.

(*e*) Other technically qualified persons as necessary.

(5) Insure that all persons working in or frequenting a controlled (restricted) area are informed of the presence of radioactive materials or equipment capable of producing ionizing radiation. These persons will be instructed in the following:

(*a*) Safety precautions and procedures needed to minimize their exposure.

(*b*) Safety precautions and procedures needed to minimize the exposure of the general public. Purposes and functions of protective clothing and equipment. The extent of these instructions will be commensurate with the potential radiological health protection problem in the controlled (restricted) area (10 CFR 19.12 and 29 CFR 1910.96).

Note. When provided instruction about health protection problems associated with ionizing radiation exposure, female employees who are radiation workers will be given specific instruction about prenatal exposure risks to the developing embryo and fetus. (See NRC Regulatory Guide 8.13, and NCRP Report No. 53.)

(6) Establish procedures for the centralized issue and control of personnel monitoring devices.

(7) Provide adequate resources to implement an effective radiation protection program.

(8) Designate in writing a person responsible for preparing and maintaining DD Forms 1141 and DD Forms 1952.

(9) Forward the results of bioassay procedures or other dosimetry data quarterly to the Central Dosimetry Record Repository. This data will be included in the proper person's exposure history (SB 11-206). If the results or data indicate that a person has exceeded applicable guidelines for exposure, dose, or intake of radionuclides, the appropriate dose equivalent for the whole-body and critical organ(s) will also be included.

(10) Investigate abnormal or alleged overexposures to ionizing radiation or radioactive materials.

Note. The investigation conducted in accordance with the requirements of this regulation will be used for the medical evaluation of abnormal or alleged overexposures to ionizing radiation or radioactive materials. Other investigations may be required under the provisions of AR 385-40.

6. Medical surveillance. *a.* Preplacement and termination medical examinations will be given to all radiation workers (military and civilian) by the supporting medical treatment facility. These medical examinations should include a review of prior occupational radiation exposure. They should also include a description of any unusual radiation exposure resulting from previous occupations, accidents/incidents, or therapeutic procedures. Baseline blood counts (white cell count with differential, platelet count, and hemoglobin) will be performed during the preplacement medical examination. Pre-

placement and termination ophthalmic examinations should be performed on employees working in areas of potential exposure to neutrons, high energy beta particles, and heavy particles. Examinations related to ocular surveillance of ionizing radiation workers may be performed by ophthalmologists, optometrists, or physicians competent in funduscopy and biomicroscopy of the eye. Designated individuals will be appropriately credentialed by the Medical Treatment Facility commander.

b. Periodic medical and ophthalmic examinations, when required, should be performed at a frequency determined by the medical commander or staff medical officer in coordination with the RPO. The frequency and thoroughness of these examinations should be commensurate with potential radiation hazards and the circumstances in which the work is performed. Periodic ophthalmic examinations are required for persons occupationally exposed to high linear energy transfer (LET) ionizing radiation when their exposures exceed 70 percent of the annual limit stated in paragraph 7*a*(1). At such examinations, special attention should be given to changes in the lenses of the eyes. Radiation workers occupationally exposed to more than 1.5 rem to the whole-body within 1 calendar quarter will need more detailed supervision by their immediate supervisor and the RPO. This is required to provide background information which might be useful in the event of an overexposure. It is also needed to detect any condition that would require termination of occupational exposure or employment.

Note. For information concerning medical examinations, see AR 40-501, Standards for Medical Fitness, for DA organizations; and DLAM 1000.1, DLA Safety and Health Program, for DLA organizations.

c. Persons suspected of having received excessive exposure will be referred to a physician. They will receive whatever examination determined appropriate by the local medical authority in consultation with the RPO. When appropriate, this examination should include tests and bioassay procedures to evaluate any potential health hazard or injury and to plan appropriate medical care.

d. A reported overexposure does not necessarily indicate the need for a physical examination. The background related to this reported overexposure must be evaluated. This evaluation should help determine the need for such an examination and the tests that are required. Factors to be considered are as follows:

(1) Total reported dose.
(2) Type and energy of ionizing radiation.
(3) Portion of the body exposed.
(4) Critical/significant organ dose.
(5) Length of wearing period for personnel monitoring devices used to measure this radiation.
(6) Time elapsed between exposure and notification, and other appropriate factors.

7. Radiation exposure standards. Every effort will be made to keep the total radiation dose equivalent and the dose commitment to each person as far below the following radiation exposure standards as is reasonably achievable. The necessity for exposures will be weighed against the benefits expected.

a. Radiation exposure standards adopted by DA, ARNG, USAR, and DLA for the control of total occupational exposure to ionizing radiation and radioactive material include the following:

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

(*a*) 1.25 rem in any calendar quarter, nor
(*b*) 5 rem in any 1 calendar year.

Note. During the entire gestation period, the maximum dose equivalent to the embryo-fetus from occupational exposure of the expectant mother should not exceed 0.5 rem (NCRP Reports No. 39 and 53).

(2) The accumulated dose equivalent of radiation to the skin of the whole-body (other than hands, wrists, feet or ankles), and forearms, or cornea of the eye, will not exceed—

(*a*) 7.50 rem in any calendar quarter, nor
(*b*) 30 rem in any 1 calendar year.

(3) The accumulated dose equivalent of radiation to the hands and wrists or the feet and ankles will not exceed—

(*a*) 18.75 rem in any calendar quarter, nor
(*b*) 75 rem in any 1 calendar year.

(4) The accumulated dose equivalent of radiation to the bone, thyroid, and other organs, tissues, and organ systems will not exceed—

(*a*) 5 rem in any calendar quarter, nor
(*b*) 15 rem in any 1 calendar year.

b. Persons entering a controlled (restricted) area but who are not classified as radiation workers or minors will not be exposed to a whole-body dose equivalent of more than—

(1) 2 mrem in any 1 hour.
(2) 100 mrem in any 7 consecutive days.
(3) 500 mrem in any 1 calendar year.

(4) 10 percent of the values in *a*(2), (3), and (4) above for other areas of the body.

c. Persons over 18 years of age, but who have not yet reached their 19th birthday, may be occupationally exposed to ionizing radiation if they do not exceed a dose equivalent of 1.25 rem to the whole-body in any calendar quarter. Persons under 18 years of age will not be exposed to more than 10 percent of the values in *a* above.

d. When a pregnant woman is occupationally exposed to ionizing radiation, the embryo-fetus enters the radiation environment involuntarily. Therefore, the female employee is responsible for advising her employer of the fact that she is pregnant. Special consideration may be necessary to insure that her dose does not exceed the radiation exposure standards in *a* above and that her exposure is kept as low as is reasonably achievable.

e. Radiation exposure standards adopted by DA, ARNG, USAR, and DLA for the control of planned occupational exposures under emergency situations are as follows:

(1) *Life saving situation*. This applies to search for and removal of seriously injured persons, or entry to prevent conditions that may injure a number of people. The following exposure standards then apply:

(*a*) Any person's accumulated total absorbed dose of ionizing radiation to the whole-body should not exceed 100 rad.

(*b*) Any person's accumulated total absorbed dose of ionizing radiation to the hands and forearms should not exceed 300 rad.

(2) *Less severe situation*. This applies when it is desirable to enter a hazardous area to protect property, minimize the release of effluents, or to control fires. The following exposure standards then apply:

(*a*) Any person's accumulated total absorbed dose of ionizing radiation to the whole-body should not exceed 25 rad.

(*b*) Any person's accumulated total absorbed dose of ionizing radiation to the hands and forearms should not exceed 100 rad.

f. Guidelines for selecting personnel to participate in emergency operations are shown below:

(1) Rescue personnel should be professionally trained in rescue operations and techniques. If professional rescue personnel are not available, then only volunteers who have received proper instruction should be allowed to participate in emergency operations.

(2) Rescue personnel will be informed of the potential consequences of exposure to ionizing radiation or radioactive material as well as other hazards associated with the rescue mission.

(3) Rescue personnel will be informed as to the proper use of protective clothing and equipment.

