## NUCLEAR WEAPONS DATABOOK

Working Paper

## NWD 86-3 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.<sup>2</sup> Taple 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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A revised list of Soviet nuclear explosions will appear as an appendix in Volume III of the <u>Nuclear Weapons Databook</u> series, <u>Soviet Nuclear Weapons</u>; 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.

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,<sup>3</sup> 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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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, 13 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).

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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

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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 cil 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

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

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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 <sup>-</sup>(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

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

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<sup>5</sup> Two reports from the Joint Atomic Energy Intelligence Committee -- <u>Status of the Soviet Energy Program</u>, 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.

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

9 Ibid.

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- 10 This assumes the efficiency of uranium utilization Ibid. was 23 percent.
- Although Joe 4 utilized the solid lithium-deuteride fuel, it was not a two stage thermonuclear device using an approach comparable to the Teller Ullam 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, <u>Scientific</u> <u>Amercian</u>, 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 debris13 and it is believed to

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

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," <u>International Security</u>, Volume 4, Number 3, Winter 1979/80, p. 194).

<sup>12</sup> 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.

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

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

15 York, The Advisors, p. 93.

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<sup>14</sup> 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.

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

- 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.

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

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DATE	-11- TIME LOCATION/COMMENTS LATITUDE LONGITUDE MB	<u>MS S</u>	<u>YIELD RANGE</u>	<u>TYPE</u>
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 given for the test, including in Asia near Semipalatinsk (e5), in an area roughly centered on the northeast shore of the Caspian Sea (j9) Inear to Kapustin Yar?J, and in the vicinity of the Aral Sea (approx. 45N 60E) (j10)/near the Ustyurt Desert (h) Inear 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) fi.e., Semi test site]. Time of the test reported as 1700 local time (j10). Test used plutonium as the fissionable material (j7).		10 to 20 kt, assuming 6kg plutonium (j7); around 20 kt (j8)	ateosphere tower (e5)
09/24/51	Joe 2, announced by AEC on 10/03/51; Semi [see Joe I] (jf Test used plutonium as the fissionable material, and occu on or slightly under the surface of the ground (j7). Time of the test reported as 1500 local time (j10), 1015 1515 local time (j11). Intensity of the acoustic signal approximately of the same order of magnitude as those ass with April/May 1951 U.S. tests at Eniwetak when measured	urred [GMT?] was sociated		ng atmosphere tower?
10/18/51	comparable distances (j11). Joe 3, announced by AEC on 10/22/51; Semi [see Joe I] (j1 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).		about 50 kt, assuming 7kg U-235 and 3.5kg plutonium (j7)	atmosphere air burst (j7)
05/12/53	Joe 4, announced by AEC on 08/19/53. First Soviet theraonuclear 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).	j <b>4</b>	th <mark>ermonucl</mark> ear (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).	- 	equivalent to that detonated at NTS (a)	at <b>e</b> osphere

DATE	<u>TIME</u>	-12- LOCATION/COMMENTSLATITUDE LONGITUDE NB	<u>s s</u>	YIELD RANGE	TYPE
09/14/54	53600.0	Ural 64.000 55.000 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.	61		atmosphere atmosphere
07/29/55		Soviet test number 15.		•	
08/02/55		Soviet test number 16.	d d	5 kt 25 kt	at mosphere
		This series of tests was announced by the AEC on 08/04/55 (al). Both probably used olutonium (d).	U	2J KL	atmosphere
09/21/55		Soviet test number 17. The test took place in the Barents Sea: the device, which	d	arder af 20 kt	underwater
		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).	1		
11/05/55		Soviet test number 18; Semi (j13).	d	215 kt	atmosphere
		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).			airburst (j13)
11/22/55		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).			
11/22/34		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 (al), and was announced on 11/23/55 (at h1). It was the Context of a several thousand	d	1600 kt	atmosphere
		on 11/23/55 (a1,b1). It was the Soviet's first high yield thermonuclear test (j2).			
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		• •
~03/20/55		A series announced by the AEC on 03/21/56 took place in			- •
~03/30-04/1/	56 4	The preceeding few days before the announcement (al,bl) A series announced by the AEC on 04/02/56 took place in			atmosphere atmosphere
08/24/55	1	ne preceeding few days before the announcement (al.bl)			ermoshuel 6
08/30/56 08/30/56	5	Biberia; part of a series of atmospheric tests (a). Biberia; 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 a, b1	less than a megaton (a) large (a)	atmosphere atmosphere

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			,					
BATE	7145			-13-				
DATE	TINE	LOCATION/COMMENTS		LONGITUDE	<u>MB</u>	<u>MS S</u>	YIELD RANGE	TYPE
09/02/56		Part of a series of atmo	Senhorie tarta	1-1				
09/10/56		Part of a series of atac	soberic tests	14/		a, b1		atmosphere
		A series of tests was ar 09/10/56 (a).			n on	a,51		atmosphere
11/17/56		Part of a series of atmo	ospheric tests	(a)		a,b1	1	atmosphere
01/19/57		Part of a series of atmo	ISDheric tests	(a)		a, bi		
03/08/57		Part of a series of ater	spheric tests	(a)		a, 51		atmosphere
04/03/57		Part of a series of atmo	spheric tests	(a)		a, 51		atomsphere
04/05/57		Part of a series of atmo	spheric tests	(a)		a, 61		atsosphere atsosphere
04/1 <b>0/57</b>			•			-	large (a)	atmosphere atmosphere
		[Probably one of three h conducted from January 1	igh yield ther 956 through 4/	sonuclear te 15/57.1	sts	-,	iorge (ar	acadophere
04/12/57		Part of a series of atmo	soheric tests	(a)		a,b1		- <b>k</b> - <b>k</b> - <b>k</b> - <b>k</b>
04/15/57		Siberia; largest of test	series (a)				large (a)	atacsphere
		Fifth high yield thermon additional high yield th	uclear device	(j2). EOne st conducted		4921	10/92 (0)	atacsphere
		between January 1956 and	this date.]					
09/22/57		Siberia				a.b1	substantial (a)	atsosphere
		Test may have evidenced	an improved yim	eld-to-wiegt)	n ratio	-,		:
		for hing yield thermonuc	lear device; te	st was the s	sixth			
		of such a device (j2).						-
<b>.</b>		yield-to-weight ratio (j	2).					
September	1957	Siberia				a1,51	aoderate (a1)	atmosphere
		Test within within precent of the second sec	ding two days o AEC (al).	f.				<b>-</b>
09/24/57	90000.0	NZ	73.000	55,000		<b>b</b> 1	megaton range (a)	atmosphere (a)
		Arctic (a). Seventh high	yield thermon	uclear test.			anderon Lande (8)	acausphere (a)
		possibly evidencing an in	proved yield-t	o-weight rat	ion			
		for such devices (j2).		•				
09/26/57	50000.0	Semi, announced by JAEIC				jl	7 to 70 kt.	
		12th test of current test	series, four	of this		-	preference to	
		series in September 1957	(two at Semi a	nd two off			lower end	
		the east coast of NZ) (j)	). [It is pro	bable that t	his			
		is the 12th test conducte	nd in 1957.] T	he two tests				
		conducted off the east co	last of NZ were	probably tw	0			
		of the three tests of dev	ices for naval	application	5			
		reported to have taken pl	ace by 03/18/5	B; if so, on	e			
		of the September 1957 tes	ts was conduct	ed underwate	r			
0/06/57	85800.0	and the other was a surfa						
	00000.0		73.000	55.000		bi	substantial (a)	ataosphere (a)
		Announced by USSR as a hy test of a birth wield there	arogen device	(a). Eighth				
		test of a high yield ther evidencing evidenced an i	monuclear devi(	e, possibly				
		such devices (j2).	mbroved Alefa-i	co-weight rai	tio for	•		
0/10/57	55500.0	Arctic (a)					•• •	
2/28/57		Siberia `					small (a)	atmosphere (a)
						a,b1		atsosphere

