NUCLEAR WEAPONS DATABOOK

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Known Soviet Nuclear Explosions, 1949-1985 Preliminary List

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This working paper provides a preliminary list of known nuclear explosions conducted by the Soviet Union from August 1949 through 31 December 1985.[1] It includes explosions announced by the United States, explosions not announced by the United States but detected by seismic means and reported by other scientific institutions, and a few explosions made public in recently declassified U.S. government documents.[2] Table 1 lists the explosions chronologically and provides, wherever possible, the time, location (including latitude and longitude), seismic data, yield range, type (atmospheric, underwater, or underground), and purpose (presumed military or civilian) of the explosions. Table 2 summarizes this information. Tables 3 and 4 provide distributions by month of the known explosions at the Semipalatinsk and Novaya Zemlya test sites, respectively, with a summary of this distribution in Table 5. Table 6 provides an estimate of the annual and cumulative yields of the known Soviet nuclear explosions.

The first Soviet test of a nuclear device occurred on 29 August 1949 on a tower variously reported to be in the vicinity

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1 A revised list of Soviet nuclear explosions will appear as an appendix in Volume III of the Nuclear Weapons Databook series, Soviet Nuclear Weapons; by Thomas B. Cochran, William M. Arkin, and Jeffrey I. Sands (Cambridge, Mass.: Ballinger Publishing Company, forthcoming). Lynn R. Sykes will be a contributing author of the appendix. Readers' additions or corrections would be appreciated.

2 With the exception of some PNEs and some early tests, typically the Soviet Union does not announce its nuclear tests.

of the Aral Sea in the Ustyurt Plateau, on the northeast shore of the Caspian Sea, or near Semipalatinsk. From 29 August 1949 to 31 December 1985 the Soviets have conducted some 600 known nuclear explosions, eighty percent of which are presumed to have been for military purposes. The U.S. has announced 340 nuclear events by date or test series (some dates are the dates of announcement, not necessarily shot dates), with an additional 34 tests known from declassified U.S. government documents by month or year. This leaves some 35 percent of the known Soviet explosions unannounced or unreported by the United States but reported by other scientific insitutions.

Just over a quarter of the known explosions were conducted in the atmosphere or from above ground towers (176 tests, all tests from 1949 through 1962 except for eight tests), at least three tests were conducted underwater (one in September 1955 in the Barents Sea, another probably in September 1957 off the coast of Novaya Zemlya,[3] and the third in October 1961 also off the coast of Novaya Zemlya), and the remainder of the tests (424) have been conducted underground. The first five underground tests occurred in 1956 through 1958, with the first announced

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3 A 1958 intelligence document notes that three tests were associated with naval applications, two underwater and one surface burst; Central Intelligence Agency, Office of Scientific Intelligence, Appendix E, Impact of a September 1958 Nuclear Test Moratorium on Soviet Nuclear Weapons Capabilities, Prepared for the Ad Hoc Panel on Nuclear Test Limitations, 18 March 1958, p. 7. A September 1957 test off the coast of Novaya Zemlya could be the second underwater burst noted in this document.

underground test taking place on 2 February 1962 at Semipalatinsk.

Approximately 69 percent of the known Soviet tests have occurred at the two main test sites at Semipalatinsk in East Kazakhstan (49 percent) and on the island of Novaya Zemlya in the Barents Sea (20 percent). The center of the Semipalatinsk site is approximately 100 miles southwest of the city of Semipalatinsk on a latitude the same as that of Paris. The main support facilities for the site appear to be on Mount (Gora) Degelen, a plateau 2200 feet high, 500 to 1000 feet higher than the surrounding area. A nearby 5800 foot airfield (Degelen/Uzynbulak) may be used for transporting nuclear devices to the site. With a few exceptions, almost three hundred tests have been exploded within a rectangle of 2150 square miles (49.700 to 50.125 North by 77.700 to 79.100 East).

The second current test site is the island of Novaya Zemlya which from the 1958 through 1963 was the main Soviet test site. Of the 119 known tests that were held there, approximately 70 percent were atmospheric tests held during these years. Included in these test series were the largest thermonuclear bombs ever exploded by any nation. Since the Limited Test Ban Treaty entered force in 1963 prohibiting explosions in the atmosphere, the Soviets have conducted 33 known underground tests on Novaya Zemlya at two sites. The northern site, where 27 of these tests were conducted, is a 100 square mile area (73.300 to 73.400 North by 54.500 to 55.160 East) on the Matochkin Shar Strait (Proliv).

Devices are probably transported by ship from the Kola Peninsula to a small dock at 73.385 North, 54.735 East on the channel. The other six tests took place at a small southern site in an area of approximately 75 square miles in the southwest part of the island (center 70.796 North, 53.992 East). All six were conducted during a two year period from the fall of 1973 to the fall of 1975.

Tests have occurred in every month of the year at Semipalatinsk though the concentration is in the second half of the year (65 percent versus 35 percent) (see Table 5). Because of the extreme climate at Novaya Zemlya (the sites are over 400 miles above the Arctic Circle), most of the underground tests there are conducted in September and October with only a handful held during the July, August, November and December. Historically, at the Semipalatinsk and Novaya Zemlya test sites, the Soviets have tested nearly three times as often in the second half of the year compared to the first half.

While specific yield data for most individual tests are unavailable, it is possible to provide estimates of the cumulative yield (see Table 6). For all Soviet tests the combined yield is estimated to be more than 500 megatons which is more than three times that of the United States and some 70 percent of the world's total (see Table 6). Some 80 percent of the Soviet total is concentrated in 1961 and 1962. During a two month period from the beginning of September to the beginning of November 1961, 200 megatons were exploded, including the largest

nuclear explosion thought to have occurred, a 58 megaton blast over Novaya Zemlya on 30 October 1961. Tests are now limited to a maximum yield of 150 kilotons under terms of the Threshold Test Ban Treaty signed by General Secretary Brezhnev on 3 July 1974. The ban did not take effect until 31 March 1976.

The Soviets have conducted an extensive Peaceful Nuclear Explosion (PNE) program. Whereas the United States detonated 27 devices in its Plowshare PNE program beginning on 10 December 1961 through 17 May 1973 (3 percent of all U.S. tests), the Soviets have exploded 110 PNEs from 30 September 1966 through 1985 (19 percent of total tests) involving a variety of projects. One project is at the Astrakhan natural gas field near where the Volga River joins the Caspian Sea, for which 31 explosions were used from 1975 through 1985. The purpose of the explosions is believed to be to create underground storage cavities. A similar project has been going on in the Orenburg gas field in the southern Urals where three explosions each in July 1983 and July 1984 were detonated. Other reported projects include canal excavation, creation of water reservoirs, underground mining, and putting out fires in oil fields.4

From the limited amount of information available it is possible to partially reconstruct the evolution of early Soviet warhead design through certain milestones in tests. The first Soviet test was on 29 August 1949. Named "Joe I" after Joseph

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4 SIPRI Yearbook, 1972, pp. 464-468.

Stalin, it was a plutonium bomb similar in design to the Nagasaki type FAT MAN bomb, with a comparable yield of approximately 10-20 kilotons (kt).[5] Uranium-238 was in close proximity to the fissile material, indicative of a natural uranium tamper.[6] The second test, Joe II, took place two years later on 24 September 1951. It was also a plutonium bomb, tested on or slightly underground. The efficiency of utilization of the plutonium was greater than that of Joe I and its yield was at least 25 kt.[7]

Joe III was tested on 19 October 1951 GMT. Analysis of the debris indicated that the explosion did not occur close to the ground (the data were most consistent with an air burst) and that both plutonium and U-235 were used as the fissionable materials.[8] Joe III was the first test by the Soviet Union of the more efficient composite core design. The efficiency of utilization of the plutonium in the explosion was determined to be about 35

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5 Two reports from the Joint Atomic Energy Intelligence Committee -- Status of the Soviet Energy Program, 27 December 1950 and 8 January 1953 -- provide yield estimates of Joe I assuming a bomb model containing 6 kilograms of plutonium. The earlier report provides an estimate of 20 kt, and the latter 10-20 kt.

6 See, Doyle L. Northrup, Director AFOAT-1, Memorandum for Major-General Nelson, 19 September 1949.

7 Joint Atomic Energy Intelligence Committee, National Scientific Intelligence Estimate, Status of the Soviet Atomic Energy Program, NSIE-1 (CIA/SI 13-52), 8 January 1953.

8 Joint Atomic Energy Intelligence Committee, National Scientific Intelligence Estimate, Status of the Soviet Atomic Energy Program, NSIE-1 (CIA/SI 13-52), 8 January 1953. Production of highly enriched uranium by the gaseous diffusion method began in the Soviet Union in 1951.

percent, but that of uranium was not determined.9 Assuming a core of 3.5 kg of plutonium and 7 kg of uranium (a ratio of uranium to plutonium lower than that employed in the U.S. B4 bomb at the time), the U.S. estimated the yield at about 50 kt.10

The Soviet Union did not test again until 12 August 1953 when Joe 4, the first Soviet thermonuclear device, took place. It was a tower shot with a yield of 200 to 300 kt. Joe 4 appears to have been a single stage boosted fission type configuration using U-235 as a fissile component and lithium deuteride as the fusion material.11

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9 Ibid.

10 Ibid. This assumes the efficiency of uranium utilization was 23 percent.

11 Although Joe 4 utilized the solid lithium-deuteride fuel, it was not a two stage thermonuclear device using an approach comparable to the Teller Ulam design. York argues that "[i]t evidently involved one of several possible straightforward configurations for igniting relative small amounts of thermonuclear material (as compared to the U.S. Mike and Bravo devices) with a relative large amount of fissile material" (Herbert F. York, The Advisors: Oppenheimer, Teller and the Superbomb (San Francisco: W.H. Freeman and Company, 1976), p. 95). York elsewhere notes that Joe 4 was "a development step the United States bypassed in its successful search for a configuration that would make it possible to produce an arbitrarily large explosion with a relatively small quantity of fissionable material"; Herbert York, Scientific Amercian, October 1975, p. 111. Thus the lithium-deuteride (Li-D) was probably contained within, or proximate to, the fissile core. Li-D is less effective than deuterium-tritium (D-T) in a boosted fission device because neutrons which otherwise would be used to increase the fission efficiency are required to breed tritium from the lithium. Joe 4 may have been designed to confirm that solid Li-D could be used as a fusion material rather than deuterium or deuterium and tritium in liquid or gaseous form. This was not confirmed in the U.S. program until the 28 February 1954 BRAVO test.

Joe 5 through 7 also occurred in August 1953, all possibly low yield fission weapons. According to a 28 August 1954 U.S. National Intelligence Estimate,

> By the end of 1953, the USSR had tested small, medium, and large-yield nuclear weapons, and had employed thermonuclear boosting prinicples to produce energy yields in the range of the equivalent of a few thousand to at least one million tons of TNT. By the end of 1953, moreover, the USSR had reached a point in weapon technology at which it was capable of producing a wide variety of weapon types, and nuclear warheads for weapons other than bombs.[12]

Little is known about the seven tests in the September-October 1954 tests series. More is known about the five tests of the 1955 tests series. The first two tests, Joe 15 and 16, were atmospheric bursts of fission devices using plutonium with yields of 5 and 25 kt respectively. Joe 17 was an underwater test (the first conducted by the Soviets) of a plutonium device with a yield on the order of 20 kt. Joe 18 was tested on 6 November 1955 and had a yield of 215 kt. The presence of a thermonuclear component was evident from the debris[13] and it is believed to

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Holloway argues that since Joe 18 was believed to be a "weaponized version" of Joe 4, the Joe 4 design was not merely a step in the development of the super but a third type of thermonuclear bomb (David Holloway, "Soviet Thermonuclear Development," International Security, Volume 4, Number 3, Winter 1979/80, p. 194).

12 Central Intelligence Agency, NIE 11-4-54, Soviet Capabilities and Probable Courses of Action Through Mid-1959, 28 August 1954, p. 52. Actually, the highest yield achieved by the end of 1953 was 200-300 kt, although yields up to one megatons were feasible using the thermonuclear boosting principle tested with Joe 4.

13 Joint Intelligence Committee, The JIC Semi-Annual Review of Trends in Communist Bloc Policy Including Communist China

have been a weaponized version of the Joe 4, a boosted configuration reduced to a more easily deliverable size. Finally, Joe 19, tested on 22 November 1955, was the first Soviet two stage thermonuclear device employing something like the Teller-Ullam idea, the so-called "superbomb." Its yield was about 1.6 Mt. This thermonuclear weapons was the first superbomb to be delivered by aircraft. It was exploded at an altitude of several thousand feet.

Eleven high-yield thermonuclear tests were conducted from 1956 through 28 February 1958. The first five of these, through 16 April 1957, had rather low yield-to-weight ratios. Evidence of an improvement in yield-to-weight occurred beginning with the sixth high-yield thermonuclear test on 22 August 1957.14 York claims that it took the Soviets "several more years following their 1955 test before they were able to match the explosions in [the U.S.] 1952 and 1954 tests."15

As of March 1958, the U.S. had determined that "at least three Soviet tests were associated with naval applications (two [del] underwater and one [del] surface burst), one test was conducted in conjunction with Army maneuvers, and two tests

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(1 Occtober 1955 - 29 Feoruary 1956), JIC 133/3(56), 16 May 1956, p. 6.

14 Central Intelligence Agency, Office of Scientific Intelligence, Appendix E, Impact of a September 1958 Nuclear Test Moratorium on Soviet Nuclear Weapons Capabilities, 18 March 1958, p. 1.

15 York, The Advisors, p. 93.

probably involved warheads in a surface-to-surface missile (SSM) and in an air-to-surface missile (ASM), respectively."16 Although certain of the test configurations were compatible with available air defense missiles, there was no evidence at that time that the Soviet Union had conducted environmental effects tests using warheads compatible with air defense applications or very high or ultra-high altitude tests leading to anti-ICBM applications.17

The Soviets tested a 58 Mt multi-stage thermonuclear device on 30 October 1961, the largest yield device ever exploded. There is no evidence that such a high yield device was ever weaponized,18 though the U.S. believed that the device could have been delivered by the Bear long-range bomber.19

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16 Central Intelligence Agency, Office of Scientific Intelligence, Appendix E, Impact of a September 1958 Nuclear Test Moratorium on Soviet Nuclear Weapons Capabilities, p. 7.

17 Ibid., pp. 7-8. On 6 September 1961, the Soviets conducted a high altitude burst over an experimental radar at Sary Shagan, presumably to test EMP effects on the radar. There were widespread but unconfirmed reports that this test was a live firing of an ABM warhead against a target (John Prados, The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength (New York: Dial Press, 1982), p. 153). Dr. Harold Brown, then DDR&E, argued that the Soviet's had not conducted a test of a live ABM interceptor; see Lawrence Freedman, US Intelligence and the Soviet Strategic Threat (Boulder, Colorado: Westview Press, 1977), p. 87, referencing Edward Randolph Jayne, The ABM Debate: Strategic Defense and National Security, MIT Center for International Studies, June 1969.

18 York, The Advisors, p. 93.

19 Minutes of Meeting of the Status of U.S. and Soviet Nuclear Tests, February 2, 1962, presented to the President by representatives of the AEC, CIA, and DoD.

