**Atomic Bomb**

ATOMIC BOMB [atomic bomb] or A-bomb, weapon deriving its explosive force from the release of atomic energy through the fission (splitting) of heavy nuclei (see nuclear energy ). The first atomic bomb was produced at the Los Alamos, N.Mex., laboratory and successfully tested on July 16, 1945. This was the culmination of a large U.S. army program that was part of the Manhattan Project , led by Dr. Robert Oppenheimer . It began in 1940, two years after the German scientists Otto Hahn and Fritz Strassman discovered nuclear fission. On Aug. 6, 1945, an atomic bomb was dropped on Hiroshima with an estimated equivalent explosive force of 12,500 tons of TNT, followed three days later by a second, more powerful, bomb on Nagasaki . Both bombs caused widespread death, injury, and destruction, and there is still considerable debate about the need to have used them.

Atomic bombs were subsequently developed by the USSR (1949; now Russia), Great Britain (1952), France (1960), and China (1964). A number of other nations, particularly India, Pakistan, Israel, and North Korea now have atomic bombs or the capability to produce them readily; South Africa formerly possessed a small arsenal. The three smaller Soviet successor states that inherited nuclear arsenals (Ukraine, Kazakhstan, and Belarus) relinquished all nuclear warheads, which have been removed to Russia.

Atomic bombs have been designed by students, but their actual construction is a complex industrial process. Practical fissionable nuclei for atomic bombs are the isotopes uranium-235 and plutonium-239, which are capable of undergoing chain reaction . If the mass of the fissionable material exceeds the critical mass (a few pounds), the chain reaction multiplies rapidly into an uncontrollable release of energy. An atomic bomb is detonated by bringing together very rapidly (e.g., by means of a chemical explosive) two subcritical masses of fissionable material, the combined mass exceeding the critical mass. An atomic bomb explosion produces, in addition to the shock wave accompanying any explosion, intense neutron and gamma radiation, both of which are very damaging to living tissue. The neighborhood of the explosion becomes contaminated with radioactive fission products. Some radioactive products are borne into the upper atmosphere as dust or gas and may subsequently be deposited partially decayed as radioactive fallout far from the site of the explosion.