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SHELTER-IN-PLACE AS AN EFFECTIVE MEANS OF CIVIL PROTECTION

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ABSTRACT

Statistically, the vast majority of dangerous impact events will be atmospheric airbursts, not surface cratering events. The primary damage mechanism from airbursts (for example the 1908 Tunguska event and the 2013 Chelyabinsk event) is the air blast. The Tunguska explosion took place over a sparsely-populated Siberian taiga, and the blast wave flattened the forest over an area spanning 2000 square kilometers. The Chelyabinsk explosion was much smaller, and blew out windows throughout a large Russian metropolitan area.

Nearly 1500 people were injured by the Chelyabinsk explosion, the majority by flying glass from blown-in windows. Many people had been drawn to the windows by the bright flash and unusual trail in the sky, only to be standing in the worst-possible place when the blast wave arrived after a couple minutes. According to reports, one schoolteacher--who had been trained to execute the "duck and cover" as a civil defense measure in response to a bright flash in the sky--ordered her 4th-grade students to get under their desks. She remained standing and suffered a serious cut from flying glass, but none of her 44 students was injured.

In the 1950s and 1960s, atmospheric tests were conducted at the Nevada Test Site to determine the effects of nuclear weapons. The knowledge gained from these tests is instrumental for developing asteroid risk assessments and informing our tabletop and threat exercises. According to those effects studies, combined with modern hydrocode simulations, the area that experiences light damage (broken glass) is much greater than the area of complete devastation. For an unexpected short-

warning airburst or impact, many more injuries could be prevented, and lives saved, by executing the established national procedures for sheltering in place.

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