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
08/29/49		Joe 1, announced by AEC on 09/23/49 At least until mid-1953, the AEC believed the test took place on or about 08/27/49 (j4/9/10); various locations are given for the test, including in Asia near Semipalatinsk (e5), in an area roughly centered on the northeast shore of the Caspian Sea (j9) [near to Kapustin Yar?], and in the vicinity of the Aral Sea (approx. 45N 60E) (j10)/near the Ustyurt Desert (h) [near to Tyuratam?]. It is possible (and reasonable to expect) that the first test took place at the proving ground which is within a few hundred miles of 48N 76E (j10) [i.e., Semi test site]. Time of the test reported as 1700 local time (j10). Test used plutonium as the fissionable material (j7).					j4	10 to 20 kt, assuming 6kg plutonium (j7); around 20 kt (j8)	atmosphere tower (e5)
09/24/51		Joe 2, announced by AEC on 10/03/51; Semi [see Joe 1] (j10) Test used plutonium as the fissionable material, and occurred on or slightly under the surface of the ground (j7). Time of the test reported as 1500 local time (j10), 1015 [GMT?] 1515 local time (j11). Intensity of the acoustic signal was approximately of the same order of magnitude as those associated with April/May 1951 U.S. tests at Eniwetak when measured at comparable distances (j11).					j4	at least 25 kt, assuming 6 kg plutonium (j7)	atmosphere tower?
10/18/51		Joe 3, announced by AEC on 10/22/51; Semi [see Joe 1] (j10) Announcement made "prematurely" and without full evaluation due to leak (j4). Test was a composite design using both plutonium and uranium-235 as the fissionable materials, with the efficiency of utilization of the plutonium about 35 percent (j7).					j4	about 50 kt, assuming 7kg U-235 and 3.5kg plutonium (j7)	atmosphere air burst (j7)
08/12/53		Joe 4, announced by AEC on 08/19/53. First Soviet thermonuclear test, a fusion reaction with a boosted configuration involving use of lithium deuteride (d); rain water samples contained tritium (j5). It is not known whether or not the device was a deliverable weapon (j5); test reported to have taken place in Siberia (h).					j4	thermonuclear (a,d) 200-300 kt (d)	atmosphere tower (e5)
08/23/53		Joe 5, 6 or 7 A series of four atmospheric tests -- Joe 4 through 7 -- took place in 1953 (j3,j6), one of which was a fission explosion on 08/23/53 (a,c1) with a yield equivalent to that of the type detonated at NTS (a). Interpretations of Joe 5, 6, and 7 are speculative, including designs for the conversion of large bombs to a large number of air defense missiles (j3). Joe 5 is the least clear of the series, especially in its motivation; it was probably an air drop but a shot on a wooden tower cannot be excluded(j6). One of the four tests, possibly Joe 4, was at first thought to have a force of one megaton (j12).					a,c1	equivalent to that detonated at NTS (a)	atmosphere

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
09/14/54	53600.0	Ural	64.000	55.000			b1		atmosphere
		A series of tests which began in mid-September at intervals was announced by the AEC on 10/26/54 (a1). This series presumably included test numbers 8 thru 14.							atmosphere
07/29/55		Soviet test number 15.					d	5 kt	atmosphere
08/02/55		Soviet test number 16. This series of tests was announced by the AEC on 08/04/55 (a1). Both probably used plutonium (d).					d	25 kt	atmosphere
09/21/55		Soviet test number 17. The test took place in the Barents Sea; the device, which probably used plutonium, was most likely moored at a depth of 100 feet or more (d). The test was announced by the AEC on 09/24/55 (a1,b1).					d	order of 20 kt	underwater
11/06/55		Soviet test number 18; Semi (j13). This test has been described as a "weaponized version of the 1953 boosted configuration [i.e., 08/12/53 test] reduced to a more easily deliverable size" and it is believed to have been a boosted fission weapon using a U-235 core as well as U-238 and lithium deuteride (d). Deliverable by aircraft (j13). The test was announced by the AEC on 11/10/55 (a1,b1). Reported to take place at about 0450Z somewhere between the Semi test site and a point 400 nautical miles to the East (j14).					d	215 kt	atmosphere airburst (j13)
11/22/55		Soviet test number 19; at Semi (d,j13). A two-stage thermonuclear weapon employing both U-235 and U-233 as well as U-238 and lithium deuteride was carried by an aircraft and set off at an elevation of several thousand feet (d). This thermonuclear weapon (j2) had a yield in the megaton range (a1), and was announced on 11/23/55 (a1,b1). It was the Soviet's first high yield thermonuclear test (j2).					d	1600 kt	atmosphere
Jan-Feb 1956		Tests possibly in northeastern Siberian area. Some relatively short-lived artificial radioactivity was detected in February 1956 suggesting further tests in the Soviet Union. This test series was still in progress at the end of February.					j13		
~03/20/56		A series announced by the AEC on 03/21/56 took place in the preceeding few days before the announcement (a1,b1)							atmosphere
~03/30-04/1/56		A series announced by the AEC on 04/02/56 took place in the preceeding few days before the announcement (a1,b1)							atmosphere
08/24/56		Siberia; part of a series of atmospheric tests (a).					a,b1	less than a megaton (a)	atmosphere
08/30/56		Siberia; part of a series of atmospheric tests (a). [Probably one of three high yield thermonuclear tests conducted from January 1956 through 4/15/57.]					a,b1	large (a)	atmosphere

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
09/02/56		Part of a series of atmospheric tests (a)					a,b1		atmosphere
09/10/56		Part of a series of atmospheric tests (a)					a,b1		atmosphere
		A series of tests was announced by the Soviet Union on 09/10/56 (a).							
11/17/56		Part of a series of atmospheric tests (a)					a,b1		atmosphere
01/19/57		Part of a series of atmospheric tests (a)					a,b1		atmosphere
03/08/57		Part of a series of atmospheric tests (a)					a,b1		atmosphere
04/03/57		Part of a series of atmospheric tests (a)					a,b1		atmosphere
04/06/57		Part of a series of atmospheric tests (a)					a,b1		atmosphere
04/10/57							a,b1	large (a)	atmosphere
		[Probably one of three high yield thermonuclear tests conducted from January 1956 through 4/15/57.]							
04/12/57		Part of a series of atmospheric tests (a)					a,b1		atmosphere
04/16/57		Siberia; largest of test series (a).					a,b1	large (a)	atmosphere
		Fifth high yield thermonuclear device (j2). [One additional high yield thermonuclear test conducted between January 1956 and this date.]							
09/22/57		Siberia					a,b1	substantial (a)	atmosphere
		Test may have evidenced an improved yield-to-wiegth ratio for hihg yield thermonuclear device; test was the sixth of such a device (j2).							
		yield-to-weight ratio (j2).							
September 1957		Siberia					a1,b1	moderate (a1)	atmosphere
		Test within within preceding two days of 09/09/57 announcement by AEC (a1).							
09/24/57	90000.0	NZ	73.000	55.000			b1	megaton range (a)	atmosphere (a)
		Arctic (a). Seventh high yield thermonuclear test, possibly evidencing an improved yield-to-weight ration for such devices (j2).							
09/26/57	50000.0	Semi, announced by JAEIC					j1	7 to 70 kt, preference to lower end	
		12th test of current test series, four of this series in September 1957 (two at Semi and two off the east coast of NZ) (j1). [It is probable that this is the 12th test conducted in 1957.] The two tests conducted off the east coast of NZ were probably two of the three tests of devices for naval applications reported to have taken place by 03/18/58; if so, one of the September 1957 tests was conducted underwater and the other was a surface burst (j2).							
10/06/57	85800.0	NZ	73.000	55.000			b1	substantial (a)	atmosphere (a)
		Announced by USSR as a hydrogen device (a). Eighth test of a high yield thermonuclear device, possibly evidencing evidenced an improved yield-to-weight ratio for such devices (j2).							
10/10/57	65500.0	Arctic (a)					b1	small (a)	atmosphere (a)
12/28/57		Siberia					a,b1		atmosphere
02/23/58		NZ; Arctic (a)	73.000	55.000			b1	megaton range (a),	atmosphere

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
02/27/58	75900.0	NZ; Arctic (a)	73.000	55.000			b1	megaton range (a)	atmosphere
02/27/58	102400.0	NZ; Arctic (a)	73.000	55.000			b1	large (a)	atmosphere
		CIA concludes that 11 thermonuclear tests conducted by 02/29/58 overall since first device of 11/22/55, three of which (numbers nine through eleven) occurred in the last week of February, 1958 (j2).							
03/14/58		NZ; Arctic (a)	73.000	55.000			b1	below megaton range (a)	atmosphere
03/14/58		Arctic (a); Siberia (b1) [?]						below megaton range (a)	atmosphere
03/15/58		Arctic (a); Siberia (b1) [?]						below megaton range (a)	atmosphere
03/20/58		NZ; Arctic (a)	73.000	55.000			b1	small (a)	atmosphere
03/21/58		Siberia					a,b1	larger than 03/20/58 (a)	atmosphere
03/22/58		NZ; Arctic (a)	73.000	55.000			b1	medium range (a)	atmosphere
09/20/58		NZ	73.000	55.000			b1		[atmosphere?]
09/30/58	75000.0	NZ; Arctic (a)	73.000	55.000			b1	moderate to high (a)	atmosphere
09/30/58	95500.0	NZ; Arctic (a)	73.000	55.000			b1	moderate to high (a)	atmosphere
10/02/58	80000.0	NZ; Arctic (a)	73.000	55.000			b1	moderate (a)	atmosphere
10/02/58	90100.0	NZ; Arctic (a)	73.000	55.000			b1	moderate (a)	atmosphere
10/05/58	60000.0	NZ; Arctic (a)	73.000	55.000			b1	smaller than 4ABV(a,sic)	atmosphere
10/10/58	75100.0	NZ; Arctic (a)	73.000	55.000			b1	relatively large (a)	atmosphere
10/12/58	75300.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/15/58	75100.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/18/58	95100.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/19/58	72700.0	NZ; Arctic (a)	73.000	55.000			b1	small (a)	atmosphere
10/20/58	82000.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/22/58	82100.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/24/58	80300.0	NZ; Arctic (a2)	73.000	55.000			b1	probably MT range (a2)	atmosphere
10/25/58	82000.0	NZ; Arctic (a)	73.000	55.000			b1	relatively large (a)	atmosphere
11/01/58		Siberia					a,b1	relatively low (a)	atmosphere
11/03/58		Siberia					a,b1	relatively low (a)	atmosphere
		Eleven tests occurred between 09/30/58 and 10/17/58 (j16), leaving three unaccounted for.							
09/01/61		Semi (a,b1)	50.000	78.000			b1	intermediate range (a)	atmosphere
		Announced by White House (a)						150 kt (e4)	
09/04/61		Semi (a,b1)	50.000	78.000			b1	low kiloton range (a)	atmosphere
		Announced by AEC (a)						10-80 kt (e4)	
09/05/61		Semi (a,b1)	50.000	78.000			b1	low to intermediate (a)	atmosphere
		Announced by AEC (a)							
09/06/61		Stalingrad	48.450	44.300			b1	low to intermediate (a)	atmosphere
		East of Stalingrad, announced by AEC (a). High altitude burst over experimental ABM radar at Sary Shagan, probably to test EMP effects on the radar (e6).							
09/10/61	90000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
09/10/61		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	low to intermediate kt(a)	atmosphere
		[unknown which 9/10/61 test]	73.480	54.000		7.8	g		
09/12/61	100800.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
09/13/61		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	low to intermediate (a)	atmosphere
09/13/61		Semi (a,b1)	50.000	78.000			b1	low to intermediate (a)	atmosphere
		Announced by AEC (a)							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
09/14/61	95616.7	NZ(a,b6); announced by AEC(a)	74.600	51.100			b6	several megatons (a)	atmosphere (a)
			74.000	53.480	~5.96		g		
09/16/61	90800.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	order of a MT (a)	atmosphere
09/17/61		Semi (a,b1)	50.000	78.000			b1	intermediate (a)	atmosphere
		Announced by AEC (a)							
09/18/61	75936.8	NZ(a,b6); announced by AEC(a)	74.000	52.000			b6	order of a MT (a)	atmosphere (a)
09/20/61	81200.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	order of a MT (a)	atmosphere
09/22/61	80100.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	order of a MT (a)	atmosphere
10/02/61	103100.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	order of a MT (a)	atmosphere
10/04/61	73054.8	NZ(a,b6); announced by AEC(a)	73.700	53.800			b6	order of several MTs (a)	atmosphere (a)
10/06/61	70000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
			73.240	54.540	~6.22		g		
10/08/61		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	low yield range (a)	atmosphere
10/11/61	74000.0	Central Asia					b1		atmosphere
10/12/61		Semi	50.000	78.000			b1	low to intermediate (a)	atmosphere
		Announced by AEC (a)							
10/20/61		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
10/23/61	83122.1	NZ(a,b6); announced by AEC(a)	73.900	53.800			b6	about 25 megatons (a)	atmosphere (a)
			73.240	54.540	~35.40		g		
10/23/61	103048.8	NZ; South of NZ (a)	70.700	53.500			b6	low yield (a)	underwater (a)
		Announced by AEC(a); [at least the third underwater test]							
10/25/61	83300.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate to high, probably less than a MT(a)	atmosphere
10/27/61	83026.6	NZ(a,b6); announced by AEC(a)	70.700	53.500			b6	low to intermedite (a)	atmosphere (a)
10/30/61	83300.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	58 megatons (a)	atmosphere
		Reportedly occurred on	74.420	75.180	~79.750		g		vicinity of
		10/31/61 GMT (h). Weapon could be delivered by the Bear bomber (j15).							1200 ft (a)
10/31/61	82900.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
10/31/61	83800.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate to high, probably below a MT (a)	atmosphere
11/02/61	84100.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	low to intermediate (a)	atmosphere
11/02/61		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	low to intermediate (a)	atmosphere
11/04/61	72000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	several megatons (a)	atmosphere
		AEC announced 12/09/61 in a preliminary analysis that USSR conducts approx. 50 atmospheric tests in recent test series (a) [31 tests announced in 1961, leaving ~19 unannounced and ~18 unaccounted for]. The total yield of the 50 tests reportedly exceeded the cumulative total of all previous tests of all nations (e4). This test series included a number of systems tests and at least four atmospheric effects tests (including 6 September and 6 October), and several were very advanced in yield to weight ratios and efficiency (j15).							
02/02/62	75957.8	Semi (a,b6)	49.700	78.100			b6		underground (a)
		Announced by AEC, test reportedly conducted well above the threshold of underground detectability even by a single national system (a); no acoustic signals, indicating							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		underground test (a), [the first reported by the United States].							
August 1962		AEC announces on 08/06/62 that tests in the low kiloton range had been conducted a few days prior to 08/05/62 test(a)							
08/05/62	90900.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 30 megatons (a)	atmosphere
			74.120	52.300	~17.71		g		
08/07/62	93000.0	Semi	50.000	78.000				b1 low kiloton (a)	atmosphere
		Central Siberia (a); announced by AEC (a)							
08/10/62	90000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 less than 1 Mt (a)	atmosphere
08/20/62	90214.1	NZ(a,b6); announced by AEC(a)	74.300	51.500				b6 order of several Mts (a)	atmosphere (a)
			74.120	52.300	~3.36		g		
08/22/62	90000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 low megaton (a)	atmosphere
			74.120	52.300	~4.64		g		
08/25/62	54000.0	Semi (a,b1)	50.000	78.000				b1 low (a)	atmosphere
		Announced by AEC (a)							
08/25/62	90000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 order of several Mts(a)	atmosphere
			74.120	52.300	~5.04		g		
08/27/62	90000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 several megatons (a)	atmosphere
			74.120	52.300	~5.43		g		
09/01/62	124000.0	NZ	73.000	55.000				b1	atmosphere
09/02/62		NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 intermediate (a)	atmosphere
09/08/62	101800.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 megaton range (a)	atmosphere
		AEC announces this as 10th in current series with all detected tests are not specifically announced and a number of additional tests had been conducted (a).							
09/15/62	80213.9	NZ(a,b6); announced by AEC(a)	74.400	51.500				b6 several megatons (a)	atmosphere (a)
09/16/62	105900.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 several megatons (a)	atmosphere
09/18/62	82902.7	NZ(a,b6); announced by AEC(a)	73.200	54.700				b6 a few megatons (a)	atmosphere (a)
09/19/62	110056.4	NZ(a,b6); announced by AEC(a)	73.800	53.800				b6 multimegaton (a) [approx. 20 MT]	atmosphere (a)
	..	2nd largest atmospheric test in current series and 4th multimegaton test in past five days (a)							
09/21/62	80100.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 a few megatons (a)	atmosphere
09/25/62	130300.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 multimegaton, slighly larger than 09/19/62 test (a) [approx. 25 MT]	atmosphere
09/27/62	80316.4	NZ(a,b6); announced by AEC(a)	74.300	52.400				b6 less than 30 MT (a)	atmosphere (a)
10/07/62	163200.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 intermediate (a)	atmosphere
10/14/62		Semi (a,b1)	50.000	78.000				b1 low yield range (a)	atmosphere
		Announced by AEC (a)							
10/22/62	34100.0	Semi	50.000	78.000				b1 a few hundred kt (a)	atmosphere (b1) high altitude (a)
		Central Asia, announced by AEC (a)							
10/22/62	90600.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 several megatons (a)	atmosphere
10/27/62	73500.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 intermediate (a)	atmosphere
10/28/62		Semi	50.000	78.000				b1 intermediate (a)	atmosphere (b1) high altitude (a)
		Central Asia, announced by AEC (a)							
10/28/62	44100.0	Semi (a,b1)	50.000	78.000				b1 low (a)	atmosphere
		Announced by AEC (a)							
		[either 10/28/62 test could be the HA test]							
10/29/62	73500.0	NZ(a,b1); announced by AEC(a)	73.000	55.000				b1 intermediate (a)	atmosphere (b1)

