

Bureau of Medicine and Surgery
7700 Arlington Blvd.
Falls Church, VA 22042

CH-1 of 12 Apr 2018
NAVMED P-5055 (FEB 2011)

Radiation Health Protection Manual

This edition includes CH-1 of 12 Apr 2018.

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Change Transmittal One
Radiation Health Protection Manual
U.S. Navy
NAVMED P-5055

12 Apr 2018

To: Holders of the Radiation Health Protection Manual

1. This Change. Updates articles 6-3.1, 6-3.9, and 6-10.1 through 6-10.3 that removes the DT-60 Navy battlefield dosimeter (BD) from authorized use and adds the new Navy IM-276 BD for fielding.

2. Action

a. Remove pages 6-3, 6-4, and 6-21 through 6-23 and replace with revised pages 6-3, 6-4, and 6-21 through 6-23.

b. Record this Change 1 in the Record of Page Changes.


C. FORREST FAISON III
Chief, Bureau of Medicine and Surgery

6-3. Dosimetric Devices

1. **Acceptable Dosimetric Devices.** The type of dosimetric device or devices used to measure personnel exposure must be specified by the commander, commanding officer, or officer in charge and approved by the Chief, BUMED. Unless other types of dosimetry are approved by Chief, BUMED, the dosimetry program must be based on dosimetry as described in this chapter, and its use must be under the cognizance of the radiation health and radiation safety officer or designated senior medical representative. Acceptable dosimetric devices include:

- a. Personnel dosimeters (PD) (DT-526/PD or DT-702/PD).
- b. Wrist badges (DT-526/PD or DT-702/PD or DXTRAD wrist dosimeter).
- c. DXTRAD finger ring dosimeter; single lithium fluoride (LiF) element.
- d. PD, IM Series/PD or electronic dosimeter (e.g., electronic personal dosimeters (EPD), Alcoa Mydose).
- e. Environmental and area monitoring dosimeters (DT-526/PD, DT-702/PD, or DT-702/PD TLD cards in a Neutron Area Monitor (NAM)).
- f. Accident dosimeters, DT-518/PD, DT-526/PD (end cap), DT-702/PD, and IM-270/PD.
- g. Battlefield dosimeters, IM-276/PD, IM-276A/PD, DT-236/PD, and IM-270/PD.

2. **PDs** are used to monitor DDE and SDE. The dosimetric devices listed in article 6-3, paragraphs 1a through 1c are known as primary PD. PDs provide very sensitive, accurate, and dependable indications of the dose equivalent to an individual. The PDs approved for use, and the facilities that process these TLDs, have been accredited by the NVLAP, as required by 10 CFR 20.1501. Specific instructions for wearing the DT-702/PD are given in article 6-5, paragraph 7.

3. **Wrist Badges and/or Finger Rings** are used to monitor dose equivalent to the extremities in special situations where a relatively high local exposure is expected (e.g., working with radio-nuclides that emit primarily energetic beta particles).

4. **PDs/Electronic Dosimeters.** Pocket and electronic dosimeters are self-indicating devices used to monitor exposure to gamma or x-ray radiation in situations where an immediate indication of the exposure is desirable. PDs are pencil shaped devices containing a small ionization chamber. These devices are susceptible to shock, moisture, and other environmental factors which may produce a false over-response. Consequently, they are used as secondary dosimetric devices and are worn in addition to the primary dosimetry device. An alternative to the PD is the electronic dosimeter, which is normally battery powered, has a digital display of integrated dose, and can be set to alarm at a preset dose or dose rate. Electronic dosimeters are also used as secondary dosimetric devices.

5. **Environmental and Area Monitoring Dosimeters.** Environmental and area monitoring dosimeters are used at the perimeter of radiation areas or in uncontrolled spaces used (in conjunction with occupancy factors) to verify doses to members of the general public and non-radiation workers are not in excess of the limits established in Chapter 4. They are not to be posted in known high radiation areas or any other restricted area. Specific program requirements are published in program radiological controls manuals.