(4) Women capable of reproduction should not be occupationally exposed during a rescue mission to more than the limits set forth in *a* above if other personnel are available for the mission.

g. Radiation exposures incurred under an emergency situation, as stated in *c* above, will not be allowed to occur more than once in the lifetime of a person. The record of such exposures will become part of the person's health record or civilian employee medical file.

h. Radiation exposure standards for nonoccupational exposures to ionizing radiation include limiting the use of sources of ionizing radiation such that:

(1) The accumulated dose equivalent of radiation to the whole-body for a person in the general population will not exceed 0.5 rem in any 1 calendar year. This excludes natural background radiation and medical and dental exposures.

(2) The accumulated dose equivalent of radiation to the whole-body for a suitable sample of the exposed population or for the whole exposed population will not exceed a yearly average of 0.170 rem per person from all sources of ionizing radiation. This excludes natural background radiation and medical and dental exposures.

i. Radiation exposure standards less restrictive than those prescribed above may be used in special circumstances only when approved by TSG (DASG-PSP) or Director, DLA (DLA-WH), as appropriate.

(1) Proposals for the use of alternate radiation exposure standards will contain complete justification. They will describe the procedures by which the alternate standards will be implemented.

(2) Less restrictive radiation exposure standards will not be considered for the following:

(*a*) Persons under 19 years of age.

(*b*) Females known to be pregnant.

(*c*) Occasionally exposed persons.

(*d*) Members of the general public for whom the exposure is considered to be a nonoccupational exposure to ionizing radiation.

8. Personnel Monitoring. *a*. Consideration will be taken of all external and internal occupational expo-

sures a person may receive during each quarter. Each person who may receive an accumulated dose equivalent in excess of 5 percent of the applicable quarterly radiation exposure standard specified in paragraph 7 will wear a personnel monitoring device. This is a person who—

(1) Is occupationally exposed to ionizing radiation.

(2) Periodically enters a controlled (restricted) area.

b. The monitoring of personnel who work only with soft beta emitters (e.g., tritium, carbon-14, calcium-45, and sulfur-35) and alpha emitters will be by bioassay as prescribed by the RPO. In general, requirements for bioassays will be based on considerations of the following:

(1) Chemical and physical forms of the radionuclides involved.

(2) Procedures and equipment which would permit radioactive material to be ingested, inhaled or absorbed into the body.

c. Bioassay measurements should be performed when it is possible for a person to acquire 5 percent or more of the annual radiation exposure standard for a specific radionuclide as established by the NCRP/ICRP. (See NRC Regulatory Guides 8.9, 8.11, 8.15, 8.20, and 8.22.)

Note. The laboratory performing the bioassay analysis should be accredited by either the Center for Disease Control, US Health and Human Service Department, or the American Industrial Hygiene Association.

d. Each person under 18 years of age who enters a controlled (restricted) area and for whom the potential exists to receive an accumulated dose equivalent excess of 5 percent of the applicable quarterly radiation exposure standard in paragraph 7*c* will wear a personnel monitoring device.

e. Each person who enters a high radiation area will wear, in addition to a film badge, one of the following near the film badge to monitor the whole-body exposure:

(1) A pocket chamber.

(2) A self-reading pocket dosimeter.

(3) A TLD.

f. An RWP will be prepared to control ingress and egress from a high radiation area or other controlled (restricted) areas that have been so designated by the RPO. The RWP will include the following:

(1) The person's name and social security number.

(2) Identification (e.g., serial number, badge number) of the assigned dosimeter.

(3) The time of entrance and time of exit.

(4) The initial reading of the dosimeter upon entrance and final reading of the dosimeter upon exit from the controlled (restricted) area, if appropriate.

Note. An RWP is not required for the routine entry into or use of a diagnostic medical or dental X-ray facility or a radiation therapy facility.

g. The RPO will review entries on the RWP periodically to ensure that complete exposure records are maintained for all persons using personnel monitoring devices issued by him.

h. The person designated in writing by the commander to be responsible for preparing and maintaining the exposure records may be one of the following:

(1) The custodian of the health records.

(2) The custodian of the civilian employee medical files.

(3) The person who prepares the DA Form 3484 Photodosimetry Report (Exposure to Ionizing Radiation), and normally controls the issuance and recovery of the personnel monitoring devices.

(4) The RPO.

i. The person responsible for the exposure records will annotate them in accordance with instructions on the reverse side of DD Form 1141 at least once each calendar quarter. The results of each wearing period for the personnel monitoring device will be annotated separately on this record. The normal wearing period for the personnel monitoring device will not exceed the wearing period schedule set by the organization furnishing the dosimetry service.

j. Personnel who may be occupationally exposed to ionizing radiation will wear a personnel monitoring device issued specifically for that purpose. The commander will ensure that the results for monitored visitors for whom personnel monitoring is required (para 8*a*) are forwarded to the custodian of the person's health record, radiation exposure record, or the custodian of the civilian employee medical files.

k. Personnel who may be exposed to ionizing radiation at other installations or activities may wear a personnel monitoring device issued for that specific purpose by the RPO at their duty station. This is in addition to the personnel monitoring device that may be provided by the installation or

activity being visited. However, only the highest value will be recorded.

l. Any person governed by this regulation who is exposed to ionizing radiation at an activity outside the jurisdiction of DA, ARNG, USAR, or DLA will ensure that the required exposure information is furnished to the individual who maintains DD Form 1141 for that person.

m. Separate requirements of DA, ARNG, USAR, and DLA with respect to personnel dosimetry are as follows:

(1) *Department of the Army, ARNG and USAR.* The primary whole-body dosimetric device will be the film badge. Exceptions to this will be when the low-energy (18 kiloelectron-volt (keV) to 1.2 MeV) direct reading personnel dosimeter (0-200 mR range) or TLD has been so designated by TSG as the primary dosimetric device. TLDs will be used to measure localized exposure to the fingers and other parts of the body, except the wrist, in accordance with paragraph 9. All personnel (military, civilian, or contractor) working within DA, ARNG, and USAR will use the dosimetry service provided by DA. The dosimetry service for Army installations and activities is provided by DARCOM. This service will be used solely for personnel dosimetry, except in unusual cases as approved by DARCOM. This requirement in no way precludes the use of supplemental or additional personnel monitoring devices when a particular operation makes such use desirable.

(2) *Defense Logistics Agency.* The primary whole-body dosimetric device will be the film badge. All DLA field activities will use the dosimetry service provided by DA, as outlined in SB 11-206. Exceptions are those DLA activities that have tenant status at a military installation, activity, or base with a personnel monitoring program, in which case they will be included in that program. Government-furnished personnel dosimetry service will be employed exclusively, as approved by the Director, DLA (DLA-WH). This requirement in no way precludes the use of supplemental or additional personnel monitoring devices when a particular operation makes such use desirable.

9. Wearing of personnel monitoring devices. *a.* When monitoring of external whole-body radiation exposure is the critical assessment, the personnel monitoring device will be worn below the shoulders, above the hips, and on the outside of clothing. During certain operations it may be appropriate to protect the film badge from environmental factors such as high humidity, temperature, or radioactive contamination. The film badge window must face outward from the body. Any procedure used will be approved by the RPO prior to initiation.

b. When a lead apron or similar protective garment is worn, the whole-body personnel monitoring device will be worn on the outside of the basic clothing but beneath the protective garment.

c. In certain situations (e.g., fluoroscopy, veterinary radiography, nuclear medicine, and radiation therapy) it is desirable to measure localized exposure to ionizing radiation. Examples are instances of exposure of the head and neck, hands, fingers, or forearms. In these situations, personnel monitoring devices should be worn in each location to assess the localized exposure. This assessment will be in addition to, but never in lieu of, routine personnel monitoring procedures (i.e., assessment of whole-body exposure). A person's regular whole-body personnel monitoring device will never be used on other areas of the body. Conversely, a personnel monitoring device used to record a specific localized exposure will never be used to record exposures at other body sites. (See para 11 for recording procedures.)

d. The wrist or finger dosimeter will be worn when a person could possibly receive an accumulated dose equivalent of radiation to the wrist or finger in excess of 10 percent of the radiation exposure standard in paragraph 7*a*(3). A wrist or finger dosimeter will be worn on the wrist or finger closest to the radiation source and under the protective glove. The wrist or finger dosimeter will be oriented toward the radiation source.