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
10/30/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere (b1)
11/01/62	83000.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
11/01/62	92000.0	Semi (b1); Central Asia (a)	50.000	78.000			b1	intermediate (a)	atmosphere (b1)
11/03/62	93100.0	NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
11/03/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
11/04/62		Semi (a,b1) Announced by AEC (a)	50.000	78.000			b1	intermediate (a)	atmosphere
11/17/62		Semi (a,b1) Announced by AEC (a)	50.000	78.000			b1	low (a)	atmosphere
12/18/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
12/18/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
12/20/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
12/22/62		NZ(a,b1); announced by AEC(a)	73.000	55.000			b1	intermediate (a)	atmosphere
12/23/62	111500.0	NZ(a,b1); announced by AEC(a) AEC 12/26 announcement notes a number of atmospheric tests 12/23 to 12/25; largest (12/24) about 20 megatons, others low to a few megatons (a)	73.000	55.000			b1	low to a few megatons(a)	atmosphere
12/24/62	104421.9	NZ	74.200	52.300			b6		[atmosphere?]
12/24/62	111142.0	NZ(a,b6); announced by AEC(a) [time of AEC announced test unknown]	73.600	57.500			b6	about 20 megatons (a)	atmosphere (a)
12/25/62	133557.2	NZ(a,b6); announced by AEC(a)	73.400	56.500			b6	low to a few megatons(a)	atmosphere (a)
03/15/64	80000.0	Semi (b1,h)	50.000	78.000	6.2(h)		b1		underground
05/16/64	60058.1	Semi (b6,h)	49.900	78.300	5.6 6.2(h)		b6		underground
07/19/64	60000.0	Semi (b1,h)	50.000	78.000	6.0(h)		b1		underground
09/18/64	75954.8	NZ(a,b6);announced by ACDA(a)	72.900	55.200	4.3		b6	low (a)	underground
10/25/64	75958.8	NZ(a,b6);announced by ACDA(a)	73.500	53.700	4.9 5.4(h)		b6	low (a)	underground
11/16/64	60000.0	Semi (a,b1)	50.000	78.000	6.1(h)		b1	low to low intermed.(a)	underground
01/15/65	55958.4	Semi (a,b3) Announced by AEC (a), released radioactivity (h)	49.880	78.960	5.8 7.0(h)		b3	intermediate (a)	underground
03/03/65	61500.0	Semi (a,b1) Announced by AEC (a)	50.000	78.000	6.0(h)		b1	low to low intermed.(a)	underground
05/11/65	83957.8	Semi	49.800	77.900	5.2		b6		underground
06/17/65	34500.0	Semi (b1,h)	50.000	78.000	5.8(h)		b1		underground
07/29/65	30500.0	Semi	50.000	78.000			b1		underground
09/17/65	35957.2	Semi (b3,h)	49.780	78.150	5.2 5.5(h)		b3		underground
10/08/65	55958.2	Semi (a,b3) Announced by AEC (a)	49.920	78.170	5.4 5.8(h)		b3	low to low intermed.(a) 20-200 kt (h)	underground
11/21/65	45758.2	Semi (a,b3) Announced by AEC (a)	49.860	78.040	5.6 6.1(h)		b3	low to low intermed.(a)	underground
12/24/65	50000.0	Semi	50.000	78.000			b1		underground
02/13/66	45757.9	Semi (a,b6)	49.800	78.100	6.2		b6	low intermediate (a)	underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		Announced by AEC (a)			6.5(h)			20-100 kt (h)	
03/20/66	55000.0	Semi (a,b1)	50.000	78.000			b1	to intermediate (a)	underground
		Announced by AEC (a)							
04/21/66	35757.9	Semi (a,b6)	49.800	78.100	5.4		b6	low (a)	underground
		Announced by AEC (a)			5.3(h)				
04/22/66	25804.0	N. Caspian Sea (b8,h)	47.900	57.700			b8		underground
		Probably PNE to regulate water (h); PNE (i1)			4.7(h)				
05/07/66	35758.2	Semi	49.740	77.950	4.8		b3		underground
06/29/66	65758.0	Semi	49.900	78.000	5.6		b6	low intermediate (a)	underground
		William C. Foster states on 7/7/66 that as recently as 8 days ago US recorded seismic signals from the Soviet nuclear testing area (a)							
07/21/66	35757.6	Semi (b6,h)	49.700	78.000	5.4		b6		underground
					5.9(h)				
08/05/66	35757.9	Semi (b3,h)	49.830	78.050	5.4		b3		underground
					6.1(h)				
08/19/66	35301.4	Semi (b3,h)	50.500	77.860	5.1		b3		underground
					4.6(h)				
09/07/66	35100.0	Semi	50.000	78.000			b1		underground
09/30/66	55952.8	Turkmen (a); Uzbekistan (h)	38.800	64.500	5.1		b6		underground
		PNE to plug fire in Urtabulak gas field near Bukhara (h); PNE (i1)			5.3(h)				
10/19/66	35757.8	Semi (a,b3)	49.770	78.030	6.3		b3	low intermediate (a)	underground
		Announced by AEC (a)						20-200 kt (h)	
10/27/66	55757.9	NZ(a,b3); announced by AEC(a) Vented (h)	73.400	54.570	6.4		b3	intermediate to high(a)	underground
		Northern site			6.5(h)				
					6.39 ±.108	4.70 ±.108	f2	420±4 kt	
12/03/66	50200.0	Semi (b1,h)	50.000	78.000	4.9(h)		b1		underground
12/18/66	45800.0	Semi (a,b1)	50.000	78.000	6.5(h)		b1	intermediate (a)	underground
		Announced by AEC (a); vented (h)							
01/30/67		Semi					h		underground
02/26/67	35800.0	Semi (a,b1)	50.000	78.000	6.6(h)		b1	intermediate (a)	underground
		Announced by AEC (a)						200-1000 kt (h)	
03/25/67	55600.0	Semi (b1,h)	50.000	78.000	5.9(h)		b1		underground
04/20/67	40757.6	Semi (a,b6)	49.700	78.000	5.7		b6	low intermediate (a)	underground
		Announced by AEC (a)			6.3(h)				
05/28/67	40757.7	Semi (b3,h)	49.810	78.110	5.4		b3		underground
					6.2(h)				
06/29/67	25700.0	Semi	50.000	78.000			b1		underground
07/15/67	32657.6	Semi (b3,h)	49.880	78.160	5.4		b3		underground
					6.0(h)				
08/04/67	65758.0	Semi (b3,h)	49.820	78.050	5.3		b3		underground
					5.8(h)				
09/16/67	40358.2	Semi (b3,h)	50.010	77.800	5.3		b3		underground
					6.0(h)				
09/22/67	50357.9	Semi (b6,h)	50.000	77.600	5.3		b6		underground
					6.0(h)				

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
10/06/67	70002.0	Ural (a,h)	57.690	65.270			b8		underground
		PNE, engineering experiment in oil fields (h)			4.7(h)				
		East of Urals, PNE (i1)							
10/17/67	50358.9	Semi (a,b6)	49.800	78.100	5.7		b6	low intermediate (a)	underground
		Announced by AEC (a)			6.1(h)				
10/21/67	45958.4	NZ(a,b3); announced by AEC(a)	73.400	54.420	5.9		b3	low end intermediate (a)	underground
		May have vented (h)			6.0(h)				
		Northern site			5.92	3.99	f2	69±8 kt	
					±.056	±.090			
10/30/67	60357.9	Semi (b6,h)	49.800	78.100	5.5		b6		underground
					6.0(h)				
11/22/67	40357.1	Semi	49.900	77.300	4.8		b6		underground
12/08/67	60357.1	Semi	49.800	78.200	5.2		b6		underground
01/07/68	34657.6	Semi	49.740	78.320	5.1		b3		underground
04/24/68	103557.3	Semi (a,b3)	49.840	78.070	5.0		b3	low (a)	underground
		Announced by AEC (a)					a		underground
05/21/68	35900.0	Bukhara (b5,i1), Uzbekistan (h)			5.6(h)		b5		underground
		PNE (h,i1), plug runaway oil well (h)							
06/11/68	30600.0	Semi (a,b1)	50.000	78.000	5.8(h)		b1	low (a)	underground
		Announced by AEC (a)							
06/19/68	50557.4	Semi (a,b3)	49.960	79.050	5.4		b3	low intermediate (a)	underground
		Announced by AEC (a)			6.5(h)				
07/01/68	40200.9	North of Caspian Sea(a,b3,i1)	47.850	47.720	5.5		b3	low intermediate (a)	underground
		Announced by AEC (a)			5.7(h)				
		PNE (h,i1); storage cavity in salt dome (h)							
07/12/68	120757.2	Semi	49.670	78.117	5.4		b6		underground
					5.9		h		
08/20/68	40558.1	Semi	50.000	77.996	4.8		b6		underground
09/05/68	40600.0	Semi (a,b1)	50.000	78.000	6.2(h)		b1	low intermediate (a)	underground
		Announced by AEC (a)							
09/29/68	34257.5	Semi	49.800	78.200	5.8		b6		underground
					6.3		h		
11/07/68	100205.3	NZ(a,b6), northern site (f2)	73.400	54.900	6.0		b6	low end intermediate (a)	underground
		Announced by AEC (a); may have vented (h)			6.02	4.30	f2	126±35 kt	
					±.025	±.076			
11/09/68	25357.7	Semi	49.760	78.060	4.9		b3		underground
12/18/68	50200.0	Semi (a,b1)	50.000	78.000	5.7(h)		b1	low (a)	underground
		Announced by AEC (a)							
03/07/69	82700.0	Semi (a,b1)	50.000	78.000	6.3(h)		b1	low intermediate (a)	underground
		Announced by AEC (a)							
05/16/69	40257.1	Semi (a,b6)	49.800	78.100	5.3		b6	low intermediate (a)	underground
		Announced by AEC (a)			6.0(h)				
05/31/69	50156.6	Semi (a,b6)	50.500	77.700	5.4		b6	low (a)	underground
		Announced by AEC (a)			6.2(h)				
07/05/69	24700.0	Semi	50.000	78.000	6.0(h)		b1		underground
		[source h gives 07/04/69 date, which is probable same event]							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
07/23/69	24658.1	Semi (a,b6) Announced by AEC (a)	49.900	78.300	5.5 5.2(h)		b6	low intermediate (a)	underground
09/02/69	45957.4	Ural (b3,h,i1) PNE (h,i1), engineering experiment in oil fields Test reportedly one of four PNEs begun in September 1969 along a watercourse system in Ural mountains (i1); [others possibly 9/8/69, 6/25/70, and 3/23/71]	57.350	54.770	4.8 5.2		b3 h		underground
09/08/69	50000.0	Ural (a,b1,h) Announced by AEC (a); PNE (h,i1); engineering experiment in oil fields (h); test reportedly one of four PNEs begun in September 1969 along a watercourse system in Ural mountains (i1);. [others possibly 9/2/69, 6/25/70, and 3/23/71]			5.2(h)		b1	low (a)	underground
09/11/69	40157.5	Semi (a,b3) Announced by AEC (a)	49.770	78.030	5.0		b3	low (a)	underground
09/26/69	70000.0	South of Volvograd (a), North of Caspian Sea (b1,h); West of Caspian Sea (i1) PNE (h,i1); gas stimulation experiment (h)			5.4(h)		b1	low intermediate (a)	underground
10/01/69	40257.7	Semi (a,b3) Announced by AEC (a)	49.610	78.180	5.2 5.9(h)		b3	low intermediate (a)	underground
10/14/69	70006.2	NZ(a,b6); northern site (f2) Announced by AEC (a)	73.400	54.800	6.1 6.5(h) 6.09 ±.019	4.27 ±.057	b6 f2	intermediate (a) 140±14 kt	underground
11/30/69	33300.0	Semi (a,b1) Announced by AEC (a)	50.000	78.000	6.9(h)		b1	intermediate (a)	underground
12/06/69	70257.5	W. Aral Sea (b3); Kazakh Desert, South of Urals (a); E. of Caspian Sea(i1) Announced by AEC (a); PNE (h,i1); engineering use?(h)	43.790	54.750	5.8 5.7(h)		b3	low intermediate (a)	underground
12/28/69	34658.0	Semi (a,b6) Announced by AEC (a)	50.000	77.800	5.7 6.5(h)		b6	low intermediate (a)	underground
12/29/69	40200.0	Semi	50.000	78.000			b1		underground
01/29/70	70257.7	Semi (a,b3) Announced by AEC (a)	49.840	78.270	5.5 5.9(h)		b3	20 to 200 kt (a)	underground
03/27/70	50300.0	Semi	50.000	78.000	5.4(h)		b1		underground
06/25/70	50000.0	Ural (b1,h); North of Caspian (i1) PNE, one of four reportedly begun in September 1969 along a watercourse system in Ural mountains (i1); [others possibly 9/2/69, 9/8/69, and 3/23/71]			5.3(h)		b1		underground
06/28/70	15800.0	Semi (a,b1) Announced by AEC (a)	50.000	78.000	6.2(h)		b1	20 to 200 kt (a)	underground
07/21/70	30257.0	Semi (a,b3) Announced by AEC (a)	49.950	77.770	5.4 6.0(h)		b3	20 to 200 kt (a)	underground
07/24/70	35647.4	Semi (a,b6) Announced by AEC (a)	49.800	78.200	5.3 5.8(h)		b6	20 to 200 kt (a)	underground
09/06/70	40257.6	Semi (a,b3) Announced by AEC (a)	49.770	78.100	5.4 6.0(h)		b3	20 to 200 kt (a)	underground
10/14/70	60000.0	NZ(a,b1); northern site (f2)	73.000	55.000	6.7(h)		b1	3 to 6 megatons (a)	underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		Announced by AEC (a)			6.60	5.02 ±.025	f2 ±.066	940±60 kt	underground
11/04/70	60257.4	Semi (a,b3)	50.000	77.820	5.4		b3	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.0(h)				
12/12/70	71000.0	E. Caspian Sea (b3,h); Kazakh Desert (a); Caspian region (i1); announced by AEC (a). PNW (i1)			6.6(h)		b1	200 kt to 1 Mt (a)	underground
12/13/70		Caspian region, PNE					i1		
12/17/70	70100.0	Semi (a,b1)	50.000	78.000	6.1(h)		b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
12/23/70	70057.3	E. Caspian Sea (b3,h)	43.810	54.820	6.0		b3	200 to 1 Mt (a)	underground
		Kazakh Desert, announced by AEC (a)			6.6(h)				
03/22/71	43257.8	Semi (a,b6)	49.700	78.200	5.8		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.0(h)				
03/23/71	65956.0	Ural (a,b6,h)	61.300	56.500	5.6		b6	20 to 200 kt (a)	underground
		Announced by AEC (a). Test vented and released radioactive debris which crossed national borders (i1); test reportedly one of four PNEs begun in September 1969 along a watercourse system in Ural mountains (i1). [others possibly 9/2/69, 9/8/69, 6/25/70]			5.9(h)				
04/25/71	33258.0	Semi (a,b6)	49.800	78.100	5.9		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.5(h)				
05/25/71	40257.7	Semi	49.800	78.200	5.2		b6		underground
06/06/71	40300.0	Semi (a,b1)	50.000	78.000	5.5(h)		b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
06/19/71	40400.0	Semi (a,b1)	50.000	78.000	5.4(h)		b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
06/30/71	35700.0	Semi (a,b1)	50.000	78.000	5.9(h)		b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
07/02/71	170000.0	Ural [PNE]					b1		underground
07/10/71	170000.0	Ural(b1,h), Western slopes(a), Northern Urals(i1) PNE (i1)			5.1(h)		b1		underground
09/19/71	110006.8	Ural (b6,i1); PNE (i1)	57.800	41.100	4.5		b6		underground
09/27/71	60000.0	NZ(a,b1), northern site (f2)	73.000	55.000			b1	2 to 4 megatons (a)	underground
		Announced by AEC (a)			6.47 ±.023	5.06 ±.038	f2	780±200 kt	
10/04/71	100002.0	Ural(b6), Western Russia(i1) PNE (i1)	61.600	47.100	5.1		b6		underground
10/09/71	60257.1	Semi (a,b6)	50.000	77.700	5.4		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)							
10/21/71		Western Russia, PNE [possibly at Semi?]					i1		underground
10/21/71	60300.0	Semi (a,b1)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
10/22/71	50000.4	Ural (a,b6)	51.600	54.500	5.3		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)							
11/29/71	60300.0	Semi (a,b1)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)							
12/15/71	75300.0	Semi	50.000	78.000			b1		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
12/22/71	70000.0	N. of Caspian Sea (a,b1); announced by AEC(a); [PNE?]					b1	200 kt to 1 Mt (a)	underground
12/30/71	62057.5	Semi (a)	49.800	78.100	5.8		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)							
02/10/72	50257.3	Semi (a,b6); E. Kazakh (i2)	50.000	78.900	5.5		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.996	78.886	6.3		i2		
03/10/72	45657.4	Semi (a,b6); E. Kazakh (i2)	49.800	78.200	5.5		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.755	78.180	5.8		i2		
03/28/72	42200.0	Semi (a,b1)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.730	78.186	5.6		i2		
04/11/72	60000.0	Turkmen (h,i2); PNE (i2)	37.400	62.000	4.8		bi(time),h,i2		underground
06/07/72	12800.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.761	78.175	5.7		i2		
07/06/72	10257.7	Semi; E. Kazakh (i2)	49.700	78.000	4.4		b6	20 to 200 kt (i2)	underground
			49.724	77.979	4.8		i2		
07/09/72	70000.0	North of Black Sea (b1,i2)	49.900	35.200	5.0	2.8	b1(time);i2(other)		underground
		PNE (i2)							
07/14/72	150000.0	North of Caspian Sea(b6,i2)	50.000	46.400			b1		underground
		PNE (i2)	55.800	47.400	3.6		i2		
08/16/72	31700.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.759	78.146	5.6		i2		
08/20/72	25957.9	North of Caspian Sea (a,b6)	49.500	48.200	5.7		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.462	78.179	6.3	3.4	i2		
		W Kazakh (i2); PNE (i2)							
08/26/72	34700.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.994	77.781	5.8		i2		
08/28/72	55956.5	NZ(a,b6,i2);northern site(f2)	73.300	55.100	6.3	4.7	b6	about 1 Mt (a)	underground
		Announced by AEC (a)	73.336	55.085		4.7	i2		
					6.3		f1		
					6.33 ±.021	4.76 ±.037	f2	400±70 kt	
09/02/72	85657.6	Semi (b6,h); E. Kazakh (i2)	50.000	77.700	5.1		b6		underground
			49.957	77.726	5.3		i2		
09/04/72	70003.6	W. Russia (b6,i2)	67.700	33.400	4.6		b6		underground
		PNE (i2)	67.689	33.445		3.0	i2		
09/21/72	90001.2	N. Caspian Sea (b6,h);	52.100	52.000	5.1		b6	20 to 200 kt (a)	underground
		Ural area (a); W. Russia (i2)							
		Announced by AEC (a), PNE(i2)	52.127	51.994	5.2		i2	20 to 200 kt	
10/03/72	90000.0 (b1)	NW. Caspian Sea (b1,h,i2)	46.848	45.010	6.1	3.0	i2	200 kt to 1 Mt (a)	underground
		S. of Volvograd, announced by AEC (a)							
11/02/72	12657.6	Semi (a,b6); E. Kazakh (i2)	49.900	78.800	6.2		b6	200 kt to 1 Mt (a)	underground
		Announced by AEC (a)	49.913	78.837		4.1	i2	200 to 1000 kt	
11/24/72	90008.0	Ural (a,b6); W. Kazakh (h);	52.800	51.100	4.7		b6	20 to 200 kt (a)	underground
		W. Russia (i2); announced	52.779	51.067	5.1		i2		
		by AEC (a); PNE (i2)							
11/24/72	95957.8	W. Kazakh, PNE (i2)	51.800	64.200	5.2		b6		underground
			51.843	64.152	5.1		i2	20 to 200 kt	
12/10/72	42657.7	Semi (a,b6); E. Kazakh (i2)	49.800	78.100	5.7		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.847	78.099	6.0		i2		

