LA-UR-22-27756

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Intended for:	For inclusion in NSRC test history.
Issued:	2022-07-29

Hardtack I

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After thirty-four tests, Hardtack I came to an end on August 18, 1958, with the thirty-fifth and final test, Fig. Four days later, President Dwight Eisenhower told Norris Bradbury, "I am today announcing that the United States will suspend nuclear weapons tests for a period of twelve months and, under certain conditions of progress toward real disarmament, continue that suspension on a year-to-year basis."[1] Although not intended, Eisenhower's announcement made Fig the last nuclear test conducted in the Marshall Islands.

Eisenhower's letter was not a surprise. Talks with the Soviet Union about a moratorium, along with international meetings on disarmament, had been underway for quite some time. A moratorium, particularly one of indefinite length could, the Division of Military Applications believed, seriously impede technical progress and hurt the nation's nuclear weapons program. Accordingly, Eisenhower gave reluctant permission for thirty five tests enough, it was hoped, to provide data for continued weapon development.[2] Seventeen tests were assigned to Los Alamos, fifteen to the UCRL, and three to the DoD. [3]

Closely coupled with the likelihood of a moratorium was the growing public concern about fallout. The 1954 Castle-Bravo test made fallout an international concern, leading to testing schemes to allay public concern. The first scheme, actually begun during the Castle test series, was the continued use of barges for the majority of the operation's tests. A second scheme was to test "clean" versions of six devices. Under discussion since Redwing, clean devices were designed to reduce the amount of fission products injected into the atmosphere. A third scheme was to invite a delegation from the United Nations to observe the detonation of a clean device and analyze test debris. The goal was to prove that American nuclear tests were not placing large amounts of radioactivity into the atmosphere. This test, codenamed Pinon, was cancelled because of the lack of international interest and because Los Alamos and the Department of Defense argued that giving foreign scientists access to bomb debris was tantamount to giving away American nuclear secrets.[4] In the end, none of these schemes were successful in reducing public concern. Hardtack I began, then, with the moratorium and fallout as significant preoccupations, something that was only of marginal importance in earlier test operations.

Technically, the operation had three purposes: weapon development, that is the scientific experiments of both Los Alamos and the UCRL; improving understanding "of the effects of

[1] President Dwight Eisenhower to Norris Bradbury, August 22, 1958.

[2] TWX, Starbird to Bradbury and York, February 13, 1957.

[3] Hacker, Barton C. *Elements of Controversy: The atomic energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947-1974*, 196-197.

[4] *Clean Bombs for UN Observers*, LANL Archives, April 1, 1958, and *Handbook for UN Observers*, LANL Archives, 1958; Shelton

underwater explosions on Navy ships and material;" and addressing "nuclear weapons in air and ballistic missile defense."[5]
Yucca, the first test of Hardtack I, was carried aloft over the Pacific Proving Ground by an untethered balloon.[6] Along with Teak and Orange, Yucca generated data pertinent to ballistic missile defense.[7] Two tests, Wahoo, in the open ocean, and Umbrella, in Enewetak's lagoon, became just the third and fourth detonations conducted by the United States to gather effects data from underwater bursts.

Los Alamos began the laboratories' experiments with the Cactus event on May 5th.[8] Fir, the UCRL's first test, followed on May 11th at Bikini. After Redwing, the UCRL sought to use Taongi, the most remote of all Marshallese atolls, for a test site. Although Taongi had an ideal wind pattern, its shallow entrance, shallow lagoon, and limited land area were problematic. The UCRL argued that these issues could be overcome by operating aboard ships in the open ocean and excavating both the entrance and lagoon with one or more tests. When Taongi was eliminated by budgetary constraints, the UCRL centered its operations at Bikini. The last four of the UCRL's tests, however, were conducted at Enewetak because of that atoll's marginally better shooting weather and to speed up the completion of the test series.