10. Care and handling of personnel monitoring devices. *a.* When personnel monitoring devices are not being worn, they will be stored in locations approved in writing by the RPO. The devices will be located conveniently close to, but outside of, any radiation area. They will be adequately shielded from ionizing radiation produced within the area. A control dosimeter will be stored in each approved personnel dosimeter storage location. To assure that persons wear only their own dosimeter, personnel monitoring devices will display some individual identification. Under *no* circumstances will the personnel monitoring device be permanently inscribed with a name, number, or other identifying symbol. The recommended procedure is to type the persons name on embossing tape or on a small strip of paper which is attached to the front or back of the per-

sonnel monitoring device with transparent tape. The small window on the front of the film badge *will never* be covered with tape or any other material except when authorized in writing by the RPO. This may be required to protect the film badge from environmental factors.

b. A person's immediate supervisor and the RPO will ensure that the personnel monitoring device issued to or used by one person will not be issued to or used by another person during the same wearing period.

c. When persons leave the controlled (restricted) area at the end of the work day or the installation or activity, they will ensure that their personnel monitoring devices are left in a location approved by the RPO.

d. Stocks of unissued dosimeter film should be stored at temperatures below 70° F (21° C), preferably between 35° F (2° C) and 46° F (8° C). Film packets should never be subjected to pressure or other physical stress that could result in sensitization of the film. The storage area for unissued film and TLDs will be as remote from ionizing radiation sources as practical. It will never be near chemical fumes since certain chemicals, such as mercury and formaldehyde, can cause fogging or sensitization.

11. Recording procedures. DD Form 1141 or Automated Dosimetry Record will be prepared and maintained for each person occupationally exposed to ionizing radiation. It may be prepared and maintained by a person other than the custodian of the health records or custodian of the civilian employee medical files. (See para 8*h*.) When the DD Form 1141 or Automated Dosimetry Record is maintained separately from the health record or civilian employee medical file, a Chargeout Record (OF 23) will be placed in each record. (See AR 40-66 for DA procedures.)

a. When a person other than the custodian of the health record or civilian employee medical file prepares DD Form 1141, he will advise the custodian of this fact and furnish the OF 23.

b. Upon notification of the transfer of a radiation worker, the RPO, in coordination with the custodian of DD Forms 1141, will perform the following:

(1) Insure completeness and accuracy of DD Form 1141 and the results of bioassay procedures.

(2) Insure that the Chargeout Record (OF 23) has been removed and that DD Form 1141 or Automated Dosimetry Records, and the results of bioassay procedures are placed in the health record or civilian employee medical file.

(3) Prepare a copy of DD Form 1141 or Automated Dosimetry Records, DD Form 1952, and results of bioassay procedures to be retained at the installation activity (10 CFR 20.401(*c*)(1)).

(4) Maintain the address of the gaining organization to which the person has been assigned to insure proper forwarding of dosimetry information. This information may be recorded on the retained copy of DD Form 1952.

(5) Submit a report to the NRC when required by 10 CFR 20.407. Also comply with paragraphs 13, 14, and 15 of this regulation.

c. Upon transfer, if DD Form 1141 or Automated Dosimetry Records, DD Form 1952, and results of bioassay procedures are not present in the person's health record or civilian employee medical file, the custodian of these records at the gaining organization will write to the installation or activity RPO identified on OF 23. He will request that these records be forwarded for inclusion into the person's health record or civilian employee medical file. DD Form 877 (Request for Medical/Dental Records or Information) may be used to request these records from the MEDCEN/MEDDAC. (For DA, see AR 40-3 and AR 340-1.)

d. In the initial preparation of DD Form 1141, the custodian shall try to obtain complete reports of all previous occupational exposures based on recorded personnel dosimetry. DD Form 1952 will be used to record the occupational exposure history and relevant health physics information. A sample DD Form 1952 is at figure 1.

(1) For each period where occupational exposure was probable and no record (or an incomplete record) is available, it shall be assumed that 1.25 rem was incurred per quarter of each calendar year or 00.416 rem was incurred per calendar month. When the person was potentially exposed to ionizing radiation at more than one facility, the cumulative exposures will be calculated and recorded in items 7 through 12 of DD Form 1141, as appropriate. (See fig. 2.) The sum of these whole-body exposures will be entered in item 13 of DD Form 1141. A statement regarding the source of this information will be entered in item 16.

(2) If there were no previous occupational exposures, the statement "no previous occupational exposure" will be entered on the first line of DD Form 1141. A copy of all previous occupational

exposure data obtained from outside employment or administrative doses will be forwarded to the Central Dosimetry Record Repository for proper posting to the person's record (SB 11-206).

Note. When an occupationally exposed individual is reassigned, the gaining organization will initiate a new DD Form 1952 and transpose previous exposure history information to the new form.

e. A separate DD Form 1141 or Automated Dosimetry Record will be maintained to record other than whole-body or skin of the whole-body exposures. Appropriate descriptions shall be made under item 16 of DD Form 1141. Examples are the thyroid, head and neck, wrist, and fingers. These records will be cross-referenced with the whole-body record. Results of bioassay procedures are considered as laboratory studies and should be filed accordingly. Reference to the results of such studies will also be entered under item 16. (See AR 40-66.)

f. The dose equivalent determined by bioassay will be entered on the appropriate DD Form 1141 or Automated Dosimetry Record when it exceeds investigational levels as defined in ICRP Report No. 10 or 10A. A case will be investigated when the amount and distribution of the radionuclide in the human body could deliver in 50 years to the critical organ more than 10 percent of the quarterly exposure standard or 5 percent of the annual exposure standard.

g. A sample DD Form 1141 at figure 2 shows the proper posting and maintenance of a whole-body exposure record. Figure 3 shows the proper posting and maintenance of a partial body (e.g., wrist, finger, etc.) exposure record. Entries in items 9 and 11 may include the abbreviation NU (not used) and NR (none reported).

h. When RWP are used, exposures recorded on supplemental monitoring devices will be recorded on the permits. (For DA, these records will be retained in accordance with AR 340-18-6.) The results from the primary dosimeter device (film badge) will be recorded on the DD Form 1141 or Automated Dosimetry Record unless this device has been lost or damaged beyond usefulness. (See para 13*g*.)

i. At the request of any employee, the RPO, in coordination with the Central Dosimetry Record Repository or custodian of DD Forms 1141, will advise the employee, in writing, annually of his exposure to ionizing radiation or radioactive material. This information will be obtained from the records maintained by the Central Dosimetry Record Repository or installation or activity (see para 5*c*).

12. Retention and disposition of DD Form 1141 or Automated Dosimetry Records, DD Form 1952, and results of bioassay procedures.

a. DD Form 1141 or Automated Dosimetry Records, and results of bioassay procedures are permanent parts of the person's health record or civilian employee medical file. (See AR 40-66 and AR 340-18-9 for Army procedures.) All previous copies of these records will be retained in the person's health record or civilian employee medical file or with the custodian of the person's DD Form 1141.

(1) Commanders will authorize inspecting officials to review exposure records and the results of bioassay procedures. If the above records are being maintained in the health record or civilian employee medical file of the person concerned, then the custodian will provide them.

