

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 standardized 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 dosimeter.

*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.

**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 purposes 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 film 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 develop 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 Radiologic 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-C1-DCR, Lexington, Kentucky 40511.

(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 4 spares:

Serial	Name	SSN	DOB	Radiation
001	King, Joseph M.	432-56-9492	20 Aug 55	$^{90}\text{Sr}$ / $^{90}\text{Y}$
002	Abney, A. E.	349-20-3251	16 May 46	$^{60}\text{Co}$ , $^{137}\text{Cs}$
003	Stevenson, Janet	423-56-7839	2 Feb 50	90 kVp x-ray
004	Jones, James	357-49-1129	3 Oct 43	30 kVp x-ray
etc.....etc.....etc.....etc.....etc.....etc.....etc.....etc				
091-095-Visitors.....				
096-097-Spares.....				

2. Send holders, original and subsequent film packets, and dosage readings to: (address and attention line of requisitioning activity.)

3. Emergency telephonic 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.

# 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 11-2-66;  
the proponent agency is USAMC.

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:

Official:

ROBERT M. JOYCE  
*Major General, United States Army*  
*The Adjutant General*

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

DISTRIBUTION:

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

10.2 Radiation Detection Instruments and Instrument Calibration



AUGUST 1967

RADIATION DETECTING INSTRUMENTS

TYPE OF INSTRUMENTS (INCLUDES MAKE & MODEL)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE(mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE
1. Radiacmeter IM-141/PDR-27J Portable Survey Meter	4	Beta Gamma	0-500	3.5	Survey
2. Radiacmeter IM-1741 J/PD Portable Survey Meter	4	Gamma	0-500K	Windowless	Survey
3. Eberline Mod PAC-12A9 Portable Scintillation Counter	2	Alpha Gamma	0-100K cpm 0-2 R/hr	1.5	Survey
4. Victoreen Mod 740 Cutie Pie Survey Meter	1	Alpha Beta Gamma	0-10K		Survey
5. Victoreen Mod 440RF/A Survey Meter	1	Gamma X-ray	0-300		Survey
6. Nuclear Measurements Corp Mod AM-3D Air Monitor	2	Beta Gamma	10-10 <sup>6</sup> cpm	5.6	Monitor
7. Victoreen Mod 808 VAMP Area Monitor	2	Beta Gamma	0-10		Monitor
8. Victoreen Mod 808A VAMP Area Monitor	2	Beta Gamma	0-50		Monitor
9. Nuclear Chicago Mod DS-5-4 Scintillation Well Detector	3	Gamma	See Note		Measure
10. Nuclear Chicago Mod DS/303 (V) Scintillation Well Detector	1	Beta Gamma	See Note		Measure
11. Nuclear Measurements Corp. PC-55 Proportional Chamber	1	Alpha Beta	See Note		Measure
12. RPO Survey Kit	1	Alpha Beta Gamma	Various	Various	Survey



RADIATION DETECTING INSTRUMENTS, Cont'd

TYPE OF INSTRUMENTS (INCLUDES MAKE & MODEL)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE(mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE
13. Delta Rate Meter Model 2	2	Gamma	999,000 cps (counts per sec.)		Search & Measure
14. Reactor Experiment, Inc. Exposure Dosimeter Model 811B	2	Gamma	Various		Measure
15. Reactor Experiment, Inc. Exposure Ratemeter Model 801	2	Beta Gamma X-ray	.1 mr/hr to 99.9 R/hr		Measure
16. Eberline Portable Scaler Model PS-1 with Model HP-210 Detector	1	Beta Gamma	Various	1.5 - 2.0	Measure & Survey
17. Eberline PRS-1 Portable Ratemeter Scaler with HP-260 Probe	1	Beta Gamma	Various	1.4 - 2.0	Measure & Survey
18. EGSA Digital Ion Chamber	1	Beta Gamma	Various		Measure & Survey
19. Packard 2000 CA TRI-CARB Liquid Scintillator	2	Alpha Beta Gamma	See Note		Smear Test Analysis
20. Gamma Products G5000 Automatic Counters	3	Alpha Beta Gamma	See Note	80 Micrograms/ cm <sup>2</sup>	Leak Test Analysis
21. Eberline ESP-1/ NRD-871 HP-280 HP-270	2 2 2	Neutron Neutron Gamma	0 - 260K  0 - 2K		Measure & Survey
22. Nuclear Research Corporation NP-2 Portable Neutron Monitor	2	Neutron	0 - 2K		Survey

RADIATION DETECTING INSTRUMENTS, Cont'd

TYPE OF INSTRUMENTS (INCLUDES MAKE & MODEL)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE(mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE
23. Eberline RM 16/NRD	1	Neutron	0 - 10K		Measure
24. Multichannel Analyzer Canberra Series 98	1	Beta Gamma	Various		Isotope identification
25. Eberline PRM-7 Micro R/hr Meter Radiation Monitor	2	Gamma	1 - 5K		Survey
26. Environmental Radiation Monitor Reuter Stokes RSS-111	1	Gamma			Environmental Radiation Survey
27. Chamber Shonka	4	Gamma	Various		Source Calibration
28. Chamber, Ionization, cavity A-2 thru A-6, Exradin, Inc.	18	Gamma	Various		Source Calibration
29. Digital Electrometer Keithly Model 642/6423	3	Current from Shonka and Exradin Chambers	None	10 <sup>-2</sup> A	Source Calibration
30. Ludlum Ratemeter Model 177-57	2	Alpha Beta Gamma	Various		Survey
31. Ludlum Model 2118 Dual Stabilizer Analyzer	1	Alpha Beta Gamma	Various		Measure

NOTE: Readout on various Scalers  
typically present count to  
10<sup>6</sup> Max or present time  
to 999.99 minutes.