With the conclusion of Hardtack I, the future of nuclear testing and the continued use of the Pacific Proving Ground were unclear. Before the moratorium took effect on October 31st, an additional thirty-seven tests were conducted in Nevada. Beyond that date, nothing was planned. The Pacific Proving Ground, held in a state of readiness for a short time, was soon decommissioned and returned to the sole jurisdiction of the Trust Territory of the Pacific, closing the era of testing in the Marshall Islands that began in 1946 at Bikini with the twenty kiloton blasts of Able and Baker and ending with a nuclear whimper – the twenty ton yield of Fig.

[5] DTRA. Fact Sheet: Defense Threat Agency, Hardtack I. Fort Belvoir, Va., September 2021.

[6] Hewlett, Richard G. and Jack M. Holl. Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic energy Commission (Berkeley: University of California Press, 1989), 482 and DTRA Fact Sheet.

[7] Although nominally part of Hardtack, Yucca, Teak, and Orange were carried out under the secondary code name Newsreel.

[8] During the cleanup of Enewetak in the 1970s, radioactive debris was dumped into the Cactus crater and covered with a massive concrete dome.

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Test	Date	Laboratory	Location	Venue	Yield
Yucca (Operation Newsreel High Altitude – 86,000 ft.)	04/28/1958	LANL/DoD	Pacific	Balloon	1.7 kt
Cactus	05/05/1958	LANL	Enewetak	Surface	18 kt
Fir	05/11/1958	LLNL	Enewetak	Barge	1.3 Mt
Butternut	05/11/1958	LANL	Enewetak	Barge	81 kt
Koa	05/12/1958	LANL	Enewetak	Surface	1.37 Mt
Wahoo	05/16/1958	LANL/DoD	Enewetak	Underwater	9 kt
Holly	05/20/1958	LANL	Enewetak	Barge	5.9 kt
Nutmeg	05/21/1958	LLNL	Enewetak	Barge	25.1 kt
Yellowwood	05/26/1958	LANL	Enewetak	Barge	330 kt
Magnolia	05/26/1958	LANL	Enewetak	Barge	57 kt
Tobacco	05/30/1958	LANL	Enewetak	Barge	11.6 kt
Sycamore	05/31/1958	LLNL	Enewetak	Barge	92 kt
Rose	06/02/1958	LANL	Enewetak	Barge	15 kt
Umbrella	06/09/1958	LANL/DoD	Enewetak	Underwater	8 kt
Maple	06/10/1958	LLNL	Enewetak	Barge	213 kt
Aspen	06/14/1958	LLNL	Enewetak	Barge	319 kt
Walnut	06/14/1958	LANL	Enewetak	Barge	1.45 Mt
Linden	06/18/1958	LANL	Enewetak	Barge	11 kt
Redwood	06/27/1958	LLNL	Enewetak	Barge	412 kt
Elder	06/27/1958	LANL	Enewetak	Barge	880 kt
Oak	06/28/1958	LANL	Enewetak	Barge	8.9 Mt
Hickory	06/29/1958	LLNL	Enewetak	Barge	14 kt
Sequoia	07/01/1958	LANL	Enewetak	Barge	5.2 kt
Cedar	07/02/1958	LLNL	Enewetak	Barge	220 kt
Dogwood	07/05/1958	LLNL	Enewetak	Barge	397 kt
Poplar	07/12/1958	LLNL	Enewetak	Barge	9.3 kt
Scaevola	07/14/1958	LANL	Enewetak	Barge	Zero
Pisonia	07/17/1958	LANL	Enewetak	Barge	255 kt
Juniper	07/22/1958	LLNL	Bikini	Barge	65 kt
Olive	07/22/1958	LLNL	Enewetak	Barge	202 kt
Pine	07/26/1958	LLNL	Enewetak	Barge	2 Mt
Teak (Operation Newsreel High Altitude – 77 kilometers)	08/01/1958	LANL/DoD	Johnston Island	Rocket	3.8 Mt
Quince	08/06/1958	LLNL/DoD	Enewetak	Surface	Zero
Orange (Operation Newsreel High Altitude – 43	08/12/1958	LANL	Johnston Island	Rocket	3.8 Mt

[9] Derived from DOE/NV—209-Rev 16, September 2015.

kilometers)					
Fig	08/18/1958	LLNL	Enewetak	Surface	20 tons