(2) For policies and procedures on the confidentiality and/or release of medical information, see chapter 2, AR 40-66, AR 50-5, AR 340-1, and AR 340-17.

b. When a civilian employee of the DA, ARNG, USAR, or DLA is not included in a Federal civilian employee health service, his DD Form 1141 or Automated Dosimetry Records, and results of bioassay procedures will be kept as a permanent document in his SF 66 (Official Personnel Folder). For a non-Federal employee, a copy of such records will be retained by the RPO and copies of the results will be forwarded to the person for his personal and employer's files. DD Form 1141 or Automated Dosimetry Records, and results of bioassay procedures will be subject to review by authorized inspecting officials (*a* above).

c. The DD Form 1141 or Automated Dosimetry Records, and results of bioassay procedures will be retained in the health record of any military member retired from DA, ARNG, USAR, or DLA who has been occupationally exposed to ionizing radiation during his service. Disposition of these records for retired or separated civilian personnel will be in accordance with governing civilian personnel directives.

d. If any member of DA, ARNG, USAR, or DLA is released from active duty, or if a civilian employee terminates employment with these agencies, he will, upon request, be furnished information concerning his radiation exposure history. This

information will be requested from the RPO at the employee's last duty station in accordance with paragraph 14.

e. The disposition of "stray" DD Forms 1141 or Automated Dosimetry Records, and results of bioassay procedures for military personnel and DA civilian personnel will be in accordance with AR 40-66 and Civil Service regulations.

13. Control procedures. The RPO will review and evaluate, at intervals not to exceed a calendar quarter, DD Form 1141 or Automated Dosimetry Records and results of bioassay procedures for each person occupationally exposed to ionizing radiation. This review and evaluation will be noted on DD Form 1141 or Automated Dosimetry Records. The RPO will establish procedures to inform and advise the person, his commander, his supervisor, and the responsible medical officer when action is necessary to limit a person's exposure to ionizing radiation. When a person is reassigned or terminates his employment at an installation or activity, the custodian of the health record or civilian employee medical file will insure that all appropriate DD Form 1141's or Automated Dosimetry Records, and results of bioassay procedures are included in the person's health record or civilian employee medical file.

a. When a person has been reported to have received an exposure to ionizing radiation or radioactive materials which exceeds the radiation exposure standards in paragraph 7, the exposure will be classified as a radiation overexposure. Overexposures are classified as follows:

(1) *Type I.* An excessive rate of radiation accumulation to one or more of the following:

(*a*) Whole-body, head and trunk, gonads or lens of the eyes greater than 400 mrem in a calendar month but less than 1.25 rem in a calendar quarter.

(*b*) Skin of the whole-body (other than hands, wrists, feet or ankles), forearms, or cornea of the eye greater than 3 rem in a calendar month but less than 7.5 rem in a calendar quarter.

(*c*) Hands and wrists, or the feet and ankles greater than 6 rem in a calendar month but less than 18.75 rem in a calendar quarter.

(*d*) Other organs including bone, thyroid, tissue, and organ system greater than 1 rem in a calendar month but less than 5 rem in a calendar quarter.

(2) *Type II.* Overexposure exceeding the quarterly radiation exposure standard but less than the annual radiation exposure standard shown in paragraph 7*a*.

(3) *Type III.* Overexposure exceeding the annual radiation exposure standard shown in paragraph 7*a*.

b. When notified of a Type I exposure, the immediate commander will conduct an informal investigation. This will determine if the apparent or actual excessive exposure is the result of a violation of approved operating procedures or indicates the existence of faulty equipment. The commander will take appropriate action to prevent recurrence. If this was in fact an exposure to a person, then the proper data will be entered on the DD Form 1141 or Automated Dosimetry Record. If the investigation reveals that this was not in fact an exposure to a person, then the RPO in coordination with the local medical authority will record the dose which most accurately assesses the dose the individual could have received. The dose assessment data will be forwarded through command channels to the Central Dosimetry Record Repository for posting to the person's record (SB 11-206).

c. When notified of a Type II exposure, the immediate commander will take the following actions:

(1) Promptly remove the person concerned from any duty involving potential exposure to ionizing radiation pending completion of an investigation of the overexposure.

(2) Conduct an investigation to determine if the apparent or actual excessive radiation exposure is the result of a violation of approved operating procedures or indicates the existence of faulty equipment.

(3) Take appropriate action to preclude recurrence.

(4) Forward a report of the investigation, along with corrective actions taken, through command channels to HQDA(DASG-PSP), WASH DC 20310.

(5) Upon completion of the investigation, return the person to duties involving potential exposure to ionizing radiation. This is allowed if the expected dose, when added to the accumulated occupational dose, will not exceed the annual radiation exposure standard shown in paragraph 7*a*. If the exposure was not in fact an exposure to the person, then a recommendation in the investigative report will be made by the RPO in coordination with local medical authority which most accurately assesses

the dose the person received.

a. The action below will be taken when notified of a Type III exposure.

(1) The immediate commander will take the actions prescribed in *c* above, except that the person will not be returned to normal duties involving potential exposure to ionizing radiation without written concurrence of OTSG (DASG-PSP).

(2) The report of investigation will include a copy of the person's DD Forms 1141 or Automated Dosimetry Records, results of bioassay procedures, if applicable, and signed statements from the person and his immediate supervisor similar to the following: "To the best of my knowledge and belief, I (did) (did not) receive this exposure because _____."

(3) If the investigation reveals that the exposure was not in fact an exposure to the person, then a recommendation in the investigative report will be made by the RPO in coordination with local medical authority which most accurately assesses the dose the person received.

(4) TSG will inform the immediate commander of additional medical evaluations, bioassay procedures, or treatment required. TSG will also state when the exposed person may be returned to duties involving potential exposure to ionizing radiation.

e. Reports of alleged or actual overexposures to ionizing radiation or radioactive material which exceed the radiation exposure standards shown herein will be made in accordance with applicable DA or DLA directives. All abnormal exposures or alleged overexposures to ionizing radiation will be investigated as stated above. An information copy of such investigations concerning NRC-licensed or DA-authorized operations or radioactive commodities will be furnished to the licensee or to the command having logistical responsibility for the radioactive commodity.

f. In addition to the above reporting requirements, the following NRC reporting requirements also apply to installations or activities possessing radioactive material under a specific NRC license. A copy of any correspondence submitted to the NRC will be provided to the appropriate MACOM and TSG (HQDA(DASG-PSP) WASH DC 20310) or Director of DLA, (DLA-WH).

(1) *Immediate notification.* Immediate notification of the Director of the appropriate NRC Regional Office listed in appendix D of 10 CFR 20 shall be made by telephone and telegraph, mailgram, or facsimile of any incident involving NRC licensed material which may have caused or threatens to cause the following:

(*a*) Exposure of the whole-body of any person to 25 rem or more of radiation.

(*b*) Exposure of the skin of the whole-body of any person to 150 rem or more of radiation.

(*c*) Exposure of the feet, ankles, hands or forearms of any person to 375 rem or more of radiation.

(2) *Twenty-four hour notification.* Notification of the Director of the appropriate NRC Regional Office listed in appendix D of 10 CFR 20 shall be made by telephone and telegraph, mailgram, or facsimile within 24 hours of any incident involving NRC-licensed material which may have caused or threatens to cause the following:

(*a*) Exposure of the whole-body of any person to 5 rem or more of radiation.

(*b*) Exposure of the skin of the whole-body of any person to 30 rem or more of radiation.

(*c*) Exposure of the feet, ankles, hands, or forearms to 75 rem or more of radiation.

(3) Thirty-day report.

(*a*) In addition to any notification required by paragraph 15, the following will be submitted within 30 days:

1. A written report to the appropriate NRC Regional office listed in appendix D of 10 CFR 20.

2. A copy of the above report to the Director of Inspection and Enforcement, US Nuclear Regulatory Commission, Washington, DC 20555.

3. An information copy to the appropriate MACOM and to HQDA (DASG-PSP), Washington, DC 20310.

(*b*) The above report and copies will be submitted for the following:

1. Each exposure of a person to radiation in excess of the applicable limits in 10 CFR 20.101 or 10 CFR 20.104(a) or the NRC license.

2. Each exposure of a person to airborne concentrations of radioactive material in excess of the applicable limits in 10 CFR 20.103(a)(1), 10 CFR 20.103(a)(2), 10 CFR 20.104(b), or the NRC license.

3. Levels of radiation of concentrations of radioactive material in a controlled (restricted) area in excess of any other applicable limit in the NRC license.