MILE         LINE         UBAILUN/COMMENTS         LATITUDE         LATITUDE         MIS         YIELD RAMGE         TYPE           20/27/58         7500.0         W1 Arctic (a)         73.000         S5.000         bl         asgston range (a)         atmosphere           02/27/58         10240.0         W1 Arctic (a)         73.000         S5.000         bl         asgston range (a)         atmosphere           02/14/53         M1 Arctic (a)         73.000         S5.000         bl         bl         bl         blow segaton range (a)         atmosphere           03/14/53         Arctic (a)         S1000         S5.000         bl         bl         blow segaton range (a)         atmosphere           03/21/53         Simria         S1000         S5.000         bl         adderste (a)         atmosphere           03/22/58         M1 Arctic (a)         73.000         S5.000         bl         adderste (a)         atmosphere           03/22/58         M2         73.000         S5.000         bl         adderste (a)         atmosphere           03/22/58         M2         73.000         S5.000         bl         adderste (a)         atmosphere           03/22/58         M2000, M1 Arctic (a)         73.000	DATE	TIME	LOCATION/COMMENTS		-14- I ONCI TUNE MI			
92/27/58       102400.0       N2; arctic (a)       73,000       53,000       b1       asgatom range (a)       ataosphere         02/27/58       102/2019 ovrall since (first davice first first davice first davice first first davice first davice first fir				CHILIUDE		<u>ns</u> <u>s</u>	YIELD RANGE	<u>TYPE</u>
02/27/55       10/2400.3       NI: Arctic (a)       73.000       55.000       NI: args (a)       Atasshere         02/22/58       Oracluass that 11 thereanuclear tests conducted of 11/22/58, thread of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of which (numbers nine through eleven) occurred in the bill weight of the standard of	02/27/58	75900.0	NZ: Arctic (a)	73 000	55 000	L 4		
Cla concludes that 11 theremuclear tests conducted by 02/23/58 overall since first device of 11/22/35, thread of which (numbers inte brough eleven) occurred in the last week of February, 158 (j2).It below segaton range (a) atmosphere 	02/27/59	102400.0					megatos range (a)	
0/22/38 overall since first device of 11/22/35, three of Mith (numbers number through eleven) occurred in the last week of February, 1958 (j2). 07/14/55 Mit; Arctic (a) 73,000 55.000 bl below segaton range (a) ataosphere 07/20/58 Mr; Arctic (a) 73,000 55.000 bl seall (a) ataosphere 07/20/58 N; Arctic (a) 73,000 55.000 bl seall (a) ataosphere 07/20/58 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 07/20/58 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 07/20/58 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 07/20/58 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 07/20/58 9500.0 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 10/02/58 9000.0 N; Arctic (a) 73,000 55.000 bl adderate to high (a) ataosphere 10/02/58 9000.0 N; Arctic (a) 73.000 55.000 bl adderate (a) ataosphere 10/02/58 9000.0 N; Arctic (a) 73.000 55.000 bl adderate (a) ataosphere 10/02/58 9000.0 N; Arctic (a) 73.000 55.000 bl sealer to high (a) ataosphere 10/02/58 9000.0 N; Arctic (a) 73.000 55.000 bl sealer to high (a) ataosphere 10/02/58 9010.0 N; Arctic (a) 73.000 55.000 bl sealer (a) ataosphere 10/02/58 9010.0 N; Arctic (a) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9010.0 N; Arctic (a) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9010.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a2) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a3) 73.000 55.000 bl probably MT range (a2) ataosphere 10/02/58 9200.0 N; Arctic (a3) 73.000 55.000 bl low to interseciate (a) ataosphere 10/02/58 9200.0 N; Arctic (a3) 73.000 55.000				nuclear tes	ts conducted b		Targe (a)	atmosphere
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10/13/58       75100.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         10/18/58       95100.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         10/19/58       9200.0       M2; Arctic (a2)       73.000       55.000       b1       small (a)       ataosphere         10/24/58       9200.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         10/24/58       82000.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         10/24/58       82000.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         10/25/58       82000.0       M2; Arctic (a2)       73.000       55.000       b1       probably MT range (a2)       ataosphere         11/01/58       Siberia       3.000       55.000       b1       probably MT range (a2)       ataosphere         11/01/58       Siberia       3.000       78.000       b1       relatively low (a)       ataosphere         10/17/58 (j16), leaving three unaccounted for.       90.000       Felaive				73.000				
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East of Stalingrad, announced by AEC (a).b1low to intermediate (a) atmosphereHigh altitude burst over experimental ABM radar at Sary Shagan, probably to test EMP effects on the radar (e6).b1low to intermediate (a) atmosphere09/10/6190000.0NZ(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a) atmosphere09/10/6190000.0NZ(a,b1); announced by AEC(a) 73.00055.000b1low to intermediate kt(a)atmosphere09/12/61100900.0NZ(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a) atmosphere09/12/61100900.0NZ(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a) atmosphere09/13/61NZ(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a) atmosphere09/13/61NZ(a,b1); announced by AEC(a) 73.00055.000b1low to intermediate (a) atmosphere								armoshilet.s
Cast of Starringrad, announced by AEC (a).High altitude burst over experimental ABH radar at Sary Shagan, probably to test EMP effects on the radar (e6).09/10/6190000.007/10/6190000.0NZ(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a)09/10/61NZ(a,b1); announced by AEC(a) 73.00009/10/61NZ(a,b1); announced by AEC(a) 73.00009/12/61100900.009/12/61100900.0NZ(a,b1); announced by AEC(a) 73.00055.00009/13/61NZ(a,b1); announced by AEC(a) 73.00009/13/61NZ(a,b1); announced by AEC(	09/08/51			48.450	44.300	b1	low to intermediate (a)	ataosphoro
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         09/12/61       I00900.0       NZ(a,b1); announced by AEC(a) 73.000       55.000       b1       several megatons (a)       atmosphere         09/12/61       100900.0       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       several megatons (a)       atmosphere         09/13/61       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			East of Stalingrad, announced	by AEC (a).	•			eraoshusi s
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         09/12/61       100800.0       NZ(a,b1); announced by AEC(a) 73.000       55.000       b1       low to intermediate kt(a) atmosphere         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       several megatons (a)       atmosphere         09/13/61       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       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			High altitude burst over exper	imental AB	M radar			
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           09/12/61         I00900.0         NZ(a,b1); announced by AEC(a) 73.000         55.000         b1         low to intermediate kt(a)atmosphere           09/12/61         100900.0         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         several megatons (a)         atmosphere           09/13/61         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			at Sary Shagan, probably to te	est EMP effi	ects on the			
09/10/61         NZ(a,b1); announced by AEC(a) 73.000         55.000         b1         several megatons (a)         atmosphere           09/12/61         NZ(a,b1); announced by AEC(a) 73.000         55.000         b1         low to intermediate kt(a)atmosphere           09/12/61         100900.0         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         several megatons (a)         atmosphere           09/13/61         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         several megatons (a)         atmosphere           09/13/61         Semi (a,b1)         50.000         78.000         b1         low to intermediate (a)         atmosphere	AB /1 A // /							
09/12/51       100800.0       NZ(a,b1); announced by AEC(a)       73.000       55.000       b1       low to intermediate kt(a)atmosphere         09/12/51       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       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		90000.0	N2(a, b1); announced by AEC(a)	73.000	55.000	<b>b</b> 1	several megations (a)	atensnhere
09/12/51       100900.0       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       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	V7/10/81		NZ(a, b1); announced by AEC(a)	73.000	55.000		low to intermediate kt(a):	atanshere
07/12/51100500.0W/(a,b1); announced by AEC(a) 73.00055.000b1several megatons (a)atmosphere09/13/61NZ(a,b1); announced by AEC(a) 73.00055.000b1low to intermediate (a)atmosphere09/13/61Semi (a,b1)50.00078.000b1low to intermediate (a)atmosphere	00/15//+	100000 0	Lunknown which 9/10/61 test]	73.480	54.000 ~7.8		at (2/)	
07/13/81         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			<pre>NL(a,b1); announced by AEC(a)</pre>	73.000	55.000		several megatons (a)	taosohara
$3em (a, g_1)$ 50.000 78.000 b1 low to intermediate (a) stands			NL(a, b1); announced by AED(a)	73.000	55.000		A 1 4 4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
Announced by AEC (a)	v7/10/01			50.000	78.000			taoschere
			Announced by AEC (a)					

