

Scientific Uses of Plowshare

It would be very strange if the remarkable event of a nuclear explosion did not produce results of direct scientific interest. Actually, such results have already been produced in a more or less incidental manner. Our plans on Plowshare include as a most important point the full scientific exploitation of nuclear detonations.

The energy released in nuclear explosions is of the same order as energies released in earthquakes. This fact has considerable importance for seismology. Comparison of signals from nuclear explosions with signals from earthquakes has made it possible to obtain a realistic value for the energies released in earthquakes.*

Another characteristic of nuclear explosions is that the time and location of the event is exactly defined, while the time and location of an earthquake is diffuse. As a result, times of travel of earthquake waves can be much more accurately determined from nuclear explosions than from natural events. Furthermore, nuclear explosions can be detonated near positions at which no natural earthquakes occur and in this way new paths of elastic waves can be explored.

An interesting example is the Gnome event of 1961. It has been observed that on a circle of a thousand miles drawn around the position of the event the intensities of the first waves differed by as much as a factor of 150.** Much higher intensities were observed toward the east than toward the west. The time of arrival was likewise unexpected in that a few percent higher velocities

*Romney, Carl, J. Geophys. Research. October 1959.

**Romney, Carl et al., Travel Times and Amplitudes of Principal Body Phases Recorded from Gnome. Ball. Seis. Soc. Am. 52, p. 1057.