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
12/10/72	42708.4	Semi (a,b6); E. Kazakh (i2)	50.100	78.800			b6	200 kt to 1 Mt (a)	underground
		Announced by AEC (a)	50.114	78.808	6.7	4.3	i2		
		[unknown which test on 12/10/72 is which yield]							
12/28/72	42700.0		51.700	77.200	4.9		b1		underground
		Semi			4.9		h,i2		
02/16/73	50300.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.835	78.232	5.6		i2		
04/19/73	43257.6	Semi (a,b6); E. Kazakh (i2)	50.000	77.700	5.4		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	50.006	77.725	5.6		i2		
07/10/73	12657.6	Semi (a,b6); E. Kazakh (i2)	49.800	78.100	5.4		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.780	75.058			i2		
07/23/73	12300.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	200 kt to 1 Mt (a)	underground
		Announced by AEC (a)	49.986	78.853	7.1	4.4	i2		
08/15/73	15957.8	NW of Tashkent(a,b6); Central	42.700	67.400	5.3		b6	20 to 200 kt (a)	underground
		Kazakh(i2); announced by	42.711	67.410	5.6	3.4	i2		
		AEC (a)							
08/28/73	30000.0	N. Kazakh (b1); Kazakh Desert					b1	20 to 200 kt (a)	underground
		(a); Central Kazakh (i2).	50.550	68.395	5.5	3.4	i2		
		Announced by AEC (a), PNE (i2)							
09/12/73	70000.0	NZ(a,b1,i2),northern site(f2)	73.000	55.000			b1	6 megatons (a)	underground
		Announced by AEC (a)	73.302	55.161		5.8	i2	3 to 6 Mt	
					6.78	5.26	f2	1830±260 kt	
					±.031	±.046			
09/19/73	30000.0	Central Kazakh(b1,i2); Kazakh Desert (a)					b1	20 to 200 kt (a)	underground
		Announced by AEC(a). PNE (i2)	45.635	67.850	5.2	3.3	i2		
09/27/73	70000.0	NZ(a,b1,i2),southern site(f2)	73.000	55.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	70.756	53.872	5.9	3.9	i2		
					5.95	3.74	f2	56±13 kt	underground
					±.034	±.102			
09/30/73	50000.0	S. Ural(b1);Ural area(a);W Russia (i2)					b1	20 to 200 kt (a)	underground
		Announced by AEC (a). PNE(i2)	51.608	54.582	5.7	3.3	i2		
10/26/73	42700.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000			b1	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.765	78.196	5.5		i2		
10/26/73	55957.6	S. Ural(b6,i2), Ural area(a)	53.700	55.400	4.8		b6	less than 20 kt (a)	underground
		Announced by AEC (a),PNE(i2)	53.565	55.375			i2		
10/27/73	65957.4	NZ(a,b6,i2),southern site(f2)	70.800	54.200	6.9	5.5	b6	3 to 6 Mt (a)	underground
		Announced by AEC (a)	70.779	54.177		5.9	i2		
					6.94	5.51	f2	3450±610 kt	
					±.018	±.052			
12/14/73	74700.0	Semi (a,b1), E. Kazakh (i2)	50.000	78.000			b1	200 kt to 1 Mt (a)	underground
		Announced by AEC (a)	50.036	79.011	6.6		i2		
01/30/74	45700.0	Semi	50.000	78.000			b1	20 to 200 kt (a)	underground
			49.894	77.993	4.6		i2		
	45702.1	Semi	49.800	78.100	5.4		b6		underground
			49.835	78.079	5.5		i2	20 to 200 kt	
		1 test on 1/30/74 announced by AEC (a); [source i2 lists 2							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		tests and 20 tests in 1974 on preliminary data, and revised list has only 19 tests for 1974]							
04/16/74	55300.0	Semi	50.000	78.000			b1		
		E Kazakh	49.994	78.824	5.2		i2		underground
05/16/74	30257.3	Semi (a,b6); E. Kazakh (i2)	49.743	78.150	5.3		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			5.6	3.6	i2		
05/31/74	32657.4	Semi (a,b6); E. Kazakh (i2)	49.952	78.844	5.9		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.7		i2		
06/25/74	35657.6	Semi	49.889	78.115	4.7		b6		
		E Kazakh			5.0		i2		underground
07/08/74	60001.7		53.800	55.200			b6		underground
		Ural Mountains, PNE			5.3		i2		
07/10/74	25657.5	Semi	49.789	78.139	5.3		b6		underground
		E Kazakh			5.7		i2		
07/22/74	13221.5	NZ	70.682	53.545	4.4		b3,i2	[no Mb in i2]	underground
08/14/74	145958.3	Tazovskiy Penin.(a);W.Siberia (i2);announced by AEC(a);PNE	68.913	75.899	5.5		b6	20 to 200 kt (a)	underground
					5.2		i2		
08/29/74	95955.6	NZ(a,b6,i2),northern site(f2) Announced by AEC (a)	73.366	55.094	6.4	5.0	b6	1 to 3 megatons (a)	underground
						5.4	i2		
					6.43 ±.021	4.88 ±.027	f2	570±70 kt	
08/29/74	145959.2		67.223	62.119	5.2		b6		underground
		Ural Mountains, PNE			5.2		i2		
09/13/74	30257.8	Semi	49.820	78.091	5.2		b6		underground
		E Kazakh	50.000	78.000	5.5		i2		
10/16/74	63257.5	Semi (a,b6); E. Kazakh (i2)	49.972	78.960	5.5		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.7		i2		
11/02/74	45956.7	Semi [sic];NZ(a,i2),southern site(f2); announced by AEC(a)	70.817	54.063	6.7	5.3	b6	3 to 4 megatons (a)	underground
						5.4	i2		
					6.78 ±.020	5.29 ±.040	f2	1890±210 kt	underground
12/07/74	55956.9	Semi	49.908	77.648	4.7		b6,i2		underground
12/12/74		NZ [see 1/30/74 note]	70.900	53.000			i2		underground
12/16/74	62302.4	Semi	49.755	78.064	5.0		b6		underground
		E Kazakh	50.400	77.100	5.3		i2		
12/16/74	64102.4	Semi	49.824	78.117	4.8		b6		underground
		E Kazakh	50.300	77.300	5.0		i2		
12/27/74	54656.8	Semi (a,b6); E. Kazakh(i2)	49.960	79.046	5.6	4.7	b6	20 to 200 kt (a)	underground
			50.200	78.900			i2		
02/20/75	53257.6	Semi (a,b3); E. Kazakh (i3)	49.760	78.090	5.7		b3	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.820	78.078	6.1		i3		
03/11/75	54257.6	Semi (a,b6); E. Kazakh (i3)	49.800	78.300	5.4		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.787	78.251	5.9		i3		
04/25/75	650003.0	[sic on time]	48.100	47.200	4.7		b3		underground
		W Russia, PNE	47.500	47.500	4.9		i3		
		[Probably to build storage cavities in Astrakhan natural gas field.]							
04/27/75	53657.2	Semi (a,b3); E. Kazakh (i3)	49.940	79.020	5.6		b3	20 to 200 kt (a)	underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		Announced by AEC (a)	49.990	78.984	6.7	3.9	i3		
06/08/75	32657.6	Semi (a,b3); E. Kazakh (i3)	49.750	78.080	5.5		b3	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.764	78.089	6.0	3.6	i3		
06/30/75	32657.0	Semi	50.000	78.999	4.8		b6		underground
		E Kazakh			5.9		i3		
08/07/75	35657.5	Semi (a,b6); E. Kazakh (i3)	49.813	78.240	5.2		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			5.4		i3	20 to 200 kt	
08/23/75	85857.9	NZ(a,b6,i3);northern site(f2)	73.369	54.641	6.4	4.9	b6	multi-megaton (a)	underground
		Announced by AEC (a)				5.4	i3		
					6.42	4.72	f2	460±20 kt	underground
					±.024	±.049			
09/29/75			69.600	90.460	4.8		b3		underground
		Central Siberia, PNE	69.592	90.396	4.4		i3		
10/05/75	42743.9	Semi	55.800	75.100	4.6		b2		underground
		E Kazakh			4.6		i3		
10/18/75	85956.5	NZ(a,b3,i3);southern site(f2)	70.840	53.530	6.7	5.1	b3	multi-megaton (a)	underground
		Announced by AEC (a)	70.843	53.690	5.2		i3		
					6.66	4.92	f2	990±290 kt	
					±.028	±.065			
10/21/75	115957.7	NZ(a,b3,i3);northern site(f2)	73.320	54.930	6.6		b3	multi-megaton (a)	underground
		Announced by AEC (a)	73.351	54.641	5.8		i3		
					6.43	4.78	f2	500±3 kt	underground
					±.028	±.030			
10/29/75	44657.5	Semi (a,b6); E. Kazakh (i3)	49.984	78.975	5.8		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.7	3.6	i3		
12/13/75	45657.5	Semi	49.810	78.240	5.1		b3		underground
		E Kazakh	49.798	78.196	5.2		i3		
12/25/75	51657.2	Semi (a,b6); E. Kazakh (i3)	50.043	78.899	5.8	5.2	b6	20 to 200 kt (a)	underground
		Announced by AEC (a)			6.9		i3	20 to 200 kt	
01/15/76	44657.2	Semi	49.800	78.250	5.2		b3		underground
		E Kazakh	49.870	78.246	5.5		i4	14 kt	
04/21/76	45757.9	Semi	49.840	78.180	5.1		b3		underground
		E Kazakh	49.818	78.198	5.4		i4	10 kt	
04/21/76	50257.4	Semi (a,b6); E. Kazakh (i4)	49.932	78.824	5.3		b6	20 to 150 kt (a)	underground
		Announced by ERDA (a);[time?]			6.4		i4	20 kt	
05/19/76	25657.9	Semi	49.856	78.007	5.0		b6		underground
		E Kazakh			5.2		i4	<20 kt	
06/09/76	30257.5	Semi (a,b3); E. Kazakh (i4)	49.980	79.070	5.3		b3	20 to 150 kt (a)	underground
		Announced by ERDA as 06/08/76	50.023	79.080	5.9		i4	25 kt	
		which is probably same as 06/10/76 test due to time difference (a)							
07/04/76	25657.5	Semi (a,b3); E. Kazakh (a)	49.850	78.970	5.8		b3		underground
		Announced by ERDA (a)	49.915	78.952	7.0	4.2	i4	90 kt	
07/23/76	23257.9	Semi	49.791	78.051	5.1		b6		underground
		E Kazakh			5.4		i4	10 kt	
07/29/76	45958.0	N. of Caspian Sea (a,b3);	47.810	48.100	5.9	4.4	b3		underground
		W Kazakh, PNE	47.782	48.120	6.4	4.2	i4	150 kt	
		announced by ERDA (a)							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		[Probably to build storage cavities in Astrakhan natural gas field.]							
08/04/76	25658.8	Semi	49.900	77.700			b2		underground
		E Kazakh			4.1		i4	2 kt	
08/28/76	25657.6	Semi (a,b3); E. Kazakh (a)	49.950	78.980	5.8		b3		underground
		Announced by ERDA (a)	49.969	79.001	6.8	3.5	i4	91 kt	
09/29/76	25957.7	NZ(a,b3);announced by ERDA(a)	73.410	54.500	5.8		b3		underground
			73.404	54.817	6.5	3.8	i4	130 kt	
10/20/76	75957.7	NZ(a,b6);announced by ERDA(a)	73.420	54.567	5.1		b6		underground
		NZ				3.4	i4	11 kt	
10/30/76	45702.5	Semi	49.980	78.200	4.9		b3		underground
		E Kazakh	50.200	78.100	4.5		i4	3 kt	
11/05/76	35956.7	Siberia;Central Siberia(a,i4)	61.528	112.712	5.3		b6		underground
		Announced by ERDA(a);PNE(i4)			5.4		i4	13 kt	
11/23/76	50257.4	Semi (a,b6); E. Kazakh (i4)	49.991	79.005	5.9		b6		underground
		Announced by ERDA (a)			6.7		i4	120 kt	
12/07/76	45657.5	Semi (a,b3); E. Kazakh (i4)	49.870	78.890	5.9		b3		underground
		Announced by ERDA as 12/06/76 which is probably same as 12/07/76 test date to time difference (a)	49.884	78.905	7.1		i4	110 kt	
12/30/76	35657.5	Semi	49.800	78.135	5.1	4.2	b6		underground
		E Kazakh			5.5		i4	10 kt	
03/29/77	35657.8	Semi (a,b3); E. Kazakh (i4)	49.790	78.150	5.4		b3		underground
		Announced by ERDA (a)							
04/25/77	40657.8	Semi	49.837	78.159	5.1		b6		underground
		E Kazakh			5.3		i4		
05/29/77	25657.8	Semi (a,b6); E. Kazakh (i4)	49.944	78.846	5.6	5.0	b6		underground
		Announced by ERDA (a)			7.0	3.7	i4		
06/29/77	30657.8	Semi (a,b3); E. Kazakh (i4)	49.960	78.910	5.3	5.2	b3		underground
		Announced by ERDA (a)	50.034	78.927	6.4		i4		
07/26/77	165957.8	Siberia;Central Siberia(a,i4)	69.540	90.510	5.0		b3		underground
		Announced by ERDA(a);PNE(i4)	69.532	90.583	4.6		i4		
07/30/77	15657.8	Semi	49.730	78.090	5.1		b3		underground
		E Kazakh	49.777	78.163	5.6		i4		
08/10/77	220200.3	Baykal, [PNE]	50.950	110.780	5.2		b3		underground
08/17/77	42657.7	Semi	49.814	78.151	5.0		b6		underground
		E Kazakh			5.3		i4		
08/20/77	215958.7	Siberia;Central Siberia(a,i4)	64.223	99.577	5.0		b6		
		Announced by ERDA(a);PNE(i4)			4.8		i4		
09/01/77	25957.5	NZ(a,b6,i4)	73.376	54.581	5.7		b6		underground
		Announced by ERDA (a)			6.5	3.7	i4		
09/05/77	30257.8	Semi(a,b3); E. Kazakh (i4)	50.050	78.930	5.8		b3		underground
		Announced by ERDA (a)	50.092	78.961	6.7		i4		
09/10/77	160003.3	Baykal, [PNE]	57.290	106.230	4.8		b3		underground
09/30/77	65955.6	W.Kazakh(b6,i4); N of Caspian Sea, ann. by ERDA(a);PNE(i4)	47.800	48.145	5.1		b6		underground
					5.6	3.6	i4		
		[Probably to build storage cavities in Astrakhan natural gas field.]							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
10/09/77	105958.8	NZ	73.470	54.000	4.5		b3		underground
		NZ	73.626	53.158	5.3		i4		
10/29/77	30657.7	Semi (a,b3); E. Kazakh (i4)	49.780	78.160	5.5		b3		underground
		Announced by DOE (a)	49.841	78.174	5.6		i4		
10/29/77	30702.9	Semi (a,b6); E. Kazakh (i4)	50.059	78.907	5.6		b6		underground
		Announced by DOE (a)			6.7	3.9	i4		
11/30/77	40657.5	Semi (a,b6); E. Kazakh (i4)	49.957	78.931	5.9	3.5	b6		underground
		Announced by DOE (a)			6.9	3.8	i4		
12/26/77	40257.7	Semi	49.881	78.141	4.9		b6		underground
		E Kazakh			5.0		i4		
03/19/78	34657.4	Semi (a,b6); E. Kazakh (i5)	49.972	77.755	5.2		b6		underground
		Announced by DOE (a)			5.4		i5		
03/26/78	35657.6	Semi (a,b6); E. Kazakh (i5)	49.734	78.074	5.5		b6		underground
		Announced by DOE (a)			6.4		i5		
						4.04	b11		
04/22/77	30657.7	Semi (a,b3); E. Kazakh (i5)	49.720	78.180	5.2	3.6	b3		underground
		Announced by DOE (a)	49.720	78.175	5.7	3.3	i5		
						3.39	b11		
05/29/78	45657.6	Semi	49.890	78.200	4.7		b3		underground
		E Kazakh	49.877	78.195	5.0		i5		
06/11/78	25157.7	Semi (a,b6); E. Kazakh (i5)	49.879	78.838	5.9	4.4	b6		underground
		Announced by DOE (a)			7.0	4.3	i5		
						4.14	b11		
07/05/78	24657.5	Semi (a,b3); E. Kazakh (i5)	49.840	78.910	5.8	3.7	b3		underground
		Announced by DOE (a)	49.839	78.906	6.9	3.9	i5		
						3.41	b11		
07/28/78	24657.6	Semi (a,b6); E. Kazakh (i5)	49.744	78.168	5.7		b6		underground
		Announced by DOE (a)			5.9		i5		
						3.28	b11		
08/09/78	175958.1	Siberia;E.Siberia(a); C.	63.650	125.340	5.1	3.7	b3		underground
		Siberia(i5); announced by	63.706	125.321	5.9	3.7	i5		
		DOE (a); PNE (i5)							
08/10/78	75957.7	NZ(a,b6,i5)	73.335	54.792	5.9	4.3	b6		underground
		Announced by DOE (a)			6.8	4.1	i5		
						3.96	b11		
08/24/78	180004.0	Siberia;N. Central Siberia(a)	65.870	112.560	5.1	3.7	b3		underground
		C.Siberia(i5); announced by	65.918	112.541	5.2	3.5	i5		
						3.67	b11		
		DOE (a); PNE (i5)							
08/29/78	23658.0	Semi	49.820	78.100	5.2		b3		underground
		E Kazakh	49.839	78.008	5.4		i5		
08/29/78	23706.4	Semi(a,b3,f3,i5);E.Kazakh(i5)	49.980	79.020	5.9	4.0	b3		underground
		announced by DOE (a)	50.008	78.996	6.9	3.9	i5		
		[time unknown]			5.967	3.637		f3	
					±.012	±.107			
		[time unknown]				3.77	b11		
09/15/78	23657.3	Semi(a,b6,f3,i5);E.Kazakh(i5)	49.898	78.925	6.0	4.4	b6		underground
		Announced by DOE (a)			5.963	3.831		f3	