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. [	DATE	<u>TINE</u>	LOCATION/COMMENTS	LATITUDE	LONGITUDE NB NS	<u>s</u>	YIELD RANGE	TYPE
2	9/14/61	95515.7	NZ(a,b6); announced by AEC(a)	74.500	51.100	56	several megatons (a)	atsosphere (a)
	5			74.000	53.480 ~5.96	g		aranahusis (4)
	9/16/61	90800.0	-i		55.000	b1	order of a MT (a)	atmosphere
Ų	9/17/51		Semi (a,b1)	50.000	73.000	<b>b</b> 1	intermediate (a)	atmosphere
0	9/18/51	7607/ 0	Announced by AEC (a)					
	9/20/61	75936.8 81200.0		74.000	52.000	<b>b</b> 6	order of a NT (a)	atgosphere (a)
	9/22/61	80100.0		73.000	55.000	b1	order of a MT (a)	ateosphere
	0/02/51	103100.0		73.000	55.000	61	order of a MT (a)	ataosphere
	0/04/51	73054.8		/5.000	55.000	b1	order of a MT (a)	atmosphere
	0/05/61	70000.0		/3.700	53.800	bó	order of several MTs (a)	atmosphere (a)
•		/ ~~~~			55.000	61	several megatons (a)	atmosphere
1	0/08/61			73.240	54.540 ~6.22	g		
	0/11/61	74000.0	NZ(a,b1); announced by AEC(a) Central Asia	73.000	55.000	61	low yield range (a)	ataosphere
	0/12/61	///////	• .	EA	70	bi		atmosphere
-			Announced by AEC (a)	50.000	78.000	61	low to intermediate (a)	ateosphere
14	0/20/61		NZ(a, b1); announced by AEC(a)	77 000	55 AAA		_	
	0/23/61	83122.1	NZ(a, b6); announced by AEC(a)	73.000	55.000	b1	several megatons (a)	atmosphere
				73.246	53.800	66	about 25 megatons (a)	atmosphere (a)
10	)/23/61	103048.9	··· ·	70.700	54.540 ~35.40 53.500	g		
			Announced by AEC(a); [at least		usdeeustes tast?	66	low yield (a)	underwater (a)
10	/25/61	83300.0	NZ(a,b1); announced by AEC(a)	73 000	S5.000	LA		
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		JJ. VVV	61	intermediate to high,	ataosphere
10	/27/61	83026.6	NZ(a,b6); announced by AEC(a)	70.700	53.500	<b>b</b> 6	probably less than a MT(;	
10	/30/61	93300.0	NZ(a, b1); announced by AEC(a)	73.000	55.000	b1	low to intermedite (a)	atmosphere (a)
			• • •	74.420	75.180 ~79.750		58 megatons (a)	atmosphere
			10/31/61 GMT (h). Weapon could		ered	g		vicinity of
			by the Bear bomber (j15).					1000 /1 (-)
	/31/61	82900.0	NZ(a,b1); announced by AEC(a)	73.000	55.000	61	several megatons (a)	1200 ft (a)
10	/31/51	83800.0	NZ(a,b1); announced by AEC(a) 7	73.000	55.000	b1	intermediate to high.	atmosphere
						••	probably below a MT (a)	atæosphere
	/02/51	84100.0	NZ(a,b1); announced by AEC(a) 7	73.000	55.000	b1	• • • • • • • •	ateosphere
	/02/51		NZ(a,b1); announced by AEC(a) 7	73.000	55.000	b1	• • • • • •	ataosphere
11	/04/61	72000.0	NZ(a,b1); announced by AEC(a) 7	3.000	55.000	b1		ateosphere
			AEC announced 12/09/61 in a pre	eliminary a	malysis that			araashiici e
			USSR conducts approx. 50 atmosp	heric test	s in recent			
			test series (a) [31 tests annou	inced in 19	61, leaving			
			"19 unannounced and "18 unaccou	inted for].	The total			
			yield of the 50 tests reported	y exceeded	the cumulative			
			total of all previous tests of	all nation	s (e4). This			
			test series included a number of	t systems	tests and at			
			least four atmospheric effects	tests (inc	luding 6 September			
			and 6 October), and several wer	e very adv	anced in yield			
			to weight ratios and efficiency	(115).				

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02/02/52 75957.8 Semi (a,bó) 49.700 78.100 bó Announced by AEC, test reportedly conducted well above the threshold of underground detectability even by a single national system (a); no acoustic signals, indicating

underground (a)

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<u>DATE</u>	TIME	LOCATION/COMMENTS	LATITUDE		<u>E MB</u>	<u> MS S</u>	YIELD RANGE	TYPE
		underground test (a), [the fir	irst report	ted by the	. Unite	d		
August 19	762	States]. AEC announces on 08/05/52 that						
-		range had been conducted a few range had been conducted a few	ew davs prid	, the iow » ≦rr to û8/	/iloton	1 (+/a)		
08/05/62	90900.0	0 NZ(a,b1); announced by AEC(a)	· 73.000	55.000	13/07 C		74 /-1	
			74.120	52.300 *	*17.71	bi a	30 megatons (a)	atmosphere
08/07/52	93000.0	0 Semi	50.000	78.000	*****	g bl	low kiloton (a)	
·- · · A / L9		Central Siberia (a); announced	d by AEC (a	(a)			IUW KIIULUN YAJ	ataosphere
08/10/62	90000.0	<pre>0 NZ(a,b1); announced by AEC(a)</pre>	73.000	55.000		bi	less than 1 Mt (a)	atmosphere
08/20/62	90214.1	<pre>NZ(a,b6); announced by AEC(a)</pre>	74.300	51.500		b6		atmosphere
			74.120	52.300	*3.36	g	97967 91 99794 98 1199	atmosphere (a)
08/22/62	90000.v	) NZ(a,b1); announced by AEC(a)	73.000	55.000	• -	9 b1	low megaton (a)	ateosphere
		· ·	74.120	52.300	*4.54	g	4.000 magazant ijar	acaosbuel e
08/25/62	54000.0		50.000	78.000		9 b1	low (a)	atmosphere
AD / DE / LD		Announced by AEC (a)						armoshuel e
08/25/52	90000.0			55.000		<b>b</b> 1	order of several Mts(a)	atmosphere
08/27/52		• • • • • • • • • • • • • • • • • • • •	74.120		~5.04	g	·····	granobuel e
JU/2//02	90000.0			55.000		bi	several megatons (a)	ataosphere
09/01/52	124000 0	-	74.120	52.300	<b>~</b> 5.43	g		aracohiei e
09/01/52	124000.0		73.000	55.000		bi		atmosphere
09/02/62 09/08/62	101000 0	NZ(a,b1); announced by AEC(a) 7	73.000	55.000		b1	intermediate (a)	ataosphere
JY/VD/01	101800.0		73.000	55.000		b1		at <b>ao</b> sphere
		AEC announces this as 10th in c	current se	aries with	, all			aradahiri -
		detected tests are not specific	ically anno	ounced and	l a			
09/15/62	00317 0	number of additional tests had	i been condi	ducted (a).				
07/13/82	105000 0	NZ(a,b6); announced by AEC(a) 7	74.400	51.500		bó	several megatons (a)	atmosphere (a)
07/10/62	103700.V 07007.7	NZ(a,b1); announced by AEC(a) 7	73.000	55.000		b1	•	ataosphere
09/19/62	027V2.7 110056.4	NZ(a,b6); announced by AEC(a) 7	73.200	54.700		bó	a few megatons (a)	atmosphere (a)
781196		NZ(a,b6); announced by AEC(a) 7	/3.800	53.800		<b>b6</b>	aultimegaton (a)	ateosphere (a)
	••	2nd largest atmospheric test in	A current /	series			Capprox. 20 MT]	gendelsere in int
09/21/62	80100.0	and 4th multimegaton test in pa	ast five dr			••	••	
09/25/62			/3.000	55.000		b1	a few megatons (a)	ateosphere
77 Lui uz	19090010	NZ(a,b1): announced by AEC(a) 7	/3.000	55.000		b1	aultimegaton,	ataosphere
							slighly larger than	armatic -
							09/19/62 test (a)	
9/27/62	80316.4	My - Lite seemend by APP(s) -	··				[approx. 25 NT]	
	143700.0	NZ(a,b6); announced by AEC(a) 74 NZ(a,b1); approved by AEC(a) 75	4.300	52.400		b6	less than 30 MT (a) a	atmosphere (a)
0/14/62	100200.0	NZ(a,b1); announced by AEC(a) 73 Seei (a b1)	-	55.000		<b>b</b> 1	intermediate (a)	atmosphere
// 17/ 22		Semi (a,b1) 5( Announced by AEC (a)	50.000	78,000				atmosphere
0/22/62		• ·						
// war			50.000 ·	78.000		<b>b1</b>	a few hundred kt (a) a	atmosphere (b1)
0/22/62	90600.0	Central Asia, announced by AEC ( NZ(a,b1); announced by AEC(a) 73					h	high altitude (a)
0/27/62		NZ(a,b1); announced by AEC(a) 73 NZ(a,b1); announced by AEC(a) 73	-	55.000			several aegatons (a) a	atmosphere
0/28/62		<b>O</b> = - 1		55.000		<b>b1</b> ;	intermediate (a) a	ataosphere
140.2		Central Asia, announced by AEC (	50.000 ;	78.000			intermediate (a) a	atmosphere (b1)
0/28/52	44100.0	<b>R</b> + <b>F</b> +					h:	high altitude (a)
/		Announced by AEC (a) 50	50.000 7	78.000		bi i		ataosphere
		Leither 10/28/52 test could be t		-				
0/29/62	73500.0	NZ(a,b1); announced by AEC(a) 73						
1 <b>-</b>	1 WM Y + + -	serainty announces by unpress in	2.000	55.000		bl i	intermediate (a) at	atmosphere (b1)

