

NUCLEAR WEAPONS DATABOOK

Working Paper

NWD 86-2

**Known U.S. Nuclear Tests
July 1945 to 31 December 1985**

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February 1986

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This working paper summarizes known nuclear tests conducted by the United States from July 1945 through 31 December 1985. It includes tests announced by the U.S. and tests not announced by the U.S. but which have been detected by seismic means and made public by other scientific institutions. Table 1 lists the tests chronologically. Tables 2 to 4 summarize the tests by type, location, and purpose, and Table 5 summarizes the tests by year and estimated yield. These tables exclude unannounced tests that have not been detected and reported by various scientific institutions. Between four and eleven such tests are estimated to have occurred in the time period 1980-1984.²

All U.S. nuclear tests conducted prior to the signing of the Limited Test Ban Treaty (banning the testing of nuclear weapons in the atmosphere, in outer space, and in the water) on 5 August 1963 have been publicly announced by the U.S. government. An explicit policy to not announce all tests was adopted by the Reagan Administration in 1982.³

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1. This material will appear as an appendix in Volume II of the Nuclear Weapons Databook series, U.S. Nuclear Warhead Production; by Thomas B. Cochran, William M. Arkin, Milton M. Hoenig, and Robert S. Norris (Cambridge, Massachusetts: Ballinger Publishing Company, forthcoming). Readers' additions or corrections would be appreciated.
 2. See Nuclear Weapons Databook Working Paper 86-1, Unannounced U.S. Nuclear Weapons Tests, 1980-1984, Thomas B. Cochran, Robert S. Norris, William M. Arkin, and Milton M. Hoenig, January 1986.
 3. Ibid.

Testing Nuclear Weapons

The first test of a nuclear device occurred on 16 July 1945, on a 100-foot tower at the White Sands Bombing Range, 55 miles northwest of Alamogordo, New Mexico.⁵ From 16 July 1945 to 31 December 1985, the United States has conducted 817 known nuclear tests.⁶ Of these, 108 took place in the Pacific, three over the South Atlantic, 689 at the Nevada Test Site, and 17 others in various states and Alaska. Of the 212 atmospheric tests conducted from 1945 through 1962, approximately 220,000 DOD participants, both military and civilian, were present in the Pacific, Atlantic, and continental tests.

Tests have occurred atop towers, on barges, suspended from balloons, dropped from aircraft, lifted by rockets, on the earth's surface, underwater, and underground (see Table 2).

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4. Announced United States Nuclear Tests: July 1945 through December 1984, NVO-209 (Rev. 5), Nevada Operations Office, January 1985; DOE's Nevada Operations Office: What It Does and Why, n.d.; Bob Campbell, et al., "Field Testing: The Physical Proof of Design Principles," Los Alamos Science Winter/Spring 1983, pp. 164-79; Final Environmental Impact Statement, Nevada Test Site, ERDA-1551, September 1977.
 5. Trinity Site is latitude 33 degrees 28 minutes-33 degrees 50 minutes and longitude 106 degrees 22 minutes-106 degrees 41 minutes. Ferenc Morton Szasz, The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion July 16, 1945 (Albuquerque: University of New Mexico Press, 1984); See also Defense Nuclear Agency, Project Trinity 1945-1946, DNA 6028F.
 6. Includes two detonations in warfare, Hiroshima and Nagasaki, and 18 joint U.S./UK tests. Unless otherwise stated, figures cited below include these tests.

The most tests in one year was 98 in 1962. This large number (and 29 through June 1963, was in anticipation of a halt in atmospheric, underwater, and outer space testing, which occurred as a result of the Limited Test Ban Treaty, signed on 5 August 1963. The annual average of known tests in the 1950s was 19; in the 1960s, 35; and in the 1970s, 17. For the years 1980-85, the numbers were 17, 17, 19, 18, 19, and 16 respectively.

The largest nuclear test conducted by the U.S. was shot Bravo, a 15 megaton (Mt) device tested at Bikini Atoll, Marshall Islands, in the Pacific on 28 February 1954. Very low yield tests down to less than a ton and a few failures have also occurred. The U.S. government has had several different policies over the years in announcing and specifying the yield or yield ranges of tests. At present, there is still no yield data on 43 announced tests. For all tests the combined yield is estimated to be 173 Mt (see Table 5), the equivalent of 13,000 Hiroshima bombs. Approximately 137 Mt of the total was detonated in the atmosphere, almost all between 1952 and 1962. Tests are now limited to a maximum yield of 150 kilotons under terms of the Threshold Test Ban Treaty, signed by President Nixon in Moscow on 3 July 1974. The ban did not take effect until 31 March 1976. In the years since, the annual average has been 17 tests with a combined yield of 450 Kt. Beginning on 9 November 1962, eleven months before the Limited Test Ban Treaty entered into force,

every U.S. tests has been underground, all but fourteen at the Nevada Test Site (NTS).

In the weeks following the dropping of atomic bombs on Hiroshima and Nagasaki, American military and political leaders began planning nuclear weapon experiments to test weapon effects and new designs. A pair of tests, code-named Operation Crossroads, was initially planned to test the effects of atomic weapons against naval vessels, and in November 1945, a search for a test site began. In late January 1946, the U.S. Navy announced that Bikini Atoll in the Marshall Islands met all their requirements, including:

a site within the control of the USA, uninhabited or subject to evacuation without unnecessary hardship on large numbers of inhabitants, . . . offering a protected anchorage at least six miles in diameter.⁸

The two tests were conducted in June and July 1946 using the FAT MAN type warhead.

In July 1947, the U.S. announced that it was establishing a proving ground in the Pacific for routing testing of atomic weapons. Enewetak Atoll, consisting of some 46 islands (2.75 square miles of dry land) surrounding a 388 square mile lagoon,

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7. The last U.S. atmospheric test was shot Tightrope, held on 4 November 1962. The first underground test was Pascal-A on 27 July 1957. It was in a three foot diameter hole at a depth of 486 feet.
 8. U.S. DOE, "Enewetak Radiological Support Project, Final Report," NVO-213, September 1982, p. 3.

was selected. Bikini was not considered acceptable at the time, since it lacked sufficient land area for necessary instrumentation. In fact, following the first two post-war nuclear tests in 1946 (Operation Crossroads), Bikini was not to be used again for nuclear testing until 1954.

Nevada Test Site

The need for a continental test site arose with plans to increase the size of the arsenal in the 1950s. Land based testing also reduced the expense and logistic problems of testing in the Pacific. A number of sites were considered on the basis of low population density, geology, favorable year-round weather conditions, safety, and security.

It was decided to use a portion of an Air Force bombing and gunnery range in Nevada. Construction of the Nevada Test Site facilities began on 1 January 1951. Operation Ranger was the first series of tests for which the site was utilized. The first test occurred on 27 January 1951, when a one-kiloton device was dropped from an Air Force plane into Frenchman Flat. Originally 680 square miles were withdrawn. Additional land withdrawals led to its present size of 1350 square miles. At Mercury in the southeast corner of the NIS are the centralized facilities which support most of the activities at NIS. The Frenchman Flat area was where atmospheric testing was conducted and is now utilized for experimental projects. The majority of tests take place in the Yucca Flat vicinity. Rainier Mesa is the location for the DNA's weapons effects tests. Pahute Mesa is an area for higher yield tests. It currently takes from one to two years to prepare

a test. Depending upon its complexity, the cost of a test ranges between \$6 million and \$70 million.

Types of Tests. There are two principal categories of nuclear weapons tests: weapons related and weapons effects. Weapons related tests are tests of nuclear devices intended for specific types of weapon systems or to understand the basic physics of nuclear explosives. The former may be for developmental, proof or confidence purposes. During the research and development phases detonating a device will verify the theoretical concepts that underlie its design and operation. In later phases, occasional proof tests are conducted of warheads, to verify its yield, before or just after entry into the stockpile. Only very occasionally are confidence tests conducted on warheads withdrawn from the stockpile. ⁹ Approximately seventy-nine percent of U.S. tests have been weapons related. Almost without exception, it is not publicly known which test is for which weapon system, though there is information on a few (see Table 1).

Most weapons related tests are conducted in vertical shafts. Huge drill bits are used to bore holes from 600 to 5000 feet in depth and from 3 to 12 feet in diameter.

The nuclear warhead, or device, is placed at the lower end of a long (up to 200 feet) cylindrical capsule or canister.

9. HFAC, Proposals to Ban Nuclear Testing, 1985, p. 78. Farooq Hussain says "only a dozen or so have been conducted . . . over the past thirty-five years . . ." The Impact of Weapons Test Restrictions, Adelphi Paper No. 165 (London: IISS), p. 19.

Diagnostic systems are usually contained within the same canister and normally make up the greater part of its length. Canisters have increased in weight to an average of over 100,000 lbs (in 1981, up from an average of 65,000 lbs in 1978).¹⁰

A considerable bundle of electrical cables connect the firing and diagnostic systems to the surface recording stations. As the degree of complexity has increased, so too has the number and length of cable used per event. In 1984, 115 cables totalling over 33 miles (on average) were used per event, up from 71 cables totalling 17 miles five years earlier.¹¹

After the canister containing the device and diagnostic equipment is lowered,¹² the hole is closed by backfilling with sand and gravel (called "stemming") and from one to three coal tar epoxy plugs. Currently "stemming" takes about two weeks. The stemming and plugs are meant to contain the explosion so as not to allow any radiation to escape.¹³

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10. HASC, FY 1983 DOE, p. 109. In 1981, the cost of a canister was over \$400,000 with some costing over \$1 million.
 11. HASC, FY 1985 DOE, p. 338.
 12. A new system, when fully operational, will allow only two days to lower the device instead of from eight to ten days previously.
 13. This has been successful less than two thirds of the time. Of the 630 announced tests at NIS through December 1984, radioactivity was detected onsite in 93 (15 percent) and offsite in 136 (22 percent). The amount of radioactivity and how far it travels can sometimes be extensive. Shot Baneberry (18 December 1970) vented an enormous amount of radioactivity, some of which reached Canada.

When everything is in place, the test device is fired by sending a specific sequence of signals from the control point to the "Red Shack" near Ground Zero. The Red Shack houses the arming and firing equipment. The diagnostic equipment in the canister detects the explosion and information is sent uphole through the cables. Within a fraction of a millisecond following the detonation, the sensors and cables are destroyed, but by that time the data has been transmitted to the recording stations or to the control point. This technique of measuring whether the nuclear device performed to design specifications is known as prompt diagnostics.

When the device detonates, it creates a large underground cavity, the bottom of which quickly fills with molten rock materials and debris. As the heat and pressure subside, material begins to fall into the cavity, creating a void that progressively works its way up. If the void reaches the surface, the overlying rock collapses under its own weight, producing a large subsidence crater. The size of the underground cavity and the surface crater (if it forms) is dependent on the yield of the explosion, the depth of burial, and the physical properties of the medium in which it is detonated. A second technique used to measure whether the device performed to design specification is nuclear chemistry diagnostics. In nuclear chemistry diagnostics laboratory analyses are made of radioactive materials produced by the explosion. The material samples are either solids or gases left in the cavity. The samples are taken as soon as possible after the detonation and returned to either LANL or LLNL for analysis. From the samples nuclear chemists can learn about

explosive yield and burn efficiency (how much nuclear fuel was used). New approaches are being developed which will retrieve gases from a test hole within minutes after the detonation.

The NIS is pockmarked with several hundred craters of various sizes from 200 to 2000 feet in diameter and up to 200 feet deep. Astronauts have used the test site for training missions prior to their journeys to the moon.

The cost of a weapon development test is between \$6 and \$20 million.¹⁴

The purpose of a weapons effects test is to research the range of nuclear effects, these being airblast, ground and water shock, heat, electromagnetic pulse, neutrons, gamma and x-rays, and apply that knowledge to military systems, plans, and policy. More specifically, the test program assesses the survivability of U.S. military systems in a nuclear environment and predicts lethality levels for destruction of enemy forces and equipment.¹⁵ The Defense Nuclear Agency (DNA) is responsible for research in this area and in recent years has conducted from two to four tests a year at the NIS. Overall they have accounted for 11 percent of the tests (see Table 4).

Most weapons effects tests are conducted within a horizontally mined tunnel drilled into a mesa. A laboratory

14. Ronald L. Soble, "Secrecy Cloaks Testing of Awesome Nuclear Arms," Los Angeles Times, 27 November 1984, p. 23.

supplied device is located in the Zero Room, which is connected to a long, horizontal line of sight (HLOS) pipe approximately 1000 feet long containing several test chambers. The pipe is usually about 1300 feet below ground and is tapered. Various pieces of military hardware such as missile reentry vehicles, communication equipment, or other components are placed in the test chambers. The HLOS pipe may be vacuum pumped to less than one micron (one millionth of a meter) of pressure to simulate conditions in space. Various rapid closure mechanisms in the HLOS allow radiation generated by the nuclear device to reach test chambers but prevent the escape of debris and radioactive gases. Following the test military hardware is retrieved from the test chambers and the effects of the explosion are evaluated at laboratories. Because of the more extensive tunnelling needed for a horizontal effects test, costs are higher than for development tests, ranging between \$40 million and \$70 million per test.

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15. SAC, FY 1985 DOD, Part 3, p. 530. Soviet and East European military equipment is also subjected to U.S. weapons effects tests.
 16. Soble, "Secrecy Cloaks Testing," p. 23. Rick Atkinson, "'Underground Events' Test Mettle of U.S. Atomic Arsenal," Washington Post, 29 May 1984, p. A6.

Known U.S. Nuclear Tests

July 1945 through 31 December 1985

See footnote 3, page 45, for Purpose abbreviations key

1
Known U.S. Nuclear Tests July 1945-31 December 1985

2

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose ³	Yield ⁴
Trinity	07-16-45	Alamogordo, NM	LANL	Tower	100	WR	19 Kt
Little Boy	08-05-45	Hiroshima, Jap.	LANL	B-29 Airdrop	1900±50	Warfare	13 Kt
Fat Man	08-09-45	Nagasaki, Japan	LANL	B-29 Airdrop	1650±33	Warfare	23 Kt

OPERATION CROSSROADS

Operation CROSSROADS was at that time the largest peacetime military operation ever conducted with 240 ships, 156 aircraft and 42,000 personnel. The two tests used FAT MAN type bombs similar to the one dropped on Nagasaki. The purpose of the tests was to determine the effects of nuclear detonations on naval ships, planes and on animals. The first test weapon, shot ABLE, was dropped by a B-29 ("Dave's Dream") on a fleet of more than 90 vessels in Bikini Lagoon and exploded 980 feet short and 1870 left of the target. The test weapon in BAKER was encased in a watertight steel caisson suspended beneath a medium landing ship anchored in the midst of the target fleet. An additional deep underwater detonation, CHARLIE, was planned but was not conducted.

Able	06-30-46	Bikini	LANL-DOD	B-29 Airdrop	520	WE	23 Kt
Baker	07-24-46	Bikini	LANL-DOD	Underwater	-90	WE	23 Kt

OPERATION SANDSTONE

The three tests of Operation SANDSTONE were the first proof tests since TRINITY. Second generation warhead design principles were tested using composite cores and levitated cores. Ten thousand two hundred personnel participated.