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
					±.015	±.032			
					7.0	4.2	i5		
09/20/78	50257.0	Semi	49.890	78.400	4.3		b3		underground
		E Kazakh			4.7		i5		
09/21/78	145957.6	Siberia;NW Siberia(a); C.	66.530	86.260	5.2		b3		underground
		Siberia(i5); announced	66.541	86.252	4.9		i5		
		by DOE (a); PNE (i5)				3.59	b11		
09/27/78	20458.2	NZ (a,b6,i5)	73.380	54.559	5.6	4.5	b6		underground
		Announced by DOE (a)			6.3	4.2	i5		
						4.02	b11		
10/07/78	235957.0	Siberia	61.530	112.870	5.2		b3		underground
		Central Siberia, PNE	61.600	112.890	5.5		i5		
		[reported as 10/08/78]				3.50	b11		
10/15/78	53657.0	Semi	49.697	78.242	5.1		b6		underground
		E Kazakh	49.756	78.261	5.5		i5		
10/17/78	45956.5	W.Kazak(b3,i5); N of Caspian	47.818	48.114	5.8	4.6	b6		underground
		Sea, ann. by DOE(a); PNE (i5)	47.906	48.209	6.3	4.3	i5		
		[Probably to build storage cavities in Astrakhan				4.01	b11		
		natural gas field.]							
10/17/78	135958.0	Ural;Far NW Siberia(a);E.Ural	63.210	63.260	5.5	3.7	b3		underground
		(i5); ann. by DOE (a);PNE(i5)	63.207	63.194	5.8	3.6	i5		
						3.61	b11		
10/31/78	41657.8	Semi (a,b3); E. kazakh (i5)	49.760	78.120	5.2		b3		underground
		Announced by DOE (a)	49.886	78.137	5.6		i5		
						3.91	b11		
11/04/78	50557.5	Semi(a,b6,f3);E. Kazakh(i5)	50.046	78.983	5.6	4.2	b6		underground
		Announced by DOE (a)	50.019	79.024	6.5	3.9	i5		
					5.576	3.582		f3	
					±.018	±.024			
11/29/78	43258.1	Semi(a,b3); E. Kazakh (i5)	49.860	78.050	5.3		b3		underground
		Announced by DOE (a)	49.920	78.089	5.6		i5		
11/29/78	43302.9	Semi(a,b3,f3); E. Kazakh(i5)	49.930	78.770	6.0	4.3	b3		underground
		Announced by DOE (a)	50.004	78.951	7.1	4.2	i5		
		[unknown which 11/29/78 test for f3]			5.996	n.a.	f3		
		Data tape not available			±.017				
12/14/78	44257.6	Semi	49.897	78.199	4.8		b6		underground
		E Kazakh	49.897	78.199	5.0		i5		
12/18/78	75956.3	W.Kazakh(b3,i5); N of Caspian	47.780	48.140	5.9	5.2	b3		underground
		Sea, ann. by DOE (a); PNE(i5)	47.872	48.258	6.4	5.0	i5		
		[Probably to build storage cavities in Astrakhan				4.89	b11		
		natural gas field.]							
12/20/78	43257.3	Semi	49.885	78.172	4.7		b6,i5		underground
01/10/79	80000.0	W. Kazakh, PNE (i6)			5.0		b2		underground
01/17/79	75955.7	W.Kazakh(b6,i6);N of Caspian	47.883	48.128	6.0		b6		underground
		Sea, ann. by DOE(a);PNE(i6)	47.985	48.212	6.5		i6		
		[Probably to build storage cavities in Astrakhan				4.12	b11		
		natural gas field.]							
02/01/79	41257.7	Semi (a,b6); E. Kazakh (i6)	50.111	78.881	5.4		b6		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		Announced by DOE (a)	50.125	78.944	6.4		i6		
						3.23	b11		
02/16/79	40357.9	Semi (a,b6); E. Kazakh (i6)	49.971	77.746	5.4		b6		underground
		Announced by DOE (a)	50.018	77.781	5.8		i6		
05/06/79	31657.6	Semi	49.800	78.120	5.2		b3		underground
		E Kazakh	49.869	78.247	5.6		i6		
05/24/79	40700.0	Semi; E. Kazakh (i6)	50.000	78.000	4.9		b2		underground
05/31/79	55457.5	Semi	49.855	78.193	5.2		b6		underground
		E Kazakh	49.837	78.237	5.4		i6		
						3.42	b11		
06/23/79	25657.6	Semi(a,b6,f3); E. Kazakh (i6)	49.918	78.915	6.3	4.4	b6		underground
		Announced by DOE (a)	49.935	78.971	7.2		i6		
					6.215	3.991		f3	
					±.013	±.022			
						4.02	b11		
07/07/79	34657.5	Semi(a,b3,f3); E. Kazakh (i6)	50.050	79.060	5.8	5.0	b3		underground
		Announced by DOE (a)	50.062	79.110	6.7		i6		
					5.839	4.027		f3	
					±.020	±0.232			
						4.04	b11		
07/14/79	5955.2	W.Kazakh(b3,i6); Semi (a)	47.810	48.070	5.6	5.3	b3		underground
		Announced by DOE (a); PNE(i6)	47.835	48.249	6.2		i6		
		[Probably to build storage cavities in Astrakhan natural gas field.]				3.68	b11		
07/18/79	31702.6	Semi	49.900	77.830	5.2	4.2	b3		underground
		E Kazakh	49.966	77.927	5.2		i6		
						3.45	b11		
08/04/79	35657.3	Semi(a,b3,f3); E. Kazakh (i6)	49.860	78.940	6.1	5.5	b3		underground
		Announced by DOE (a)	49.866	78.957	7.2		i6		
					6.161	4.052		f3	
					±.013	±.022			
						3.84	b11		
08/12/79	175957.4	Siberia	61.872	122.185	4.9		b6		underground
		Central Siberia, PNE	61.909	122.087	5.4		i6		
08/18/79	25157.3	Semi (a,b3,f3); E. Kazakh(i6)	49.930	78.980	6.1	4.3	b3		underground
		Announced by DOE (a)	49.961	79.020	7.2		i6		
					6.170	3.772		f3	
					±.015	±.072			
09/06/79	175957.7	Siberia	64.060	99.620	4.9		b3		underground
		Central Siberia, PNE	64.126	99.554	4.6		i6		
09/14/79	73300.0	Semi	50.000	78.000	5.2		b2		underground
		E Kazakh			5.2		i6		
09/15/79	40700.0	Semi	50.000	78.000	4.6		b2		underground
		E Kazakh			4.6		i6		
09/24/79	32958.4	NZ(a,b6,i6)	73.370	54.580	5.7	4.5	b3		underground
		Announced by DOE (a)	73.335	54.729	6.5		i6		
						4.15	b11		
09/27/79	41257.4	Semi	49.743	78.051	4.5		b6		underground
		E Kazakh			5.4		i6		
10/04/79	155958.0	Siberia;W. Siberia(i6);East	60.660	71.440	5.4	3.8	b3		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		of Ural Mts, announced by DOE (a); PNE (e1,i6) believed designed to hasten the flow of oil in the Salym oil field (e1)	60.650	71.525	5.8		i6		
10/07/79	205956.9	Semi [sic?]	61.854	113.090	4.9		b6		underground
		Central Siberia, PNE	61.839	113.059	5.3		i6		
						3.78	b11		
10/18/79	41657.6	Semi	49.783	78.118	5.2		b6		underground
		E Kazakh			5.4		i6		
10/18/79	70958.3	NZ (a,b6,i6)	73.338	54.807	5.8		b6		underground
		Announced by DOE (a)			6.6		i6		
						3.90	b11		
10/24/79	55956.6	W.Kazakh(b6,i6); N.of Caspian	47.806	48.158	5.8		b6		underground
		Sea, ann. by DOE (a); PNE(i6)	47.769	48.177	6.4		i6		
		[Probably to build storage cavities in Astrakhan natural gas field.]				3.95	b11		
10/28/79	31656.9	Semi (a,b6,f3); E. Kazakh(i6)	49.967	79.059	6.0	4.4	b6		underground
		Announced by DOE (a)	49.941	79.041	6.6		i6		
					5.990	3.974		f3	
					±.016	±.058			
						4.10	b11		
11/30/79	45257.8	Semi	49.810	78.210	4.5		b3		underground
		E Kazakh	49.840	78.269	4.9		i6		
						3.08	b11		
12/02/79	43657.5	Semi (a,b6,f3); E. Kazakh(i6)	49.894	78.843	6.0	4.4	b6		underground
		Announced by DOE (a)	49.868	78.824	7.2		i6		
					5.998	4.080		f3	
					±.013	±.022			
						4.24	b11		
12/21/79	44156.8	Semi	49.794	78.347	4.7		b6		underground
		E Kazakh			5.0		i6		
12/23/79	45657.6	Semi (a,b6,f3); E. Kazakh(i6)	49.964	78.827	6.1	4.1	b6		underground
		Announced by DOE (a)			7.2		i6		
					6.170	3.772		f3	
					±.017	±.016			
						3.98	b11		
04/04/80	52357.3	Semi	49.385	77.937	4.9		b6		underground
		E Kazakh	49.968	77.777	5.1		i7		
04/10/80	40657.6	Semi	49.792	78.128	5.0		b6		underground
		E Kazakh	49.813	78.140	5.3		i7		
04/25/80	35657.4	Semi (a,b3); E. Kazakh (i7)	49.960	78.810	5.5		b3		underground
		Annnounced by DOE (a)	49.946	78.808	6.5		i7		
05/22/80	35657.8	Semi (a,b3); E. Kazakh (i7)	49.750	78.110	5.5		b3		underground
		Announced by DOE (a)	49.759	78.102	5.8		i7		
06/12/80	32657.5	Semi (a,b6); E. Kazakh (i7)	49.994	79.038	5.6		b6		underground
		Announced by DOE (a)	49.990	79.027	6.1		i7		
06/29/80	23257.8	Semi (a,b3,f3); E. Kazakh(i7)	49.910	78.860	5.7	3.7	b3		underground
		Announced by DOE (a)	49.923	78.860	6.8		i7		
					5.707	3.400		f3	