DATE	TINE	LOCATION/CONNENTS	LATITUDE	LONGITUD	<u>e mb</u>	<u>MS S</u>	YIELD RANGE	TYPE
10/30/62		NZ(a,b1); announced by AEC(a)	73.000	55.000		b1	intermediate (a)	
11/01/62	53000.0	NZ(a,b1); announced by AEC(a)	73,000	55.000		bi	intermediate (a)	ataosphere (b1)
11/01/62	92000.0	Semi (b1); Central Asia (a)	50.000	78.000		b1	intermediate (a)	atmosphere
11/03/62	93100.0	NZ(a,b1); announced by AEC(a)		55.000		b1	intermediate (a)	atmosphere (51)
11/03/62		NZ(a,b1); announced by AEC(a)		55.000		b1	intermediate (a)	atmosphere
11/04/52		Semi (a,b1)	50.000	78.000		b1	intermediate (a)	atmosphere
		Announced by AEC (a)		/01000		01	incermeulace (a)	atmosphere
11/17/62		Semi (a,bi)	50.000	78.000		<b>b1</b>	low (a)	*****
		Announced by AEC (a)					10W (8/	atmosphere
12/18/52		NZ(a,bi); announced by AEC(a)	73,000	55.000		b1	intermediate (a)	*****
12/18/62		NZ(a,b1); announced by AEC(a)	73.000	55.000		b1	intermediate (a)	atsosphere
12/20/52		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)		55.000		b1	intermediate (a)	atmosphere
12/23/62	111500.0			55.000		b1	low to a few megatons(a)	atmosphere
		AEC 12/26 announcement notes	a number n	f atensoh	orir	<b>D</b> 1	Tow to a rew wegacons(a)	ateosphere
		tests 12/23 to 12/25; largest	(12/24) a	hout 20 m	en it enstanc			
		others low to a few megatons	(a)		cyacons	,		
12/24/62	104421.9		74.200	52.300		b6		[
12/24/62	111142.0	NZ(a,b6); announced by AEC(a)		57.500		b6	about 20 megatons (a)	[atmosphere?]
		Itime of AEC announced test un	iknown]			00	about 20 megalons (a)	atmosphere (a)
12/25/52	133557.2	NZ(a,b6); announced by AEC(a)		56.500		<b>b</b> 6	low to a few megatons(a)	atmosphere (a)
)3/1 <b>5/64</b>	80000.0	Semi (bl,h)	50.000	78.000	6.2(h)			
5/16/64			49.900	78.300	5.6	) b1 b6		underground
			+/ <b>.</b> /VV	10.300	6.2(h)			underground
7/19/64	60000.0	Semi (b1,h)	50.000	78.000	6.0(h)			
9/18/54	75954.8	NZ(a, b6); announced by ACDA(a)		55.200	4.3	p9 01	lów (a)	underground
0/25/64	75958.8	NZ(a,b6); announced by ACDA(a)	73.500	53.700	4.9	00 06		underground
		-,		301/44	5.4(h)		low (a)	underground
1/16/64	60000.0	Semi (a,bl)	50.000	78.000	6.1(h)		low to low intermed.(a)	underground
01/15/65								
1/13/03	55958.4	Semi (a,b3)	49.880	78.960	5.8	b3	intermediate (a)	underground
3703765	51500.0	Announced by AEC (a), released			7.0(h)			
0100100	01300.0	<b>,</b>	50.000	78.000	6.0(h)	bi	low to low intermed.(a)	underground
5/11/65	83957.8	Announced by AEC (a)						
6/17/65			49.800	77.900	5.2	bó		underground
7/29/65	34300.0	·	50.000	78.000	5.8(h)			underground
9/17/65		• · · · · -	50.000	78.000	• -	bi		underground
	JJ7J/+6	Semt (US;A/	49.780	78.150	5.2	b3		underground
0/08/65	55050 0	Capi (= 17)			5.5(h)			
v/ vu/ gu	44740.4		49.920	78.170	5.4	p2	low to low intermed.(a)	underground
1/21/65	15750 0	Announced by AEC (a)			5.8(h)		20-200 kt (h)	
1 - 41 - 64			49.960	78.040	5.6	P2	low to low intermed.(a)	underground
2/24/65	50000.0	Announced by AEC (a)	EA 444	70	6.1(h)	_		
	30000.0	JE#1	50.000	7 <b>8.</b> 000		b1		under ground
2/13/66	45757.9	Semi (a,bó)	49.900	78.100	5.2	<b>b6</b>	low intermediate (a)	underground

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DATE	TIME	LOCATION/COMMENTS		-18- L <u>ongitui</u>	<u>)e mb 1</u>	<u>15 S</u>	YIELD RANGE	
03/20/66	55000 /	Announced by AEC (a)			6.5(h)		20-100 kt (h)	
V0/2V/00	22000.1	Semi (a,b1)	50.000	78.000		bi	to intermediate (a)	underground
04/21/55	35757 4	Announced by AEC (a) ? Semi (a,b6)						
		Announced by AEC (a)	49.800	78.100	5.4	<b>b</b> 6	low (3)	underground
04/22/65	25804.(	N. Caspian Sea (b8,h)	47 000	F7 744	5.3(h)			•
		Probably PNE to regulate wat	47.900	57.700	1 7/14	b8		underground
05/07/66	35758.2	Sesi	49.740	77.950	4.7(h)			
06/29/66	65758.0	Seni	49.900	78.000	4.8	b3	• • • • • •	underground
		William C. Foster states on		/0.000	5.6	þó	low intermediate (a)	underground
		days ago US recorded seismic nuclear testing area (a)	signals fr	ca the So	viet			
07/21/55	35757.6	Sesi (b6,h)	10 744	70			1	
			49.700	78.000	5.4	<b>b</b> 6		underground
08/05/66	35757.9	Semi (b3,h)	40 070		5.9(h)			-
		cear (boyn)	49.830	78.050	5.4	P2		underground
8/19/66	35301.4	Semi (b3,h)	50 500	77 5/6	6.1(h)			
		dest (boși)	50.500	77.860	5.1	<b>b</b> 3		underground
9/07/66	35100.0	Seai	50,000	70	4.5(h)			
9/30/66		Turkmen (a); Uzbekistan (h)		78.000		<b>b1</b>		underground
		PNE to plug fire in Urtabula near Bukhara (h); PNE (i1)	38.800 ( gas field	64.500	5.1 5.3(h)	. b6		underground
0/19/56	35757.8		40 770	70 .70				
0/27/66	55757.9	Announced by AEC (a)	49.770	78.030	6.3	63	low intermediate (a) 20-200 kt (h)	underground
		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)			•
		Noi chern SICe			6.39 4.7		420 <u>+</u> 4 kt	
2/03/66	50200.0	Semi (b1,h)	<b>FA</b>		<u>+.108+.10</u>			
2/18/66	45800.0	Sesi (a,b1)	50.000	78.000	4.9(h)	<b>b1</b>		underground
		Announced by AEC (a); vented	50.000 (h)	78.000	5.5(h)	bi	intermediate (a)	underground
1/30/67		Seai						
2/26/67	35800.0		EA			h		underground
		Announced by AEC (a)	50.000	78.000	6.6(h)	61	intermediate (a)	underground
3/25/67	55600.0	Sení (b1,h)	EA				200-1000 kt (h)	-
/20/67	40757.6	Semi (a,b6)	50.000	78.000	5.9(h)	b1		underground
		Announced by AEC (a)	49.700	78.000	5.7	b6	low intermediate (a)	underground
/28/67	40757.7	Sesi (b3,h)	40.010	70	6.3(h)			
			49.810		5.4	63		underground
/29/67	25700.0	Sesi	50.000		6.2(h)			
/15/67		Sesi (b3,h)	49.380	78.000	E 1	b1		underground
			71.00V		5.4	b3		underground
/04/67	65758.0	Semi (b3,h)	49.820		6.0(h)			
			7/1040		5.3	63		underground
/16/67	40358.2	Semi (b3,h)	50.010		5.8(h)			
			AA*ATA		5.3	b3		underground
/22/67	50357.9	Semi (b6,h)	50.000		5.0(h)			
		·			5.3 5.0(h)	b6		underground