X-Ray Most weapons in the stockpile in early 1948 were Mark-IV of this type.	04-14-48	Enewetak	LANL	Tower	200	WR	37 Kt
Yoke	04-30-48	Enewetak	LANL	Tower	200	WR	49 Kt
Zebra	05-14-48	Enewetak	LANL	Tower	200	WR	18 Kt

OPERATION RANGER

Operation RANGER was the first series of atmospheric tests held at the Nevada Proving Ground (now NTS) and were the first devices tested in the U.S. since TRINITY. In November 1950 scientists at Los Alamos decided that a series of small nuclear tests were needed in preparation for the upcoming GREENHOUSE series to establish satisfactory design criteria related to the variation of yield with compression of the fissile material. RANGER was a series of experiments involving devices using a fraction of a critical mass ("fractional crit"). The concept of a "fractional crit" originated in 1944 during the Manhattan Project. The White House approved the tests on 11 January 1951 accelerating the establishment of the Nevada Proving Ground. During the 11 days a total of five devices were dropped from a B-50 bomber. All of the devices detonated approximately 1100 feet to 1400 feet over Frenchman Flat.

Able	01-27-51	NTS	LANL	B-50 Airdrop	1060	WR	1 Kt
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Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Baker	01-28-51	NTS	LANL	B-50 Airdrop	1080	WR	8 Kt
Easy	02-01-51	NTS	LANL	B-50 Airdrop	1080	WR	1 Kt
Baker-2	02-02-51	NTS	LANL	B-50 Airdrop	1100	WR	8 Kt
Fox	02-06-51	NTS	LANL	B-50 Airdrop	1435	WR	22 Kt

OPERATION GREENHOUSE

Two of the GREENHOUSE tests were thermonuclear experiments. Shot GEORGE produced the first significant U.S. thermonuclear reaction. GEORGE was an experiment using a fission bomb to ignite a small quantity of deuterium and tritium that contributed only a small amount to the yield. Shot ITEM was a major contribution to the development of thermonuclear weapons. It was the first test of a boosted fission device using deuterium and tritium. Shot DOG was probably a test of the B6. Fifteen thousand mice, swine, and dogs were used during GREENHOUSE to test the lethality range of blast, heat and radioactivity.

Dog	04-07-51	Enewetak	LANL	Tower	300	WR	70 Kt
Easy Probably the B5.	04-20-51	Enewetak	LANL	Tower	300	WR	47 Kt
George First thermonuclear experiaent.	05-08-51	Enewetak	LANL	Tower	200	WR	225 Kt
Itea Tested principle of tritium boosting.	05-24-51	Enewetak	LANL	Tower	200	WR	45.5 Kt

OPERATION BUSTER-JANGLE

The five LANL weapon development tests constituted the BUSTER phase held in October and November 1951, the second series held at NTS. The objective of these tests was to evaluate new devices for possible inclusion in the stockpile. The two weapons effects tests of the JANGLE phase were meant to help determine the military utility of surface and underground nuclear detonations. The first three of eight Desert Rock troop exercises were held during BUSTER-JANGLE. These exercises were designed to explore the conditions and tactics of the atomic battlefield. The Mk-5 was tested sometime during 1951, possibly during BUSTER. A prototype of the B8 was tested during BUSTER and possibly the B7.

Able The ABLE device partially misfired.	10-22-51	NTS	LANL	Tower	100	WR	<0.1 Kt
Baker	10-28-51	NTS	LANL	B-50 Airdrop	1118	WR	3.5 Kt
Charlie	10-30-51	NTS	LANL	B-50 Airdrop	1132	WR	14 Kt
Dog	11-01-51	NTS	LANL	B-50 Airdrop	1417	WR	21 Kt
Easy	11-05-51	NTS	LANL	B-45 Airdrop	1314	WR	31 Kt
Sugar	11-19-51	NTS	DOD	Surface	3.5	WE	1.2 Kt
Uncle	11-29-51	NTS	LANL-DOD	Crater	-17	WE	1.2 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
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OPERATION TUMBLER-SNAPPER

Operation TUMBLER-SNAPPER was a series of eight atmospheric tests at NTS. The purpose of the first phase, TUMBLER, was to collect information on the effect of the height of burst on overpressure. The peak blast overpressure of the devices used during GREENHOUSE/BUSTER-JANGLE were lower than predicted and TUMBLER was designed to investigate the reasons. The accuracy of the GREENHOUSE/BUSTER-JANGLE data was affirmed and in general the TUMBLER shots gave a more comprehensive description of blast phenomena than had been previously known. A further objective was to learn more about the dust "sponge" effect and the relationship of dust to radiation. The purpose of the SNAPPER phase was to test potential warhead designs for inclusion in the stockpile and to study techniques to be used during Operation IVY. Shot EASY was the first test using beryllium as a tamper material. Ten thousand six hundred DOD personnel participated in Desert Rock IV.

Able	04-01-52	NTS	LANL-DOD	B-50 Airdrop	793	WE	1 Kt
Baker	04-15-52	NTS	LANL-DOD	B-50 Airdrop	1109	WE	1 Kt
Charlie	04-22-52	NTS	LANL-DOD	B-50 Airdrop	3447	WR	31 Kt
Dog	05-01-52	NTS	LANL-DOD	B-45 Airdrop	1040	WR	19 Kt
Easy	05-07-52	NTS	LANL	Tower	300	WR	12 Kt
Fox	05-25-52	NTS	LANL	Tower	300	WR	11 Kt
George	06-01-52	NTS	LANL	Tower	300	WR	15 Kt
How	06-05-52	NTS	LANL	Tower	300	WR	14 Kt

OPERATION IVY

Event MIKE was the first test of an experimental thermonuclear device in which a substantial portion of the energy was generated by the fusion of hydrogen isotopes. It used liquid deuterium. Event KING was the largest fission weapon ever detonated, presumed to be a prototype of the B18 Super Orally bomb.

Mike Experimental thermonuclear device. Produced a crater 6240 ft in diameter and 164 ft deep.	10-31-52	Enewetak	LANL	Surface		WR	10.4 Mt
King	11-15-52	Enewetak	LANL	B-36 Airdrop	1480	WR	500 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION UPSHOT-KNOTHOLE							
The major purposes of Operation UPSHOT-KNOTHOLE were to test devices for possible inclusion in the stockpile; to improve military tactics, equipment and training for the atomic battlefield; and to enhance civil defense requirements by measuring and assessing blast effects upon dwellings, shelters, automobiles, etc. Some objectives were to improve the nuclear weapons used for strategic bomber delivery and those used for tactical battlefield situations, and to establish military doctrine for the tactical use of nuclear weapons. The yields ranged from 1 to 61 Kt and included three airdrops, seven tower shots and an artillery firing using a 280mm cannon. Approximately 21,000 DOD personnel from the four armed services participated in Desert Rock V. The third and fifth tests of the series were LLNL's first tests since being established as the second design laboratory the year before. These two tests were fizzles.							
Annie	03-17-53	NTS	LANL	Tower	300	WR	16 Kt
Nancy	03-24-53	NTS	LANL	Tower	300	WR	24 Kt
Ruth	03-31-53	NTS	LLNL	Tower	300	WR	0.2 Kt
LLNL fizzle of uranium hydride core							
Dixie	04-06-53	NTS	LANL	B-50 Airdrop	6020	WR	11 Kt
Ray	04-11-53	NTS	LLNL	Tower	100	WR	0.2 Kt
LLNL fizzle of uranium hydride core							
Badger	04-18-53	NTS	LANL	Tower	300	WR	23 Kt
Was expected to yield 40 Kt							
Simon	04-25-53	NTS	LANL	Tower	300	WR	43 Kt
Predicted yield was 35 Kt							
Encore	05-08-53	NTS	DOD-LANL	B-50 Airdrop	2423	WE	27 Kt
Harry	05-19-53	NTS	LANL	Tower	300	WR	32 Kt
Grable	05-25-53	NTS	DOD-LANL	Airburst	524	WR	15 Kt
A 280mm 85-ton cannon fired an atomic artillery projectile using the Mk-9 warhead which was detonated at a height of 524 feet above Frenchman Flat, NTS. The top of the mushroom cloud reached an altitude of 35,000 feet.							
Climax	06-04-53	NTS	LANL	B-36 Airdrop	1334	WR	61 Kt
Probably a test of the 87.							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION CASTLE							
Operation CASTLE was the culmination in the development of the super, or hydrogen, bomb that began in 1950. The objectives were threefold: first, to fire six or seven experimental thermonuclear devices, including proof tests of three emergency capability weapons (EC14, EC16 and EC17) -- the test firing of one of these, presumably the EC16, was contingent upon the results of the other six tests; second, to obtain diagnostic information on these tests necessary to evaluate their performance; and third, to obtain effects information on devices in the megaton range. The first two shots fired, BRAVO and ROMEO, gave yields considerably above those expected just prior to actual detonation and led to the conclusion that a lithium deuteride "dry bomb" was practical for stockpiling purposes. Since this type of device was appreciably simpler to use than a liquid deuterium bomb the Los Alamos test of the EC16 was cancelled and an alternative device inserted in its place (probably shot NECTAR). The seventh shot of the CASTLE series, ECHO, a LLNL design, was withdrawn following the failure of KOON. The total fission yield for all tests in the three year period 1952-54 was 37 Mt.							
Bravo Experimental thermonuclear device using lithium deuteride. Produced a crater with a diameter of 6000 ft and a depth of 240 ft. Expected yield 6 Mt (presumed range 4-8 Mt).	02-28-54	Bikini	LANL	Surface	7	WR	15 Mt
Romeo Test of EC14. Expected yield 8 Mt (range 1.5-15 Mt).	03-26-54	Bikini	LANL	Barge		WR	11 Mt
Koon LLNL fizzle. Expected yield 1.5 Mt (range 0.33-4 Mt).	04-06-54	Bikini	LLNL	Surface		WR	110 Kt
Union Expected yield 5-10 Mt (range 1-18 Mt)	04-25-54	Bikini	LANL	Barge		WR	6.9 Mt
Yankee Test of EC17. Expected yield 9.5 Mt (range 7.5-15 Mt).	05-04-54	Bikini	LANL	Barge		WR	13.5 Mt
Nectar Expected yield 2-3 Mt (range 1-5 Mt).	05-13-54	Enewetak	LANL	Barge		WR	1.69 Mt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION TEAPOT							
Operation TEAPOT, a series of 14 tests held at NTS, was authorized by President Eisenhower on 30 August 1954. Some of the tests were for the purpose of expanding the variety of tactical weapons, including those primarily designed for defensive purposes. These tests would most likely be the EC25/W25 warhead for the GENIE, and the W31 for the NIKE HERCULES missile and ADM. Approximately 8000 DOD personnel took part in Desert Rock VI. According to a joint AEC-DOD press release, "the mission of Exercise Desert Rock VI . . . [is] to teach its soldiers to view nuclear weapons in their proper perspective . . . that powerful though these weapons are, they can be controlled and harnessed . . . and that despite the weapons' destructiveness there are defenses against them on the atomic battlefield." The third shot of the series, TESLA, was LLNL's first successful test, two and one-half years after the establishment of the laboratory.							
Masp	02-18-55	NTS	LANL	B-36 Airdrop	762	WE	1 Kt
Moth	02-22-55	NTS	LANL	Tower	300	WR	2 Kt
Tesla	03-01-55	NTS	LLNL	Tower	300	WR	7 Kt
Predicted yield 2 Kt.							
Turk	03-07-55	NTS	LLNL	Tower	500	WR	43 Kt
Hornet	03-12-55	NTS	LANL	Tower	300	WR	4 Kt
Bee	03-22-55	NTS	LANL	Tower	500	WR	8 Kt
Ess	03-23-55	NTS	DOD	Crater	-67	WE	1 Kt
Purpose was to prepare a subsurface emplacement site for an atomic demolition munition test, emplace the munition, backfill the shaft, and fire the munition. It made a crater 290 ft in diameter and 96 ft deep. It was probably the low yield option of the W31.							
Apple-1	03-29-55	NTS	LANL	Tower	500	WR	14 Kt
Wasp Prime	03-29-55	NTS	LANL	B-36 Airdrop	737	WR	3 Kt
Ha	04-06-55	NTS	DOD	B-36 Airdrop	36620	WE	3 Kt
Post	04-09-55	NTS	LLNL	Tower	300	WR	2 Kt
Met	04-15-55	NTS	LANL-DOD	Tower	400	WE	22 Kt
Apple-2	05-05-55	NTS	LANL	Tower	500	WR	29 Kt
Zucchini	05-15-55	NTS	LANL	Tower	500	WR	28 Kt
OPERATION WIGWAM							
Operation WIGWAM was a single test conducted approximately 400 miles southwest of San Diego, CA. One of only five underwater tests ever held, the WIGWAM device was suspended by cable from a towed unmanned barge to a depth of 2000 feet in water that was approximately 16,000 feet deep. The major purpose of WIGWAM was to determine the fatal range a deeply detonated nuclear weapon would have on a submarine and on surface ships. The weapon used was the B7, "Betty" nuclear depth charge.							
Wigwam	05-14-55	Pacific	DOD	Underwater	-2000	WE	30 Kt
North 29 Degrees West 126 Degrees.							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
PROJECT 56							
Project 56 No. 1	11-01-55	NTS	LANL	Surface		SE	Zero
Project 56 No. 2 (Pu dispersal)	11-03-55	NTS	LANL	Surface		SE	Zero
Project 56 No. 3 (Pu dispersal)	11-05-55	NTS	LANL	Surface		SE	No Yield
Project 56 No. 4 (Pu dispersal)	11-18-55	NTS	LANL	Surface		SE	Very Slight

OPERATION REDWING

The objectives of REDWING were to proof test certain weapons in stockpile or to be stockpiled in the near future, to continue developmental research on promising weapons, to continue long range research on new techniques, ideas and designs. The seventeen shots in the REDWING series of mid-1956 were primarily to test high-yield thermonuclear devices that could not be tested in Nevada. All REDWING shots except CHEROKEE tested new weapon developments. CHEROKEE was less a scientific experiment and more a demonstration to the world of U.S. ability to drop a hydrogen bomb from a bomber. The AEC reported that Operation REDWING "gave important information relating to developing means of reducing fall-out from weapon firing, weapons for defensive purposes, and new design principles." Of the new weapon types nine tests were sponsored by LANL and seven by LLNL. The test shots fired at Enewetak had smaller yields than those fired at Bikini. High yield warheads likely tested at REDWING were LANL's B/W28 (bomb/HOUND DOG), B/W39 3.75 Mt (bomb/SNARK, REDSTONE), and W49 1.4 Mt (THOR, ATLAS D, JUPITER) and LLNL's B/W27 (bomb/REGULUS II). Lower yield warheads probably included the W40 (BOMARC, LACROSSE), W44 (ASROC), and W45 (MADM, TERRIER, LITTLE JOHN). The total fission yield for all REDWING tests was 9 Mt; the total fission yield for tests over 1 Mt was 8 Mt.