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
					±.019	±.087			
07/13/80	81900.0	Semi; E. Kazakh (i7)	50.000	78.000	5.0		b2		underground
07/21/80	33259.0	Semi	49.810	78.140	5.3		b3		underground
		E Kazakh	49.812	78.169	5.5		i7		
09/14/80	24239.3	Semi (a,b3,f3); E. Kazakh(i7)	49.940	78.860	6.2	4.2	b3		underground
		Announced by DOE (a)	49.979	78.883	7.3		i7		
					6.213	4.043		f3	
					±.030	±.019			
09/20/80	104000.0	Semi; E. Kazakh (i7)	50.000	78.000	4.9		b2		underground
09/25/80	62110.6	Semi	49.752	78.027	4.7		b6		underground
		E Kazakh	49.713	77.986	4.9		i7		
09/30/80	55700.0	Semi; E. Kazakh (i7)	50.000	78.000	4.6		b2		underground
09/30/80	55700.0	Semi; E. Kazakh (i7)	50.000	78.000	5.2		b2		underground
10/08/80	55957.3	SW Russia	46.790	48.290	5.2	3.7	b3		underground
		W Kazakh, PNE	46.748	48.288	5.7		i7		
		[Probably to build storage cavities in the Astrakhan natural gas field.]							
10/11/80	70957.2	NZ (a,b3); Semi (a) [sic?]	73.360	54.820	5.7	4.0	b3		underground
		Announced by DOE (a)	73.313	55.021	6.6		i7		
10/12/80	33414.3	Semi (a,b3,f3); E. Kazakh(i7)	49.940	79.100	5.9	4.2	b3		underground
		Announced by DOE (a)	49.912	79.050	6.2		i7		
					5.918	4.094		f3	
					±.019	±.015			
11/01/80	125957.8	Siberia;C.Siberia(i7);N.C.	60.822	97.568	5.2		b6		
		Siberia,ann.by DOE(a);PNE(i7)	61.000	98.000	4.7		i7		
12/10/80	65957.3	Siberia	61.686	66.999	4.6	3.7	b6		underground
		W Siberia, PNE	61.713	67.018	4.8		i7		
12/14/80	34706.5	Semi (a,b3,f3); E. Kazakh(i7)	49.870	78.970	5.9	4.1	b3		underground
		Announced by DOE (a)			7.0		i7		
					5.953	3.934		f3	
					±.019	±.038			
12/26/80	40707.5	Semi	50.001	77.973	4.5		b6		underground
		E Kazakh			4.6		i7		
12/27/80	40908.5	Semi (a,b3,f3); E. Kazakh(i7)	50.010	79.030	5.9		b3		underground
		Announced by DOE (a)			6.9		i7		
					5.872	3.758		f3	
					±.023	±.144			
03/29/81	40350.1	Semi (a,b3); E. Kazakh (i7)	49.980	79.020	5.6		b3		underground
		Announced by DOE as 03/28/81	49.960	78.936	6.3		i7		
		which is probably same as 03/29/81 test due to time difference(a)							
04/22/81	11711.4	Semi (a,b3,f3); E.Kazakh (i7)	49.870	78.900	6.0	4.7	b3		underground
		Announced by DOE as 04/21/81	49.915	78.879	7.0		i7		
		which is probably same as 04/22/81 test due to time difference(a)			5.954	4.070		f3	
					±.015	±.020			
05/25/81	45957.3	W.Russia;Eur. USSR (i7);NW	68.205	53.656	5.5		b6		underground
		USSR, ann. by DOE (a);PNE(i7)	68.182	53.689	5.8		i7		
05/27/81	35812.3	Semi (a,b3); E. Kazakh (i7)	49.940	79.010	5.5	3.4	b3		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		Announced by DOE as 05/26/81 which is probably same as 05/27/81 test due to time difference (a)	49.963	78.992	6.1		i7		
06/05/81	32200.0	Semi; E. Kazahk (i7)	50.000	78.000	4.7		b2		underground
06/30/81	15712.7	Semi	49.736	78.082	5.0		b6		underground
		E Kazakh	49.706	78.022	4.6		i7		
07/05/81	35900.0	Semi; E. Kazakh (i7)	50.000	78.000	4.6		b2		underground
07/17/81	23715.7	Semi	49.790	78.170	5.2		b3		underground
		E Kazakh	49.778	78.220	5.3		i7		
08/14/81	22712.9	Semi	49.750	78.070	5.0		b3		underground
		E Kazakh	49.779	78.078	5.3		i7		
09/02/81	40004.0	Ural	60.590	55.700	4.4		b3		underground
		Ural Mountains, PNE			4.6		i7		
09/13/81	21718.4	Semi (a,b3,f3); E. Kazakh(i7)	49.890	78.980	6.1	4.9	b3		underground
		Announced by DOE as 09/12/81 which is probably same as 09/13/81 test due to time difference(a)	49.882	78.791	7.0		i7		
					6.064 ±.017	4.206 ±.026		f3	
09/25/81	45957.5	SW Russia	46.820	48.280	5.2		b3		underground
		W Kazakh, PNE	46.778	48.242	5.5		i7		
09/26/81	50357.0	SW Russia	46.790	48.270	5.3		b3		underground
		W Kazakh, PNE	46.714	48.240	5.6		i7		
		[Series of two tests in the Astrakhan natural gas field, probably to build storage cavities.]							
09/30/81	125500.0	Semi; E. Kazakh (i7)	50.000	78.000	4.6		b2		underground
10/01/81	121456.9	NZ (a,b3,i7)	73.320	54.550	6.0	3.8	b3		underground
		Announced by DOE (a)	73.297	54.381	5.8		i7		
10/18/81	35702.7	Semi (a,b3,f3); E. Kazakh(i7)	49.880	78.890	6.1	4.7	b3		underground
		Announced by DOE as 10/17/81 which is probably same as 10/18/81 test due to time difference(a)	49.981	78.877	7.1		i7		
					6.033 ±.019	4.094 ±.020		f3	
10/22/81	135957.5	Siberia	63.790	97.540	5.1		b3		underground
		Central Siberia, PNE	63.755	97.570	4.6		i7		
11/20/81	45702.5	Semi	49.736	78.183	4.9		b6		underground
		E Kazakh	49.757	78.201	5.2		i7		
11/29/81	33508.6	Semi (a,b6); E. Kazakh (i7)	49.860	78.857	5.6	4.0	b6		underground
		Announced by DOE as 11/28/81 which is probably same as 11/29/81 test due to time difference (a)			6.7		i7		
12/22/81	43102.6	Semi	49.840	78.210	5.1		b3		underground
		E Kazakh			4.9		i7		
12/27/81	34314.2	Semi (a,b3,f3); E. Kazakh(i7)	49.900	78.860	6.2	4.4	b3		underground
		Announced by DOE as 12/26/81 which is probably same as 12/27/81 test due to time difference(a)			7.3		i7		
					6.242 ±.028	4.106 ±.030		f3	
02/19/82	35611.0	Semi	49.801	78.116	5.4		b6		underground
		E Kazakh	49.809	78.102	5.4		i8		
04/25/82	32305.5	Semi (a,b3,f3); E. Kazakh(i8)	49.870	78.920	6.1	4.6	b3		underground
		Announced by DOE as 04/24/82	49.889	78.976			i8		

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		which is probably same as 04/25/82 due to time difference (a)			6.089 ±.021	4.026 ±.009	f3		
05/11/82	105900.0	Semi	50.000	78.000			b2		underground
		E Kazakh			4.7		i8		
06/25/82	20304.2	Semi	49.795	78.158	4.9		b6		underground
		E Kazakh	49.783	78.197	4.7		i8		
07/04/82	11714.4	Semi (a,b6,f3); E. Kazakh(i3)	49.995	78.856	6.1	4.9	b6		underground
		Announced by DOE as 07/03/82	50.047	78.799	7.0		i8		
		which is probably same as 07/04/82 test due to time difference (a). Surface waves masked by an earthquake (f3)			6.222 ±.026	n.a.	f3		
07/12/82	102900.0	Semi	50.000	78.000	7.0		b2		underground
		E Kazakh			4.6		i8		
07/30/82	210002.2	Baykal	53.813	104.132	5.1	3.8	b6		underground
		Central Siberia, PNE	62.000	113.000	5.0		i8		
07/31/82	70800.0	W. Kazakh; PNE (i8)	47.000	48.000	4.0		b2		underground
		[Probably to build storage cavities at Astrakhan natural gas field.]							
08/23/82	24304.2	Semi	49.747	77.971	4.7		b6		underground
		E Kazakh	50.000	78.000	5.0		i8		
08/28/82	90900.0	W. Kazakh; PNE (i8)	47.000	48.000	4.0		b2		underground
		[Probably to build storage cavities at Astrakhan natural gas field.]							
08/31/82	13100.5	Semi (a,b6); E. Kazakh (i8)	49.920	78.812	5.4	3.5	b6		underground
		Announced by DOE as 08/30/82	49.901	78.834	6.3		i8		
		which is probably same as 08/31/82 due to time difference (a)							
08/31/82	84000.0	W. Kazakh; PNE (i8)	47.000	48.000	4.6		b2		underground
		[Astrakhan natural gas field]							
09/04/82	54700.0	Semi	50.000	78.000	4.1		b2,i8		underground
09/04/82	175958.4	Siberia	69.206	81.647	5.2	3.5	b6		underground
		NW Siberia	69.175	81.691	5.2		i8		
09/15/82	43300.0	Semi	50.000	78.000	5.2		b2		underground
		E Kazakh			5.1		i8		
09/21/82	25700.8	Semi	49.854	78.216	5.2		b6		underground
		E Kazakh	49.909	78.229	5.5		i8		
09/25/82	176957.1	Siberia	64.313	91.834	5.1		b6		underground
		Central Siberia, PNE	64.311	91.859	4.7		i8		
10/01/82	131000.0	W. Kazakh; PNE (i8)	47.000	48.000	4.0		b2		underground
		[Probably to build storage cavities at Astrakhan natural gas field.]							
10/10/82	45956.7	Siberia	61.553	112.864	5.3		b6		underground
		Central Siberia, PNE	61.555	112.833	5.3		i8		
10/11/82	71458.2	NZ (a,b6,i8)	73.392	54.559	5.6	3.6	b6		underground
		Announced by DOE	73.368	54.532	6.3		i8		
10/16/82	55957.1	N. Caspian Sea	46.730	48.197	5.2	3.0	b6		underground
		W Kazakh, PNE	47.000	48.000	5.4		i8		
10/16/82	60457.2	N. Caspian Sea	46.748	48.215	5.2	3.0	b6		underground
		W Kazakh, PNE	47.000	48.000	5.3		i8		
10/16/82	60957.1	N. Caspian Sea	46.754	48.270	5.2	3.1	b6		underground
		W Kazakh, PNE	47.000	48.000	5.5		i8		

