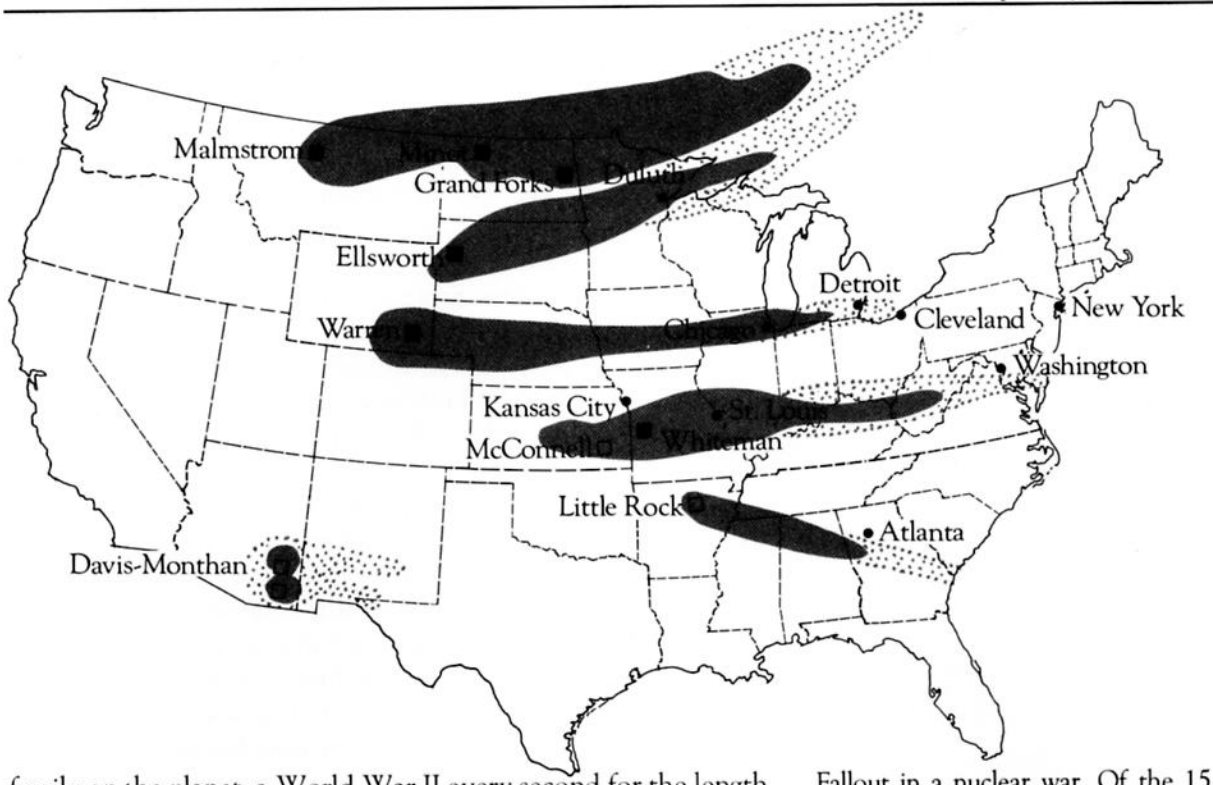

Fallout in a nuclear war. Of the 15,000 targets in a full nuclear exchange, these Titan and Minuteman intercontinental ballistic missile sites in the American Midwest are likely targets for surface bursts by a pair of one-megaton thermonuclear weapons. The energy released by these two explosions alone would equal all the destruction caused all over the world by all the aircraft in World War II. The cloud of radioactive debris would be blown by prevailing winds towards the East Coast of the United States, the same path followed by the Mount St. Helens volcanic debris after its eruptions in 1980. The outer contour curve shows the area within which casualties would exceed 50 percent from radioactive fallout alone. Comparable horrors would be visited on the Soviet Union by two one-megaton bursts on, say, the Western Ukraine. Courtesy *Scientific American*. From *Limited Nuclear War* by Sidney D. Drell and Frank Von Hippel. Copyright © 1976 by Scientific American. All rights reserved.

family on the planet, a World War II every second for the length of a lazy afternoon.

The immediate causes of death from nuclear attack are the blast wave, which can flatten heavily reinforced buildings many kilometers away, the firestorm, the gamma rays and the neutrons, which effectively fry the insides of passersby. A school girl who survived the American nuclear attack on Hiroshima, the event that ended the Second World War, wrote this first-hand account:

> Through a darkness like the bottom of hell, I could hear the voices of the other students calling for their mothers. And at the base of the bridge, inside a big cistern that had been dug out there, was a mother weeping, holding above her head a naked baby that was burned bright red all over its body. And another mother was crying and sobbing as she gave her burned breast to her baby. In the cistern the students stood with only their heads above the water, and their two hands, which they clasped as they imploringly cried and screamed, calling for their parents. But every single person who passed was wounded, all of them, and there was no one, there was no one to turn to for help. And the singed hair on the heads of the people was frizzled and whitish and covered with dust. They did not appear to be human, not creatures of this world.

The Hiroshima explosion, unlike the subsequent Nagasaki explosion, was an air burst high above the surface, so the fallout was insignificant. But on March 1, 1954, a thermonuclear weapons test at Bikini in the Marshall Islands detonated at higher yield