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TYPE OF INSTRUMENTS (INCLUDING MAKE & MODEL)	METHOD	C A L I B R A T I O N	
		FREQUENCY	STANDARD USED
1. Radiacmeter IM-141/PDR-27J Portable Survey Meter	Direct Comparison	3 months	AN/UDM-1
2. Radiacmeter IM-174(1)/PD Portable Survey Meter	Direct Comparison	3 months	1200 Ci60 Source
3. Eberline Mod PAC-1SAG Portable Scintillation Counter	Direct Comparison	3 months	AN/UDM-6 (Alpha) AN/UDM-1 (Gamma)
4. Victoreen Mod 740 Cutie Pie Survey Meter	Direct Comparison	3 months	AN/UDM-1
5. Victoreen Mod 4498F/A Survey Meter	Direct Comparison	3 months	AN/UDM-1
6. Nuclear Measurements Corp Mod AM-3D Air Monitor	Direct Comparison	3 months	Internal 3600 cpm Test Signal
7. Victoreen Mod 808 VAMP Area Monitor	Direct Comparison	3 months	As appropriate
8. Victoreen Mod 808A VAMP Area Monitor	Direct Comparison	3 months	As appropriate
9. Nuclear Chicago Mod DS-5-4 Scintillation Well Detector	Direct Comparison	As required	As appropriate
10. Nuclear Chicago Mod DS/303 (V) Scintillation Well Detector	Direct Comparison	As required	As appropriate
11. Nuclear Measurements Corp. PC-55 Proportional Chamber	Direct Comparison	As required	As appropriate
12. RPO Survey Kit	Direct Comparison	3 months	Various Sources Traceable to NBS
13. Delta Rate Meter Model 2	Direct Comparison	As required	Various Sources

TYPE OF INSTRUMENTS (INCLUDING MAKE & MODEL)	METHOD	C A L I B R A T I O N	
		FREQUENCY	STANDARD USED
14. Reactor Experiment, Inc. Exposure Dosimeter Model 811B	Direct Comparison	3 months	Various Sources Traceable to NBS
15. Reactor Experiment, Inc. Exposure Ratemeter Model 801	Direct Comparison	3 months	Various Sources Traceable to NBS
16. Eberline Portable Scaler Model ES-1 with Model HP-210 Detector	Direct Comparison	As required	As appropriate
17. Eberline Portable Ratemeter Scaler PRC-1 with HP-260 Probe	Direct Comparison	As required	As appropriate
18. Digital Ion Chamber Model PG5-A	Direct Comparison	3 months	AN/UDM-1A
19. Packard 2600 CA TRI-CARB Liquid Scintillator	Direct Comparison	360 days	Set of variously quenched H <sup>3</sup> & C14 Stds
20. Gamma Products G5000 Automatic Counters	Direct Comparison	As required	As appropriate
21. Eberline ESP-1/ NRD-871 HP-260 HP-270	Direct Comparison	360 days	NBS
	Direct Comparison	360 days	NBS
	Direct Comparison	360 days	NBS
22. Nuclear Research Corporation NP-2 Portable Neutron Monitor	Direct Comparison	3 months	As appropriate
23. Eberline SM 16/NRD	Direct Comparison	3 months	As appropriate
24. Multichannel Analyzer Canberra Series 98	Direct Comparison	As required	Various Sources Traceable to NBS
25. Eberline PRM-7 Micro R/hr Meter Radiation Monitor	Direct Comparison	3 months	As appropriate
26. Environmental Radiation Monitor Reuter Stokes RSS-111	Direct Comparison	360 days	As appropriate

TYPE OF INSTRUMENTS  
(INCLUDING MAKE & MODEL)

METHOD

CALIBRATION

FREQUENCY

STANDARD USED

27. Chamber Shonka	Direct Comparison	4 years	NBS and local Intercomparison
28. Chamber, Ionization, cavity A-2 thru A-6, Exradin, Inc.	Direct Comparison	4 years	NBS and local Intercomparison
29. Digital Electrometer Keithly Model 642/6423	Direct Comparison	30 days	Area Cal & Repair Cnt, Lexington, KY
30. Ludlum Ratometer Model 177-57	Direct Comparison	3 months	As appropriate
31. Ludlum Model 2118 Dual Stat'lizer Analyzer	Direct Comparison	3 months	As appropriate

The following instruments are normally used for the analysis of leak test samples:

Item 19. Packard 2000 CA Tri-Carb Liquid Scintillation Counters

Item 20. Gamma Products G5000 Automatic Counters

This equipment is capable of accurately measuring 0.001 microcuries or less of activity.

### 10.3 Operating and Emergency Procedures

1. USAIRDC SOP 01, Radiation Protection Program for US Army Ionizing Radiation Dosimetry Center
2. USAIRDC SOP 02, Performing Wipe Tests on Radiation Sources at US Army Ionizing Radiation Dosimetry Center
3. USAIRDC SOP 03, Radiological Accidents, Incidents, or Fires
4. USAIRDC SOP 05, Standing Operating Procedures Californium-252 Facility
5. LBAD-R 40-7, Monitoring and Recording Occupational Exposure to Technical Radiation
6. LBAD-R 40-6, Medical Procedures for Radiation Casualties.
7. LBAD-R 385-1, Lexington-Blue Grass Army Depot Safety Program
8. LBAD-R 385-14, Radiological Safety Program
9. LBAD-R 420-8, Fire Prevention Control and Evacuation