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10/16/82	61457.3	N. Caspian Sea	46.743	48.213	5.4	3.1	b6		underground
		W Kazakh, PNE	47.000	48.000	5.6		i8		
		Series of four tests at five minute intervals; [probably to build storage cavities at Astrakhan natural gas field]. Reported [incorrectly] as a project to build a new waterway at the Ural River (e2).					e2	5.9-6.2 Richter	underground
10/27/82	72800.0	W. Kazakh; PNE (i8)	47.000	48.000	4.0		b2		underground
		W Kazakh, PNE	47.000	48.000	4.0		i8		
		[Probably to build storage cavities at Astrakhan natural gas field.]							
11/21/82	61000.0	Ural;S.Ural, PNE (i8)	55.000	50.000	4.4		b2		underground
11/29/82	191900.0	Ural;S.Ural, PNE (i8)	55.000	50.000	4.1		b2		underground
11/30/82	94900.0	W. Kazakh; PNE (i8)	47.000	48.000	4.5		b2		underground
		[Probably to build storage cavities at Astrakhan natural gas field.]							
12/05/82	33712.6	Semi (a,b6); E. Kazakh (i8)	49.928	78.869	6.1	4.4	b6		underground
		Announced by DOE as 12/04/82	50.000	78.000	7.1		i8		
		which is probably same as 12/05/82 due to time difference (a)							
12/25/82	42305.6	Semi (a,b6); E. Kazakh (i8)	49.871	78.095	4.8	3.4	b6		underground
		Announced by DOE (a)	50.000	78.000	4.9		i8		
12/26/82	33514.1	Semi	50.066	79.043	5.7		b6		underground
		E Kazakh	50.000	78.000	6.7		i8		
02/01/83	135500.0	NCaspian Sea;W.Kazakh,PNE(i9)	47.000	48.000	4.3		b2		underground
02/24/83	141100.0	NCaspian Sea;W.Kazakh,PNE(i9)	47.000	48.000	4.3		b2		underground
02/25/83	65300.0	W. Kazakh; PNE (i9)	47.000	48.000	4.2		b2		underground
		[Probably to build storage cavities at Astrakhan natural gas field.]							
03/02/83	84530.0	W. Kazakh (b9,i9)	48.000	49.000	3.8		b9		underground
		PNE	47.000	48.000	4.1		i9		
		[Probably to build storage cavities at Astrakhan natural gas field.]							
03/30/83	41700.0	Semi	49.000	79.000	5.0		b2		underground
		E. Kazakh	50.000	78.000	5.0		i9		
04/12/83	34105.2	Semi	49.815	78.222	4.9		b2		underground
		E. Kazakh	49.815	78.222	5.0		i9		
05/30/83	33344.5	Semi (a,b6); E. Kazakh (i9)	49.740	78.206	5.4		b6		underground
		Announced by DOE as 05/30/83	49.740	78.210			i9		
		which is probably same as 05/30/83 due to time difference (a)							
06/12/83	23643.6	Semi (a,b6); E. Kazakh (i9)	49.906	78.981	6.1	4.6	b6		underground
		Announced by DOE as 06/11/83	49.894	78.964			i9		
		which is probably same as 06/12/83 due to time difference (a)							
06/24/83	25611.1	Semi	49.810	78.107	4.7		b6		underground
		E. Kazakh	50.000	78.000	5.0		i9		
07/10/83	35957.1	Ural	51.308	53.273	5.3		b6		underground
		S. Ural Mountains, PNE	51.327	53.286			i9		
	40457.1	Ural	51.340	53.270	5.3		b6		underground
		S. Ural Mountains, PNE	51.336	53.290			i9		
	40957.1	Ural	51.344	53.291	5.2		b6		underground

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		S. Ural Mountains, PNE	51.357	53.301			i9		
		Series of three tests at five minute intervals; [probably to build storage cavities at Orenburg natural gas field]. Reported [incorrectly] to be used to build a new waterway at the Ural River (e2)					e2	5.9-6.2 Richter	underground
07/28/83	34100.0	Semi	49.000	79.000	5.0		b2		underground
		E. Kazakh	50.000	79.000	5.0		i9		
08/18/83	160958.6	NZ (a,b6,i9)	73.383	54.913	5.9	4.2	b6		underground
		Announced by DOE (a)	73.373	54.839			i9		
09/11/83	63310.4	Semi	49.878	78.183	4.8		b6		underground
		E. Kazakh	79.801	78.244			i9		
09/24/83	45957.1	Ural	46.816	48.291	5.1		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.773	48.300	5.4		i9		
09/24/83	50457.2	Ural	46.817	48.279	5.0		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.763	48.281	5.2		i9		
09/24/83	50957.5	Ural	46.860	48.272	4.9		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.872	48.214	5.2		i9		
09/24/83	51457.1	Ural	46.780	48.300	5.2		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.748	48.299	5.4		i9		
09/24/83	51957.1	Ural	46.796	48.297	5.2		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.722	48.267	5.5		i9		
09/24/83	52457.4	Ural	46.837	48.231	5.2		b6	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.758	48.257	5.5		i9		
		Series of six tests at five minute intervals; [probably to build storage cavities at Astrakhan natural gas field]. Reported [incorrectly] to be used to build a new waterway at the Ural River (e2)					e2	5.9-6.2 Richter	underground
09/25/83	130957.7	NZ (a,b6,i9)	73.348	54.495	5.8		b6		underground
		Announced by (a)	73.341	54.501	6.4		i9		
10/06/83	14706.5	Semi (a,b6); E. Kazakh (i9)	49.932	78.843	6.0		b6		underground
		Announced by DOE as 10/05/83 which is probably same as 10/06/83 due to time difference (a)	49.933	78.833			i9		
10/26/83	15504.8	Semi (a,b6); E. Kazakh (i9)	49.921	78.907	6.1	4.6	b6		underground
		Announced by DOE as 10/25/83 which is probably same as 10/26/83 due to time difference (a)	49.933	78.856			i9		
11/20/83	32704.4	Semi (a,b6); E. Kazakh (i9)	50.066	79.036	5.5		b6		underground
		Announced by DOE as 11/19/83 which is probably same as 11/20/83 due to time difference (a)	50.000	78.000	6.4		i9		
11/29/83	21906.5	Semi (a,b6); E. Kazakh (i9)	49.764	78.169	5.4		b6		underground
		Announced by DOE as 11/28/83 which is probably same as 11/29/83 due to time difference (a)	50.000	78.000	5.5		i9		
12/26/83	42906.8	Semi (a,b6); E. Kazakh (i9)	49.838	78.218	5.5		b6		underground
		Announced by DOE as 12/25/83 which is probably same as 12/26/83 due to time difference (a)	50.000	78.000	5.7		i9		
02/19/84	35700.0	Semi (a,b2); E. Kazakh(i10)			7.0	4.4	b2		underground
	35703.4	251 stations	49.908	78.807	5.8	4.3	k		
		E. Kazakh	49.888	78.788	7.0		i10		
		Announced by DOE as 02/18/84 which is probably							

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
		same as 02/19/84 due to time difference (a)							
03/07/84	23906.3	Semi (a,b6)	50.022	78.978	5.6		b6		underground
	23906.4	249 stations	50.061	79.003	5.7		k		
		E. Kazakh	50.022	78.978	6.6		i10		
		Announced by DOE as 03/06/84 which is probably same as 02/19/84 due to time difference (a)							
03/29/84	51900.0	Semi (a,b2); announced by DOE (a)				4.3	b2		underground
	51908.2	263 stations	49.937	79.017	5.9	4.3	k		
		E. Kazakh	49.934	79.013			i10		
04/15/84	31700.0	Semi (a,b2)			5.9	4.1	b2		underground
	31709.1	244 stations	49.740	78.163	5.7		k		
		E. Kazakh	49.766	78.135	5.9		i10		
		Announced by DOE as 04/14/84 which is probably same as 04/15/84 due to time difference (a)							
04/25/84	10903.5	Semi (a,b6)	49.934	78.915	6.0	5.0	b6		underground
	10903.5	291 stations	49.953	78.940	5.9	4.7	k		
		E. Kazakh			7.0		i10		
		Announced by DOE as 04/24/84 which is probably same as 04/25/84 due to time difference (a)							
05/26/84	31300.0	Semi (a,b2)			6.6		b2		underground
	31312.4	325 stations	49.980	79.060	6.0		k		
		E. Kazakh	49.949	79.060	6.6		i10		
		Announced by DOE as 05/25/84 which is probably same as 05/26/84 due to time difference (a)							
06/23/84	25700.0	Semi				4.4	b9		underground
		E. Kazakhstan	50.000	79.000			i10		
07/14/84	10910.5	Semi	49.981	78.963	6.2	4.6	b6		underground
	10910.5	316 stations	49.891	78.963	6.2	4.6	k		
		E. Kazakhstan	49.902	78.988	7.2		i10		
		Announced by DOE as 07/13/84 which is probably same as 07/14/84 due to time difference (a)							
07/21/84	25957.1	W. Kazakh(b6);Eur. USSR(k)	51.356	53.249	5.4		b6,k		underground
		141 stations(k); PNE	51.366	53.253			i10		
07/21/84	30500.0	W. Kazakh				4.0	b2		underground
	30457.0	Eur. USSR, 176 stations	51.374	53.257	5.3		k		
		PNE	51.384	53.271			i10		
07/21/84	30957.0	W. Kazakh(b6);Eur. USSR (k)	51.353	53.271	5.3		b6		underground
		166 stations (k);PNE	51.366	53.276			i10		
		PNEs, series of three tests at five minute intervals; all announced by DOE as 07/20/84 which is probably same as 07/21/84 due to time difference (a)							
		[Probably to build storage cavities at Orengurg natural gas field.]							
08/11/84	190000.0	Ural;NW USSR (a);Ural MTs(i10)			5.1		b2		underground
	185957.8	174 stations	65.025	55.187	5.3		k		
		Announced by DOE(a); PNE(i10)	65.079	55.287	4.4		i10		
08/25/84	185958.6	W. Siberia(b6,i10);NC USSR(a)	61.876	72.092	5.4		b6,k		underground
		209 stations (k); PNE	61.889	72.149	5.2		i10		
08/28/84	25955.5	Ural Mts(b6,k);23 stations(k)	60.826	57.472	4.4		b6,k		underground
		PNE	61.000	56.000	4.4		i10		

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
08/28/84	30459.0	Ural	61.000	58.000	4.5		b9		underground
	30455.2	Ural Mts, 24 stations	60.791	57.544	4.3		k		
		PNE	61.000	56.000	4.4		i10		
	PNEs; series of two tests at five minute intervals								
09/09/84	25906.3	Semi	49.873	78.208	5.0		b6		underground
	25906.4	E. Kazakh, 79 stations	49.869	78.176	5.0		k		
		E. Kazakh			5.1		i10		
09/15/84	61500.0	Semi			5.2		b2		underground
		E. Kazakh	50.000	79.000	5.2		i10		
09/17/84	205947.4	C. Siberia (b6,i10)	55.835	87.408	4.9		b6		underground
	205957.5	C USSR, 124 stations	55.870	87.446	4.9		k		
		PNE			4.5		i10		
10/18/84	45700.0	Semi	50.000	80.000	4.5		b9		underground
	45705.7	E. Kazakh, 22 stations	49.800	78.141	4.5		k		
		E. Kazakh	49.787	78.004			i10		
10/25/84	63000.0	NZ				4.4	b2		underground
	62957.5	NZ, 269 stations	73.370	54.955	5.9	4.7	k		
		NZ	73.365	54.979			i10		
		Announced by DOE (a)							
10/27/84	15010.6	Semi	49.950	78.842	6.2	4.4	b6,i10		underground
	15010.6	376 stations	49.949	78.834	6.2	4.4	k		
		Announced by DOE as 10/26/84 which is probably same as 10/27/84 due to time difference (a); NZ (a) [sic]							
10/27/84	55958.6	W. Kazakh	47.044	47.919	4.8		b6		underground
	55957.1	SW USSR, 107 stations	46.857	48.098	5.0		k		
10/27/84	60500.0	W. Kazakh					b2		underground
	60456.1	SW USSR, 100 stations	46.842	48.083	5.0		k		
			46.843	48.023			i10		
		Series of two PNEs (i10) at five minute intervals. [Probably to build storage cavities at Astrakhan natural gas field]							
11/23/84	35500.0	Semi	50.000	79.000	4.5		b2,i10		underground
	35504.8	E. Kazakh, 30 stations	48.897	78.132	4.7		k		
12/02/84	31906.2	Semi (a,b6)	49.989	79.091	5.8	3.8	b6		underground
	31906.3	283 stations	49.993	79.072	5.8	4.6	k		
		E. Kazakh	50.000	79.000	4.5		i10		
		Announced by DOE as 12/01/84 which is probably same as 12/02/84 due to time difference (a)							
12/16/84	35500.0	Semi (a,b2)				4.5	b2		underground
	35502.7	312 stations	49.957	78.862	6.1	4.6	k		
		E. Kazakh	50.000	79.000			i10		
		Announced by DOE as 12/15/84 which is probably same as 12/02/84 due to time difference (a)							
12/23/84	35010.5	Semi (a,b6)	49.853	78.785	6.0		b6		underground
	35010.7	306 stations	49.861	78.752	6.0	4.1	k		
		E. Kazakhstan	50.000	79.000	7.3		i10		
		Announced by DOE as 12/27/84 which is probably same as 12/28/84 due to time difference (a)							
02/10/85	32707.5	Semi	49.869	78.818	5.9	4.4	b6,b10 (7.2 MB in b10)		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	S	YIELD RANGE	TYPE
	32707.6	Semi	49.877	78.816			c		
04/25/85	5706.5	Semi	49.907	78.932	5.9	4.1	b6,b10 (6.9 MT in b10)		underground
06/15/85	5700.0	Semi	50.000	79.000	7.2	4.5	b2		underground
	5700.7	Semi	49.878	78.888	7.2	4.5	b10		
		Semi; announced by DOE as 06/14/85 test,	205700.0	EDT			c		underground
06/30/85	23900.0	Semi	50.000	79.000	7.1	4.4	b2		underground
	23902.7	Semi	49.854	78.693	7.1	4.4	b10		
07/18/85	211457.5	W. Russia	65.965	40.754	5.0		b6		underground
		Eur.USSR			5.5	3.6	b10		
		[PNE?]							
07/20/85	5300.0	Semi	50.000	79.000	6.7		b2		underground
	5314.5	Semi	49.951	78.847	6.8		b10		
07/25/85	31100.0	Semi	50.000	79.000	5.3		b2		underground
	31106.6	Semi	49.862	78.099	5.3		b10		

Notes to Table 1

Time = Hour, minutes, seconds, tenths of a second
S = Source
Semi = Semipalatinsk
NZ = Novaya Zemlya
Mb = body wave magnitude(s)
Ms = surface wave magnitude(s)
PNE = peaceful nuclear explosion

Sources:

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f. Sykes.
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i. SIPRI Yearbooks (London: Taylor & Francis).
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i2. SIPRI Yearbook 1975, pp. 507-509.
i3. SIPRI Yearbook 1977, p. 401.
i4. SIPRI Yearbook 1979, pp. 652-653.
i5. SIPRI Yearbook 1980, p. 362.
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Table 2

Summary of Known Soviet Nuclear Explosions, 1949-1985

Year	Number	PRESUMED PURPOSE		LOCATION			Cumulative Total
		Military	Peaceful	Semi	NZ	Other[1]	
1949	1	1	0	0	0	1	1
1950	0	0	0	0	0	0	0
1951	2	2	0	2	0	0	3
1952	0	0	0	0	0	0	3
1953	4	4	0	4	0	0	7
1954	7	7	0	0	0	7	14
1955	5	5	0	2	0	3	19
1956	9\	9\	0	0	0	9	28
1957	15 ¦+18[2]	15 ¦+18[2]	0	2	4	9	43
1958	29/	29/	0	0	26	3	90[2]
1959	0	0	0	0	0	0	90
1960	0	0	0	0	0	0	90
1961	50	50	0	6	24	20	140
1962	44	44	0	10	32	2	184
1963	0\	0\	0	0	0	0	184
1964	6 ¦	6 ¦	0	4	2	0	190
1965	9 ¦	9 ¦	0	9	0	0	199
1966	15 ¦	13 ¦	2	12	1	2	214
1967	16 ¦	15 ¦	1	14	1	2	230
1968	13 ¦	11 ¦	2	10	1	2	243
1969	15 ¦	11 ¦	4	10	1	4	258
1970	13 ¦+16[3]	9 ¦+16[3]	4	8	1	4	271
1971	20 ¦	12 ¦	8	11	1	8	291
1972	22 ¦	13 ¦	9	12	1	9	313
1973	14 ¦	9 ¦	5	6	3	5	327
1974	20 ¦	17 ¦	3	13	4	3	347
1975	15 ¦	13 ¦	2	10	3	2	362
1976	17 ¦	15 ¦	2	13	2	2	379
1977	18/	13/	5	11	2	5	413[3]
1978	27	20	7	18	2	7	440
1979	29	21	8	19	2	8	469
1980	21	18	3	17	1	3	490
1981	21[4]	16	5	15	1	5	511
1982	31	15	16	14	1	16	542
1983	27[4]	14	13	12	2	13	569
1984	27	17	10	16	1	10	596
1985	7	6	1	6	0	1	603
Totals	**603**	**493**	**110**	**286**	**119**	**198**	**603[4]**

Notes to Table 2

1. Includes tests whose location are unknown.

2. The Stockholm International Peace Research Institute (SIPRI) and the Swedish National Defence Research Institute list 57 Soviet explosions from 1949 through 1958, and SIPRI notes that an additional 33 tests took place during this period whose dates are unknown (see Table 1; World Armaments and Disarmament, SIPRI Yearbook, 1975, pp. 510-511, 1976, pp. 416-417). These additional tests are apparently included in a classified Swedish list. Table 1 lists 72 tests during this period, leaving at least 18 of the 33 tests unaccounted for. All of these tests presumably took place in 1956-1958 since the tests through 1955 are numbered and were for weapons related purposes. The locations of these tests are unknown. Hence, the cumulative totals reflect an additional 18 weapons related tests from 1958 on. The French Ministry of Defense estimates that 182 Soviet tests were conducted before 1963, 174 of which were conducted in the atmosphere and eight underground (Minister de la Defence, Direction de Centre d'Esperimentations Nucleaire, Organization et Functionnement de Centre d'Experimentation Nucleaire, Dossier No. 1, "Essais Nuclaires, Taoleau Recapitulatif Des Explosions Annoncees Et Presumees," Piece No. 7/41, 31 January 1985). Thus, there may be only 16 tests unaccounted for.