4. Any incident for which notification is required by paragraph 13(*c*)(1) and (2), or 10 CFR

20.403.

g. Any report filed with the NRC and HQDA(DASG-PSP) shall be prepared so that names of persons who have received exposure to radiation will be stated in a separate part of the report. For each individual exposed, this will include, the name, social security number, date of birth, and an estimate of the person's exposure.

h. When a person's dose equivalent cannot be determined because his primary dosimetric device has been lost or damaged, he will be assigned an administrative dose by the RPO for each month the device was used. Use any of the following methods to determine the administrative dose:

(1) Calculate the person's exposure based on occupancy information and exposure levels.

(2) Assign the dose measured by a supplemental monitoring device if one was worn during this period.

(3) Average the person's previous occupational exposure over the preceding calendar year. This value may be used if the radiation exposure during the period in question is not likely to have been significantly different from that of a similar period the previous year.

(4) Assign 00.416 rem for each month during the period in question. This is the monthly average of the whole-body limit of 5 rem over 12 months.

i. The RPO should select the method, in *h* above, which will determine the most accurate assessment. The method of determining the administrative dose will be noted in the REMARKS section of the DD Form 1141. The Form will also be annotated to indicate an "administrative dose." The RPO will forward this information to the Central Dosimetry Record Repository for proper posting to the individual's record (SB 11-206).

14. Report of personnel exposure on termination of employment or work assignment.

a. When a person who has been occupationally exposed to ionizing radiation terminates employment, he will be provided, at his request, with a report of his exposure to ionizing radiation. This report will be provided by the RPO in coordination with the custodian of DD Forms 1141 or Automated Dosimetry Records. The information will be obtained from the records maintained by the Central Dosimetry Record Repository or the installation or activity (see para 5c). Such reports will be furnished within 30 days from the time the request is made and will cover each quarter of the person's employment involving exposure to ionizing radiation or a lesser monitored period if requested by the employee. The report will also include the results of any calculations and analyses of radioactive material deposited in the body of the employee.

b. The former employee's request will include appropriate identifying data, such as social security number and dates and location of employment.

c. The report furnished the employee will be in writing and contain the following statement:

"This report is furnished to you under the provisions of the US Nuclear Regulatory Commission Regulations (10 CFR 19) or the Department of Labor Regulations (29 CFR 1910). You should preserve this report for future reference."

15. Personnel radiation exposure RCS NRC-1007. *a.* A yearly report must be filed by NRC licensees which conduct industrial activities requiring substantial quantities of radioactive material (10 CFR 20.407 and 20.408). These include the following:

(1) Operators of Army nuclear reactors designed to produce electrical or heat energy, or used as research and testing facilities. Their reports normally are included in their annual operating report in accordance with AR 385-80.

(2) Installations or activities that use or possess byproduct materials for radiographic purposes (10 CFR 34).

(3) Installations or activities that possess or use at any one time, for the purposes of fuel processing, fabrication or reprocessing, special nuclear material in quantities exceeding 5,000 grams of contained uranium-235, uranium-233, plutonium, or any combination of these.

(4) Installations or activities that possess or use at any one time, for processing or manufacturing for distribution pursuant to 10 CFR 30, 32 or 33, byproduct material whose activity exceeds any of the following:

Radionuclide	*Activity in Curies*
Cesium-137	1
Cobalt-60	1
Gold-198	100
Iodine-131	1
Iridium-192	10
Krypton-85	1,000
Promethium-147	10
Technetium-99m	1,000

b. Each NRC licensee described in *a* above, will, within the first quarter of each calendar year, sub-

mit a Personnel Radiation Exposure report (RCS NRC-1007) for the previous calendar year. This report will be sent to the Director of Management and Program Analysis, US Nuclear Regulatory Commission, Washington, DC 20555. DA licensees will forward information copies to HQDA(DASG-PSP), WASH DC 20310.

c. The report will contain the following information:

(1) Either the total number of persons for whom personnel monitoring was required or the total number for whom personnel monitoring was furnished during the calendar year. This total must include at least the number of persons required to wear personnel monitoring devices.

(2) A statistical summary report of personnel monitoring information recorded for persons for whom personnel monitoring was required. It shall indicate the number of persons whose total whole-body exposure recorded during the previous calendar year was in each of the dose equivalent ranges shown below.

Estimated whole-body dose equivalent range (rem)	*Number of individuals*
No measurable dose	
Measurable, less than 0.10	
0.10 to 0.25	
0.25 to 0.50	
0.50 to 1.00	
1.00 to 2.00	
2.00 to 3.00	
3.00 to 4.00	
4.00 to 5.00	
5.00 to 6.00	
6.00 to 7.00	
7.00 to 8.00	
8.00 to 9.00	
9.00 to 10.00	
10.00 to 11.00	
11.00 to 12.00	
12.00 or greater	

Note. Individual values exactly equal to the values separating dose equivalent ranges will be reported in the next higher range.

d. When a person terminates employment with an NRC licensee or work assignment in an NRC licensee's facility as described in *a* above, the NRC licensee will furnish the Director of Management and Program Analysis, US Nuclear Regulatory Commission, Washington, DC 20555, a report of the person's exposure to radiation and radioactive materials incurred during the period of employment or work assignment in the NRC licensee's facility. An information copy of this report for each DA licensee will be forwarded through the appropriate MACOM to HQDA (DASG-PSP), WASH DC 20310. Such report will be furnished within 30 days after exposure of the person has been determined or 90 days after the date of termination of employment or work assignment, whichever is earlier. A copy of this report will also be provided to the person concerned.

16. Careless and intentional exposure of the personnel dosimeter to ionizing radiation.

a. The personnel dosimeter is a device used to measure how much radiation a person has been exposed to such that his accumulated dose equivalent will not exceed the radiation exposure standards. These data may be used for "medical-legal" purposes. All reported overexposures will be investigated to ensure that unsafe practices and improper procedures are corrected and that overexposed persons are provided suitable medical care (see para 13). Improper use of the personnel dosimeter may result in misleading reports and unnecessary expenditure of resources to conduct an investigation.

b. It is incumbent upon each commander, supervisor, and person issued a personnel dosimeter to ensure that it is used correctly.

17. Privacy Act Statements. The following statements implement the Privacy Act of 1974 (PL 93-579). (See AR 340-21 for Army requirements.)

a. The Privacy Act statement for the DD Form 1141 or Automated Dosimetry Record is DD Form 2005 (Privacy Act Statement—Health Care Records)

b. The Privacy Act statement for the DD Form 1952 will be found on the reverse side of the form. See figure 1.

DOSIMETER APPLICATION AND RECORD OF OCCUPATIONAL RADIATION EXPOSURE

Print legibly or type all information requested. See Privacy Act Statement on reverse.

1. FULL NAME (Last, First, Middle)	2. DATE OF BIRTH (YYMMDD)	3. SOCIAL SECURITY NO.

EX 6

4. DUTY SECTION (Dept., Ward, Unit, etc.)	5. JOB TITLE	6. DUTY PHONE
Research Laboratory	Chemist	283-1814

7. PAY GRADE		8. HAVE YOU WORN A DOSIMETER ISSUED BY THIS COMMAND IN THE PAST	9. DATE OF RADIATION PHYSICAL (YYMMDD)
CIVILIAN	MILITARY		
GS-12		☐ YES ☒ NO	81-05-01

10. DUTY STATUS	IF TRANSIENT SHOW MAILING ADDRESS (street address, city, state, zip code) OF LOCATION OF HEALTH RECORDS
☒ PERMANENT ☐ TRANSIENT 6 WEEKS OR LESS	

EXPOSURE INFORMATION *(ITEMS 11 THROUGH 20 FOR HEALTH PHYSICS USE ONLY)*

11. CLASSIFICATION OF EXPOSURE: ☒ EXTERNAL ☐ NEUTRON ☐ INTERNAL

12. BADGES REQUIRED	13. TLD REQUIRED
☐ WRIST ☒ WHOLE-BODY ☐ NEUTRON	☐ WRIST ☐ WHOLE-BODY ☐ FINGER

14. BIOASSAYS REQUIRED

WHOLE-BODY COUNT	THYROID UPTAKE	URINALYSIS	FREQUENCY
☐ YES ☐ NO	☐ YES ☐ NO	☐ α ☐ β ☐ β-γ	☐ MONTHLY ☐ QUARTERLY ☐ ANNUALLY

GIVE DATES FOR ITEMS 15 THROUGH 20 (YYMMDD)

15. DOSIMETER(S) ISSUED	16. DD FORM(S) 1141 INITIATED	17. DOSIMETER(S) DISCONTINUED
81-05-03	81-05-03	
18. LAST DOSIMETER(S) RETURNED	**19. LOCATOR CARD TO HEALTH RECORD**	**20. DD FORM(S) 1141 TO MEDICAL RECORDS**
	81-05-03	

OCCUPATIONAL EXPOSURE HISTORY

NOTE: This section only applies to the individual who has worked with radiation-producing devices or radioisotopes in a permanent status. List only those employers for whom you worked with radiation.