Lacrosse	05-04-56	Enewetak	LANL	Surface	17	WR	40 Kt
Cherokee	05-20-56	Bikini	LANL	B-52 Airdrop	4350±150	WR	Several Mt
First air drop by U.S. of a thermonuclear weapon -- probably B36 bomb.							
Zuni	05-27-56	Bikini	LLNL	Surface	9	WR	3.5 Mt
Yuma	05-27-56	Enewetak	LLNL	Tower	205	WR	
Erie	05-30-56	Enewetak	LANL	Tower	300	WR	
Seminole	06-06-56	Enewetak	LANL	Surface		WR	13.7 Kt
Flathead	06-11-56	Bikini	LANL	Barge	15	WR	
Blackfoot	06-11-56	Enewetak	LANL	Tower	200	WR	
Kickapoo	06-13-56	Enewetak	LLNL	Tower	300	WR	
Osage	06-16-56	Enewetak	LANL	B-36 Airdrop	670±35	WR	
Inca	06-21-56	Enewetak	LLNL	Tower	200	WR	
Dakota	06-25-56	Bikini	LANL	Barge		WR	
Mohawk	07-02-56	Enewetak	LLNL	Tower	300	WR	
Apache	07-08-56	Enewetak	LLNL	Barge		WR	
Navajo	07-10-56	Bikini	LANL	Barge		WR	
Tewa	07-20-56	Bikini	LLNL	Barge		WR	5 Mt
Produced a crater of 4000 ft diameter and 129 ft depth.							
Huron	07-21-56	Enewetak	LANL	Barge		WR	

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
PROJECT 57							
Project 57 No. 1 (Fu dispersal)	04-24-57	Bombing Range, NV	AEC	Surface		SE	Zero
OPERATION PLUMBBOB							
<p>Operation PLUMBBOB, the sixth series held at NTS, included 24 detonations and six safety experiments. The series was approved by President Eisenhower on 28 December 1956. The purposes of PLUMBBOB were to proof test certain air defense and anti-submarine warheads scheduled for early production; to conduct development tests of components and mockups which provided design information for thermonuclear devices to be fired in Operation HARDTACK I, including devices having higher yield-to-weight ratios; to conduct exploratory and development tests directed toward achieving more efficient use of nuclear material and warheads of smaller size and weight; and to conduct a deep underground test to explore that mode of testing. Sixteen thousand DOD personnel participated in Desert Rock VII and VIII. The prototype for the W30 warhead for the TALOS missile was tested and the W34 warhead for the LULU, ASTOR, and HOTPOINT anti-submarine weapons may have been tested during PLUMBBOB.</p>							
Boltzmann	05-28-57	NTS	LANL	Tower	500	WR	12 Kt
Franklin	06-02-57	NTS	LANL	Tower	300	WR	140 Tons
Lassen	06-05-57	NTS	LLNL	Balloon	500	WR	0.5 Tons
Wilson	06-18-57	NTS	LLNL	Balloon	500	WR	10 Kt
Priscilla	06-24-57	NTS	LANL-DOD	Balloon	700	WR	37 Kt
<p>Purpose was to study the effects of a nuclear weapon with a known yield. The weapon was drawn from the stockpile.</p>							
Couloab-A	07-01-57	NTS	LANL	Surface		SE	Zero
Hood	07-05-57	NTS	LLNL	Balloon	1500	WR	74 Kt
Diablo	07-15-57	NTS	LLNL	Tower	500	WR	17 Kt
John	07-19-57	NTS	DOD	Rocket	18500	WE	~2 Kt
<p>An F-89J fired a GENIE (AIR-2A) air-to-air rocket with a W25 warhead. The rocket traveled 4240 meters, in 4.5 seconds after release, before detonating.</p>							
Kepler	07-24-57	NTS	LANL	Tower	500	WR	10 Kt
Owens	07-25-57	NTS	LLNL	Balloon	500	WR	9.7 Kt
Pascal-A	07-26-57	NTS	LANL	Shaft	-500	SE	Slight
<p>First underground test. The hole was 485 ft deep and 3 ft in diameter.</p>							
Stokes	08-07-57	NTS	LANL	Balloon	1500	WR	19 Kt
Saturn	08-10-57	NTS	LLNL	Tunnel	-100	SE	Zero
Shasta	08-18-57	NTS	LLNL	Tower	500	WR	17 Kt
Doppler	08-23-57	NTS	LANL	Balloon	1500	WR	11 Kt
Pascal-B	08-27-57	NTS	LANL	Shaft	-500	SE	0.3 Kt
Franklin Prime	08-30-57	NTS	LANL	Balloon	750	WR	4.7 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Smoky	08-31-57	NTS	LLNL	Tower	700	WR	44 Kt
Galileo	09-02-57	NTS	LANL	Tower	500	WR	11 Kt
Wheeler	09-06-57	NTS	LLNL	Balloon	500	WR	197 Tons
Coulomb-B	09-06-57	NTS	LANL	Surface		SE	0.3 Kt
Laplace	09-08-57	NTS	LANL	Balloon	750	WR	1 Kt
Fizeau	09-14-57	NTS	LANL	Tower	500	WR	11 Kt
Newton	09-16-57	NTS	LANL	Balloon	1500	WR	12 Kt
Rainier	09-19-57	NTS	LLNL	Tunnel	-899	WR	1.7 Kt

First detonation contained underground.
Seismic waves detected 2300 miles away
in Alaska.

Whitney	09-23-57	NTS	LLNL	Tower	500	WR	19 Kt
Charleston	09-28-57	NTS	LLNL	Balloon	1500	WR	12 Kt
Morgan	10-07-57	NTS	LLNL	Balloon	500	WR	8 Kt

PROJECT 58

Pascal-C	12-06-57	NTS	LANL	Shaft		SE	Slight
Coulomb-C	12-09-57	NTS	LANL	Surface		SE	0.5 Kt

Pascal-C and Coulomb-C were safety
tests of two designs being fired in
their final version at HARDTACK.

PROJECT 58 A

Venus	02-22-58	NTS	LLNL	Tunnel		SE	<1 Ton
Uranus	03-14-58	NTS	LLNL	Tunnel		SE	<1 Ton

OPERATION HARDTACK I

Operation HARDTACK I included 35 tests, all but three of which were at Enewetak and Bikini. Planned at a time when pressures were building for a test moratorium, scientists tried to include tests for as many weapon types as possible. Originally each lab had requested 20 shots and DOD 10 shots. HARDTACK was divided into three parts. The first was development tests of warhead types of which LANL sponsored 15 and LLNL sponsored 15. These tests probably included the W38 (ATLAS E/F, TITAN I), B41, B43, the W47 (POLARIS), the B/W53 (bomb/TITAN II), and B/W46 (bomb/TITAN II-cancelled), and prototypes for the W56 and W59 warheads for the MINUTEMAN ballistic missiles. The second part was two shots sponsored by DOD to improve the understanding of the effects of underwater explosions on Navy ships. The third part, also sponsored by DOD, included three high-altitude shots to study ballistic missile defense possibilities. The tests also provided information on the electromagnetic pulse effect from low yield bursts on electronic components.

Yucca	04-28-58	Pacific	DOD	Untethered Helium Balloon	86000	WE	
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North 12 degrees 37 minutes East 163
degrees 01 minutes.

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Cactus	05-05-58	Enewetak	LANL	Surface		WR	
Fir	05-11-58	Bikini	LLNL	Barge		WR	18 Kt
Butternut	05-11-58	Enewetak	LANL	Barge		WR	
Koa	05-12-58	Enewetak	LANL	Surface		WR	1.37 Mt
Produced a crater 4000 ft in diameter and 171 ft deep.							
Wahoo	05-16-58	Enewetak	DOD-LANL	Underwater	-500	WE	
Holly	05-20-58	Enewetak	LANL	Barge		WR	
Nutaeg	05-21-58	Bikini	LLNL	Barge		WR	
Yellowwood	05-26-58	Enewetak	LANL	Barge		WR	
Magnolia	05-26-58	Enewetak	LANL	Barge		WR	
Tobacco	05-30-58	Enewetak	LANL	Barge		WR	
Sycamore	05-31-58	Bikini	LLNL	Barge		WR	
Rose	06-02-58	Enewetak	LANL	Barge		WR	
Umbrella (in lagoon)	06-08-58	Enewetak	DOD	Underwater	-150	WE	
Maple	06-10-58	Bikini	LLNL	Barge		WR	
Aspen	06-14-58	Bikini	LLNL	Barge		WR	
Walnut	06-14-58	Enewetak	LANL	Barge		WR	
Linden	06-18-58	Enewetak	LANL	Barge		WR	
Redwood	06-27-58	Bikini	LLNL	Barge		WR	
Elder	06-27-58	Enewetak	LANL	Barge		WR	
Oak	06-28-58	Enewetak	LANL	Barge		WR	8.9 Mt
Possibly the B/W53. Produced a crater 4400 ft in diameter and 183 ft deep.							
Hickory	06-29-58	Bikini	LLNL	Barge		WR	
Sequoia	07-01-58	Enewetak	LANL	Barge		WR	
Cedar	07-02-58	Bikini	LLNL	Barge		WR	
Dogwood	07-05-58	Enewetak	LLNL	Barge		WR	
Poplar	07-12-58	Bikini	LLNL	Barge		WR	
Scaevola	07-14-58	Enewetak	LANL	Barge		SE	Low
Pisonia	07-17-58	Enewetak	LANL	Barge		WR	
Juniper	07-22-58	Bikini	LLNL	Barge		WR	
Last of 23 tests held at Bikini Atoll.							
Olive	07-22-58	Enewetak	LLNL	Barge		WR	
Pine	07-26-58	Enewetak	LLNL	Barge		WR	
Teak	08-01-58	Johnston Island Area	DOD	Redstone Rocket	252000	WE	Mt Range
The flash of light was visible from Hawaii, 700 miles away.							
Guince	08-06-58	Enewetak	LLNL-DOD	Surface		WR	
Orange	08-12-58	Johnston Island Area	DOD	Redstone Rocket	141000	WE	Mt Range
Fig	08-18-58	Enewetak	LLNL-DOD	Surface		WR	
Last of 43 tests held at Enewetak.							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION ARGUS							
Operation ARGUS was a series of three very-high-altitude tests carried out shortly after the conclusion of HARDTACK I in the South Atlantic about 1100 miles southwest of Capetown, South Africa. It was the only clandestine test series conducted in the 17-year period of atmospheric testing. Specially modified X-17a three stage ballistic missiles were fired from the USS <u>Norton Sound</u> (AVM 1) carrying low yield warheads. The ARGUS operation was not intended as a test of nuclear weapons or their destructive effects. It was an experiment designed to provide information on the trapping of electrically charged particles in the earth's magnetic field with the objective of assessing how very-high-altitude nuclear detonations might interfere with communications equipment and ballistic missile performance.							
Argus I About 300 miles altitude. South 38.5 degrees, West 11.5 degrees.	08-27-58	South Atlantic	DOD	Rocket		WE	1-2 Kt
Argus II About 300 miles altitude. South 49.5 degrees, West 8.2 degrees.	08-30-58	South Atlantic	DOD	Rocket		WE	1-2 Kt
Argus III About 300 miles altitude. South 48.5 degrees, West 9.7 degrees.	09-06-58	South Atlantic	DOD	Rocket		WE	1-2 Kt

OPERATION HARDTACK II

Operation HARDTACK II was a series of 37 tests, the last the U.S. conducted before adopting a test moratorium. Nineteen of the tests were conducted to evaluate the yield and efficiency of newly developed nuclear devices. The other eighteen were safety experiments designed to determine the stability of nuclear devices during transportation and storage. After a flurry of 13 tests in seven days at the end of October, the U.S. did not test again for more than 34 months.

Otero	09-12-58	NTS	LANL	Shaft		SE	38 Tons
Bernalillo	09-17-58	NTS	LANL	Shaft		SE	15 Tons
Eddy (possibly the W47)	09-19-58	NTS	LANL	Balloon	500	WR	83 Tons
Luna	09-21-58	NTS	LANL	Shaft		SE	1.5 Tons
Mercury	09-23-58	NTS	LLNL	Tunnel		SE	Slight
Valencia	09-26-58	NTS	LANL	Shaft		SE	2 Tons
Mars	09-28-58	NTS	LLNL	Tunnel		SE	13 Tons
Mora	09-29-58	NTS	LANL	Balloon	1500	WR	2 Kt
Colfax	10-05-58	NTS	LANL	Shaft		SE	5.5 Tons
Hidalgo	10-05-58	NTS	LANL	Balloon	377	SE	77 Tons
Tamalpais	10-08-58	NTS	LLNL	Tunnel		WR	72 Tons
Quay	10-10-58	NTS	LANL	Tower	100	WR	79 Tons
Lea	10-13-58	NTS	LANL	Balloon	1500	WR	1.4 Kt
Neptune	10-14-58	NTS	LLNL	Tunnel		SE	115 Tons
Hamilton	10-15-58	NTS	DOD-LLNL	Tower	50	WR	1.2 Tons
Logan	10-16-58	NTS	LLNL	Tunnel		WR	5 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Dona Ana	10-16-58	NTS	LANL	Balloon	450	WR	37 Tons
Vesta	10-17-58	NTS	LLNL	Surface		SE	24 Tons
Rio Arriba	10-18-58	NTS	LANL	Tower	72.5	WR	90 Tons
San Juan	10-20-58	NTS	LANL	Shaft		SE	Zero
Socorro	10-22-58	NTS	LANL	Balloon	1450	WR	6 Kt
Wrangell	10-22-58	NTS	LLNL	Balloon	1500	WR	115 Tons
Rushmore	10-22-58	NTS	LLNL	Balloon	500	WR	188 Tons
Oberon	10-22-58	NTS	LLNL	Tower	25	SE	Zero
Catron	10-24-58	NTS	LANL	Tower	72.5	SE	21 Tons
Juno	10-24-58	NTS	LLNL	Surface		SE	1.7 Tons
Ceres	10-26-58	NTS	LLNL	Tower	25	SE	0.7 Tons
Sanford	10-26-58	NTS	LLNL	Balloon	1500	WR	4.9 Kt
De Baca	10-26-58	NTS	LANL	Balloon	1500	WR	2.2 Kt
Chavez	10-27-58	NTS	LANL	Tower	52.5	SE	0.6 Tons
Evans	10-29-58	NTS	LLNL	Tunnel		WR	55 Tons
Humboldt	10-29-58	NTS	DOD-LLNL	Tower	25	WR	7.8 Tons
Mazama	10-29-58	NTS	LLNL	Tower	50	WR	Zero
Santa Fe	10-30-58	NTS	LANL	Balloon	1500	WR	1.3 Kt
Blanca	10-30-58	NTS	LLNL	Tunnel		WR	22 Kt
Ganyaede	10-30-58	NTS	LLNL	Surface		SE	Zero
Titania	10-30-58	NTS	LLNL	Tower	25	SE	0.2 Tons

OPERATION NOUGAT

Hereafter, with the exceptions of DOMINIC I and DOMINIC II, operations are by Fiscal Year. FY 1962-FY 1976 (1 July 1961-30 September 1976) and FY 1977-FY 1985 (1 October 1976-30 September 1985).