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DATE	TIME	LOCATION/CONHENTS		-19- Longitudi	E <u>MB</u> N	<u>s</u> s	YIELD RANGE	TYPE
0/06/ <b>6</b> 7	70002.1	) Ural (a,h)	E7 /00	15 074				
		PNE, engineering experiment East of Urals, PNE (i1)	57.690 in oil fie	6 <b>5.2</b> 70 lds (h)	4.7(h)	58		underground
10/17/57	50358.(		49.800	78.100	5.7 6.1(h)	<b>b</b> 6	low intermediate (a)	underground
10/21/57	45958,4	NZ(a,b3); announced by AEC(a May have vented (h)	) 73.400	54.420	5.9 6.0(h)	b3	low end intermediate (a	) underground
		Northern site			5.92 3.9 <u>+</u> .056 <u>+</u> .09		69 <u>+</u> 8 kt	
10/30/67 ·	60357.9	) Semi (b6,h)	49.800	78.100	5.5 6.0(h)	6		underground
11/22/67	40357.1	Seni	47.900	77.300	4.8	66		
12/08/57	60357.1	Seni	49.800	78.200	5.2	66 66		underground underground
)1/07/68	34657.6	Spei	10 744	70.70.	<b>-</b> .			
4/24/58		Semi (a,b3)	49.740	78.320	5.1	P2		underground
		Announced by AEC (a)	49.840	78.070	5.0	b3	low (a)	underground
5/21/68	35900.0	Bukhara (b5,ii), Uzbekistan (	(6)		e	a		underground
6/11/58		PNE (h,il), plug runaway oil Semi (a,bl)	well (h)		5.5(h)	b5		underground
		Announced by AEC (a)	50.000	78.000	5.8(h)	b1	lcw (a)	underground
6/19/58		Semi (a,b3) Announced by AEC (a)	49.960	79.050	5.4 6.5(h)	p2	low intermediate (a)	under ground
7/01/68	40200.9	Announced by AEC (a)		47.720	5.5 5.7(h)	<b>b</b> 3	low intermediate (a)	underground
7/12/68	120757.2	PNE (h,ii); storage cavity in						
			49.670	78.117	5.4 5.9	b6 h		und <b>er</b> g <b>r ound</b>
8/20/68	40558.1		50.000	77.996	4.8	b6		underground
9/05/68		Semi (a,51) Announced by AEC (a)	50.000	78.000	6.2(h)	<b>b</b> 1	low intermediate (a)	underground
9/29/68	34257.5		47.800	78.200	5.8 6.3	bó h		underground
1/07/68	100205.3	NZ(a,b6), northern site (f2)	73.400	54.900	6.0	b6	low end intermediate (a)	underground
1/09/68	15757 7	Announced by AEC (a); may have		±	5.02 4.30 .025 <u>+</u> .076		126 <u>+</u> 35 kt	
2/18/68	25357.7		49.760		4.9	b3		underground
/ 10/ 00	50200.0	Semi (a,bl) Announced by AEC (a)	50.000	78.000	5.7(h)	61	low (a)	underground
/07/59	82700.0	Semi (a,b1)	50 000	70	· • · · ·			
/16/69		Announced by AEC (a)	50.000	78.000		<b>b</b> 1	low intermediate (a)	underground
		Announced by AEC (a)	49.800		5.3 5.0(h)	66	low intermediate (a)	underground
/31/69		Announced by AEC (a)	50.500	77.700	5.4 5.2(h)	55	low (a)	underground
705769	24700.0	A	50.000 Which is a	79.000	h.0(h)	51		underground

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DATE	TIME	LOCATION/COMMENTS	1 4717000	-20-				
		EVENT ON COMENTS	LATITUDE	LONGITUD		<u>15 S</u>	YIELD RANGE	<u>TYPE</u>
07/23/69	24658.1	l Semi (a,b6)	49,900	79 200				
		Announced by AEC (a)	11,199	78.300	5.5 5.2(h)	<b>b</b> 6	low intermediate (a)	underground
09/02/69	45957.4		57.350	54.770	4.8	b3		underground
		PNE (h,i1), engineering exp	eriment in o	il fields	5.2	h		underground
		lest reportedly one of four	PNEs begun	in Sectemb	er			
		1969 along a watercourse sy	stem in Ural	mountains	; (i1);			
09/08/69	50000.0	fothers possibly 9/8/69, 6/2 Ural (a.bl.h)	20/70, and 3	/23//11	5 9/LV		•	
		Announced by AEC (a); PNE ()	.il): ennin	Borina	5.2(h)	<b>b</b> 1	low (a)	underground
		experiment in oil fields (h)	: test reno	rtedly				
		one of four PNEs begun in Se	eptember 196	9 alono a				
		watercourse system in Ural #	ountains (i	1); Lothe	rs			
09/11/59	40157 F	possibly 9/2/69, 6/25/70, ar Semi (a,b3)	id 3/23/711					
	4719/*3	Announced by AEC (a)	49.770	7 <b>8.</b> 030	5.0	b3	low (a)	under ground
09/25/59	70000.0	South of Volvograd (a), Nort	h of Carnia		5 J/L)		• • • • • • •	
		Sea (b1,h); West of Caspian	Sea (i1)	1	5.4(h)	51	low intermediate (a)	underground
		PNE (h,i1); gas stimulation	experiment	(h)				
10/01/69	40257.7	Semi (a,b3)	49.610	78.180	5.2	b3	low intermediate (a)	underground
10/14/69	70004 0	Announced by AEC (a)			5.9(h)			anger år ogna
10/19/07	70008.2	NZ(a,b6); northern site (f2) Announced by AEC (a)	73.400	54.800	6.1	66	intermediate (a)	underground
		Announced by HEL (2)			6.5(h)			
					6.09 4.2		140 <u>+</u> 14 kt	
1/30/69	33300.0		50.000	78.000	<u>.019+.05</u> 6.9(h)	57 b1	intermediate (a)	
		Announced by AEC (a)					19751 #4014[4 (4)	underground
2/05/69	70257.5	the second second	43.790	54.750	5.8	b3	low intermediate (a)	underground
		Desert, South of Urals (a);	E. of Caspia	n Sea(i1)	5.7(h)			sincer y, ound
2/28/59	34658.0	Announced by AEC (a); PNE (h Semi (a,b6)	,11); engine					
		Announced by AEC (a)	50.000		5.7 6.5(h)	56	low intermediate (a)	underground
2/29/69	40200.0	Semi	50.000	78.000	0.3(8)	61		
						61		underground
1/29/70	70757 -	Part In Lat						
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	/v2a/./	Semi (a,b3) Announced by AEC (a)	49.840		5.5	<b>b</b> 3	20 to 200 kt (a)	underground
3/27/70	50300.0	Semi	50 000		5.9(h)			•
6/25/70	50000.0		50.000		5.4(h) 5.7(h)	bi		underground
		PNE, one of four reportedly b	equn in Sent	teaher 196	5.3(h) 9	61		undergraund
		along a watercourse system in	Ural mount:	ains (il):	,			
2/00/76		Lothers possibly 9/2/69, 9/8/	69, and 3/23	3/71]				
6/28/70	15800.0		50.000	78.000	6.2(h)	<b>b</b> 1	20 to 200 kt (a)	underground
7/21/70	30257.0	Announced by AEC (a) - Semi (a,b3)		79				
/ v		Announced by AEC (a)	49.950		5.4 6 A/65	<b>b</b> 3	20 to 200 kt (a)	underground
7/24/70	35647.4	Semi (a,b6)	49.800		5.0(h) 5.3	<b>h</b> .£	20 ha 200 l l / l	
		Announced by AEC (a)			5.8(h)	bó	20 to 200 kt (a)	underground
206/70	40257.5	Semi (a,b3)	49.770		5.4	b3	20 to 200 kt (a)	underground
		Announced by AEC (a)			5.0(h)			underground
0/14/70	LAAAA A	NI(a,b1); northern site (f2)		55.000 8				

