

# GAO@100 Highlights

Highlights of [GAO-22-104113](#), a report to congressional committees

## Why GAO Did This Study

Radioactive material, which is dangerous if mishandled, is found in many medical and industrial applications. In the hands of terrorists, it could be used to construct a radiological dispersal device, or dirty bomb, that uses conventional explosives to disperse the material. Replacing technologies that use dangerous radioactive materials with safer alternatives may help protect people and reduce potential socioeconomic costs from remediation and evacuation of affected residents.

Senate Report 116-102 included a provision for GAO to review alternative technologies to applications that use radioactive materials. This report examines (1) the potential for adopting alternative technologies in the United States for the six most commonly used medical and industrial applications; (2) factors affecting adoption of alternative technologies; and (3) federal activities relating to alternative technologies in the United States. GAO reviewed relevant documents to identify potential alternative technologies, conducted interviews with users of applications that employ radioactive material to identify factors affecting adoption of alternatives, and interviewed federal officials to discuss current federal activities relating to alternative technologies.

## What GAO Recommends

Congress should consider directing an entity to develop a national strategy to support alternative technologies. The federal agencies involved in research and adoption of alternative technologies neither agreed nor disagreed with our matters for congressional consideration.

View [GAO-22-104113](#). For more information, contact Allison Bawden at (202) 512-3841 or [bawdena@gao.gov](mailto:bawdena@gao.gov).

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## ALTERNATIVES TO RADIOACTIVE MATERIALS

### A National Strategy to Support Alternative Technologies May Reduce Risks of a Dirty Bomb

## What GAO Found

GAO examined six common medical and industrial applications that use high-risk radioactive materials—identified through agency and expert reports—and found that three applications already have technically viable alternative technologies in many circumstances and for which there is market acceptance. For example, x-ray provides a technically viable alternative to replace cesium-137 blood irradiators, one of the common applications. Another of the applications has a technically viable alternative, though only in certain limited circumstances, and the two remaining applications do not yet have viable alternatives. For example, alternatives to replace americium-241 used in oil and gas well logging equipment, another common application, are still under development.

#### Irradiator with Radioactive Material (left) and Alternative Technology (right)



Sources: Brookhaven National Lab and Rad Source Technologies Inc. | GAO-22-104113

Users of applications that employ high-risk radioactive materials identified six factors they take into account when determining whether to adopt alternative technologies: technical viability of alternatives, device cost, costs to convert (such as facility renovations), disposal of radioactive materials, regulatory requirements, and liability and other potential costs associated with possessing high-risk radioactive materials. An accident at the University of Washington in May 2019 shows that liability and other potential costs would likely range from millions to billions of dollars if radioactive materials were accidentally released or used in a dirty bomb. These largely uninsured socioeconomic costs are an implicit fiscal exposure for the federal government, which could be expected to provide financial assistance.

Several federal agencies and interagency entities support research and promote adoption of alternative technologies. For example, the National Nuclear Security Administration (NNSA) has removed 355 irradiators since 2004 and subsidized the replacement of some with x-ray technology. Congress also established the goal for the NNSA to eliminate the use of cesium-137 blood irradiators in the United States by 2027. At the same time, the Nuclear Regulatory Commission licenses radioactive materials for irradiators, consistent with its mission. Currently, no strategy exists to guide federal efforts to find alternatives and reduce risk. A strategy to support alternative technologies would ensure a cohesive federal approach and potentially reduce the implicit fiscal exposure associated with addressing socioeconomic damage from a dirty bomb.