Antler	09-15-61	NTS		Tunnel		WR	2.6 Kt
Shrew	09-16-61	NTS		Shaft		WR	Low
Boomer	10-01-61	NTS		Shaft		WR	Low
Chena	10-10-61	NTS		Tunnel		WR	Low
Mink	10-29-61	NTS		Shaft		WR	Low
Fisher	12-03-61	NTS		Shaft		WR	13.4 Kt
Enoae	12-10-61	Carlsbad, NM		Shaft		Plowshare	3 Kt
Mad	12-13-61	NTS		Shaft		WR	0.50 Kt
Ringtail	12-17-61	NTS		Shaft		WR	Low
Feather	12-22-61	NTS		Tunnel		WR	Low
Stoat	01-09-62	NTS		Shaft		WR	5.1 Kt
Agouti	01-18-62	NTS		Shaft		WR	6.4 Kt
Dormouse	01-30-62	NTS		Shaft		WR	Low
Stillwater	02-08-62	NTS		Shaft		WR	3.07 Kt
Armadillo	02-09-62	NTS		Shaft		WR	7.1 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Hard Hat Purpose was to test the capability of underground structures to withstand strong motions generated by an underground nuclear detonation in hard rock.	02-15-62	NTS	DOD	Shaft		WE	5.7 Kt
Chinchilla	02-19-62	NTS		Shaft		WR	1.9 Kt
Codsaw	02-19-62	NTS		Shaft		WR	Low
Cimarron	02-23-62	NTS		Shaft		WR	11.90 Kt
Platypus	02-24-62	NTS		Shaft		WR	Low
Pampas	03-01-62	NTS		Shaft		1st UK	Low
Danny Boy Crater diameter 265 ft, depth 84 ft, in basalt.	03-05-62	NTS	DOD-LLNL	Crater		WE	0.43 Kt
Ermine	03-06-62	NTS		Shaft		WR	Low
Brazos	03-08-62	NTS		Shaft		WR	8.4 Kt
Hognose	03-15-62	NTS		Shaft		WR	Low
Hoosic	03-28-62	NTS		Shaft		WR	3.40 Kt
Chinchilla II	03-31-62	NTS		Shaft		WR	Low
Doraouse II	04-05-62	NTS		Shaft		WR	10.6 Kt
Passaic	04-06-62	NTS		Shaft		WR	Low
Hudson	04-12-62	NTS		Shaft		WR	Low
Platte	04-14-62	NTS		Tunnel		WR	1.85 Kt
Dead	04-21-62	NTS		Shaft		WR	Low

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION DOMINIC I							
<p>The 1962 tests in the Christmas and Johnston Island areas and elsewhere in the Pacific constituted Operation Dominic I. These tests were also part of either Operation NOUGAT or Operation STORAX depending on whether they occurred in FY 1962 or FY 1963 respectively.</p> <p>Operation DOMINIC I was a series of 36 atmospheric nuclear detonations held at several Pacific Ocean locations from April to November 1962. With the four continental tests of DOMINIC II these were the last atmospheric tests conducted by the U.S. No longer able to use the atolls of Eniwetok and Bikini, the U.S. entered into an agreement with the United Kingdom in early 1962 to use Christmas Island for twenty-five of the tests. In return the British were allowed to participate in the nuclear test program at NTS. Another ten tests took place in the Johnston Island area.</p> <p>Four types of tests were carried out: (a) About 20 devices were detonated for weapons development purposes. In these tests, progress was made in nuclear technology which resulted in significant increases in the yield-to-weight ratios, more efficient use of nuclear materials, reduction of the fission component of total yield, and increased safety and reliability of stockpiled weapons. Among the DOMINIC development tests were some failures occurring in cases where designs involved a substantial extension of known technology; (b) Several stockpiled bombs and warheads were proof tested. These weapons had been designed after HARDTACK and manufactured during the moratorium. The designs had extrapolated to the maximum extent practicable the nuclear weapons technology developed during HARDTACK and previous tests. Each of the nuclear weapons proof tested functioned satisfactorily; (c) A third group were five high altitude effects tests from the kiloton to megaton range. The FISHBOWL portion of the DOMINIC tests investigated the ability of the intercontinental missile systems, the early warning systems, and the command and control systems to operate in a nuclear environment. Some failures occurred. Three THOR rockets malfunctioned in flight (Bluegill, 2 June; Starfish, 19 June; Bluegill Double Prime, 15 October) and had to be destroyed, with their warheads. On 25 July (Bluefish Prime) a THOR missile blew up on the launch pad on Johnston Island, causing extensive damage. The nuclear warhead was destroyed by radio command causing extensive alpha contamination of the launch pad; (d) Proof tests of two complete nuclear weapons systems were carried out. The entire POLARIS and ASROC systems including the delivery vehicles, missiles, and nuclear warheads were tested under realistic conditions.</p>							
Adobe	04-25-62	Christmas Island Area	LANL	B-52 Airdrop		WR	Intermediate
Aztec	04-27-62	Christmas Island Area	LANL	B-52 Airdrop		WR	Intermediate
Black	04-27-62	NTS		Shaft		WR	Low
Arkansas	05-02-62	Christmas Island Area	LLNL	B-52 Airdrop		WR	Low Mt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Guesta	05-04-62	Christmas Island Area	LANL	B-52 Airdrop		WR	Intermediate
Frigate Bird	05-06-62	Pacific	LLNL	Freefall POLARIS A2 Rocket		WR	600 Kt
<p>The submarine <u>USS Ethan Allen</u> (SSBN-608), launched a POLARIS missile while submerged about 155 nm east northeast of Christmas Island in the Pacific Ocean, North 4 degrees 50 minutes, West 149 degrees 25 minutes. The warhead traveled about 1020 nm toward the island, detonating as an airburst. The yield of the W47 warhead on the POLARIS A2 SLBM was not announced but is estimated to be 600 Kt. Shot FRIGATE BIRD was the first and only operational test of a U.S. SSBN/SLBM weapon system.</p>							
Paca	05-07-62	NTS		Shaft		WR	Low
Yukon	05-08-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Mesilla	05-09-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Arikaree	05-10-62	NTS		Shaft		WR	Low
Muskegon	05-11-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Swordfish	05-11-62	Pacific	DOD	Underwater		WE	Low
<p>The <u>USS Agerholm</u> (DD-826) steaming in an area about 370 nm west-southwest of San Diego, California, North 31 degrees 14 minutes, West 124 degrees 13 minutes, fired an anti-submarine rocket (ASROC) at a target raft about 4000 yards away. The W44 warhead detonated underwater, producing a low yield. Among other things the test was meant to determine the effect of the nuclear explosion on the sonar gear of destroyers and submarines. Shot SWORDFISH is the last of only five underwater tests.</p>							
Encino	05-12-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Hardvark	05-12-62	NTS		Shaft		WR	40 Kt
Swanee	05-14-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Eel	05-19-62	NTS		Shaft		WR	Low
Chetco	05-19-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
White	05-25-62	NTS		Shaft		WR	Low

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Tanana	05-25-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Low
Maabe	05-27-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Paccoon	06-01-62	NTS		Shaft		WR	Low
Packrat	06-06-62	NTS		Shaft		WR	Low
Aisa	06-08-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Truckee	06-09-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Yeso	06-10-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Low Mt
Harlea	06-12-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Des Moines	06-13-62	NTS		Tunnel		WR	Low
Rinconada	06-15-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Juice	06-17-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Petit	06-19-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Low
Saman I	06-21-62	NTS		Shaft		WR	Low
Otowi	06-22-62	Christmas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Bighorn	06-27-62	Christmas Island Area		B-52 Airdrop Parachute		WR	Mt Range
Haymaker	06-27-62	NTS		Shaft		WR	67 Kt
Marshmallow	06-28-62	NTS	DOD-LLNL	Tunnel		WE	Low
Purpose was to study effects on equipment and materials at a simulated high altitude.							
Bluestone	06-30-62	Christmas Island Area	LLNL	B-52 Airdrop Parachute		WR	Low Mt
Sacramento	06-30-62	NTS		Shaft		WR	Low

OPERATION STORAX

Sedan	07-06-62	NTS		Crater	-635	Plowshare	104 Kt
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Excavation experiment -- crater 1280 ft diameter, 320 ft deep -- thermonuclear device.

OPERATION DOMINIC II

The four weapons effects tests at NTS in July of 1962 constituted Operation DOMINIC II and were also part of Operation STORAX.

Little Feller II	07-07-62	NTS	DOD	Surface	3	WE	Low
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Used a W54 stockpile warhead.

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Starfish Prime High altitude: 450 km.	07-09-62	Johnston Island Area	DOD	THOR Rocket		WE	1.4 Mt
Sunset	07-10-62	Christaas Island Area	LANL	B-52 Airdrop Freefall		WR	Intermediate
Paalico	07-11-62	Christaas Island Area	LLNL	B-52 Airdrop Parachute		WR	Low Mt
Johnie Boy (possibly an ADM)	07-11-62	NTS	DOD	Crater	-2	WE	0.5 Kt
Merrimac	07-13-62	NTS		Shaft		WR	Intermediate
Small Boy	07-14-62	NTS	DOD	Tower	10	WE	Low
Little Feller I Warhead was a stockpiled W54 (DAVY CROCKETT).	07-17-62	NTS	DOD	Surface	3	WE	Low
Wichita	07-27-62	NTS		Shaft		WR	Low
York	08-24-62	NTS		Shaft		WR	Low
Sobac	08-24-62	NTS		Shaft		WR	Low
Raritan	09-06-62	NTS		Shaft		WR	Low
Hyrax	09-14-62	NTS		Shaft		WR	Low
Feba	09-20-62	NTS		Shaft		WR	Low
Allegheny	09-29-62	NTS		Shaft		WR	Low
Androscoggin	10-02-62	Johnston Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Mississippi	10-05-62	NTS		Shaft		WR	115 Kt
Buaping	10-06-62	Johnston Island Area	LLNL	B-52 Airdrop Parachute		WR	Low
Roanoke	10-12-62	NTS		Shaft		WR	Low
Wolverine	10-12-62	NTS		Shaft		WR	Low
Chama	10-18-62	Johnston Island Area	LLNL	B-52 Airdrop Freefall		WR	Low Mt
Tioga	10-18-62	NTS		Shaft		WR	Low
Sandicoot	10-19-62	NTS		Shaft		WR	Low
Checkmate (high altitude--tens of kms)	10-20-62	Johnston Island Area	DOD	STRYPI Rocket (XM-33)		WE	Low
Bluegill Triple Prime High altitude: tens of kms.	10-26-62	Johnston Island Area	DOD	THOR Rocket		WE	Submegaton
Santee	10-27-62	NTS		Shaft		WR	Low
Calamity	10-27-62	Johnston Island Area	LLNL	B-52 Airdrop Parachute		WR	Intermediate
Housatonic	10-30-62	Johnston Island Area	LLNL	B-52 Airdrop Parachute		WR	Mt Range
Kingfish High altitude: tens of kms.	11-01-62	Johnston Island Area	DOD	THOR Rocket		WE	Submegaton
Tightrope (high altitude--tens of kms) Last U.S. atmospheric test.	11-04-62	Johnston Island Area	DOD	NIKE HERCULES Rocket		WE	Low
St. Lawrence	11-09-62	NTS		Shaft		WR	Low
Bundi	11-15-62	NTS		Shaft		WR	Low
Anacostia	11-27-62	NTS		Shaft		Plowshare	Low

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Taunton	12-04-62	NTS		Shaft		WR	Low
Tendrac	12-07-62	NTS		Shaft		2nd UK	Low
Tadison	12-12-62	NTS		Tunnel		WR	Low
Tusbat	12-12-62	NTS		Shaft		WR	Low
Tanatee	12-14-62	NTS		Shaft		WR	Low
Tassalaan	02-08-63	NTS		Shaft		WR	Low
Tcushi	02-08-63	NTS		Shaft		WR	Low
Terret	02-08-62	NTS		Shaft		WR	Low
Tatchie	02-08-63	NTS		Shaft		WR	Low
Chipaunk	02-15-63	NTS		Shaft		WR	Low
Taweah	02-21-63	NTS		Shaft		WR	Low
Tarsael	02-21-63	NTS		Shaft		Plowshare	Low
Terboa	03-01-63	NTS		Shaft		WR	Low
Toyah	03-15-63	NTS		Shaft		WR	Low
Terbil	03-29-63	NTS		Shaft		WR	Low
Terret Prime	04-05-63	NTS		Shaft		WR	Low
Toypu	04-10-63	NTS		Shaft		WR	Low
Tumberland	04-11-63	NTS		Shaft		WR	Low
Tootanai	04-24-63	NTS		Shaft		WR	Low
Taisano	04-24-63	NTS		Shaft		WR	Low
Tundi Priae	05-09-63	NTS		Shaft		WR	Low
Double Tracks (Pu dispersal)	05-15-63	Bombing Range, NV		Surface		ST	Zero
Harkee	05-17-63	NTS		Shaft		WR	Low
Tejon	05-17-63	NTS		Shaft		WR	Low
Stones	05-22-63	NTS		Shaft		WR	Intermediate
Clean Slate I (Pu dispersal)	05-25-63	Bombing Range, NV		Surface		ST	Zero
Pleasant	05-29-63	NTS		Shaft		WR	Low
Clean Slate II (Pu dispersal)	05-31-63	Bombing Range, NV		Surface		ST	Zero
Tuba	06-05-63	NTS		Tunnel		WR	Low
Tutia	06-06-63	NTS		Shaft		WR	Low
Toshapa	06-06-63	NTS		Shaft		WR	Low
Clean Slate III (Pu dispersal)	06-09-63	Bombing Range, NV		Surface		ST	Zero
Tataco	06-14-63	NTS		Shaft		WR	Low
Tennebed	06-25-63	NTS		Shaft		WR	Low

Limited Test Ban Treaty signed 5 August 1963.

OPERATION NIBLICK

Pekan	08-12-63	NTS		Shaft		WR	Low
Eatsop	08-15-63	NTS		Shaft		WR	Low
Kohocton	08-23-63	NTS		Shaft		WR	Low
Ahtanua	09-13-63	NTS		Shaft		WR	Low
Bilby	09-13-63	NTS		Shaft		WR	249 Kt

First underground test reported felt in Las Vegas.

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Grunion	10-11-63	NTS		Shaft		WR	Low
Tornillo	10-11-63	NTS		Shaft		Plowshare	Low
Clearwater	10-16-63	NTS		Shaft		WR	Intermediate
Sheal	10-26-63	Fallon, NV		Shaft		VU	12 Kt
Anchovy	11-14-63	NTS		Shaft		WR	Low
Mustang	11-15-63	NTS		Shaft		WR	Low
Greys	11-22-63	NTS		Shaft		WR	Intermediate
Sardine	12-04-63	NTS		Shaft		WR	Low
Eagle	12-12-63	NTS		Shaft		WR	Low
Fore	01-16-64	NTS		Shaft		WR	20-200 Kt(19)
Oconto	01-23-64	NTS		Shaft		WR	<20 Kt
Klickitat	02-20-64	NTS		Shaft		Plowshare	20-200 Kt(24)
Pike	03-13-64	NTS		Shaft		WR	<20 Kt
Hook	04-14-64	NTS		Shaft		WR	<20 Kt
Sturgeon	04-15-64	NTS		Shaft		WR	<20 Kt
Turf	04-24-64	NTS		Shaft		WR	<20 Kt
Pipefish	04-29-64	NTS		Shaft		WR	20-200 Kt(100)
Backswing	05-14-64	NTS		Shaft		WR	<20 Kt(15)
Minnow	05-15-64	NTS		Shaft		WR	<20 Kt
Ace	06-11-64	NTS		Shaft		WR	<20 Kt
Fade	06-25-64	NTS		Shaft		Plowshare	<20 Kt
Dub	06-30-64	NTS		Shaft		WR	<20 Kt
				Shaft		Plowshare	<20 Kt(9)

OPERATION WHETSTONE

Bye	07-16-64	NTS		Shaft		WR	20-200 Kt
Cormorant	07-17-64	NTS		Shaft		3rd UK	<20 Kt
Alva	08-19-64	NTS		Shaft		WR	<20 Kt
Canvasback	08-22-64	NTS		Shaft		WR	<20 Kt(18)
Haddock	08-28-64	NTS		Shaft		WR	<20 Kt
Guanay	09-04-64	NTS		Shaft		WR	<20 Kt(12)
Auk	10-02-64	NTS		Shaft		WR	<20 Kt(12)
Par	10-09-64	NTS		Shaft		Plowshare	38 Kt
Barbel	10-16-64	NTS		Shaft		WR	<20 Kt
Salaon	10-22-64	Hattiesburg, MS		Shaft		VU	5.3 Kt
Forest	10-31-64	NTS		Shaft		WR	<20 Kt
Handcar	11-05-64	NTS		Shaft		Plowshare	12 Kt
Crape	12-05-64	NTS		Shaft		WR	20-200 Kt(10)
Drill	12-05-64	NTS		Shaft		WR	3.4 Kt
Parrot	12-16-64	NTS		Shaft		WR	1.3 Kt
Mudpack	12-16-64	NTS	DOD	Shaft		WE	2.7 Kt
Purpose was to obtain information concerning ground shock.							
Sulky	12-18-64	NTS		Shaft		Plowshare	0.092 Kt
Wool	01-14-65	NTS		Shaft		WR	<20 Kt
Cashaere	02-04-65	NTS		Shaft		WR	<20 Kt
Alpaca	02-12-65	NTS		Shaft		WR	<20 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Merlin	02-16-65	NTS		Shaft		WR	10.1 Kt
Wishbone	02-18-65	NTS	DOD-LLNL	Shaft		WE	<20 Kt
Purpose was to study effects on equipment and materials.							
Magtail	03-03-65	NTS		Shaft		WR	20-200 Kt(65)
Dup	03-26-65	NTS		Shaft		WR	20-200 Kt(35)
Kestrel	04-05-65	NTS		Shaft		WR	<20 Kt
Balanquin	04-14-65	NTS		Crater		Plowshare	4.3 Kt
Sun Drop	04-21-65	NTS	DOD	Tunnel		WE	<20 Kt(8)
Purpose was to study effects on equipment and materials.							
‡	04-23-65	NTS		?		?	?
Tee	05-07-65	NTS		Shaft		WE	<20 Kt
Buteo	05-12-65	NTS		Shaft		WR	<20 Kt
Ecaup	05-14-65	NTS		Shaft		WR	<20 Kt
Caabrio	05-14-65	NTS		Shaft		WR	0.75 Kt
Tweed	05-21-65	NTS		Shaft		WR	<20 Kt
Petrel	06-11-65	NTS		Shaft		WR	1.3 Kt
Diluted Waters	06-16-65	NTS	DOD-LLNL	Shaft		WE	<20 Kt
Purpose was to study effects on equipment and materials.							
Tiny Tot	06-17-65	NTS	DOD	Tunnel		WE	<20 Kt
Purpose was to obtain information on ground shock. First known nuclear detonation conducted on a rock surface within an underground cavity.							