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DATE	TIME	LOCATION/COMMENTS		-21- Longitui	<u>de mb ms</u>	<u>s</u>	YIELD RANGE	TYPE
		Announced by AEC (a)			6.60 5.0 <u>+</u> .025 <u>+</u> .06		940 <u>+</u> 60 kt	underground
11/04/70	60257.4	Gemi (a,53) Announced by AEC (a)	50,000	77.820		b3	20 to 200 kt (a)	underground
12/12/70	71000.0	E. Caspian Sea (b3,h); Kazal Caspian region (i1); announ	kh Desert () ced by AFC	a); (a). PNW (	5.6(h)	61	200 kt to 1 Mt (a)	underground
12/13/70		Caspian region, PNE		1971 FAW 1	111	<b>i</b> 1		
12/17/70	70100.0	Semi (a,b1) Announced by AEC (a)	50.000	7 <b>8.</b> 000	6.1(h)	b1	20 to 200 kt (a)	underground
12/23/70	700 <b>57.</b> 3	E. Caspian Sea (b3,h) Kazakh Desert, announced by	43.910 AEC (a)	54.820	6.0 6.6(h)	<u>,</u> b3	200 to 1 Mt (a)	underground
03/22/71	43257.8	Semi (a,bó) Announced by AEC (a)	49.700	78.200	5.S	b6	20 to 200 kt (a)	underground
03/23/71	65956.0	Ural (a,b6,h) Announced by AEC (a). Test	61.300 vented and	56.500 released	6.0(h) 5.6 5.9(h)	65	20 to 200 kt (a)	underground
		radioactive debris which cro (i1); test reportedly one of September 1969 along a water nountains (i1). Lothers poss	four PNEs course syst	begun in Sem in Ura	1			:
04/25/71	33258.0	Semi (a,bó) Announced by AEC (a)	49.800	78.100	5.9 6.5(h)	60	20 to 200 kt (a)	s- underground
05/25/71	40257.7	Sesi	47.800	78.200	5.2	ь,		
6/06/71	40300.0	Semi (a,b1) Announced by AEC (a)	50.000	78.000	3.2 5.5(h)	65 61	20 to 200 kt (a)	underground underground
6/19/71	40400.0		50.000	78.000	5.4(h)	<b>b</b> 1	20 to 200 kt (a)	underground
6/30/71	35700.0		50.000	78.000	5.9(h)	bi-	20 to 200 kt (a)	underground
7/02/71	170000.0	Ural (PNE)						
7/10/71	170000.0		, Northern	Urals(i1)	5.1(h)	b1 b1		underground underground
9/19/71	110006.3		57.800	41.100	4.5	۲,		
9/27/71	60000.0		73.000	55.000	6.47 5.06		2 to 4 megatons (a) 780 <u>+</u> 200 kt	underground underground
0/04/71	100002.0	Ural(b6), Western Russia(i1) PNE (i1)	61.600	47.100	<u>+</u> .023 <u>+</u> .038 5.1	56		underground
0/09/71	50257.1	Semi (a,b6) Announced by AEC (a)	50.000	77.700	5.4	56	20 to 200 kt (a)	underground
)/21/71		Western Russia, PNE [possibly at Semi?]		•		i1		underground
)/21/71	50300.0	Semi (a,b1) Announced by AEC (a)	50.000	78.000		bi	20 to 200 kt (a)	underground
0/22/71		Ural (a,b6) Announced by AEC (a)	51.600	54.500	5.3	56	20 to 200 kt (a)	underground
1/29/71	60300.0	Semi (a,bl) Announced by AEC (a)	50.000	7 <b>8.</b> 000		61	20 to 200 kt (a)	underground
/15/71	75300.0	Semi	50.000	78.000		61		underground

DATE	TIME	LOCATION/COMMENTS	LATITUDE	-22- Longitudi	<u>je mb</u>	<u> </u>	<u>i s</u>	YIELD RANGE	TYPE
12/22/71			nounced by	ΔFC(a): [	PNE?]		b1	200 kt to 1 Ht (a)	· · · · · · · · · · · · · · · · · · ·
12/30/71	62057.5	5 Semi (a) Announced by AEC (a)	49.800				55		under ground under ground
02/10/72	50257.3	Announced by AEC (a)	50.000 49.996	78.900 78.886	5.5		56 12		underground
03/10/72	45657 <b>,</b> 4	Semi (a,b6); E. Kazakh (i2) Announced by AEC (a)	47.736 49.800 49.755	78.886 78.200 78.180	6.3 5.5 5.8		i2 b6	20 to 200 kt (a)	underground
03/28/72	42200.0	Semi (a,b1) Announced by AEC (a)	47.733 50.000 49.730	78.000 78.186	5.8 5.6		i2 b1 i2	20 to 200 kt (a)	underground
04/11/72	50000.0	Turkmen (h,i2); PNE (i2)	37.400	52.000				(time),h,i2	
05/07/72	12800.0	Semi (a,b1); E. Kazakh (i2) Announced by AEC (a)	50.000 49.761	78.000 78.175			b1 i2	20 to 200 kt (a)	underground underground
07/06/72	10257.7		49.700 49.724	78.000 77.979	4.4 4.8		b6 i2	20 to 200 kt (i2)	underground
07/09/72		North of Black Sea (b1,i2) PNE (i2)	49.900	35.200		2.8		(time);i2(other)	underground
07/14/72 08/16/72	•	North of Caspian Sea(b6,i2) PNE (i2) Soci (a bi): 5 Yearly (10)	50.000 55.800	46.400 47.400	3.6		b1 i2		underground
08/18/72	25957.9	Announced by AEC (a)	50.000 49.759	78.000 78.146	518		b1 i2	20 to 200 kt (a)	underground
/W/ BY/ 1 B	; و ډي <i>د</i> ليک	North of Caspian Sea (a,b6) Announced by AEC (a) ¥ Kazakh (i2); PNE (i2)	49.500 49.462	<b>48.200</b> 78.179	5.7 6.3	3.4	b6 i2	20 to 200 kt (a)	underground
08/25/72	34700.0	Semi (a,51); E. Kazakh (i2) Announced by AEC (a)	50.000 49.994	78.000 77.781	5.8		b1 i 2	20 to 200 kt (a)	underground
8/28/72	55956.5	NZ(a, b6, i2); northern site(f2)	73.300 73.336	55.100 55.085	6.3	4.7 4.7		about 1 Mt (a)	underground
					6.3 6.33		f1	400+70 kt	
9/02/72	05157 L	Paul Ibi bit P Harald Irms		1	<u>+.021</u> +				
17 <b>44</b> 7 7 <b>4</b>	01011.0		50.000		5.1		<b>b6</b>		underground
9/04/72		W. Russia (b6,i2)	49.957 67.700 67.689		5.3 4.6	3.0	i2 66 12		underground
9/21/72		N. Caspian Sea (b6,h); Ural area (a); W. Russia (i2)	52.100		5.1	914	66	20 to 200 kt (a)	underground
0/03/72	90000.0		46.848		5.2 6.1		i2 i2	20 to 200 kt 200 kt to 1 Mt (a)	underground
1/02/72	12657.6	· · · · · · · · · · · · · · · · · · ·	AEC (a) 49.900 49.913	78.800 78.837	6.2		b6	200 kt to 1 Ht (a)	underground
1/24/72	70008.0	Ural (a,b6); W. Kazakh (h);	52.800	51.100	4.7 5.1		12 b6 i2	200 to 1000 kt 20 to 200 kt (a)	underground
1/24/72		W. Kazakh, PNE (12)			5.2 5.1		56	RA 1 RAA 11	underground
2/10/72		Semi (a,b6); E. Kazakh (i2)			2.1 5.7		i2 55	20 to 200 kt	
		•			6.0		i2	20 to 200 kt (a)	underground