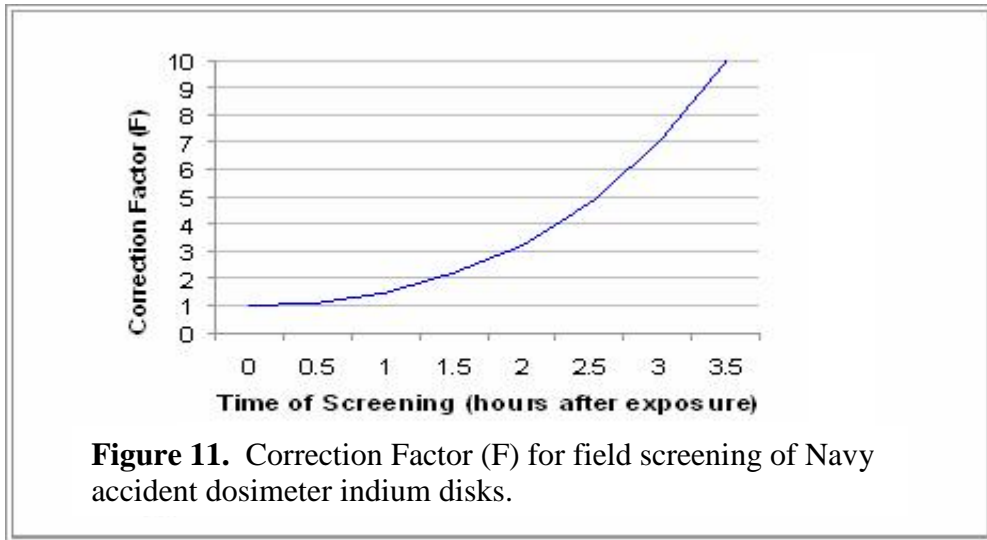
6. **Accident Dosimeters.** Accident dosimeters are used to monitor areas or personnel in situations where very high doses may occur as the result of an accident. These dosimeters are less accurate than personnel dosimeters but have a much higher range. These dosimeters may be worn by individuals in addition to personnel dosimeters or they may be posted in areas to facilitate dose reconstruction.

7. **Battlefield Dosimeters.** Battlefield dosimeters provide an estimate of personnel exposure to high levels of ionizing radiation that can be used to aid in medical triage of affected individuals. These dosimeters are less accurate than personnel dosimeters but have a much higher range.

8. **Special Purpose Dosimetry.** Special purpose dosimetry is used to measure the dose from unique or special sources, e.g., low energy x-rays, high energy protons, high energy heavy particles, very low or high intensity sources, etc., or to measure special radiation fields in unique or special settings, e.g., research and patient dosimetry. BUMED approval is required prior to use of special purpose dosimetry, or use of dosimetry in a manner other than prescribed in article 6.2. Requests for such approval shall be submitted to the BUMED Ionizing Radiation Branch, via NDC and include sufficient detail and procedures to clearly describe the special purpose being requested. Upon approval, guidance for use of appropriate special purpose dosimetry must be provided by NDC.

9. **Contact Information.** For further information or clarification, technical or administrative, concerning naval personnel dosimetry contact the NDC by telephone, letter, or e-mail:

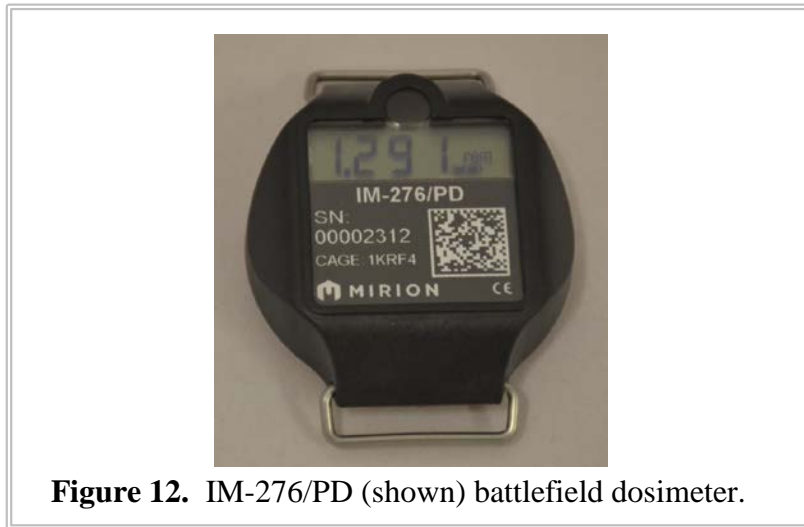
Telephone	Voice: (301) 295-0142 or (301) 295-5410 (DSN: 295) FAX: (301) 295-5981 (DSN: 295)
Mailing Address	Officer in Charge Naval Dosimetry Center 4975 North Palmer Road, Bldg. 84-T Bethesda, MD 20889-5629
Plain Language Address	NAVDOSCEN BETHESDA MD
E-mail	dod.bethesda.dod.mbx.navdoscen2@mail.mil
URL	http://www.med.navy.mil/sites/nmcphc/ndc