OPERATION FLINTLOCK

Bronze	07-23-65	NTS		Shaft		WR	20-200 Kt(60)
Mauve	08-06-65	NTS		Shaft		WR	<20 Kt(18)
Centaur	08-27-65	NTS		Shaft		WR	<20 Kt
Screaaer	09-01-65	NTS		Shaft		WR	<20 Kt(12)
Charcoal	09-10-65	NTS		Shaft		4th UK	20-200 Kt
Elkhart	09-17-65	NTS		Shaft		WR	<20 Kt
Long Shot	10-29-65	Amchitka, AK	DOD	Shaft		VU	~80 Kt
Seoia	11-12-65	NTS		Shaft		WR	<20 Kt
Corduroy	12-03-65	NTS		Shaft		WR	20-200 Kt(100)
Emerson	12-16-65	NTS		Shaft		WR	<20 Kt
Buff	12-16-65	NTS		Shaft		WR	20-200 Kt(36)
Maxwell	01-13-66	NTS		Shaft		WR	<20 Kt
Laapblack	01-18-66	NTS		Shaft		WR	20-200 Kt(32)
Dovekie	01-21-66	NTS		Shaft		WR	<20 Kt
Plaid II	02-03-66	NTS		Shaft		WR	<20 Kt
Rex	02-24-66	NTS		Shaft		WR	19 Kt
Red Hat	03-05-66	NTS	DOD	Shaft		WR	<20 Kt
Purpose was to study ground shock.							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Finfoot	03-07-66	NTS		Shaft		WR	<20 Kt
Glymer	03-12-66	NTS		Shaft		WR	<20 Kt
Purple	03-18-66	NTS		Shaft		WR	<20 Kt
Teaplar	03-24-66	NTS		Shaft		Plowshare	<20 Kt
Lize	04-01-66	NTS		Shaft		WR	<20 Kt
Stutz	04-06-66	NTS		Shaft		WR	<20 Kt(5)
Tomato	04-07-66	NTS		Shaft		WR	<20 Kt
Duryea	04-14-66	NTS		Shaft		WR	70 Kt
Pin Stripe	04-25-66	NTS	DOD	Shaft		WE	<20 Kt(4)
Purpose was to study effects on equipment and material.							
Traveller	05-04-66	NTS		Shaft		WR	<20 Kt
Cyclaaen	05-05-66	NTS		Shaft		WR	12 Kt
Chartreuse	05-06-66	NTS		Shaft		WR	73 Kt
Tapestry	05-12-66	NTS		Shaft		WR	<20 Kt(10)
Piranha	05-13-66	NTS		Shaft		WR	20-200 Kt(100)
Bumont	05-19-66	NTS		Shaft		WR	20-200 Kt(190)
Discus Thrower	05-27-66	NTS	DOD-LANL	Shaft		WE	22 Kt
Purpose was to study ground shock transmissions.							
Pile Driver	06-02-66	NTS	DOD-LANL	Tunnel		WE	62 Kt
Purpose was to study nuclear detonation effects on underground structures.							
Tan	06-03-66	NTS		Shaft		WR	20-200 Kt(140)
Puce	06-10-66	NTS		Shaft		WR	<20 Kt
Double Play	06-15-66	NTS	DOD-LLNL	Tunnel		WE	<20 Kt
Purpose was to study effects on equipment and materials.							
Kankakee	06-15-66	NTS		Shaft		WR	20-200 Kt
Vulcan	06-25-66	NTS		Shaft		Plowshare	25 Kt
Halfbeak	06-30-66	NTS		Shaft		WR	365 Kt
OPERATION LATCHKEY							
Saxon	07-28-66	NTS		Shaft		Plowshare	<20 Kt
Rovena	08-10-66	NTS		Shaft		WR	<20 Kt
Berringer	09-12-66	NTS		Shaft		WE	<20 Kt(12)
Daiquiri	09-23-66	NTS		Shaft		WR	<20 Kt
Newark	09-26-66	NTS		Shaft		WR	<20 Kt(4)
Simms	11-05-66	NTS		Shaft		Plowshare	<20 Kt
Ajax	11-11-66	NTS		Shaft		WR	<20 Kt
Cerise	11-18-66	NTS		Shaft		WR	<20 Kt
Sterling	12-03-66	Hattiesburg, MS		Shaft		VU	380 Tons
New Point	12-13-66	NTS	DLD-LLNL	Shaft		WE	<20 Kt(10)
Purpose was to study effects on equipment and materials.							
Breeley	12-20-66	NTS		Shaft		WR	870 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Wash	01-19-67	NTS		Shaft		WR	20-200 Kt(49)
Sourbon	01-20-67	NTS		Shaft		WR	20-200 Kt(29)
Yard	02-08-67	NTS		Shaft		WR	<20 Kt(10)
Persimmon	02-23-67	NTS		Shaft		WR	<20 Kt(3)
Agile	02-23-67	NTS		Shaft		WR	20-200 Kt(130)
Rivet III	03-02-67	NTS		Shaft		WR	<20 Kt
Hawn	04-07-67	NTS		Shaft		WR	<20 Kt
Chocolate	04-21-67	NTS		Shaft		WR	<20 Kt(7)
Effendi	04-27-67	NTS		Shaft		WR	<20 Kt
Mickey	05-10-67	NTS		Shaft		WR	20-200 Kt(10)
Comodore	05-20-67	NTS		Shaft		WR	250 Kt
Scotch	05-23-67	NTS		Shaft		WR	155 Kt
Knickerbrocker	05-26-67	NTS		Shaft		WR	76 Kt
Switch	06-22-67	NTS		Shaft		Plowshare	<20 Kt
Midi Mist	06-26-67	NTS	DOD-LLNL	Tunnel		WE	<20 Kt(9)
Purpose was to study effects on equipment and materials.							
Jaber	06-29-67	NTS		Shaft		WE	<20 Kt(8)
OPERATION CROSSTIE							
Stanley	07-27-67	NTS		Shaft		WR	20-200 Kt
I	08-04-67	NTS		?		?	?
Washer	08-10-67	NTS		Shaft		WR	<20 Kt
Bordeaux	08-18-67	NTS		Shaft		WR	<20 Kt
Door Mist	08-31-67	NTS	DOD	Tunnel		WE	<20 Kt(9)
Yard	09-07-67	NTS		Shaft		WR	20-200 Kt
Marvel	09-21-67	NTS		Shaft		Plowshare	2.2 Kt
Zaza	09-27-67	NTS		Shaft		WR	20-200 Kt(170)
Lanpher	10-18-67	NTS		Shaft		WR	20-200 Kt(140)
Sazerac	10-25-67	NTS		Shaft		WR	<20 Kt
Dobbler	11-08-67	NTS		Shaft		WR	<20 Kt(7)
Gasbuggy	12-10-67	Farlington, NM		Shaft		Plowshare	29 Kt
Stilt	12-15-67	NTS		Shaft		WR	<20 Kt(2)
Hupaobile	01-18-68	NTS		Shaft		WE	7.4 Kt
Established many of the criteria for underground diagnostics still used today.							
Staccato	01-19-68	NTS		Shaft		WR	20-200 Kt
Faultless	01-19-68	Central Nevada		Shaft		WR	200-1000 Kt(1200)
Cabriole	01-26-68	NTS		Crater		Plowshare	2.3 Kt
I	01-31-68	NTS		?		?	?
Knox	02-21-68	NTS		Shaft		WR	20-200 Kt(200)
Dorsal Fin	02-29-68	NTS	DOD	Tunnel		WE	<20 Kt(20)
Suggy	03-12-68	NTS		Crater		Plowshare	5.4 Kt
5 simultaneous detonations. Counts as one test.							
Pomard	03-14-68	NTS		Shaft		WR	1.5 Kt
Etinger	03-22-68	NTS		Shaft		WR	20-200 Kt(160)

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Milk Shake	03-25-68	NTS	DOD	Shaft		WE	<20 Kt(10)
Noor	04-10-68	NTS		Shaft		WR	20-200 Kt(20)
Shuffle	04-18-68	NTS		Shaft		WR	20-200 Kt(25)
Scroll	04-23-68	NTS		Shaft		VU	<20 Kt(6)
Poxcar	04-26-68	NTS		Shaft		WR	1.3 Mt
#	05-03-68	NTS		?		?	?
Clarksaobile	05-17-68	NTS		Shaft		WR	20-200 Kt(15)
Tub	06-06-68	NTS		Shaft		WR	<20 Kt
Rickey	06-15-68	NTS		Shaft		WR	20-200 Kt(300)
Chateaugay	06-28-68	NTS		Shaft		WR	20-200 Kt(58)

OPERATION BOWLINE

Tanya	07-30-68	NTS		Shaft		WR	20-200 Kt(10)
Diana Moon	08-27-68	NTS	DOD	Shaft		WE	<20 Kt
Sled	08-29-68	NTS		Shaft		WR	20-200 Kt(260)
Noggin	09-06-68	NTS		Shaft		WR	20-200 Kt(110)
Knife A	09-12-68	NTS		Shaft		WR	<20 Kt
Stoddard	09-17-68	NTS		Shaft		Plowshare	20-200 Kt(13)
Hudson Seal	09-24-68	NTS	DOD	Tunnel		WE	<20 Kt(10)
Knife C	10-03-68	NTS		Shaft		WR	<20 Kt(3)
#	10-10-68	NTS		?		?	?
#	10-31-68	NTS		?		?	?
Crew	11-04-68	NTS		Shaft		WR	20-200 Kt(22)
Knife B	11-15-68	NTS		Shaft		WR	<20 Kt(8)
#	11-15-68	NTS		?		?	?
Ming Vase	11-20-68	NTS	DOD	Tunnel		WE	<20 Kt(12)
Tinderbox	11-22-68	NTS		Shaft		WR	<20 Kt(3)
Schooner	12-08-68	NTS		Crater		Plowshare	30 Kt
Tyg	12-12-68	NTS		Shaft		WR	<20 Kt(20)
#	12-12-68	NTS		?		?	?
Benham	12-19-68	NTS		Shaft		WR	1.15 Mt
Packard	01-15-69	NTS		Shaft		WE	10.0 Kt
Wineskin	01-15-69	NTS		Shaft		WR	20-200 Kt(40)
Vise	01-30-69	NTS		Shaft		WR	20-200 Kt(40)
Cypress	02-12-69	NTS		Tunnel		WE	<20 Kt(15)
Barsac	03-20-69	NTS		Shaft		WR	<20 Kt(10)
Coffer	03-21-69	NTS		Shaft		WR	<100 Kt(35)
Thistle	04-30-69	NTS		Shaft		WR	20-200 Kt
Blenton	04-30-69	NTS		Shaft		WR	20-200 Kt
Purse	05-07-69	NTS		Shaft		WR	20-200 Kt(180)
Torrado	05-27-69	NTS		Shaft		WR	20-200 Kt(22)
Tapper	06-12-69	NTS		Shaft		WR	<20 Kt(12)

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION MANDREL							
Ildria	07-16-69	NTS		Shaft		WR	20-200 Kt(6)
Hutch	07-16-69	NTS		Shaft		WR	20-200 Kt(300)
Spider	08-14-69	NTS		Shaft		WR	<20 Kt
Pliers	08-27-69	NTS		Shaft		WR	<20 Kt
Mulison	09-10-69	Grand Valley, CO		Shaft		Plowshare	47 Kt
Minute Steak	09-12-69	NTS	DOD	Shaft		WE	<20 Kt(10)
Jorum	09-16-69	NTS		Shaft		WR	<1 Mt(700 Kt)
Milrow (seismic calibration)	10-02-69	Amchitka, AK		Shaft		WR	*1 Mt
Pipkin	10-08-69	NTS		Shaft		WR	200-1000 Kt(82)
Cruet	10-29-69	NTS		Shaft		WR	11 Kt
Pod	10-29-69	NTS		Shaft		WR	20-200 Kt
Calabash	10-29-69	NTS		Shaft		WR	110 Kt
Scuttle	11-13-69	NTS		Shaft		WR	<20 Kt
Piccalilli	11-21-69	NTS		Shaft		WR	20-200 Kt(17)
Diesel Train	12-05-69	NTS	DOD	Tunnel		WE	<20 Kt(16)
Grape A	12-17-69	NTS		Shaft		WR	20-200 Kt(61)
Lovage	12-17-69	NTS		Shaft		WR	<20 Kt
Terrine	12-18-69	NTS		Shaft		WR	20-200 Kt(28)
Tab	01-23-70	NTS		Shaft		WR	<20 Kt
Ajo	01-30-70	NTS		Shaft		WR	<20 Kt(20)
Grape B	02-04-70	NTS		Shaft		WR	20-200 Kt(120)
Labis	02-05-70	NTS		Shaft		WR	25 Kt
Diana Mist	02-11-70	NTS	DOD	Tunnel		WE	<20 Kt(9)
Cumarin	02-25-70	NTS		Shaft		WR	20-200 Kt(25)
Yannigan	02-26-70	NTS		Shaft		WR	20-200 Kt(100)
Cyathus	03-06-70	NTS		Shaft		WR	8.7 Kt
Arabis	03-06-70	NTS		Shaft		WR	<20 Kt
Jal	03-19-70	NTS		Shaft		WR	<20 Kt(6)
Shaper	03-23-70	NTS		Shaft		WR	20-200 Kt(93)
Handley	03-26-70	NTS		Shaft		WR	>1 Mt(1900 Kt)
Snubber	04-21-70	NTS		Shaft		WE	<20 Kt(6)
Can	04-21-70	NTS		Shaft		WR	20-200 Kt(8)
Beebala	05-01-70	NTS		Shaft		WR	<20 Kt(1)
Pod	05-01-70	NTS		Shaft		WR	<20 Kt(6)
Mint Leaf	05-05-70	NTS	DOD	Tunnel		WE	<20 Kt(28)
Diamond Dust	05-12-70	NTS	DOD	Tunnel		VU	<20 Kt
Cornice	05-15-70	NTS		Shaft		WR	20-200 Kt(39)
Manzanas	05-21-70	NTS		Shaft		WR	<20 Kt(1)
Morrone	05-21-70	NTS		Shaft		WR	20-200 Kt(20)
Hudson Moon	05-26-70	NTS	DOD	Tunnel		WE	<20 Kt(9)
Flask	05-26-70	NTS		Shaft		Plowshare	105 Kt
#	05-28-70	NTS		?		?	?
Arnica	06-26-70	NTS		Shaft		WR	20-200 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION EMERY							
Tijeras	10-14-70	NTS		Shaft		WR	20-200 Kt(94)
#	10-28-70	NTS		?		?	?
Abeytas	11-05-70	NTS		Shaft		WR	20-200 Kt(11)
?	11-19-70	NTS		?		?	?
Artesia	12-16-70	NTS		Shaft		WR	20-200 Kt
Cream	12-16-70	NTS		Shaft		WR	<20 Kt
Carpetbag	12-17-70	NTS		Shaft		WR	220 Kt
Baneberry	12-18-70	NTS		Shaft		WR	10 Kt
Embudo	06-16-71	NTS		Shaft		WR	<20 Kt(18)
Laguna	06-23-71	NTS		Shaft		WR	20-200 Kt(10)
Harebell	06-24-71	NTS		Shaft		WR	20-200 Kt(40)
Camphor	06-29-71	NTS		Tunnel		WE	<20 Kt
OPERATION GROMMET							
Diamond Mine	07-01-71	NTS	DOD	Tunnel		VU	<20 Kt
iniata	07-08-71	NTS		Shaft		Plowshare	83 Kt
Algodones	08-18-71	NTS		Shaft		WR	20-200 Kt(66)
#	09-22-71	NTS		?		?	?
Redernal	09-29-71	NTS		Shaft		WR	<20 Kt
Dathay	10-08-71	NTS		Shaft		WR	<20 Kt(7)
#	10-14-71	NTS		?		?	?
Cannikin	11-06-71	Amchitka, AK		Shaft		WR	<5 Mt
Proof test of W71 warhead for SPARTAN ABM missile.							
Diagonal Line	11-24-71	NTS	DOD	Shaft		WE	<20 Kt
#	11-30-71	NTS		?		?	?
Chaenactis	12-14-71	NTS		Shaft		WR	20-200 Kt(24)
#	02-03-72	NTS		?		?	?
#	03-30-72	NTS		?		?	?
Longchaeps	04-19-72	NTS		Shaft		WR	<20 Kt
Fisty North	05-02-72	NTS	DOD	Tunnel		WE	<20 Kt(19)
#	05-11-72	NTS		?		?	?
Zinnia	05-17-72	NTS		Shaft		WR	<20 Kt(8)
tonero	05-19-72	NTS		Shaft		WR	<20 Kt(7)
#	06-28-72	NTS		?		?	?
#	06-29-72	NTS		?		?	?
OPERATION TOGGLE							
Diamond Skulls	07-20-72	NTS	DOD	Tunnel		WE	<20 Kt(21)
Using full scale missile.							
#	07-25-72	NTS		?		?	?
Oscuro	09-21-72	NTS		Shaft		WR	20-200 Kt(130)
Delphinium	09-26-72	NTS		Shaft		WR	15 Kt
#	11-09-72	NTS		?		?	?
Flax	12-21-72	NTS		Shaft		WR	20-200 Kt(27)

