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The risks of a dirty bomb attack are increasing and the consequences could be devastating. GAO reported in 2019 that a dirty bomb using radioactive materials could trigger mass evacuations and have socioeconomic costs of billions of dollars. For example, an accident at a hospital in 2019 involving a small quantity of radioactive materials resulted in clean-up and other costs of \$150 million for that building alone. Many GAO recommendations to reduce the risks of these materials have not yet been implemented.

## GAO U.S. Government Accountability Office Radiological Security SNAPSHOT

# Security of Radioactive Materials

### Security Threats

**Numerous incidents indicate weaknesses in controls over radioactive materials that could be used in a dirty bomb.** Recent security threats have raised concerns that radioactive materials could be stolen and used in a domestic attack. For example, in April 2019, a technician was arrested after stealing three radioactive devices from his workplace in Arizona. According to a court filing, the technician intended to release the radioactive materials at a shopping mall, but local police and the FBI arrested him before he could do so.

From 2010 through 2019, the Nuclear Regulatory Commission (NRC) reported over 2,000 nuclear materials events, which included instances of lost or stolen radioactive materials, radiation overexposures, leaks of radioactive materials, and other events. Furthermore, officials from the National Nuclear Security Administration (NNSA), which provides enhanced security to facilities with high-risk radioactive materials, told GAO that there is increasing interest among adversaries in using radioactive materials for making a dirty bomb.

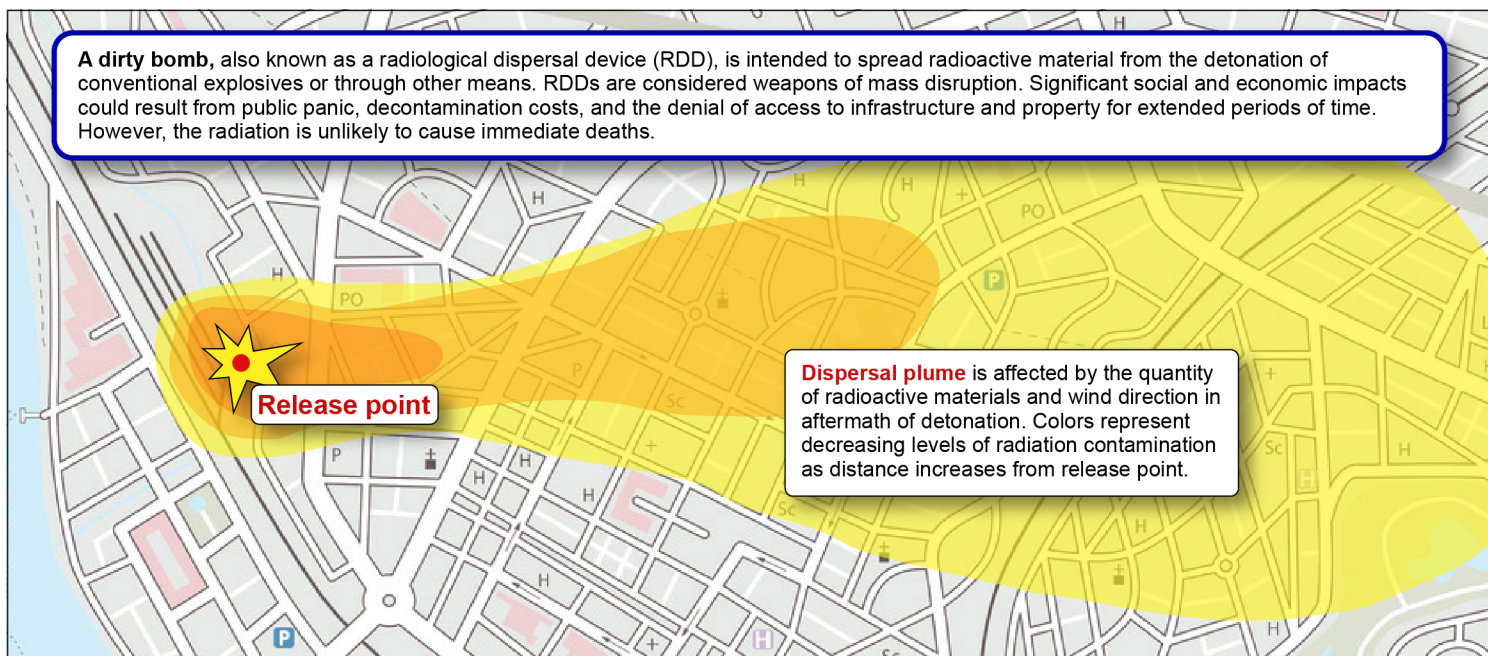
Vulnerabilities arise because NRC's security requirements do not take into account the most devastating potential effects, including billions of dollars in cleanup costs, and deaths and injuries from chaotic evacuations. In addition, weaknesses in licensing make it relatively easy for bad actors to obtain small quantities of high-risk radioactive materials, which could be dangerous in the wrong hands. Given the risks associated with these materials, which are in widespread use, it may be time to consider greater reliance on alternatives, when feasible. Previously, GAO has recommended that Congress consider this matter.

