

Characterization of the world's first nuclear explosion, the Trinity Test, as a source of public radiation exposure.

Widner, T.E. and S.M. Flack.

Abstract—The world's first atomic bomb was tested in New Mexico on 16 July 1945. From 1999 through 2008, scientists working for the Centers for Disease Control and Prevention gathered information relevant to past releases from Los Alamos activities, including the Trinity test. Detonation on a 30.5 m tower enhanced radioactive fallout, and terrain and wind patterns caused “hot spots” of deposition. Several ranchers reported that fallout resembling flour was visible for 4 to 5 d after the blast, and residents living as close as 19 km from ground zero collected rain water from metal roofs for drinking. Pressures to maintain secrecy and avoid legal claims led to decisions that would not likely have been made in later tests. Residents were not warned before the test or informed afterward about potential protective actions, and no evacuations were conducted. Occupied homes were overlooked on the day of the blast. Exposure rates in residential areas were recorded as high as $1.4 \mu\text{C kg}^{-1} \text{s}^{-1}$ (20 R h^{-1}) using instruments that were crude, ill suited to field use, and incapable of effectively measuring alpha contamination from about 4.8 kg of unfissioned plutonium that was dispersed. Vehicle shielding and contamination were recognized but not corrected for. To date, the post-shot field team measurements have not been rigorously evaluated, cross-checked, adjusted, or subjected to uncertainty analysis. Evaluations of Trinity fallout published to date have not addressed internal doses to members of the public following intakes of contaminated air, water, or foods. The closing of these data gaps appears feasible with the information that has been assembled and would support placement of the Trinity event in perspective as a source of public radiation exposure and more defensible evaluation of the potential for human health effects.

Key words: atomic bomb; contamination, environmental; environmental impact; fallout