3. The French MoD reports an additional 16 tests from 1963 through 1977; ibid. These tests presumably were weapons related tests it is reasonable to assume that PNEs would have appeared on other lists. Hence, the cumalive totals reflect an additional 16 weapons related tests from 1958 on.

4. The French MoD reports 23 tests in both 1981 and 1983; ibid. Accounting for these tests and the earlier discrepancy in the totals before 1963, the overall number of Soviet nuclear explosions would range from 597 to 605.

Table 3

Known Nuclear Explosions at Semipalatinsk By Month

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1949													0
1950													0
1951									1	1			2
1952													0
1953								4					4
1954													?
1955											2		2
1956													0
1957									2				2
1958													0
1959													0
1960													0
1961									5	1			6
1962		1						2		4	3		10
1963													0
1964			1		1		1				1		4
1965	1		1		1	1	1		1	1	1	1	9
1966		1	1	1	1	1	1	2	1	1		2	12
1967	1	1	1	1	1	1	1	1	2	2	1	1	14
1968	1			1		2	1	1	2		1	1	10
1969			1		2		2		1	1	1	2	10
1970	1		1			1	2		1		1	1	8
1971			1	1	1	3				2	1	2	11
1972		1	2			1	1	2	1		1	3	12
1973		1		1			2			1		1	6
1974	2			1	2	1	1		1	1		4	13
1975		1	1	1		2		1		2		2	10
1976	1			2	1	1	2	2		1	1	2	13
1977			1	1	1	1	1	1	1	2	1	1	11
1978			2	1	1	1	2	2	2	2	3	2	18
1979		2			3	1	2	2	3	2	1	3	19
1980				3	1	2	2		5	1		3	17
1981			1	1	1	2	2	1	2	1	2	2	15
1982		1		1		2	2	2	3			3	14
1983			1	1	1	2	1		1	2	2	1	12
1984		1	2	2	1	1	1		2	2	1	3	16
1985		1		1		2	2						6
Total	**7**	**11**	**17**	**20**	**19**	**28**	**30**	**23**	**37**	**30**	**24**	**40**	**286**

Table 4

Known Nuclear Explosions at Novaya Zemlya By Month

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1949													0
1950													0
1951													0
1952													0
1953													0
1954													0
1955													0
1956													0
1957									2	2			4
1958		3	5						3	15			26
1959													0
1960													0
1961									9	12	3		24
1962								6	10	5	3	8	32
1963													0
1964									1	1			2
1965													0
1966										1			1
1967										1			1
1968											1		1
1969										1			1
1970										1			1
1971									1				1
1972								1					1
1973									2	1			3
1974							1	1			1	1	4
1975								1		2			3
1976									1	1			2
1977									1	1			2
1978								1	1				2
1979									1	1			2
1980										1			1
1981										1			1
1982										1			1
1983								1	1				1
1984										1			1
1985													0
Total		3	5				1	11	33	49	8	9	119

Table 5

Summary of Explosions at Semipalatinsk and Novaya Zemlya

Month	1949-1985 Numbers			1949-1985 Percentages			1964-1985 Numbers			1964-1985 Percentages		
	Semi	NZ	Tot	Semi	NZ	Total	Sem	NZ	Tot	Semi	NZ	Total
January	7	0	7	2.4	0.0	1.7	7	0	7	2.7	0.0	2.4
February	11	3	14	3.8	2.5	3.5	10	0	10	3.8	0.0	3.4
March	17	5	22	5.9	4.2	5.4	17	0	17	6.5	0.0	5.8
April	20	0	20	7.0	0.0	4.9	20	0	20	7.7	0.0	6.8
May	19	0	19	6.6	0.0	4.7	19	0	19	7.3	0.0	6.5
June	28	0	28	9.8	0.0	6.9	28	0	28	10.7	0.0	9.6
July	30	1	31	10.5	0.8	7.7	30	1	31	11.9	3.0	10.6
August	23	11	34	8.0	9.2	8.4	17	5	22	6.5	15.2	7.5
September	37	33	70	12.9	27.7	17.3	29	9	38	11.1	27.3	13.0
October	30	49	79	10.5	41.2	19.5	24	15	39	9.2	45.5	13.3
November	24	8	32	8.4	6.7	7.9	19	2	21	7.3	6.1	7.2
December	40	9	49	14.0	7.6	12.1	40	1	41	15.3	3.0	14.0
Totals	**286**	**119**	**405**	**70.6**	**29.4**	**100.0**	**260**	**33**	**293**	**88.7**	**11.3**	**100.0**

Table 6

Known Soviet Nuclear Tests By Year With Estimated Yield

Year	Number	Cumulative Total	Yield (kt)[1]	Cumulative Yield (kt)
1949	1	1	15	15
1950	0	1	0	15
1951	2	3	75	90
1952	0	3	0	90
1953	4	7	360	450
1954	7	14	260	710
1955	5	19	1865	2575
1956	9	28	6135	8500[3]
1957	15 +18[2]	43	10500	19000
1958	29	90[2]	31500	50500
1959	0	90	0	50500
1960	0	90	0	50500
1961	50	140	200000	250500
1962	44	184	201500	452000
1963	0	184	0	452000
1964	6	190	200	452200
1965	9	199	1000	453200
1966	15	214	2000-2500	455200-455700
1967	16	230	2000	457200-457700
1968	13	243	1000	458200-458700
1969	15	258	1500	459700-460200
1970	13 +16[2]	271	3000-6500 +2600-	462700-466700
1971	20	291	3000-5500 3400[4]	465700-472200
1972	22	313	3500-4000	469200-476200
1973	14	327	6500-10000	475700-486200
1974	20	347	6000-11000	481700-497200
1975	15	362	3500-8000	485200-505200
1976	17	379	1000	486200-506200
1977	18	413[2]	1000	489800-510600[4]
1978	27	440	1500	491300-512100
1979	29	469	1500	492800-513600
1980	21	490	1000	493800-514600
1981	21[2]	511	1000	494800-515600
1982	31	542	1500	496300-517100
1983	27[2]	569	1500	497800-518600
1984	27	596	1500	499300-520100
1985	7	603[2]	400	499700-520500

Notes to Table 6

1. Specific yield information for most individual tests are unavailable. More information is available for annual yields prior to 1963 than after 1963, thus different methodologies are used to calculate annual yields for these periods.

   Before 1963, the annual yields are based on the following pieces of information:

   a. Yields of individual tests as given in Table 1;
   b. The following estimates for fission yield from 1949 through 1958 were presented to Congress in 1958: 1949-51, 60 kt; 1952-54, 500 kt; 1955-56, 4 Mt; 1957-58, 21 Mt (Joint Committee on Atomic Energy, Fallout from Nuclear Weapons Tests, Hearings, Volume I, May 5-8, 1959, p. 23).
   c. The former Chairman of the Atomic Energy Commission, Glenn T. Seaborg, has estimated that the cumulative yield of the 1961 test series was nearly 200 megatons (Glenn T. Seaborg with the assistance of Benjamin S. Loeb, Kennedy, Khrushchev, and the Test Ba, (Berkeley, Calif.: University of California Press, 1981), p. 90).
   d. The French Ministry of Defense cumulative estimate of 452 megatons for atmospheric tests through 1962 (Minister de la Defence, Direction de Centre d'Esperimentations Nucleaire, Organization et Functionnement de Centre d'Experimentation Nucleaire, Dossier No. 1, "Essais Nuclaires, Tableau Recapitulatif Des Explosions Annoncees Et Presumees," Piece No. 7/41, 31 January 1985).

   The annual yields for 1949, 1951, 1953, and 1955 are thus derived from specific yield estimates for individual tests. There were no tests in 1950 and 1952. The estimate for 1954 is derived by taking the estimated cumulative fission yield for 1952-54 (500 kt) and subtracting the annual yield value for 1953. It was assumed that half of the total yield of the thermonuclear device on 8/12/53 was fission yield. The same methodology is used to derive the estimates for 1956, 1957, and 1958. For example, the 1956 yield was determined by subtracting from the estimated 1955-56 cumulative yied (4 Mt) the known yields of the 1955 test series. For the 1957-58 period, it was also assumed that the annual cumulative yields are at a ratio of one to three, which is the approximate ratio of high yield tests during the two years. The estimate for 1961 is that provided by Seaborg, and the estimate for 1962 is the remaining amount needed to reach the French MoD estimate for the cumulative total through 1962 (ignoring the presumed relatively small cumulative total from the three underwater and five underground tests conducted before 1963).

The years since 1963 can be broken into three periods. In the first, from 1964 through 1975, the U.S. has provided yield ranges for the majority of the tests that have been announced. Varying nomenclature is used for test yields, and the following are the author's estimates of the average yield in each range:

Yield (kt)		Nomenclature
6	=	less than 20 kt
20	=	small, low
50	=	moderate, low to low intermediate, 20 to 150, 20 to 200
100	=	low intermediate, to intermediate, low end intermediate
200	=	medium, intermediate, a few hundred kt
500	=	relatively large, 200 to 1000
600	=	intermediate to high
1000	=	about 1 megaton
2000	=	multimegaton
3000	=	2 to 4 megatons
3500	=	3 to 4 megatons
4500	=	3 to 6 megatons
6000	=	6 megatons

In addition, Sykes has estimated the yields of fifteen tests during this period (see Table 1), the total some 19 megatons less the total that would accrue if the above estimates for the yield ranges announced by the United States are used. SIPRI has estimated the yields of all tests in 1976. In the final period, 1977 through 1985, two pieces of data are available: first, the historical average of some 30 kt for U.S. underground tests (see Robert S. Norris, Thomas B. Cochran and William M. Arkin, "Known U.S. Nuclear Tests, July 1945 to 31 December 1985," Nuclear Weapons Databook Working Paper NWD 86-2, Natural Resources Defense Council, Inc., February 1986, Table 5); and second, the average of selected Soviet nuclear tests of 1978 and 1979, roughly double that of the U.S. average (Peder Johansson, Yields Estimates of Soviet Nuclear Explosions 1978-79, National Defence Research Institute, September 1984, FOA Report C 20553-T1). Finally, the French Ministry of Defence has estimated a total yield of 68.5 megatons for the 418 underground tests, all but eight of which occurred after 1962 (Minister de la Defence, Direction de Centre d'Esperimentations Nucleaire, Organization et Functionnement de Centre d'Experimentation Nucleaire, Dossier No. 1, "Essais Nuclaires, Tableau Recapitulatif Des Explosions Annoncees Et Presumees," Piece No. 7/41, 31 January 1985). To reach this total, the average yield for the ranges provided by the U.S. for the ten tests that are one megaton or above were lowered some 18 percent.

From 1964 through 1975, some annual and all cumulative yields are presented as a range (rounded to the nearest 100 kt for yield

totals below 500 kt, and to the nearest 500 kt for yield totals above 500 kt). The low estimate in the range uses the yields of individual tests where provided by Sykes, and for all other tests, the yields were based on the authors' estimates for the yield range values given by the U.S. (see above). The high estimate in the range is based on the authors' estimates for the yield range values given by the U.S., but here the authors' values were reduced by 18 percent in order to normalize the overall cumulative yield to the estimate made by the French MoD. In both cases, the estimated yield for tests where no information is available is the average yield for the tests in that particular year (low and high estimates). In 1976, the SIPRI numbers are used. From 1977 through 1985, an average yield of 60 kt is used.

2. See Note 1, Table 2.

3. Rounded to the nearest 100.

4. The French MoD reports an additional 16 tests from 1963 through 1977 (Minister de la Defence, Direction de Centre d'Esperimentations Nucleaire, Organization et Functionnement de Centre d'Experimentation Nucleaire, Dossier No. 1, "Essais Nuclaires, Tableau Recapitulatif Des Explosions Annoncees Et Presumees," Piece No. 7/41, 31 January 1985). The dates and yields of these tests are unknown. The average yield of all tests during this period based on the methodologies outlined in note 1 above is assumed for these tests, and the cumulative yield totals from 1977 through 1985 are raised accordingly.

Nuclear Weapons Databook Publications

"The U.S. Nuclear Stockpile: Materials Production and New Weapons Requirements." William M. Arkin, Thomas B. Cochran and Milton M. Hoenig. Arms Control Today, April 1982.

Nuclear Weapons Databook, Volume I U.S. Nuclear Forces and Capabilities. Thomas B. Cochran, William M. Arkin, Milton M. Hoenig. Cambridge, Massachusetts: Ballinger Publishing Company, 1984. $19.95 pb.

"The Soviet Nuclear Stockpile." William M. Arkin and Jeffrey I. Sands. Arms Control Today, June 1984.

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"Nuclear Weapons." William M. Arkin, Andrew S. Burrows, Richard W. Fieldhouse, Thomas B. Cochran, Robert S. Norris, Jeffrey I. Sands. February 1985. Nuclear Weapons Databook Working Paper 85-1. Printed in World Armaments and Disarmament: SIPRI Yearbook 1985.

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"Unannounced U.S. Nuclear Weapons Tests, 1980-84." Thomas B. Cochran, Robert S. Norris, William M. Arkin, Milton M. Hoenig. January 1986. Nuclear Weapons Databook Working Paper 86-1. $2.00.

"Known U.S. Nuclear Tests, July 1945 to 31 December 1985." Robert S. Norris, Thomas B. Cochran, and William M. Arkin. February 1986. Nuclear Weapons Databook Working Paper 86-2. $5.00

"Known Soviet Nuclear Explosions, 1949-1985, Prelimary List". Jeffrey I. Sands, Robert S. Norris and Thomas B. Cochran. February 1986. Nuclear Weapons Databook Working Paper 86-3. $5.00