



# Atmospheric Tests at the Nevada Test Site

## Introduction

Five of the first six nuclear tests conducted by the United States occurred in the far reaches of the Pacific Ocean. Almost immediately, scientists and military planners discovered that logistics, weather, security and safety concerns required the need for a continental test site. The effort of transporting, supplying and housing a nuclear test task force in the middle of the Pacific was more than originally anticipated. In addition to the communist insurgency in Korea, the need for a continental proving ground was evident. The Armed Forces Special Weapons Project conducted a top-secret feasibility study, code named Nutmeg, to identify the best location for a test site. The study concluded that arid southwest of the United States was the ideal location. In December, 1950, the Nevada Proving Grounds was established. Thirty one days later, the first atmospheric test was conducted in Nevada.



*Climax crates a fireball at the Nevada Test Site in 1953.  
Climax was an airdrop, weapons-related test.*

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## Atmospheric Testing at the Nevada Test Site

Operation Ranger was the first atmospheric nuclear weapons test series conducted by the Atomic Energy Commission at the Nevada Test Site. This 1951 series consisted of five nuclear tests, all of which were airdrops detonated at heights of about 1,000-1,400 feet.

Operation Upshot-Knothole was unique in that the first test, Annie, was conducted for the Federal Civil Defense Administration (FCDA) in 1953. In preparation for the test, the FCDA constructed "a typical American community" complete with houses, utility stations, automobiles, furniture, appliances, food, and even mannequins simulating the people who might live in the town. It was witnessed by more than 600 Civil Defense observers and

media. Grable, also part of the 1953 Upshot-Knothole series, was significant in that it was the only test fired from a military cannon.

Operation Teapot, in early 1955, had two primary objectives: to establish military doctrine and tactics for the use of ground forces on a nuclear battlefield; and to improve the nuclear weapons used for strategic bomber delivery and missile delivery and those used for tactical battlefield situations.

Operation Plumbbob in 1957, included five safety experiments, conducted to ensure that no nuclear reaction would occur if the high explosive components of the device were accidentally detonated during storage or transport.

Operation Hardtack II, conducted in 1958, was the last nuclear test series before the United States adopted a nuclear test moratorium, which had originally been intended to last one year but continued until 1961. The nuclear weapons tests were conducted to evaluate the yield and efficiency of newly developed nuclear devices. The United States resumed nuclear weapons testing on September 15, 1961. The last atmospheric test conducted at the Nevada Test Site was Little Feller I on July 17, 1962.



A total of 100 atmospheric tests were conducted at the Nevada Test Site. These tests were conducted to provide information on weapons effects, effects of the height of burst on overpressure, and information on nuclear phenomena to improve the design of nuclear weapons. Atmospheric testing ceased for good in 1963, after which nuclear testing moved underground.

## Pacific Testing

After the atomic bomb attacks on Japan abruptly ended World War II, postwar atmospheric testing took place in the southern Pacific Ocean.

Operations Crossroads and Sandstone were designed to produce information not available from the Trinity test. Their primary purposes were scientific data collection and to determine the effects of atomic bombs on naval vessels positioned in the Pacific Ocean.

Pacific testing offered ample protected anchorage for both a target fleet and support ships, but as a test site, it held two drawbacks: the distance from the continental United States made extraordinary logistical demands; and the humid climate created numerous problems for sophisticated electronic and photographic equipment.

While the test site was established as the continental site, larger yield atmospheric tests continued to be tested in the Pacific. There were a total of 106 atmospheric tests in the Pacific. Notably, Operation Greenhouse was significant to the development of nuclear weapons for defense, more specifically, the use of thermonuclear weapons. Although Operation Greenhouse did not test thermonuclear devices, two of the tests in the series involved thermonuclear experiments. One test, George, was an important step toward thermonuclear development by demonstrating the initiation of a sustained thermonuclear reaction by use of a fission reaction. This led directly to the first successful thermonuclear test, Mike (Operation Ivy) in the South Pacific 16 months later. In addition, Item, the fourth test of the series, involved boosting the efficiency of fission explosions.

Prior to 1955, most nuclear weapons had been tested in the atmosphere, on the surface of the earth or water, or at shallow underwater depths. The Navy expressed interest in investigating deep underwater effects by detonating a weapon at sufficient depth to contain all the initial energy of the nuclear explosion in the water. On May 14, 1955 Wigwam was conducted in the Pacific Ocean approximately 500 miles southwest of San Diego, California. The device was detonated at a depth of 2,000 feet in water 16,000 feet deep. Results showed that most of the radioactivity from Wigwam was confined deep under the surface of the water.

Additional weapons effects tests, named Operation Argus, occurred in the South Atlantic in 1958.

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