



Radioactive Lightning Arresters — Identification and Safety Precautions

June 04



Some countries where you may be deployed use lightning arresters that contain radioactive sources. These lightning arresters are typically mounted on the ground or mounted on top of buildings to protect structures from lightning strikes. They are able to protect structures by guiding the destructive energy from a lightning strike safely into the ground. When properly installed, these arresters pose no hazard to personnel. Arresters that have been dismantled or damaged may pose a risk of low-level exposure to ionizing radiation. You can greatly minimize exposure to ionizing radiation by following the basic radiation safety principles of **time** (limit the amount of time spent near a source); **distance** (move away from a known or suspected radioactive source); and **shielding** (use radiation shielding materials such as lead, heavy steel materials or concrete) when possible.

NOTE: The final sections of this fact sheet provide additional information for Radiation Safety Personnel, and to those assigned to Nuclear, Biological, and Chemical (NBC) units.

What are radioactive lightning arresters?

Radioactive lightning arresters are ground-mounted, vertical, 17 to 21 meter (57 – 69 foot) high poles, or 6-meter (20 foot) poles mounted vertically on top of buildings. They use a technology known as Early Streamer Emission (ESE) that employs a radioactive source on the top of the arrester to emit a stream of ions that attracts lightning strikes to the arrester. Lightning arresters look very similar to cellular phone relay towers or radio transmission towers (Figure 1). However, arresters are used only to attract lightning strikes, and do not transmit radio or cellular phone signals.

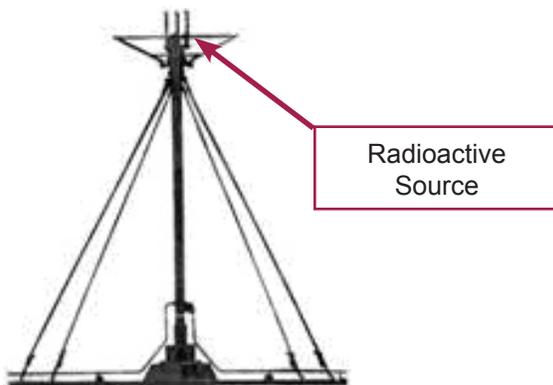


Figure 1. Lightning Arrester Containing Radioactive Material

Can I tell by sight if a lightning arrester contains radioactive material?

Maybe. Radioactive sources require proper warning labels regardless of the country in which they are used. Over the years, however, these markings may have become detached or hard to read (illegible). The primary hazard associated with the arresters is inadvertent exposure of personnel because appropriate radiation signs are not readily visible. When this occurs, the only means to identify a radioactive source and a potential exposure hazard is with the appropriate radiation monitors (e.g., RADIAC meter) either assigned to your unit or used by an NBC unit.

Is it safe to be in the vicinity of a lightning arrester?

Yes, if the lightning arresters are properly installed and used in their intended configuration.

Is it safe to be near lightning arresters that are not installed in their intended configuration, have fallen over, or have been damaged?

The potential for exposure to low levels of ionizing radiation does exist in the immediate vicinity of the lightning arresters if they have been damaged in any way. However, following proper radiation safety precautions (i.e., time, distance, and shielding) will greatly minimize potential exposure. Furthermore, if you were to be exposed at all, the radiation levels would most likely be within radiation safety standards for exposures allowed to members of the U.S. general public [100 millirem per year (100 mrem/year)].

How do I protect myself from radiation hazards associated with the radioactive sources found on lightning arresters?

First, minimize the time spent in and around the source or control area. Second, maximize the distance away from the sources as much as practical. Third, take maximum advantage of any shielding available. For instance, if you are able to utilize lead or heavy steel containers to shield the source, do so.

What should I do if I find radioactive sources from lightning arresters that have been removed, have become detached from lightning arresters or if intact radioactive lightning arresters are found out of their normal use configuration (i.e., fallen over)?

Do not panic. Do not touch or tamper with the radioactive source. Move out of the area. Notify your chain of command or unit NBC personnel.

What should I do if I have been exposed to a source that has been removed from a lightning arrester?

Report the incident, to include a list of any other personnel potentially exposed, to your chain-of-command or unit NBC personnel. Your chain-of-command will determine if

you require medical evaluation due to your finding of this radioactive source. You may wish to note this incident on your Post-Deployment Health Questionnaire that you will fill out upon return to CONUS from deployment.

Where can I get more information?

USACHPPM Technical Guide (TG) 244, *The Medical NBC Battlebook.*

USACHPPM TG 236, *Basic Radiological Dose Estimation: A Field Guide.*

<http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG236A.pdf>

Defense Intelligence Agency, Defense Intelligence Report DI-1881-2-01, *Identification of Ionizing Radiation Sources in a Peacetime Environment.*

Information for Unit NBC or Radiation Safety Personnel

Will my RADIAC meter alert me if radioactive material is present?

Yes. The radioisotopes used in lightning arresters are cobalt-60 (Co-60) and europium-152 (Eu-152). Both emit gamma rays (high energy radiation similar to x-rays). Your RADIAC meter equipped with the appropriate probe will alert you to the presence of radiation from these sources.

What RADIAC meter probes are recommended?

For the AN/VDR-2 (Figure 3), the choice is easy – use the beta/gamma probe (DT 616) with the end window closed. If you have the AN/PDR-77 (Figure 4), use the beta/gamma probe (DT 616) with the end window closed or the x ray probe (DT 674). If you have the AN/PDR-77 Radiation Protection Officer (RPO) Kit, then you may use the pancake probe (DT 695) or the micro-R probe (DT-696).



Figure 3. AN/VDR-2 RADIAC Set



Figure 4. AN/PDR 77 RADIAC Set

What procedures should be followed if a damaged or fallen lightning arrester with a radioactive source is found?

Once the source is identified, personnel trained in radiation safety wearing assigned personnel radiation monitors (dosimeters) and personal protective equipment (PPE) should establish control areas to limit access to the sources. A control line should be established at a distance from the source where radiation exposure rates are less than or equal to 2 millirad/hour (2 mrad/hr) or 0.02 milligray/hour (0.02 mGy/hr). Unshielded, or damaged lightning arresters equipped with a Eu-152 source have the potential to yield an exposure rate of 232 mrad/hr (2.32 mGy/hr) at one meter. In this unlikely worst-case exposure scenario, a control line would be required to be established 11 meters from the source. If the sources are found to have intact shielding, the control line likely will be nearer to the source. Only authorized personnel should be allowed past the control line.

What should be done with the radioactive sources from damaged or fallen lightning arresters or with radioactive sources that have been removed from lightning arresters?

After control areas have been established, the radioactive source should be removed from the area by properly trained personnel wearing appropriate PPE and radiation dosimeters. The sources should be secured in a consolidated radioactive source storage facility, and the storage facility posted with the appropriate radiation warning signs.