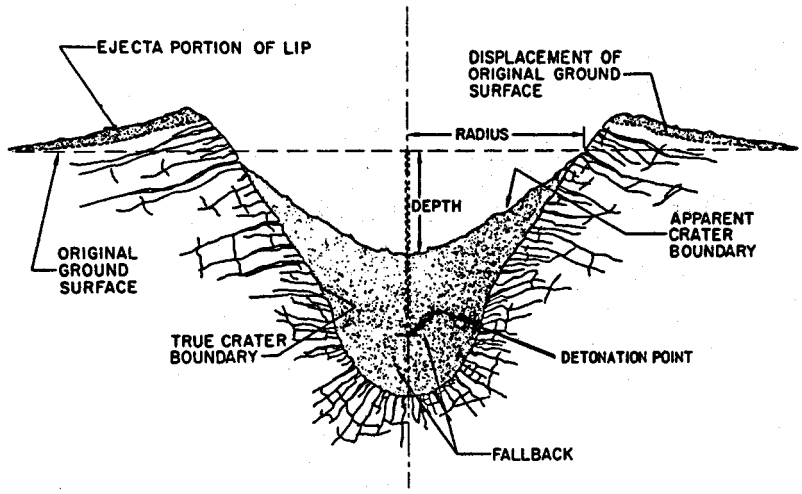

Figure 1. A typical nuclear crater.

In crater formation from a nuclear explosive detonated at the optimum depth, the shock wave and pressure initially fracture the overlying rock and set it in motion, as illustrated in A of Figure 3. The rapidly expanding cavity pushes against this rock and bulges the ground surface upward. In C and D, as the cavity continues to expand, cracks and fissures open through the surface allowing escape of the high-pressure gas. In D about half of the material originally above the explosion is thrown out to the crater sides. The remainder does not reach a high enough velocity to clear the crater and falls back into the cavity.

The series of photographs shown in Figure 3 record the 100-kiloton SEDAN explosion at 635 feet below ground. As shown, the desert bulged up 290 feet before the explosion broke out. Some 12 million tons of rock and earth was flung up by the explosion, and over 8 million tons fell outside the crater. When the rock and dust had settled, a crater 1,200 feet across and 320 feet deep remained. This was the largest excavation ever produced by a single man-made explosion.

Our experience with nuclear cratering has been limited. A large number of physical processes take place concurrently and successively in a nuclear excavation explosion, and these processes proceed almost instantaneously. Therefore measurements are very difficult; there is little wonder that nuclear cratering has not yet advanced to the state