



Photograph by Fabian Bac brach.

Marshall Hallum

Marshall G. Holloway

1912-1991

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Submitted By The Nae Home Secretary

MARSHALL G. HOLLOWAY, pioneer in nuclear weapon development, died in Winterhaven, Florida, on June 18, 1991, after a lengthy illness. He was seventy-eight years old. His career included academic research at Cornell University, research and program management at the Los Alamos Scientific Laboratory (LASL), and senior management positions in industrial laboratories. He was elected to membership in the National Academy of Engineering in April 1967.

Marshall was born in Oklahoma, but his family moved to Florida a few years later, so Marshall's schooling through college was in Florida. He earned his bachelor's degree from the University of Florida in 1933 and a master's degree in physics two years later. He was then accepted into graduate school at Cornell University and received his Ph.D. in physics in 1938. He remained there as a research associate until 1942, when he was selected to head up a secret project using the cyclotron in the physics department at Purdue University.

The Purdue assignment was the measurement of the cross-section of tritons colliding with deuterons and fusing to form helium—vital data for the study of the feasibility of thermonuclear energy production and thermonuclear explosives. The work was funded by the Manhattan District of the U.S. Army Corps of Engineers and was completed in the early fall of 1943.

The Purdue team was invited to join the Manhattan District

laboratory known then as Site Y (somewhere in New Mexico) and later known as the Los Alamos Scientific (now Los Alamos National) Laboratory. Marshall and his colleagues became part of the group that designed and built the "Water Boiler," a miniature nuclear water boiler fueled with U-235, uranium of atomic weight 235, which had been separated from the much more abundant 238 isotope at Oak Ridge. A few hundred grams of this enriched uranium in an aqueous solution achieved a "critical mass" or self-sustaining nuclear reaction and provided experimental data to supplement the theoretical calculation concerning such phenomena. The Water Boiler "went critical" in May 1944 and contained essentially the entire world supply of enriched uranium at that time, although the pipeline was filling up rapidly.

During the remainder of 1944, Marshall was involved in a series of experiments to measure the critical mass of various combinations of enriched uranium and reflector materials and, later, similar measurements with plutonium. This work led him into the design of the nuclear components and the loading techniques of the "Fat Man," the implosion system tested at Trinity Site in July 1945 and dropped on Nagasaki in early August.

In the spring and summer of 1946, the U.S. Navy sponsored an elaborate nuclear bomb effects test, Operation Crossroads, at the Bikini Atoll. An array of ships, submarines, and other armaments was subjected to an air drop and an underwater explosion of the "Fat Man" device. LASL was responsible for providing and preparing the explosives and for providing or specifying much of the nuclear effects instrumentation. Marshall was designated as the LASL field representative and was deputy scientific director of the operation.

During the next several years, Marshall was in charge of the division responsible for implementing and testing improvements in nuclear weapons design, developing stockpiling procedures, and training nuclear military officers. During this period, nuclear testing of experimental devices was initiated at the Pacific Proving Grounds headquartered in Eniwetok Atoll and smaller scale testing at the Nevada Test Site.

The feasibility and advisability of developing a thermonuclear "Super" bomb had been debated intermittently at top national policy levels since the end of World War II. The cold war with the USSR was a powerful stimulant. Finally, in the fall of 1951, LASL was directed by the Atomic Energy Commission (AEC) to proceed as rapidly as possible with the design, fabrication, and testing of a thermonuclear explosive device. This was a formidable assignment involving the design and fabrication of unusual materials on a very large scale. Marshall was placed in charge of the operation by LASL Director Norris Bradbury. Other AEC laboratories and industrial contractors were called on for help, and LASL was placed on an extended work week. The program was started on November 1, 1951, with a target of a full-scale test within a year. On November 1, 1952, "Mike" was detonated and one of the islands of the Eniwetok Atoll disappeared.

"Mike" was not a thermonuclear weapon but was a monstrously over-designed device to show whether an explosive thermonuclear reaction could be achieved. It obviously could be achieved, so the LASL team was kept busy over the next several years designing and testing weaponized versions based on the "Mike" results.

In 1955 Marshall was chosen as the director of the Lincoln Laboratory of MIT and spent the next two years there administering research related to air defense. The focus of work there involved computers, radar, and solid-state physics.

Later, Marshall transferred to ACF Industries to head up the Nuclear Products-Erco Division, a research and development organization that operated an AEC weapons complex and also was engaged in nuclear reactor development.

Marshall's last professional assignment was as vice-president, research, for the Budd Company in Philadelphia. His duties there involved development of new technology and troubleshooting throughout the company. He remained in this position from 1967 to 1969 and then retired to Jupiter, Florida, where he was active in community affairs for a considerable time.

Marshall and his wife, Harriet, later moved to Winter Haven, Florida, to be near their son, Jerry, a retired U.S. Air Force officer. Both Marshall and Harriet are now deceased.

In addition to his membership in the National Academy of Engineering, Marshall was elected a fellow of the American Physical Society and a fellow of the American Nuclear Society. He did little writing for technical journals since most of his professional career involved work classified by the AEC as restricted data or company confidential work for corporations.

Marshall received little public recognition for what was probably his most challenging assignment: project leader for the gigantic task of designing, building, and testing the "Mike" thermonuclear device in a one-year period. He was given unlimited authority and used it wisely. He relied heavily on team leaders from the several laboratories and engineering firms that were involved, but scheduling conflicts and interface problems were his to solve—often on very short notice. In spite of the remarkable success of the "Mike" operation, Marshall remained almost anonymous except to his colleagues.