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Aiera	03-08-73	NTS		Shaft		WR	20-200 Kt(67)
Angus	04-25-73	NTS		Shaft		WR	20-200 Kt(21)
Starwort	04-26-73	NTS		Shaft		WR	90 Kt
Rio Blanco Three devices fired.	05-17-73	Rifle, CO		Shaft		Plowshare	Three 33 Kt Devices
‡	05-24-73	NTS		?		?	?
Dido Queen	06-05-73	NTS	DOD	Tunnel		WE	<20 Kt(26)
Alaendro	06-06-73	NTS		Shaft		WR	200-1000 Kt(570)
‡	06-21-73	NTS		?		?	?
Portulaca	06-28-73	NTS		Shaft		WR	20-200 Kt(60)

OPERATION ARBOR

Husky Ace	10-12-73	NTS	DOD	Tunnel		WE	<20 Kt(9)
Bernal	11-28-73	NTS		Shaft		WR	<20 Kt
‡	12-12-73	NTS		?		?	?
Latir	02-27-74	NTS		Shaft		WR	20-200 Kt(150)
‡	05-22-74	NTS		?		?	?
Fallon	05-23-74	NTS		Shaft		5th UK	20-200 Kt
‡	06-06-74	NTS		?		?	?
King Blade	06-19-74	NTS	DOD	Tunnel		WE	<20 Kt(20)

OPERATION BEDROCK

Threshold Test Ban Treaty signed 3 July 1974. Submitted to U.S. Senate for ratification on 29 July 1976.

Escabosa	07-10-74	NTS		Shaft		WR	20-200 Kt(170)
‡	07-18-74	NTS		?		?	?
Puye	08-14-74	NTS		Shaft		WR	<20 Kt(40)
Portanteau	08-30-74	NTS		Shaft		WR	20-200 Kt(200)
‡	09-25-74	NTS		?		?	?
Etanyan	09-26-74	NTS		Shaft		WR	20-200 Kt(100)
Hybla Fair	10-28-74	NTS	DOD	Tunnel		WE	<20 Kt
‡	12-16-74	NTS		?		?	?(4)
Topgallant	02-28-75	NTS		Shaft		WR	20-200 Kt(185)
Cabrillo	03-07-75	NTS		Shaft		WR	20-200 Kt(120)
Dining Car	04-05-75	NTS	DOD	Tunnel		WE	<20 Kt(20)
Edaa	04-24-75	NTS		Shaft		WR	20-200 Kt(9)
Obar	04-30-75	NTS		Shaft		WR	20-200 Kt(41)
Tybo	05-14-75	NTS		Shaft		WR	200-1000 Kt(380)
Stilton	06-03-75	NTS		Shaft		WR	20-200 Kt(275)
Mizzen	06-03-75	NTS		Shaft		WR	20-200 Kt(160)
Hast	06-19-75	NTS		Shaft		WR	200-1000 Kt(520)
Canembert	06-26-75	NTS		Shaft		WR	200-1000 Kt(750)

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION ANVIL							
Marsh	09-06-75	NTS		Shaft		WR	<20 Kt(15)
Husky Pup	10-24-75	NTS	DOD	Tunnel		WE	<20 Kt(15)
Kasseri	10-28-75	NTS		Shaft		WR	200-1000 Kt(1200)
#	11-18-75	NTS		?		?	?
Inlet	11-20-75	NTS		Shaft		WR	200-1000 Kt(500)
Leyden	11-26-75	NTS		Shaft		WR	<20 Kt(5)
Chiberia	12-20-75	NTS		Shaft		WR	20-200 Kt(160)
Muenster	01-03-76	NTS		Shaft		WR	200-1000 Kt(600)
Keelson	02-04-76	NTS		Shaft		WR	20-200 Kt(200)
Esrom	02-04-76	NTS		Shaft		WR	20-200 Kt(150)
Fontina	02-12-76	NTS		Shaft		WR	200-1000 Kt(900)
Cheshire	02-14-76	NTS		Shaft		WR	200-500 Kt(350)
Estuary	03-09-76	NTS		Shaft		WR	200-500 Kt(350)
Colby	03-14-76	NTS		Shaft		WR	500-1000 Kt(900)
Pool	03-17-76	NTS		Shaft		WR	200-500 Kt(500)
Strait	03-17-76	NTS		Shaft		WR	200-500 Kt(200)
Mighty Epic	05-12-76	NTS	DOD	Tunnel		WE	<20 Kt
Billet	07-27-76	NTS		Shaft		WR	20-150 Kt
Banon	08-26-76	NTS		Shaft		6th UK	20-150 Kt
OPERATION FULCRUM							
Chevre	11-23-76	NTS		Shaft		WR	<20 Kt
Redaud	12-08-76	NTS		Shaft		WR	<20 Kt
Asiago	12-21-76	NTS		Shaft		WR	<20 Kt
Rudder	12-28-76	NTS		Shaft		WR	20-150 Kt
Marsilly	04-05-77	NTS		Shaft		WR	20-150 Kt
Bulkhead	04-27-77	NTS		Shaft		WR	20-150 Kt
Crewline	05-25-77	NTS		Shaft		WR	20-150 Kt
Strake	08-04-77	NTS		Shaft		WR	20-150 Kt
Scantling	08-19-77	NTS		Shaft		WR	20-150 Kt
Ebbtide	09-15-77	NTS		Shaft		WR	<20 Kt
Coulonniers	09-27-77	NTS		Shaft		WR	20-150 Kt
OPERATION CRESSET							
Bobstay	10-26-77	NTS		Shaft		WR	<20 Kt
Hybla Gold	11-01-77	NTS	DOD	Tunnel		WE	<20 Kt
Sandreef	11-09-77	NTS		Shaft		WR	20-150 Kt
Seamount	11-17-77	NTS		Shaft		WR	<20 Kt
Farallones	12-14-77	NTS		Shaft		WR	20-150 Kt
Campos	02-13-78	NTS		Shaft		WR	<20 Kt
Reblochon	02-23-78	NTS		Shaft		WR	20-150 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
#	03-16-78	NTS		?	?		?
Iceberg	03-23-78	NTS		Shaft	WR		20-150 Kt
Backbeach	04-11-78	NTS		Shaft	WR		20-150 Kt
Fondutta	04-11-78	NTS		Shaft	7th UK		20-150 Kt
Transea	05-10-78	NTS		Shaft	WR		Zero
No nuclear yield. Device was destroyed by Hearts detonation on 09-06-79.							
#	06-01-78	NTS		?	?		?
#	07-07-78	NTS		?	?		?
Lowball	07-12-78	NTS		Shaft	WR		20-150 Kt
Panir	08-31-78	NTS		Shaft	WR		20-150 Kt
Diablo Hawk	09-13-78	NTS	DOD	Tunnel	WE		<20 Kt
Broughts	09-27-78	NTS		Shaft	WR		20-150 Kt
Russey	09-27-78	NTS		Shaft	WR		20-150 Kt

OPERATION QUICKSILVER

Easenthal	11-02-78	NTS		Shaft	WR		<20 Kt
Guargel	11-18-78	NTS		Shaft	8th UK		20-150 Kt
#	12-01-78	NTS		?	?		?
Fara	12-16-78	NTS		Shaft	WR		20-150 Kt
Baccarat	01-24-79	NTS		Shaft	WR		<20 Kt
Guinella	02-08-79	NTS		Shaft	WR		20-150 Kt
Kloster	02-15-79	NTS		Shaft	WR		20-150 Kt
Memory	03-14-79	NTS		Shaft	WR		<20 Kt
#	05-11-79	NTS		?	?		?
Pepato	06-11-79	NTS		Shaft	WR		20-150 Kt
Chess	06-20-79	NTS		Shaft	WR		<20 Kt
Fajy	06-28-79	NTS		Shaft	WR		20-150 Kt
Burzet	08-03-79	NTS		Shaft	WR		20-150 Kt
Offshore	08-08-79	NTS		Shaft	WR		20-150 Kt
Kessel	08-29-79	NTS		Shaft	9th UK		20-150 Kt
Hearts	09-06-79	NTS		Shaft	WR		20-150 Kt
Detonation destroyed Transea device that did not detonate on 05-10-78.							
Fara	09-08-79	NTS		Shaft	WR		<20 Kt
Sheepshead	09-26-79	NTS		Shaft	WR		20-150 Kt

OPERATION TINDERBOX

Backgammon	11-29-79	NTS		Shaft	WR		<20 Kt
Azul	12-14-79	NTS		Shaft	WR		<20 Kt
Detonation destroyed Peninsula device that was damaged during emplacement on 10-23-75. The Peninsula device was not tested.							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Tarko	02-28-80	NTS		Shaft		WR	<20 Kt
Norbo	03-08-80	NTS		Shaft		WR	<20 Kt
Liptauer	04-03-80	NTS		Shaft		WR	20-150 Kt
Pyramid	04-16-80	NTS		Shaft		WR	20-150 Kt
Edwick	04-26-80	NTS		Shaft		10th UK	20-150 Kt
Canfield	05-02-80	NTS		Shaft		WR	<20 Kt
Flora	05-22-80	NTS		Shaft		WR	<20 Kt
Kash	06-12-80	NTS		Shaft		WR	20-150 Kt
Huron King	06-24-80	NTS	DOD	Shaft		WE	<20 Kt
Part of an Air Force and National Security Agency program to improve the database on nuclear hardening design techniques for satellites. A vertical line of sight test using a small BSCS III prototype.							
Tafi	07-25-80	NTS		Shaft		WR	20-150 Kt
Verdello	07-31-80	NTS		Shaft		WR	<20 Kt
Sonarda	09-25-80	NTS		Shaft		WR	20-150 Kt
Riola	09-25-80	NTS		Shaft		WR	<20 Kt
OPERATION GUARDIAN							
Dutchess	10-24-80	NTS		Shaft		11th UK	<20 Kt
Miners Iron	10-31-80	NTS	DOD	Tunnel		WE	<20 Kt
A test to evaluate the nuclear hardness of candidate materials for MX components such as motor cases, ablative nozzle, propellant and external booster parts. The test used 2000 channels of data.							
Dauphin	11-14-80	NTS	LLNL	Shaft		WR	<20 Kt
Test associated with development of a nuclear pumped x-ray laser.							
Serpa	12-17-80	NTS		Shaft		12th UK	20-150 Kt
Baseball	01-15-81	NTS		Shaft		WR	20-150 Kt
Clairette	02-05-81	NTS		Shaft		WR	<20 Kt
Beco	02-25-81	NTS		Shaft		WR	<20 Kt
Vide	04-30-81	NTS		Shaft		WR	<20 Kt
Aligote	05-29-81	NTS		Shaft		WR	<20 Kt
Harzer	06-06-81	NTS		Shaft		WR	20-150 Kt
Niza	07-10-81	NTS		Shaft		WR	<20 Kt
Pineau	07-16-81	NTS		Shaft		WR	<20 Kt
Havarti	08-05-81	NTS		Shaft		WR	<20 Kt
Islay	08-27-81	NTS		Shaft		WR	<20 Kt
Trebbiano	09-04-81	NTS		Shaft		WR	<20 Kt
Cernada	09-24-81	NTS		Shaft		WR	<20 Kt

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
OPERATION PRAETORIAN							
Faliza	10-01-81	NTS		Shaft		WR	20-150 Kt
Filci	11-11-81	NTS		Shaft		WR	20-150 Kt
Fousanne	11-12-81	NTS		Shaft		13th UK	20-150 Kt
Ikavi	12-03-81	NTS		Shaft		WR	20-150 Kt
Caboc	12-16-81	NTS		Shaft		WR	<20 Kt
Jornada	01-28-82	NTS		Shaft		WR	20-150 Kt
Molbo	02-12-82	NTS		Shaft		WR	20-150 Kt
Hosta	02-12-82	NTS		Shaft		WR	20-150 Kt
Tenaja	04-17-82	NTS		Shaft		WR	<20 Kt
Gibne	04-25-82	NTS		Shaft		14th UK	20-150 Kt
Kryddost	05-06-82	NTS		Shaft		WR	<20 Kt
Bouschet	05-07-82	NTS		Shaft		WR	20-150 Kt
Kesti	06-16-82	NTS		Shaft		WR	<20 Kt
Nebbiolo	06-24-82	NTS		Shaft		WR	20-150 Kt
Monterey	07-29-82	NTS		Shaft		WR	20-150 Kt
Atrisco	08-05-82	NTS		Shaft		WR	20-150 Kt
Queso	08-11-82	NTS		Shaft		WR	<20 Kt
Carro	09-02-82	NTS		Shaft		WR	<20 Kt
Huron Landing	09-23-82	NTS	DOD	Tunnel		WE	<20 Kt
<p>Simultaneous with Diamond Ace. A horizontal line of sight test on MX components. It was one of the largest, most complex tests DNA ever did, using 3000 channels of data to assess 400 separate experiments.</p>							
Diamond Ace	09-23-82	NTS	DOD	Tunnel		WE	<20 Kt
<p>Simultaneous with Huron Landing. The first event in the DISTANT ARBOR series. A joint DNA/DOE test to provide detailed diagnostic data of the radiation output of a low-yield nuclear device.</p>							
Frisco	09-23-82	NTS		Shaft		WR	20-150 Kt
Borrego	09-29-82	NTS		Shaft		WR	<150 Kt
OPERATION PHALANX							
Seyval	11-12-82	NTS		Shaft		WR	<20 Kt
Manteca	12-10-82	NTS		Shaft		WR	20-150 Kt
Coalora	02-11-83	NTS		Shaft		WR	<20 Kt
Cheedan	02-17-83	NTS		Shaft		WR	<20 Kt
Cabra	03-26-83	NTS		Shaft		WR	20-150 Kt
<p>Test associated with development of a nuclear pumped x-ray laser.</p>							

