



Radioluminescent Devices

FACT SHEET 26-019-0418

About radioluminescent devices

Radioluminescence involves the use of a radioactive material that provides a long-term source of visible light which does not require any form of external or internal power such as a wall outlet or battery pack. Radioluminescent devices use a radioactive material which is mixed with a phosphorescent material painted on a surface or coated on the inside of a clear container.

Since the early 1900s, the availability of radioluminescent materials has attracted many manufacturers, producing many consumer products that glow in the dark for a wide range of applications. In addition, the military has developed equipment that takes advantage of radioluminescence to support their needs during missions.

Some examples of widely available radioluminescent consumer products are:

- Clock dials and wristwatches
- Navigational instruments such as compasses
- Torches
- Fishing floats
- Exit signs
- Dials and switches on boats and aircrafts



Radioluminous consumer products glowing in the dark. (Photos: APHC)

Some examples of military equipment that use radioluminescent devices are:

- Weapon sights on tanks and rifles
- Telescopes
- Collimators
- Lamps
- Fire control devices



A Soldier uses the ACOG weapon sight on an M-4 weapon. The inset shows the illumination due to the presence of tritium, which facilitates pointing the target in darkness. (Stock Photos)

Common radioactive sources in radioluminescent devices

Early radioluminescent dials and watches used a paint containing radium (Ra-226), which emits alpha particles and gamma rays and remains radioactive for thousands of years. Later, radium was gradually replaced with other radioactive materials, such as promethium (Pm-147) and tritium (H-3). These two materials produce little or no radiation exposure to the users of radioluminescent devices under normal conditions.



A commercially available clock with a radium-226 painted face. These pictures are under white light, and no light conditions, respectively. (Photos: APHC)

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Health risks associated with radioluminescent devices and how to protect yourself

The radioactive material used in radioluminescent devices is always emitting radiation. Radioluminescent devices are designed to be safe and usually contain a small amount of radioactive material that poses no adverse effects to externally exposed users. However, if the device is broken the release of radioactive material may pose serious adverse effects to consumers/Soldiers and the environment if it is not controlled. The radioactive material may become a danger if inhaled or ingested; therefore, individuals handling radioactive devices must do so carefully and follow the precautions described below.

- **Do not attempt to disassemble** the radioluminescent components embedded in your consumer product or military equipment.
- **Handle** any broken radioluminescent device with gloves, and **secure** the contaminated area. If you have a personal radioluminescent consumer product or personal item that is broken, **report** the incident to your state or local radiation control authorities. Report incidents for military equipment to your Radiation Safety Officer or safety office.
- **Keep** radioluminescent devices out of the hands of children.
- **Disposal** of any unused radioluminescent consumer product should be arranged with the manufacturer that produced the device (e.g., exit signs) or your state or local radiation control program. Disposal of military devices that have radioactive material must be coordinated with your Radiation Safety Officer. Refer to Department of the Army (DA PAM) 385-24, *The Army Radiation Safety Program*, for additional requirements on radioactive materials disposal within the Army.

Where can I find more information?

- Additional information regarding radium painting and radium radioluminescent devices can be found at: <https://www.ornl.gov/ptp/collection/radioluminescent/radioluminescentinfo.htm>
- Additional information regarding tritium radioluminescent devices can be found at: <https://www.osti.gov/scitech/biblio/89498>
- Additional information for military regarding the inventory of radioluminescent commodities, federal regulations, technical bulletin, technical manuals, radiation safety programs and other DOD publications: https://cecom.aep.army.mil/gstaff/DS_USER/RSO/default2.aspx
- Additional information regarding how to contact state or local radiation control program: <http://www.crcpd.org/mpage/Map>
- Additional information from EPA regarding radioluminescent antiques: <https://www3.epa.gov/radtown/subpage.html#?scene=Downtown&polaroid=Strip+Mall&sheet=4>