NAME OF EMPLOYER	ADDRESS (street address, city, state, zip code)	FROM YR	FROM MO	TO YR	TO MO	Do not write in this space
Nuclear Services, Inc	Shickshinny, PA	78	08	80	04	
Rosewater University	Portland, OR	80	04	81	04	
	TOTAL EXPOSURE DATA					

REMARKS

DD FORM 81 NOV 1952 EDITION OF 1 SEP 74 IS OBSOLETE. (see reverse)

Figure 1. Sample DD Form 1952.

PRIVACY ACT STATEMENT
DATA REQUIRED BY THE PRIVACY ACT OF 1974
(5 USC 552a)

1. TITLE OF FORM: Dosimeter Application and Record of Occupational Radiation Exposure.

2. PRESCRIBING DIRECTIVE: AR 40-14 and DLAR 4145.24.

3. AUTHORITY: 5 USC 301-Departmental Regulation; 10 USC 1071, Medical and Dental Care, Purposes; 42 USC 2073, 2093, 2095, 2111, 2133, 2134, 2201(b), and 2201(o). The authority for soliciting the social security number is 10 CFR 20; 44 USC 3101-Record Management by Agency Heads, General Duties.

4. PRINCIPAL PURPOSE(S): To establish qualification of personnel monitoring and document previous exposure history. The information is used in the evaluation of risk of exposure to ionizing radiation or radioactive materials. The data permits meaningful comparison of both current (short-term) and long-term exposure to ionizing radiation or radioactive material. Data on your exposure to ionizing radiation or radioactive materials is available to you upon request.

5. ROUTINE USES: The information may be used to provide data to other Federal agencies, academic institutions, and non-governmental agencies, such as the National Council on Radiation Protection and Measurement and the National Research Council, involved in monitoring/evaluating exposures of individuals to ionizing radiation or radioactive materials who are employed as radiation workers on a permanent or temporary basis and exposure received by monitored visitors. The information may also be disclosed to appropriate authorities in the event the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding.

6. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: It is voluntary that you furnish the requested information, including social security number; however, the installation or activity must maintain a completed DD Form 1141 on each individual occupationally exposed to ionizing radiation or radioactive material as required by 10 CFR 20, 29 CFR 1910.96 and AR 40-14/DLAR 4145.24. If information is not furnished, individual may not become a radiation worker. The social security number is used to assure that the Army/Agency has accurate identifier not subject to the coincidence of similar names or birthdates among the large number of persons on whom exposure data is maintained.

STATEMENT

Under the provisions of 10 CFR 19.13, 29 CFR 1910.96 and the Privacy Act of 1974, I hereby authorize the release of, and request that all of my radiation exposure records be furnished appropriate authorities in accordance with the "Routine Uses" portion of the above Privacy Act Statement. As a radiation worker, I have been provided instructions in radiation protection as required by 10 CFR 19.12 and 29 CFR 1910.96. As a female radiation worker, I have been informed of the biological affects and the risks from ionizing radiation on the embro-fetus and received a copy of NRC (Nuclear Regulatory Commission) Guide 8.13. I will contact my supervisor or the radiation protection officer if I have any questions. I hereby certify that the exposure history listed on the obverse is correct and complete, to the best of my knowledge and belief. I have read and understand the above Privacy Act Statement.

81-04-25
Date (YYMMDD)

Ex 6

Figure 1. Sample DD Form 1952—Continued.

RECORD OF OCCUPATIONAL EXPOSURE TO IONIZING RADIATION

FOR INSTRUCTIONS, SEE REVERSE OF SHEET.

1. IDENTIFICATION NUMBER	2. NAME (Last, first, middle initial)	3. SOCIAL SECURITY NUMBER	4. RANK/RATE TITLE OF POSITION	5. DATE OF BIRTH (Day, month, year)
074			TDR	

EX. 6

PLACE WHERE EXPOSURE OCCURRED	PERIOD OF EXPOSURE		DOSE THIS PERIOD (rem) 1. Method of monitoring is presumed to be film badge reading unless otherwise specified under Item 16, "REMARKS."				ACCUMULATED DOSE (rem)		INITIAL
ACTIVITY	FROM (Day-Mo-Yr)	TO (Day-Mo-Yr)	SKIN DOSE (Soft)	GAMMA AND X-RAY	NEUTRON	TOTAL THIS PERIOD	TOTAL LIFETIME	PERMISSIBLE LIFETIME 5(N-18)	PERSON MAKING ENTRY
6	7	8	9	10	11	12	13	14	15
WHOLE BODY									
Previous Exposure[1]	Aug66	Apr68	NR	00.107	NU	00.107	00.107	-	CED
Admin Dose[2]	Apr68	Apr69	-	-	-	05.000	05.107	45.000	CED
APG-EA, MD	3May69	4Jun69	NR	00.000	NU	00.000	05.107	45.000	CED
do	6Jun69	6Jun69	Quarterly Review by RPO				-	-	JER
do	5Jun69	4Jul69	00.003	00.010	NU	00.010	05.117	45.000	CED
do	5Jul69	7Aug69	NR	00.078	NU	00.078	05.195	45.000	CED
do	8Aug69	6Sep69	Film Badge Lost[3]		NU	00.416	05.611	45.000	CED
do	8Sep69	8Sep69	Quarterly Review by RPO				-	-	JER
do	7Sep69	4Oct69	NR	00.064	NU	00.064	05.675	45.000	CED
do	5Oct69	4Nov69	NR	00.075	NU	00.075	05.750	45.000	WLW
do	5Nov69	6Dec69	00.016	00.070	NU	00.070	05.820	45.000	WLW
do	Film Badge Service Discontinued 6 Dec 69						-	-	WLW
do	6Dec69	6Dec69	Quarterly Review by RPO				-	-	JER
Fort Plunkett	2Jan70	3Feb70	NR	00.000	00.000	00.000	05.820	45.000	RKO
do	4Feb70	3Mar70	NR	00.178	00.062	00.240	06.060	45.000	RKO
do	4Mar70	2Apr70	00.052	02.504	00.126	02.630	08.690	45.000	RKO
do	22Mar70	22Mar70	Quarterly Review by RPO				-	-	MJM
do	3Apr70	4May70	Relieved From Duties				08.690	50.000	RKO
do	5May70	3Jun70	Involving Exposure to RAD[5]				08.690	50.000	RKO
do	4Jun70	2Jul70	00.017	00.100	00.043	00.143	08.833	50.000	RKO
Fort Smith, CA	Aug70	Jul71	No Film Badge Worn or Exposure Received				08.833	55.000	GML
			S A M P L E						

16. REMARKS (Continue on additional sheet if necessary)

1. Nuclear Services, Inc., Shickshinny, PA
2. Rosewater University, Portland, OR
   No film badge records (AR 40-14).
3. Admin Dose = $\frac{5 \text{ rem}}{12 \text{ months}}$ = 00.416 rem
4. Alleged overexposure.
5. Pending investigation IAW AR 40-5.

NR - none reported; NU - not used
Has wrist badge No. 086.

TO BE RETAINED PERMANENTLY IN INDIVIDUAL'S MEDICAL RECORD

DD FORM 1 MAY 67 1141 PREVIOUS EDITIONS ARE OBSOLETE.

Figure 2. Sample DD Form 1141 for whole-body exposure.