Event Name (and Comments)	Date (GCT)	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Turquoise	04-14-83	NTS		Shaft		WR	<150 Kt
Armada	04-22-83	NTS		Shaft		15th UK	<20 Kt
Crowdie	05-05-83	NTS		Shaft		WR	<20 Kt
Mini Jade	05-26-83	NTS	DOD	Tunnel		WE	<20 Kt
A test to obtain data to predict ground motion and cratering prediction. The test was conducted in a hemispherical cavity having an eleven meter radius.							
Fahada	05-26-83	NTS		Shaft		WR	<20 Kt
Danablu	06-09-83	NTS		Shaft		WR	<20 Kt
Laban	08-03-83	NTS		Shaft		WR	<20 Kt
Sabado	08-11-83	NTS		Shaft		WR	<20 Kt
‡	08-27-83	NTS		?		?	?
Chancellor	09-01-83	NTS		Shaft		WR	20-150 Kt
Toaae/Midnight Zephyr	09-21-83	NTS	DOD	Tunnel		WE	<20 Kt
The second event in the DISTANT ARBOR series. A joint DNA/DOE test to provide data for a low yield test bed.							
‡	09-21-83	NTS		?		?	?
Tachado	09-22-83	NTS		Shaft		WR	<150 Kt
OPERATION FUSILEER							
‡	12-09-83	NTS		?		?	?
Rozano	12-16-83	NTS		Shaft		WR	20-150 Kt
Test associated with development of a nuclear pumped x-ray laser.							
Gorbea	01-31-84	NTS		Shaft		WR	20-150 Kt
Midas Myth/Milagro	02-15-84	NTS	DOD	Tunnel		WE	<20 Kt
The first test in a series of three to validate hardness specifications for major elements of the triad. This 800 foot line of sight test provided data on the nuclear hardness of strategic reentry systems, specifically the MX's Mark 21. First use of glass strand fiber optics cables, which provide clearer reception of data and are secure from "tapping," thus improving the level of security.							
Tortugas	03-01-84	NTS		Shaft		WR	20-150 Kt
Agrini	03-31-84	NTS		Shaft		WR	<20 Kt
Mundo	05-01-84	NTS		Shaft		16th UK	20-150 Kt
‡	05-02-84	NTS		?		?	?
‡	05-16-84	NTS		?		?	?
Caprock	05-31-84	NTS		Shaft		WR	20-150 Kt

Event Name (and Comments)	Date	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Duoro	06-20-84	NTS		Shaft		WR	20-150 Kt
#	07-12-84	NTS		?		?	?
Kappeli	07-25-84	NTS		Shaft		WR	20-150 Kt
Corneo (test of W64 warhead)	08-02-84	NTS	LLNL	Shaft		SC	<20 Kt
Dolcetto	08-30-84	NTS	LANL	Shaft		WR	<20 Kt
Breton	09-13-84	NTS		Shaft		WR	20-150 Kt

OPERATION GRENADIER

#	10-02-84	NTS		?		?	?
Villita	11-20-84	NTS		Shaft		WR	<20 Kt
Egmont	12-09-84	NTS		Shaft		17th UK	20-150 Kt
Tierra (test of B83 bomb)	12-15-84	NTS		Shaft		SC	20-150 Kt
#	12-20-84	NTS		?		?	?
Vaughn	03-15-85	NTS	LANL	Shaft		WR	20-150 Kt
Cottage	03-23-85	NTS	LLNL	Shaft		WR	20-150 Kt

Test associated with development of a nuclear pumped x-ray laser.

Heraosa	04-02-85	NTS	LANL	Shaft		WR	20-150 Kt
Fifty Rain	04-06-85	NTS	LLNL/DOD	Tunnel		WE	<20 Kt

The second in a series to validate hardness specifications. A 900 foot line of sight test in support of the MX system, specifically the Mk21 reentry vehicle. Also included was a satellite vulnerability experiment to test its electronics in a radiation environment. Some X-ray laser lethality testing was also conducted.

Towanda	05-02-85	NTS	LANL	Shaft		WR	20-150 Kt
Salut	06-12-85	NTS	LLNL	Shaft		WR	20-150 Kt
Villa	06-12-85	NTS	LLNL	Shaft		WR	<20 Kt
Haribo	06-26-85	NTS	LLNL	Shaft		WR	<20 Kt
Serena	07-25-85	NTS	LLNL	Shaft		WR	20-150 Kt
Chaaita	08-17-85	NTS	LANL	Shaft		WR	<20 Kt
Ponil	09-27-85	NTS	LANL	Shaft		WR	<20 Kt

OPERATION CHARIOTEER

Hill Yard	10-09-85	NTS	LANL/DOD	Tunnel		WE	<20 Kt
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A second cavity experiment, similar to MINI Jade, to obtain data on cratering phenomenology and airburst phenomena. Also addressed issues on superhardening silos and the basing of the small ICBM. The shot used a very low yield device detonated at ground level in a 22 meter diameter hemispherical cavity.

Event Name (and Comments)	Date	Location	Sponsor	Type	Height of Burst (ft)	Purpose	Yield
Diamond Beach Third and final proof test for low yield test bed.	10-09-85	NTS	LLNL/DOD	Tunnel		WE	<20 Kt
Rocquefort	10-15-85	NTS	LLNL	Shaft		WR	20-150 Kt
Kinibito	12-05-85	NTS	LANL	Shaft		18th UK	20-150 Kt
Soldstone Test associated with development of a nuclear pumped X-ray laser.	12-28-85	NTS	LLNL	Shaft		WR	20-150 Kt

Footnotes for Table 1

1. DOE, Announced United States Nuclear Tests, July 1945 through December 1984, NVO-209 (Rev. 5), Nevada Operations Office, January 1985; "Nuclear Explosions 1945-Aug 17, 1985," printout, Swedish National Defense Research Institute; U.S. Department of Interior/Geological Survey, "Preliminary Determination of Epicenters," monthly; Ola Dahlman and Hans Israelson, Monitoring Underground Nuclear Explosions (Amsterdam: Elsevier Scientific Publishing Company, 1977), pp. 383-399; Stockholm International Peace Research Institute, Yearbooks 1968-69 through 1985; Defense Nuclear Agency volumes supporting Nuclear Test Personnel Review program: Project Trinity 1945-1946 (DNA 6028F); Operation Crossroads 1946 (DNA 6032F); Operation Sandstone 1948 (DNA 6033F); Operation Ranger 1951 (DNA 6022F); Operation Greenhouse 1951 (DNA 6034F); Operation Buster-Jangle 1951 (DNA 6023F); Shots Able to Easy (DNA 6024F); Shots Sugar and Uncle (DNA 6025F); Operation Tumbler-Snapper 1952 (DNA 6019F); Shots Able, Baker, Charlie, and Dog (DNA 6020); Shots Easy, Fox, George, and How (DNA 6021F); Operation Ivy 1952 (DNA 6036F); Operation Upshot-Knothole 1953 (DNA 6041F); Shots Annie to Ray (DNA 6017F); Shot Badger (DNA 6015F); Shot Simon (DNA 6016F); Shots Encore to Climax (DNA 6018F); Operation Castle 1954 (DNA 6035F); Operation Teapot 1955 (DNA 6009F); Shots Wasp to Hornet (DNA 6010F); Shot Bee (DNA 6011F); Shots Ess through Met and Shot Zucchini (DNA 6013F); Shot Apple 2 (DNA 6012F); Operation Wigwam (DNA 6000F); Operation Redwing 1956 (DNA 6037F); Plumbob Series 1957 (DNA 6005F); Shots Boltzmann to Wilson (DNA 6008F); Shot Priscilla (DNA 6003F); Shot Hood (DNA 6002F); Shots Diablo to Franklin Prime (DNA 6006F); Shot Smoky (DNA 6004F); Shot Galileo (DNA 6001F); Shots Wheeler to Morgan (DNA 6007F); Operation Hardtack I 1958 (DNA 6038F); Operation Hardtack II 1958 (DNA 6026F); Operation Dominic I 1962 (DNA 6040F); Operation Dominic II (DNA 6027F); Safety Experiments November 1955 - March 1958 (DNA 6030F); Projects Gnome and Sedan (DNA 6029F); Operations Nougat and Whetstone (DNA 6320F); Operations Flintlock and Latchkey (DNA 6321F); Operation Castle, Report of the Manager, Santa Fe Operations, Pacific Proving Ground Spring of 1954, Contract No. DNA 001-79-C-0455; DNA, Compilation of Local Fallout Data from Test Detonations 1945-1962 Extracted from DASA 1251, Volume II - Oceanic U.S. Tests, Contract No. DNA 001-79-C-0081, 1 May 1979; DOD-DOE, The Effects of Nuclear Weapons, compiled and edited by Samuel Glasstone and Philip J. Dolan, Third Edition, 1977; Lee Bowen, History of the Air Force Atomic Energy Program, Volume IV, The Development of Weapons (Washington, DC: U.S. Air Force Historical Division History, 1955), pp. 235-315; Robert A. Divine, Blowing on the Wind: The Nuclear Test Ban Debate 1954-1960 (New York: Oxford University Press, 1978).

2. Greenwich Civil Time.

3. Purposes abbreviated; key follows: WR = Weapons Related; WE = Weapons Effects; SE = Safety Experiment; ST = Storage-Transport; UU = Vela Uniform; SC = Stockpile Confidence; nth UK = Joint U.S./UK Test; Plowshare = Plowshare.

4. The nomenclature for test yields varied according to information policy governing specific years. In some cases, no yield information has been released; in a few cases, the terms "very slight" and "slight" were used without amplification. Except for tests where specific yields or relative specific yields such as "about 2 Kt," "several Mt," "less than 0.1 Kt," etc., were announced, test yields are given in these terms:

A. 1945 through 1963:

- Low (less than 20 Kt)
- Intermediate (20 to 200 Kt) -- all tests except Operation DOMINIC I
- Intermediate (20 to 1000 Kt) -- Operation DOMINIC I
- Submegaton (less than one Mt, but more than 200 Kt)
- Megaton Range
- Low Megaton (from one to several Mt)

B. 1964 through February 1976:

- Less than 20 Kt
- 20 to 200 Kt
- 200 to 1000 Kt

C. March 1976:

During a series of high-yield tests conducted during this month, two ranges were added, and the 200 to 1000 Kt range was dropped.

- 200 to 500 Kt
- 500 to 1000 Kt

D. Since March 1976:

On 31 March 1976 the Soviet Union and the United States agreed to limit the maximum yield of underground tests to 150 Kt. The yield ranges now reported are:

- Less than 20 Kt
- Less than 150 Kt
- 20 to 150 Kt

Figures in parentheses are from Dahlman and Israelson, Monitoring Underground Nuclear Explosions, and may carry a high degree of uncertainty. In cases where precise yields are given by DOE, Dahlman and Israelson estimates are excluded.

5. The symbol "*" in lieu of a test name denotes a test not announced by DOE.

Table 2
Known U.S. Nuclear Tests by Type

TESTS

	1		2
Underground	Shaft		491
	3	Tunnel	57
	4	Crater	9
		Unknown	43
			—
		Subtotal	600
	5		
Atmospheric	Tower		56
	6	Airdrop	52
	7	Barge	36
	8	Surface	28
	9	Balloon	25
	10	Rocket	12
	11	Artillery	1
			—
		Subtotal	210
Underwater			5
<u>WARFARE</u>			
Airdrop			2
			—
		TOTAL	817

-
1. A nuclear device exploded at the bottom of a drilled or mined vertical hole.
 2. Includes 18 joint U.S./UK tests.
 3. A nuclear device exploded at the end of a long horizontal drift mined into a mountain or mesa.
 4. A nuclear device placed shallow enough underground to produce a throw-out of earth when exploded.
 5. A nuclear device mounted at the top of a steel or wooden tower and exploded in the atmosphere.
 6. A nuclear device dropped from an aircraft.
 7. A nuclear device exploded from a barge moored in the lagoon at Enewetak or Bikini. This technique, first used in 1954, was to compensate for the lack of land at the Pacific Proving Ground.
 8. A nuclear device placed on or close to the Earth's surface.
 9. A nuclear device suspended from a balloon and exploded in the atmosphere.
 10. A nuclear device launched by rocket and exploded in the atmosphere.
 11. This category is identified by DOE as "airburst," referring to an explosion of a nuclear weapon at such a height that the expanding fireball does not touch the Earth's surface prior to the time the fireball reaches its maximum luminosity. The only airburst event reported by DOE, however, is Event Grable (25 May 1953), an atomic artillery shell fired from a 280mm cannon.

Table 3
Known U.S. Nuclear Tests by Location

Pacific	4	
1		
Johnston Island Area	12	
2		
Enewetak	43	
3		
Bikini	23	
4		
Christmas Island Area	24	
	<u>106</u>	Total Pacific
Nevada Test Site (underground)	589	
Nevada Test Site (atmospheric)	100	
	<u>689</u>	Total Nevada Test Site
Alamagordo, New Mexico	1	
Hiroshima, Japan	1	
Nagasaki, Japan	1	
Carlsbad, New Mexico	1	
Hattiesburg, Mississippi	2	
Grand Valley, Colorado	1	
Rifle, Colorado	1	
Farmington, New Mexico	1	
Central Nevada	1	
Fallon, Nevada	1	
Bombing Range, Nevada	5	
Amchitka, Alaska	3	
	<u>19</u>	Total
South Atlantic	3	
	<u>817</u>	GRAND TOTAL

-
1. Johnston Island, a possession of the U.S. since the acquisition of Hawaii in the 19th century, is about 780 nm west-southwest of Hawaii.
 2. Enewetak, part of the Marshall Islands, is approximately 2380 nm southwest of Honolulu. It encloses a lagoon 23 miles in diameter and has a total land area of 2.75 square miles.
 3. Bikini is 189 nm east of Enewetak. Its islands consist of about 2.7 square miles of surface area and encircles a lagoon that is 25 miles long and 15 miles wide, with a maximum depth of about 200 feet.
 4. Christmas Island is an atoll lying 2 degrees north of the equator, approximately 1200 nm south and slightly east of Hawaii. A British possession, it was used to test U.K. nuclear devices in 1957-58.

Table 4
Known U.S. Nuclear Tests by Purpose

Warfare	2	
Weapons Related ¹	613	
Weapons Effects	88	
Safety Experiment ²	33	
Plowshare ³	27	
Vela Uniform ⁴	7	
Storage-Transportation ⁵	4	
Unknown	43	
	<u>817</u>	TOTAL

-
1. Includes 18 joint U.S./UK tests.
 2. An experiment designed to confirm a nuclear explosion will not occur in case of an accidental detonation of the explosive associated with the device.
 3. Application of nuclear explosives to develop peaceful uses for atomic energy between 1961-1973.
 4. Vela tests are nuclear explosions designed to provide information so as to improve the capability of detecting, identifying, and locating underground nuclear explosions.
 5. Detonation of combinations of high explosives and nuclear materials designed to study distribution of nuclear materials during accidents in several transportation and storage configurations.