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				-23-					
ATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUDE	MB	MS	<u>s</u> _	YIELD RANGE	<u>TYPE</u>
2/10/72	42708.4	Semi (a,b6); E. Kazakh (i2)	50.100	78.800			66	200 kt to 1 Mt (a)	underserved
		Announced by AEC (a)	50.114	78.809	5.7	4.3		200 KC (0 1 HC (8)	underground
		Eunknown which test on 12/10/		h vield]			••		
2/28/72	42700.0		51.700	77.200	4.9		b1		underground
		Seni			4.9		h,i:	2	annsi di navo
								•	
2/15/73	50300 0	Coni (o billo E Maralla Jim)							
27-19//3	50300.0		50.000	78.000			61	20 to 200 kt (a)	underground
A / 1 13 / 77		Announced by AEC (a)	49.835	78.232	5.6		i 2		
/19/73	43237.5	Semi (a,b6); E. Kazakh (i2)	50.000	77.700	5.4		b6	20 to 200 kt (a)	underground
110/33	-	Announced by AEC (a)	50.006	77.725	5.6		i2		-
/10/73	12657.6	· · · · · · · · · · · · · · · · · · ·	49.800	78.100	5.4		b6	20 to 200 kt (a)	underground
		Announced by AEC (a)	49.780	75.058			i2		•
7/23/73	12300.0	, , , ,	50.000	78.000			bi	200 kt to 1 Mt (a)	underground
		Announced by AEC (a)	49.986	78.853	7.1	4.4	i2		
8/15/73	15957.8		42.700	67.400	5.3		<b>b</b> 6	20 to 200 kt (a)	underground
		Kazakh(i2); announced by	42.711	67.410		3.4	i 2		<u>3</u> , 0200
	<b></b>	AEC (a)							
3/28/73	30000.0						bi	20 to 200 kt (a)	underground
		(a); Central Kazakh (i2).	50.550	68.395	5.5	3.4	i 2		yr sunu
		Announced by AEC (a), PNE (i2					-		
/12/73	70000.0			55.000			bi	6 megatons (a)	underground
		Announced by AEC (a)	73.302	55.161		5.8		3 to 6 Mt	ander gr Utitit
		-			6.78	5.25		1830 <u>+</u> 260 kt	
				,	1.031		• •		
/19/73	30000.0	Central Kazakh(b1,i2); Kazakh	Desert (a)	•			b1	20 to 200 kt (a)	underground
		Announced by AEC(a). PNE (12)		67.850	5.2	3.3		FR TAA VF 161	under ground
/27/73	70000.0	NZ(a,b1,i2), southern site(f2)	73.000	55.000		414	b1	20 to 200 kt (a)	المحمد معاليم بر
		Announced by AEC (a)	70.756	53.872	5.9	3.9		10 LU LVV KL (d)	underground
						3.74		54117 64	
				•	.034		T <b>4</b>	56 <u>+</u> 13 kt	underground
/30/73	50000.0	S. Ural(b1);Ural area(a);W Rus	ssia (17)	-		-	61	20 be 200 be /->	
-		Announced by AEC (a). PNE(i2)	51.309	54.582	57	3.3	b1	20 to 200 kt (a)	underground
/26/73	42700.0	Semi (a,b1); E. Kazakh (i2)	50.000	78.000	ule i			30 ha 300 ta tas	
	· • • • • ¥	Announced by AEC (a)	49.765		5 5		b1	20 to 200 kt (a)	underground
/26/73	55957.6	• · · • · · · · · ·	53.700	78,196	5.5		i2	Tana Abra BA ta ta	
			53,565		4.8		b6	less than 20 kt (a)	underground
/27/73	65957.4	NZ(a,b6,i2), southern site(f2)		55.375	, .		i2	• • • •	
		Announced by AEC (a)				5.5		3 to 6 Mt (a)	underground
		THINDUNCED UY MED (3)	70.779	54.177		5.9			
						5.51	f2	3450 <u>+</u> 610 kt	
/14/73	74700.0	Coni (s. ht) P. M., in the	<b>FA A</b> AA		.018 <u>+</u>				
1114	17100.0	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		
/30/74	45700.0	Seni	50.000	78.000			61	20 to 200 kt (a)	110 downwara -
			49.894		4.5		i2	** 28 TAA VE 191	underground
	45702.1	- · ·	49.800	_	5.4		56		under en en el el
			49.835		5.5			20 to 200 kt	underground
		1 test on 1/30/74 announced by							

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DATE	TIME	LOCATION/COMMENTS		-24- Longitu	<u>ide mi</u>	<u>B M</u>	<u>s s</u>	YIELD RANGE	<u>TYPE</u>
		tests and 20 tests in 1974 o	n prelimin	ary data,	and r	evise	ed		
04/15/74	55300.	list has only 19 tests for 1							
V7/10//4	20200.	) Semi E Kazakh	50.000	78.000			bi		underground
05/15/74	30257.3		49.994	78.824			i 2		<b>,</b>
		Announced by AEC (a)	49.743	78.150			06	20 to 200 kt (a)	underground
05/31/74	32657.4	Semi (a,b6); E. Kazakh (i2)	49.952	70 044	5.6			<b>16. 1. 19.6</b>	•
		Announced by AEC (a)	47. JUL	78.944	5.9 6.7		b6 i2	20 to 200 kt (a)	underground
06/25/74	35657.0		49.889	78.115			12 56		
		E Kazakh		/ 4/ 119	5.0		i2		underground
07/ <b>08/74</b>	50001.7		53.800	55.200			56		under som st
		Ural Mountains, PNE			5.3		i2		underground
07/10/74	25657.5		49.789	78.139	5.3		b6		underground
07/00/74	43004 -	E Kazakh			5.7		i2		anver ground
07/22/74	13221.5		70.582	53.545	4.4			i2 [no Mb in i2]	underground
08/14/74	145958.3		a 68.913	75.899	5.5		b6	20 to 200 kt (a)	underground
08/29/74	95955.6	(12); announced by AEC(a); PNE			5.2		i2		anser ground
9072777 <del>4</del>	74743.0	) ; · ; ·· - · • · • • • • • • • • • • • • • •	73.366	55.094	6.4	5.0		1 to 3 megatons (a)	underground
		Announced by AEC (a)				5.4			
						5 4.88		570 <u>+</u> 70 kt	
08/29/74	145959.2		17 397	10.440	±.021	+.027			
		Ural Mountains, PNE	67.223	62.119	5.2		b6		underground
09/13/74	30257.8	Seni	49.820	78.091	5.2		i2		
		E Kazakh	50.000	78.000	5.2		66		underground
10/16/74	63257.5	Semi (a,b6); E. Kazakh (i2)	49.972	78.960	2.5 5.5		i2	74 1. 244 1	
		Announced by AEC (a)		/01/00	6.7		b6 i2	20 to 200 kt (a)	underground
11/02/74	<b>45956.</b> 7		70.817	54.063	6.7	5.3	b6	3 to 4 megatoms (a)	
		site(f2); announced by AEC(a)					i2	o cu y megacuns (a)	underground
					6.78	5.29		1890 <u>+</u> 210 kt	understand
17/07/78	Ptati a	•			<u>+.020</u>			10/0_210 Kt	underground
12/07/74 12/12/74	55756.9	Seni	49.908	77.648	4.7	-	b6,i	2	underground
12/12/74	43700 4	NZ [see 1/30/74 note]	70.900	53.000			i2		underground
12/10//4	62302.4		49.755	78.064	5.0		<b>b6</b>		underground
12/16/74	64102.4	E Kazakh Sami	50.400	77.100	5.3		i2 -		
	0119L17	<b>•</b> 14 1.	49.824	78.117	4.8		66		underground
12/27/74	54656.8	8. 1. J. 1. 1	50.300	77.300	5.0		i2		• -
			49.960 50.200	79.046	5.6	4.7	b6	20 to 200 kt (a)	underground
			JV. 200	78,900			i2		
02/20/75	57757 L	Sani (n. 17) - F. M							
	995919	Annual 2.1 Annual 1	49.760	78.090	5.7		b3	20 to 200 kt (a)	underground
03/11/75	54257.4		49.820	78.078	5.1		i3		
		A	49.800	78.300	5.4		b6	20 to 200 kt (a)	underground
04/25/75	650003.0	· · · · · ·	49.787	78.251	5.9		i3		÷
. –		11 6 1 6110	48.100 47.500	47.200	4.7		b3		underground
		[Probably to build storage cav	tige in A	47.500	4.9		i3		
		natural gas field.]	***************************************	ori gruguj					
04/27/75	53657.2	Part 1 Las a la la la la	49.940	79.020	5.6		<b>b</b> 3	70 += 300 I.F. /	
					414		5	20 to 200 kt (a)	underground