**Federal response to material security.** NRC, NNSA, the Department of Homeland Security (DHS), and others play a role in radioactive material security.

Agencies have implemented several GAO recommendations for improving radioactive material security. For example, DHS strengthened the vetting for imports of radioactive materials. However, as of April 2022, NRC has not yet implemented a number of key recommendations to address vulnerabilities that GAO has identified.

### Potential Dispersal of Radioactive Materials from a Dirty Bomb

A **dirty bomb**, also known as a radiological dispersal device (RDD), is intended to spread radioactive material from the detonation of conventional explosives or through other means. RDDs are considered weapons of mass disruption. Significant social and economic impacts could result from public panic, decontamination costs, and the denial of access to infrastructure and property for extended periods of time. However, the radiation is unlikely to cause immediate deaths.



**Dispersal plume** is affected by the quantity of radioactive materials and wind direction in aftermath of detonation. Colors represent decreasing levels of radiation contamination as distance increases from release point.

Sources: GAO analysis of Nuclear Regulatory Commission and U.S. Department of Homeland Security data; VectorStock® (map). | GAO-22-105498

GAO identified three broad categories of risks and recommendations  
for improving security for radioactive materials

Vulnerabilities to theft

Risks

- **Potential security weaknesses.** GAO has repeatedly found potential security weaknesses at medical and industrial locations storing such materials in the U.S. For example, in 2014, GAO reported that an individual had been given unescorted access to high-risk radioactive materials, even though he had two convictions for terroristic threat. Furthermore, small quantities of radioactive materials located within the same facility are not subject to enhanced security requirements that the total amount would be required to meet. [GAO-14-293](#), [GAO-12-925](#)

Recommendations

- **Better secure co-located radioactive materials.** NRC should require licensees that have multiple small quantities of radioactive materials at a single facility to provide enhanced security measures commensurate with the total amount of materials, as recommended in [GAO-19-468](#).

Weakness in licensing controls for radioactive materials

Risks

- **Weak licensing controls for radioactive materials.** NRC controls the flow of radioactive materials domestically through a licensing process. DHS, on the other hand, controls the flow internationally through a license verification process. In 2016, we reported that GAO created a fake company to obtain a license for radioactive materials. GAO altered the license and used it to obtain commitments to acquire a dangerous quantity of material. In 2018, GAO reported that agency officials at U.S. airports had not verified the legitimacy of all licenses for imported radioactive materials. [GAO-16-330](#), [GAO-18-214](#)

Recommendations

- **Track all high-risk radioactive materials.** NRC should require tracking of all quantities of high-risk radioactive materials in the U.S., as recommended in [GAO-16-330](#).
- **Conduct on-site security reviews.** NRC should consider requiring an on-site security review for all unknown applicants for licenses for small quantities of high-risk radioactive materials to verify that each applicant is prepared to implement the required security measures before taking possession of licensed radioactive materials, as recommended in [GAO-16-330](#).

Potential for significant consequences from dispersal of small amounts of radioactive materials

Risks

- **Failure to consider key consequences of a dirty bomb.** Although NRC has implemented security requirements for large quantities of radioactive materials, it has not done so for small quantities of high-risk radioactive materials that can have significant socioeconomic consequences, even if they do not cause immediate deaths from radiation exposure. However, NRC considers only immediate deaths and health effects from radiation exposure as the criteria for determining what quantities of radioactive materials require enhanced security measures. Ultimately, greater use of technologies that do not rely on these materials could reduce the risk of a dirty bomb, where such alternative technologies are available and effective. [GAO-19-468](#), [GAO-22-104113](#)

Recommendations

- **Consider the most significant effects of dirty bombs.** NRC should consider socioeconomic consequences and deaths from evacuations when determining what security measures should be required for high-risk radioactive materials, as recommended in [GAO-19-468](#).
- **Increase security for small quantities of high-risk materials.** NRC should require additional security measures for certain small quantities of high-risk radioactive materials, as recommended in [GAO-19-468](#).
- **Develop a strategy for greater use of alternative technologies.** Congress should consider establishing a national strategy for replacing technologies that use high-risk radioactive materials where there are viable alternatives, as recommended in [GAO-22-104113](#).

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