Table 5
Known U.S. Nuclear Tests by Year with Estimated Yields

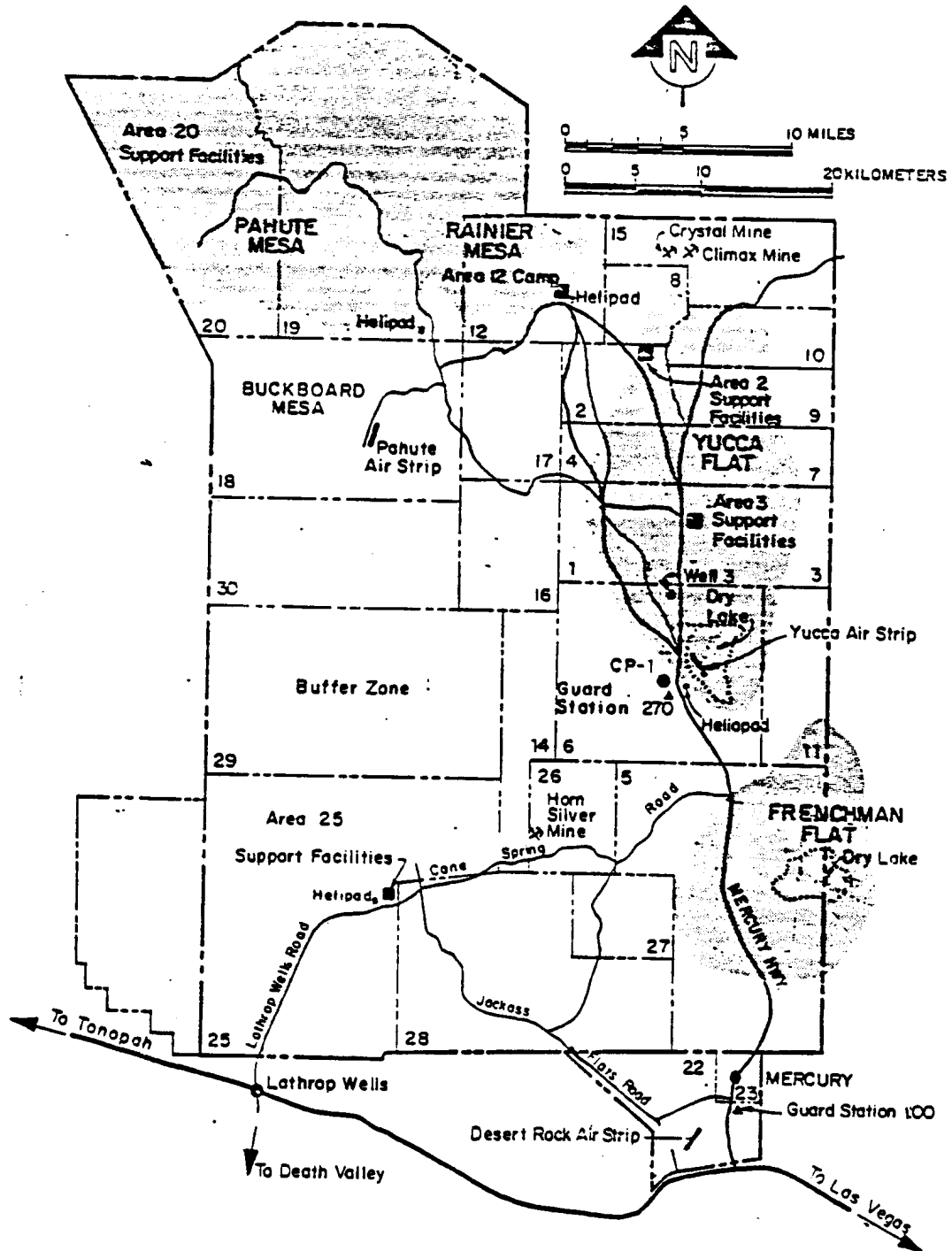
<u>Year</u>	<u>Number</u> ¹	<u>Cumulative Total</u>	<u>Yield (Kt)</u> ²	<u>Cumulative Yield (Kt)</u>
1945	3	3	55	55
1946	2	5	46	101
1947	0	5	0	101
1948	3	8	104	205
1949	0	8	0	205
1950	0	8	0	205
1951	16	24	500	705
1952	10	34	11004	11709
1953	11	45	252	11961
1954	6	51	48200	60161
1955	18	69	197	60358
1956	18	87	17000	77358
1957	32	119	346	77704
1958	77	196	35500	113204
1959	0	196	0	113204
1960	0	196	0	113204
1961	10	206	56	113260
1962	98(2)	304	24102	137362
1963	43 ³	347	615	137977
1964	30(1)	377	999	138976
1965	30(1)	407	576	139552
1966	40	447	2189	141741
1967	29	476	1245	142986
1968	39	515	4736	147722
1969	29	544	2836	150558
1970	33	577	3020	153578
1971	15	592	4800	158378
1972	15	607	274	158652
1973	12	619	960	159612
1974	13(1)	632	744	160356
1975	17	649	4012	164368
1976	16(1)	665	4484	168852
1977	12	677	424	169276
1978	18(2)	695	542	169818
1979	16(1)	711	492	170310
1980	17(3)	729	410	170720
1981	17(1)	745	366	171086
1982	19(1)	764	568	171654
1983	18(1)	782	280	171934
1984	19(2)	801	528	172462
1985	16(1)	817	492	172954

-
1. Includes 18 joint U.S./UK tests and Hiroshima and Nagasaki. The number of joint U.S./UK tests in each year are given in parentheses.
 2. The nomenclature for test yields varied according to information policy governing specific years. In 46 cases, DOE provided no yield information. In other cases the exact yield or a yield range was given. In the latter case three formats have been used (A-C below). The yields following the "-" signs are the authors estimates of the average yield in each range, which were used to compute the total annual and cumulative yields.
 - A. 1945 through 1963:
 - Low (less than 20 Kt) = 6 Kt
 - Intermediate (20 to 200 Kt) -- all tests except Operation Dominic I = 50 Kt
 - Intermediate (20 to 1000 Kt) -- Operation Dominic I = 200 Kt
 - Submegaton (less than one Mt, but more than 200 Kt) = 300 Kt
 - Megaton Range = 5.0 Mt
 - Low Megaton (from one to several Mt) = 1.4 Mt
 - B. 1964 through February 1976:
 - Less than 20 Kt = 6 Kt
 - 20 to 200 Kt = 50 Kt
 - 200 to 1000 Kt = 300 KtDuring a series of high-yield tests conducted during March 1976, two ranges were added, and the 200 to 1000 Kt range was dropped.
 - 200 to 500 Kt = 300 Kt
 - 500 to 1000 Kt = 750 Kt
 - C. Since March 1976:

On 31 March 1976, the Soviet Union and the United States agreed to limit the maximum yield of underground tests to 150 Kt. The yield ranges now reported are:

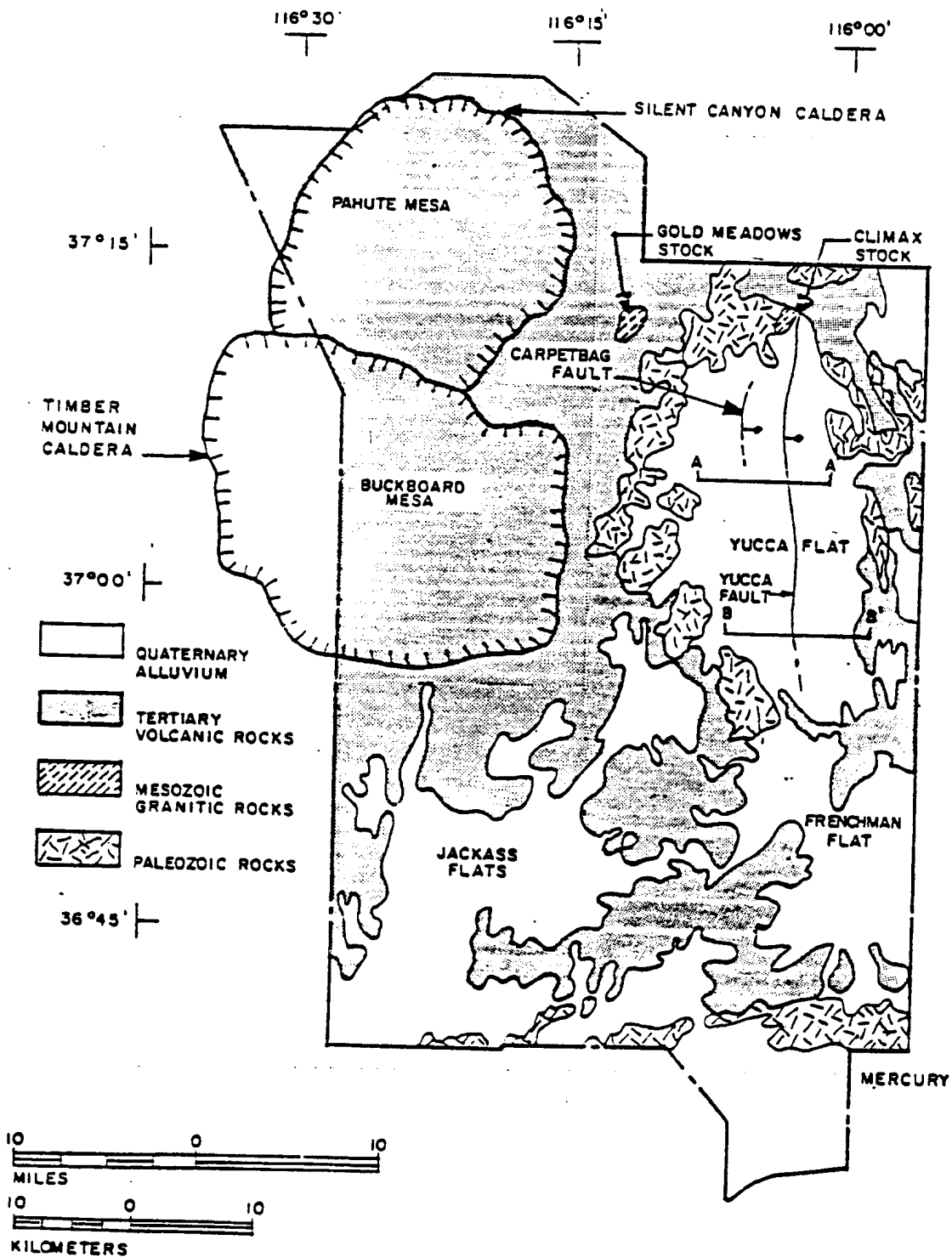
 - Less than 20 Kt = 6 Kt
 - 20 to 150 Kt = 50 Kt
 - Less than 150 Kt = 20 Kt
 - D. The 43 tests announced by the National Defense Research Institute but not by DOE are assumed to be less than 20 Kt (averaging 6 Kt).
 - E. Announced tests with no yield data in 1956 and 1958 were calculated from yield data in tables provided by the AEC in a Note to Editors and Correspondents which were provided to the JCAE on 5 May 1959.
 3. Number pre-treaty 333; post-treaty 484.

NEVADA TEST SITE

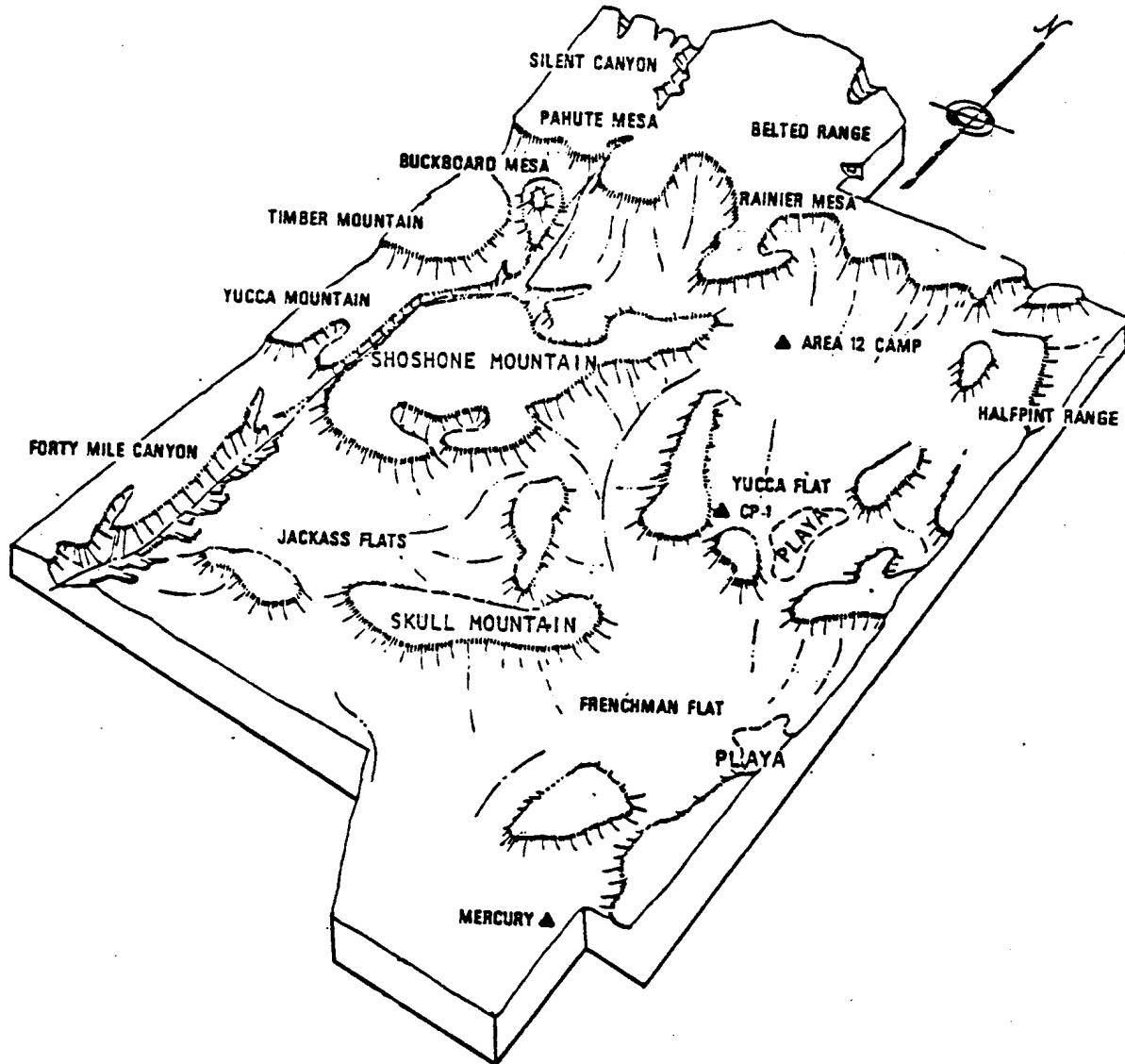


Shaded Areas indicate principal areas used for underground testing

PRINCIPAL ROCK TYPES OF THE NEVADA TEST SITE



NEVADA TEST SITE TOPOGRAPHY



Pahute Mesa	-	7,235 feet
Rainier Mesa	-	7,694 feet
Frenchman Flat	-	3,000 feet
Jackass Flats	-	3,000 feet

Highest and lowest points above sea level