Ex 6

RECORD OF OCCUPATIONAL EXPOSURE TO IONIZING RADIATION

FOR INSTRUCTIONS, SEE REVERSE OF SHEET.

1. IDENTIFICATION NUMBER	2. NAME (Last, first, middle initial)	3. SOCIAL SECURITY NUMBER	4. RANK/RATE TITLE OF POSITION	5. DATE OF BIRTH (Day, month, year)
086	[redacted]	[redacted]	TDR	[redacted]

EX 6

PLACE WHERE EXPOSURE OCCURRED	PERIOD OF EXPOSURE		DOSE THIS PERIOD (rem) 1. Method of monitoring is presumed to be film badge reading unless otherwise specified under Item 16, "REMARKS."				ACCUMULATED DOSE (rem)		INITIAL
ACTIVITY	FROM (Day-Mo-Yr)	TO (Day-Mo-Yr)	SKIN DOSE (Soft)	GAMMA AND X-RAY	NEUTRON	TOTAL THIS PERIOD	TOTAL LIFETIME	PERMISSIBLE LIFETIME 5(N-18)	PERSON MAKING ENTRY
6	7	8	9	10	11	12	13	14	15
Previous Exposure[2]	Aug66	Apr68	-	-	-	00.204	00.204	NA	CED
Admin Dose[3]	Apr68	Apr69	-	-	-	75.000	75.204	NA	CED
APG-EA, MD	3May69	4Jun69	NR	00.009	NU	00.009	75.213	NA	CED
do	6Jun69	6Jun69	Quarterly Review by RPO				-	NA	JER
do	5Jun69	4Jul69	00.007	00.018	NU	00.018	75.231	NA	CED
do	5Jul69	7Aug69	NR	00.159	NU	00.159	75.390	NA	CED
do	8Aug69	6Sep69	Film Badge Lost[4]		NU	06.250	81.640	NA	CED
do	8Sep69	8Sep69	Quarterly Review by RPO				-	NA	JER
do	7Sep69	4Oct69	NR	00.143	NU	00.143	81.783	NA	CED
do	5Oct69	4Nov69	NR	00.162	NU	00.162	81.945	NA	WLW
do	5Nov69	6Dec69	00.032	00.150	NU	00.150	82.095	NA	WLW
do	Film Badge Service Discontinued 6 Dec 69						-	NA	WLW
do	6Dec69	6Dec69	Quarterly Review by RPO				-	NA	JER
Fort Plunkett	2Jan70	3Feb70	NR	00.015	NU	00.015	82.110	NA	RKO
do	4Feb70	3Mar70	NR	00.420	NU	00.420	82.530	NA	RKO
do	4Mar70	2Apr70	00.140	18.125[5]	NU	18.125	100.655	NA	RKO
do	22Mar70	22Mar70	Quarterly Review by RPO				-	NA	MJM
do	3Apr70	4May70	Relieved From Duties[6]				100.655	NA	RKO
do	5May70	3Jun70	Involving Exposure to RAD				100.655	NA	RKO
do	4Jun70	2Jul70	00.025	00.200	NU	00.200	100.855	NA	RKO
Fort Smith, CA	Aug70	Jul71	No Film Badge Worn or Exposure Received				100.855	NA	GML
			S A M P L E						

16. REMARKS (Continue on additional sheet if necessary)

1. Wrist Record (WB Record 074)
2. Nuclear Services, Inc., Shickshinny, PA
3. Rosewater University, Portland, OR
   No film badge records (AR 40-14)
   NR - none reported; NU - not used.
4. Admin Dose = $\frac{75 \text{ rem}}{12 \text{ months}}$ = 06.250
5. Accidental Exposure. Case documented IAW AR 40-5.
6. Necessary to avoid exceeding quarterly limit

TO BE RETAINED PERMANENTLY IN INDIVIDUAL'S MEDICAL RECORD

DD FORM 1 MAY 67 1141 PREVIOUS EDITIONS ARE OBSOLETE.

Figure 3. Sample DD Form 1141 for wrist exposure.

Ex 6

The Army office of primary interest in this joint regulation is the Office of The Surgeon General. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to HQDA (DASG–PSP–E) WASH DC 20310.

By Order of the Secretary of the Army and Director, Defense Logistics Agency:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

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Defense Logistics Agency: 2

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DEPARTMENT OF THE ARMY SUPPLY BULLETIN

PERSONNEL DOSIMETRY SUPPLY AND SERVICE FOR TECHNICAL IONIZING RADIATION EXPOSURE CONTROL

Headquarters, Department of the Army, Washington, DC
31 May 1983

1. General. This bulletin outlines the requisitioning, processing, and disposal procedures for the primary dosimetric device used in the detection of technical (nontactical) dosages from ionizing radiation sources, including x-rays. The current primary dosimeter is the film badge issued by the US Army Ionizing Radiation Dosimetry Center (AIRDC). However, the AIRDC may issue thermoluminescent dosimeters or other devices as the primary dosimeter for use in certain monitoring situations. This bulletin also describes the operation of the Central Dosimetry Records Repository maintained by the AIRDC. Procedures and responsibilities for the control and recording of exposures to ionizing radiation are outlined in AR 40-14.

2. Applicability. This bulletin applies to all persons who utilize the dosimetry service provided by the AIRDC.

3. Definitions. The following definitions apply to this bulletin. Note: The explanation of terms in AR 40-14 is also applicable to the bulletin.

a. Photodosimetry. Measurement of radiation dosage received from beta, gamma, and X-ray emitting sources including radioactive materials, X-ray machines, nuclear reaction equipment, and nuclear bombardment devices by means of exposure of photographic films.

b. Film Badge. A film packet in a holder. The holder normally includes a means of attaching to the wearer's clothing.

c. Film Packet. One or more pieces of radiation detection film, similar to dental X-ray film, in a light-proof envelope issued and standarded by AIRDC.

d. Technical Radiation Exposure. Recurrent radiation exposure to medical, dental, and industrial X-ray machines; radioactive materials; nuclear reaction equipment; and nuclear bombardment devices. In some applications, the term nontactical is used to distinguish between technical and tactical radiation exposure. The major distinctions between tactical and nontactical dosimetry are the different techniques used in measuring short-time, high-level exposure (tactical) and cumulative low-level exposure (nontactical or technical).

e. Processing. The chemical development and evaluation of the images formed on photographic films by ionizing radiation.

f. Wearing Period. The length of time during which a dosimeter is worn by the individual being monitored. Initially, the dosimetry service is furnished for a work-week period. This may be modified for monitoring on a monthly basis. The initial wearing period may be one month where the dosimeters are to be used on standby basis such as for atomic incident or CBR teams.

g. Control Dosimeters. Dosimeters used to compute correlation factors for incidental exposure or deterioration which may occur in transit or storage.

h. Code Designator. A coding system which identifies each separate dosimeter with a specific period of time, the using installation, and the wearing individual. The exchange of dosimeters and correspondence in reference thereto between the using installation and AIRDC will employ the code designator appearing on the dosimater.

i. Dosage. Quantity of radiation exposure, as applied to an individual, expressed in rem or millirem. Maximum permissible exposures are prescribed by The Surgeon General.

j. Monthly Wearing Period. The length of time from the 1st, 2d, 3d, or 4th Sunday of one month to the 1st, 2d, 3d, or 4th Sunday respectively of the following month. Once each calendar quarter, this wearing period will be 5 weeks long.

k. Using Installation. The installation or agency which uses the army dosimetry service to measure the technical radiation exposure of all or a portion of its personnel.

Encl 2

*This bulletin supersedes SB 11-206, 18 April 1969.

