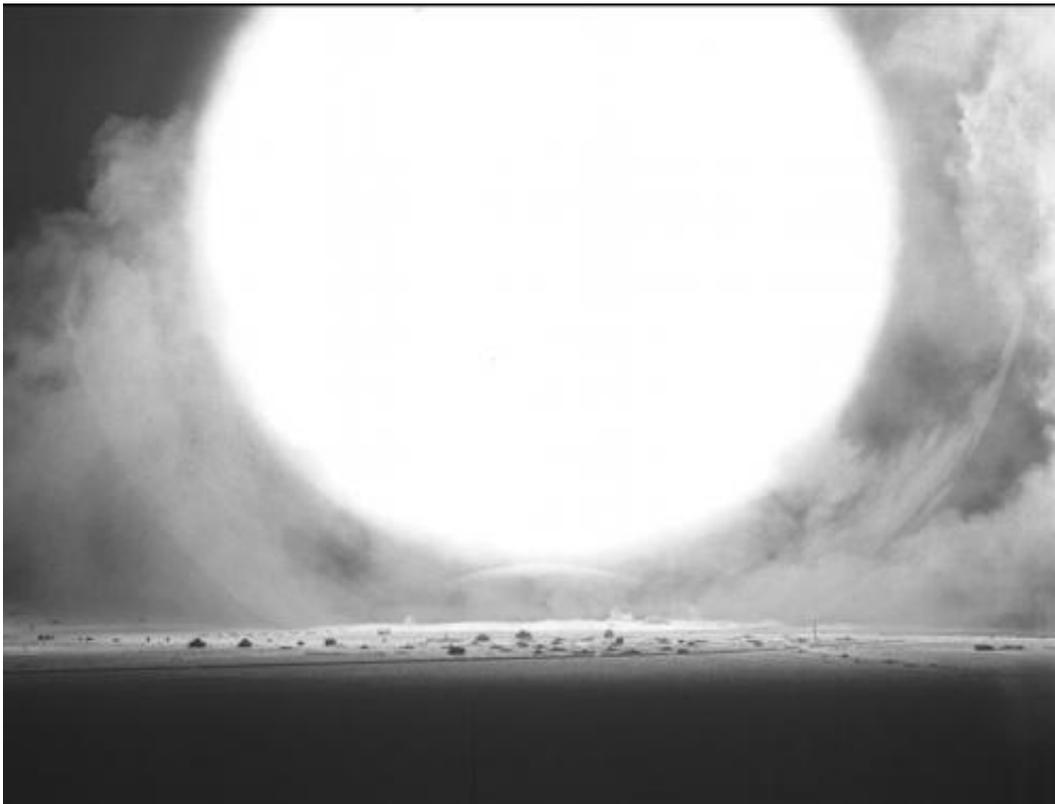


# Mathematician drafts urban nuclear shelter guide

January 15 2014

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Credit: © Original image courtesy of US Defense Threat Reduction Agency and was scanned and restored by Peter Kuran

A scientist published a guide Wednesday to help authorities limit deaths from fallout after a city is hit by a nuclear bomb.

Taking cover in existing buildings is widely accepted as a critical first

action after a nuclear blast in a major city.

But how long people should stay there before moving to better shelter is a more complex question.

Buildings that are lightweight or lack a basement are more easily penetrated by radioactive dust.

Writing in a British scientific journal, Michael Dillon of the Lawrence Livermore National Laboratory in California, has now come up with a mathematical model for the "optimal shelter exit time" to minimise radiation risk.

Based on his calculations, if adequate shelter is 15 minutes away, individuals should remain in their initial, poor-quality shelter no longer than 30 minutes after detonation.

If, however, the better shelter is only five minutes away, individuals should move there immediately and forego the closer but unsafe buildings altogether, he wrote.

Reaching adequate shelter rapidly could save between 10,000 and 100,000 individuals from fatal exposure in the event of a single, low-yield detonation, said the study published in *Proceedings of the Royal Society A*.

"These methods are intended to assist emergency planning officials in the development of an optimal low-yield [nuclear detonation](#) response strategy," wrote Dillon.

A low-yield blast is described as 0.1-10 kilotons.

One kiloton (kT) is an explosive force equivalent to that of 1,000 metric

tons of TNT. The US bomb that killed more than 200,000 people in Hiroshima, Japan, in 1945 was about 15 kT.

More than a fifth of American households lack basements or are considered too lightweight to offer shelter in the fallout phase of the emergency, the study said.

**More information:** Determining Optimal Fallout Shelter Times Following a Nuclear Detonation, [rspa.royalsocietypublishing.or ...  
.1098/rspa.2013.0693](https://rspa.royalsocietypublishing.org/doi/10.1098/rspa.2013.0693)

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Citation: Mathematician drafts urban nuclear shelter guide (2014, January 15) retrieved 26 April 2024 from <https://phys.org/news/2014-01-mathematician-urban-nuclear.html>

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