d. Finally, the accident dosimeter must be sent to the NDC for definitive evaluation.

6-10. Battlefield Dosimeters

1. *IM-276/PD & IM-276A/PD Battlefield Dosimeter (Figure 12).*



a. The IM-276/PD and IM-276A/PD battlefield dosimeters are the replacement for the IM-270/PD Personnel Accident Dosimeter.

b. The battlefield dosimeter is a real-time, self-indicating, gamma and neutron detecting device that requires no user intervention for operation. It uses both passive and active technologies and is designed to be worn on the wrist or the trunk of the body.

c. The IM-276/PD has a user-replaceable main battery with non-replaceable internal batteries giving the unit an approximate life expectancy of 10 years. The IM-276A/PD has a user-replaceable main battery and calibration laboratory-replaceable internal batteries.

d. The IM-276/PD and IM-276A/PD battlefield dosimeters have a radiological detection range of 1 mrem to 2000 rad deep gamma and a range of 150 mrem to 1000 rad deep neutron.

2. *DT-236 Marine Corps battlefield dosimeter (Figure 13).*

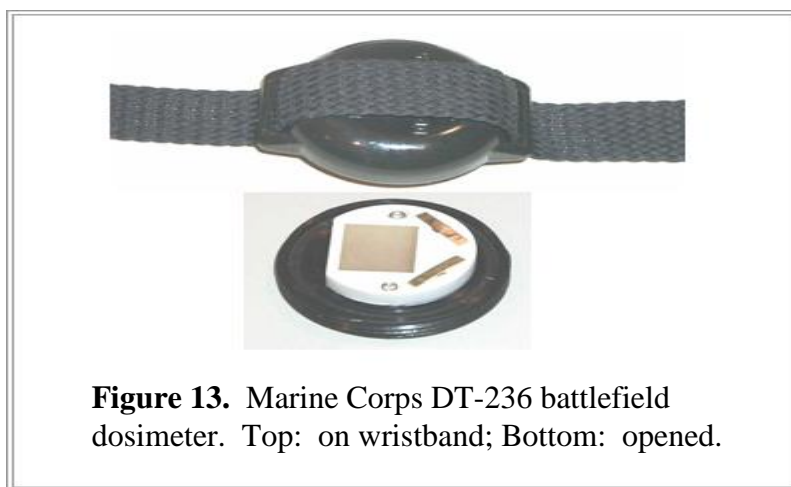


Figure 13. Marine Corps DT-236 battlefield dosimeter. Top: on wristband; Bottom: opened.

a. Designed to measure short duration, high intensity neutron, and prompt gamma radiation.

b. Uses a silicon junction diode to measure neutron radiation and a silver activated phosphate glass to measure gamma radiation.

c. The elements are encased in a tamper resistant locket worn on the wrist.

d. The DT-236 can be used over a wide temperature range (-32°C to $+52^{\circ}\text{C}$) and withstands all military environmental requirements e.g. shock, vibration, nuclear hardness and decontamination.

e. The DT-236 is read with the AN/PDR-75 RADIAC set powered by a 24 Volt DC source and uses a single digital readout to display the combined gamma and neutron dose ranging from 0 to 1000 rad. The reader takes non-destructive readings as often as desired. The lower limit of detection for these devices is 5 rad neutron and 5 rad gamma.

3. *IM-270/PD Personnel Accident Dosimeter (Figure 14).* The IM-270/PD dosimeter is a personnel accident dosimeter that uses metal oxide semiconductor field effect transistor technology. It is designed to detect x-rays and gamma rays. It has a dynamic range of 10-1000 rad in 1 rad increments which will initiate after an initial exposure of 10 rad. The IM-270/PD has a battery life expectancy of 10 years.



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