4. Requisitioning, Initial. The AIRDC supplies all primary dosimeters for the Army and other authorized activities. All activities requiring film badge service should place a letter requisition directly on AIRDC. Figure 1 represents a typical requisition. The initial requisition will include the following:

a. Name (and grade/rank of military personnel), social security number, and date of birth of each individual to be monitored.

b. Type and energy level of radiation to which each individual will be subjected. If energy levels are mixed or not known, a thorough description of the radiation devices or materials involved shall be furnished.

c. A specific quantity of dosimeters required for visitors.

d. An additional quantity equal to 1 percent of the quantity supplied under a and c above, or two dosimeters (whichever is greater) for emergency purposes. (These are for replacement puposes in the event of loss or damage to regular dosimeters and for use as additional visitor dosimeters.)

e. The assignment of a serial number starting with 001 to the first individual named (a above) and proceeding through the visitors and spare badges (c and d above).

f. A description of any unusual environmental conditions (such as high humidity, heat, etc) to which the badges will be subjected.

5. Supply of Dosimeters. The AIRDC will:

a. Furnish on initial requisition a quantity of dosimeters equal to the named individuals and number of visitors and spares requested.

b. Forward by expeditious means, three times each calendar quarter the required number of dosimeters times the number of wearing periods included in the dosimeter shipment.

c. Continue supply of dosimeters at the original requisition rate until changed or terminated by the originator, or modified in accordance with paragraph 6.

d. Provide detailed user instructions for the type of dosimeter issued.

6. Change of Wearing Period. After 8 weeks of weekly dosimetry service, the using installation will review the exposure records to determine which individuals should be monitored on a monthly wearing period basis. This determination should be brought to the attention of AIRDC for modification of supply cycles, dosimeter types, and code designators. Although a single basis is preferred from a supply and administrative standpoint, and a monthly basis is more economical, the determination to use a one week, one month, or split wearing period is made on health environment considerations by the using installation.

7. Code Designator. The code designator for film packets will consist of three or four letters and three or four digits. Complete information on the film badge service including details of the code designator and a list of wearing period letters and dates will be furnished when the initial requisition for dosimetry service is filled. AIRDC will assign the letter designator to each installation serviced; the installation will assign a permanent serial number to specific individuals, visitors, and spare dosimeters. The serial numbers assigned to specific individuals, visitors, and spare dosimeters are shown on the original requisition for dosimetry service. Any change in the assignment of serial numbers should be brought to the attention of AIRDC when the first group of dosimeters affected are returned for processing and evaluation.

8. Return of Dosimeters.

a. General. At the end of the wearing period, all dosimeters for that particular wearing period, including control dosimeters and those not worn, must be returned to AIRDC. When an overdose is suspected, that particular dosimeter should be forwarded to AIRDC immediately for processing. All film must be accompanied by DA Form 3484 (Photodosimetry Report) in triplicate.

b. Preparation of DA Form 3484. The Photodosimetry Report will be printed (by hand) or typed by the using installation according to instructions on the reverse side of the form. DA Form 3484 does not require a reports control symbol. DA Form 3484 will be requisitioned through US Army AG Publication Center channels.

c. Shipment of Films. The film and Photodosimetry Report will be packed together and returned to AIRDC in the following manner:

(1) The film packets shall be placed in the same numerical sequence as listed on the Photodosimetry Report with the control films placed first and tied with rubber bands or string; do not tape, staple, or glue film packets to backing material.

(2) Small groups of film may be returned in double envelopes; large groups shall be returned in strong cardboard or metal containers.

(3) DA Label 120 (Caution Label (fig. 2)) will be placed on the outside of the shipping container or envelope for all film packets being returned for processing. DA Label 120 will be requisitioned through US Army AG Publication Center channels.

(4) Shipments of film to be returned shall be addressed to: Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: DRXTM-CI-DCS, Lexington, Kentucky 40511.

(5) The film shall be returned via expeditious means.

9. Processing. Upon receipt of returned dosimeters, AIRDC will develope and evaluate all used dosimeters. A dosage evaluation will be recorded and forwarded to the using agency of DA Form 3484 or equivalent document. Where an overexposure is indicated, the commander of the using installation will be notified immediately by telephone or TWIX, with notification to The Surgeon General, ATTN: DASG-PSP-E. Further, for suspected overexposures that may be caused by radioactive commodities in The Army Supply System, the commodity command having logistical responsibility for the radioactive commodity should also be notified for compliance to AR 385-40.

10. Change of Names or Quantity. Additions or deletions of individuals by name, (rank, and social security number) shall be brought to the early attention of AIRDC to permit modification of the quantities and adjustment of serial number records. Notification of changes in the type and energy level of radiations to be monitored must also be brought to the attention of the AIRDC.

11. Protection of Film Packs. Film deterioration rate increases with humidity and temperature, and film is highly susceptible to random radiation. Therefore, it is essential that all film be stored in a cool, dry, low radiation location when not being worn. Film badges in use must be similarly protected between working periods. Film to be returned for processing must not be delayed and should be dispatched within a few hours after the end of the wearing period.

12. Special Requirements. Special dosimeters, holders, or service such as wrist badges, neutron monitoring, area monitoring dosimeters, etc., may be obtained by direct request to AIRDC.

13. Dosimetry Record Repository. A Central Dosimetry Record Repository is established at AIRDC for the purpose of maintaining an ionizing radiation exposure history for each person who utilizes the Army dosimetry service.

a. The results of all used dosimeters processed by AIRDC will routinely be entered into the automated Record Repository. In the event the using installation determines that a reported dosimeter result is not a valid measurement of the dose received by the individual, the using installation shall report to AIRDC the dose assignment for the individual.

b. Administrative dose assignments made in accordance with AR 40-14 will be reported by the Radiological Protection Officer (RPO) of the using installation to AIRDC. Such report will contain:

(1) Name of individual.

(2) Social Security Number of individual.

(3) Period of time covered by the administrative dose.

(4) Occupation speciality code of individual.

(5) Method of determining the administrative dose.

(6) Location (installation) where person is assigned.

(7) Administrative dose assigned.

(8) Authenticating signature of RPO.

c. Results of all bioassay procedures will be reported by the using installation RPO to AIRDC in units of individual dose commitment. Reports will also contain all applicable information required in paragraph b above.

d. Ionizing radiation exposure histories for individuals who utilize the Army dosimetry service may be requested from the AIRDC. Such requests shall contain the following information:

(1) Name of individual.

(2) Maiden name if applicable.

(3) Social Security Number.

(4) Period of time of exposure (if known).

(5) Location of exposure (if known).

e. Direct all reports, queries and requests relating to the Central Repository to Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: DRXTM-CI-DCR, Lexington, Kentucky 40511.

CAUTION

CONTENTS...UNEXPOSED FILM

KEEP AWAY FROM
- RADIOACTIVE MATERIALS
- X-RAYS AND FLUOROSCOPES
- OPEN FLAME LIGHTS
- EXCESSIVE HEAT OR MOISTURE

STORE IN A COOL DRY PLACE

HANDLE WITH CARE

DA LABEL 120, 1 Apr 69 For use of this form, see SB 11-206; the proponent agency is USAMC.

Figure 2. DA Label 120.

The Army office of primary interest in this joint regulation is the US Army Ionizing Radiation Dosimetry Center. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: DRXTM-CI-DCR, Lexington, Kentucky 40511

By Order of the Secretary of the Army:

E. C. MEYER
General, United States A
Chief of Staff

fficial:

ROBERT M. JOYCE
lajor General, United States Army
The Adjutant General

ISTRIBUTION:

To be distributed in accordance with DA Form 12-9A, requirements for Medical Services pplicable to All Army Elements.

(Letterhead of requisitioning activity)
SUBJECT: Initial Requisition for Film Badge Service
TO: Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: DRXTM-CI-DCS, Lexington, Kentucky 40511

1. Request that film badge service be furnished for the following 90 named individuals, 5 visitors, and 2 spares:

Serial	Name	SSN	DOB	Radiation
001	King, Joseph M.			
002	Abney, A. E.			
003	Stevenson, Janet			
004	Jones, James			
etc	etc	etc	etc	etc
091-095-Visitors				
096-097-Spares				

2. Send holders, original and subsequest film packets, and dosage readings to: (address and attention line of requisitioning activity.)

3. Emergency telephone contact from 0800 through 1700 hours during working days is: (Name or title of individual, telephone and extension numbers.)

At other times: Duty Officer (telephone and extension numbers).

Figure 1. Sample requisition.

Ex 6