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DATE	TINE	LOCATION/COMMENTS		-25- Longitud	E MA	I N	5 (	YIELD RANGE	TYPE
					z _ <u></u> ¥	- 4	×. 3	LILLY MANUC	<u>ITE</u>
		Announced by AEC (a)	45 004	70 604		-		_	
05/08/75	32657.6		47.990 49.750	78.984		3.			
		Announced by AEC (a)		78.080	5.5			13 20 to 200 kt	(a) underground
06/30/75	32657.0	Saei	49.764	78.089	6.0			3	
		E Kazakh	50.000	78.999	4.8			6	underground
08/07/75	35657.5	Semi (a,b6); E. Kazakh (i3)	49.813	70 046	5.9			3	
		Announced by AEC (a)	47.010	78.240	5.2 5.4			6 20 to 200 kt 3 20 to 200 kt	(a) underground
08/23/75	85857.9		73.369	54.641	6.4	4	9 b		
		Announced by AEC (a)		071071	0.7		7 u 4 i		(a) underground
		,			6. A	2 4.3			
					<u>+.02</u>			2 400 <u>7</u> 20 Kt	under ground
09/29/75			69.600	90.460	4.8	· ـــ • ۷	•7 b	र	
		Central Siberia, PNE	69.592	90.395	4.4		i i		underground
10/05/75	42743.9		55.800	75.100	4.6		1 b		
		E Kazakh			4.6		o i		underground
10/18/75	85956.5		70,840	53.530	<b>4.0</b> 6.7	5.1			<i>I</i> -> ·
		Announced by AEC (a)	70.843	53.690	5.2	-1-1	i		(a) underground
		-, •=•				5 4.5	-		
					±.028			2 990 <u>+</u> 290 kt	
10/21/75	115957.7	NZ(a,b3,i3);northern Site(f2)	73.320	54.930	<u>1</u> .020	1 <u>7</u> . 70		8	1-1
		Announced by AEC (a)	73.351	54.641	5.8		b; i;		(a) underground
		,		011011	6.43				
					•••• <u>+</u> •028			2 500 <u>+</u> 3 kt	underground
10/29/75	44657.5	Semi (a,b6); E. Kazakh (i3)	49.984	78.975	<u>-</u> .020 5.8	<u>.</u> .v3	ь	70 4 5 900 LE /	-1
•		Announced by AEC (a)	•••	( <b>4114</b>	<b>6.</b> 7	7 4			a) underground
12/13/75	45657.5	Seni	47.810	78.240	5.1	J. 0	b3		
-		E Kazakh	49.798	78.196	5.2		i3		underground
12/25/75	51657.2	Semi (a,b6); E. Kazakh (i3)	50.043	78.899	5.8	5.2			a)
		Announced by AEC (a)			6.9	4	00 i3		a) underground
					<b>w</b> i /		14	- 10 LO 200 KC	
01/15/76	44657.2	Seni							
v ∎/ 19/79	779J/+4		49.800	78.250	5.2		b3		underground
04/21/76	45757.9	<b>-</b> .	49.970	78.246	5.5		i4		•
97: 41/ I U	7414/17	• • •	49.840	78.180	5.1		b3		underground
04/21/76	50257.4	E Kazakh	49.818	78.198	5.4		i4		•
V7/11//0	JVLJ/.4	Semi (a,b6); E. Kazakh (i4)	49.932	78.824	5.3		66		) underground
05/19/76	25657.9	Announced by ERDA (a);[time?]			6.4		i4		
AME # 1118	4JQJ/.7		49.856	78.007	5.0		b6		underground
06/09/76	30357 E	E Kazakh			5.2		i4	<20 kt	1
vu/ v1//0	30257.5		49.980		5.3		b3	20 to 150 kt (a	) underground
		Announced by ERDA as 06/08/76	50.023	79.080	5.9		i4		
		which is probably same as 06/19	0/76 test						
07/04/76	nelen e	due to time difference (a)							
V//V <del>9</del> //0	25657.5	A			5.8		b3		underground
1717171	070F7 a		49.915		7.0	4.2		90 kt	
07/23/76	23257.9		49.791		5.1		66		underground
17170171		E Kazakh			5.4		i4	10 kt	
07/29/75	45958.0	<b>10 10 1 1 1 1 1</b>	47.910		5.9	4.4	63		underground
		W Kazakh, PNE	47.782		6.4			150 kt	anaer di nava
		announced by ERDA (a)						· · · · -	

DATE	7714-			-26-					
DATE	TIME	LOCATION/COMMENTS		LONGITUE	<u>)e me</u>	<u> </u>	<u>s s</u>	YIELD RANGE	
		[Probably to build storage c	avities in	n Astrakhan	1				
08/04/75	25659.8	naturai gas field.] Cari							
VE2 1477Q	40000.C	Semi E Kazakh	49.900	77.700			b2		undergrou
08/28/76	25657.6		10 050	70 004	4.1		i4	2 kt	•
		Announced by ERDA (a)	49.950 <b>49.96</b> 9	78.980	5.8		b3		undergrou
09/29/76	25957.7	NZ(a,b3);announced by ERDA(a	73.410	79.001 54.500	0.8 5.8	3.5	5 i4 b3	91 kt	· · ·
		,	73.404	54.817			i4	130 kt	undergrou
10/20/76	75957.7	NZ(a,b6);announced by ERDA(a	) 73.420	54.567	5.1		b6	150 KL	undorarow
10/70/71		NZ				3.4	i4	11 kt	undergrou
10/30/75	45702.5		49.980	78.200	4.9		b3		undergrou
11/05/76	75051 7	E Kazakh Siberi - Siberi - Sib	50.200	78.100	4.5		i4	3 kt	ander grou
11/03/70	00730./	Siberia;Central Siberia(a, 14	) 61.528	112.712	5.3		<b>b6</b>		undergrou
11/23/76	50257 A	Announced by ERDA(a);PNE(i4) Semi (a,b6); E. Kazakh (i4)			5.4		i4	13 kt	-
	0020114	Announced by ERDA (a)	47,991	79.005	5.9		bó		undergrour
12/07/76	45657.5		49.870	78 000	6.7		14	120 kt	
		Announced by ERDA as 12/06/7	47.07V	78.890 78.905	5.9 7.1		b3		undergrou
		which is probably same as	F00.77	/0.7VJ	/.1		i4	110 kt	
		12/07/76 test date to time di	fference	(a)					
12/30/76	35657.5	Semi	49.800	78.135	5.1	4.2	b5		
		E Kazakh			5.5		i4	10 kt	undergroun
03/29/77	35657.8	in the second se	49.790	78.150	5.4		b3		undergroun
4/25/77	40657.8	Announced by ERDA (a)							under grout
17/23///	40037.8		49.837	78.159	5.1		bó		undergroun
5/29/77	25657.8	E Kazakh Semi (a,bó); E. Kazakh (i4)	40.014		5.3		i4		<b>.</b>
		Announced by ERDA (a)	49.944	78.846	5.6				undergroun
6/29/77	30657.9	Semi (a,b3); E. Kazakh (i4)	49.960	78.910	7.0				
		Announced by ERDA (a)	50.034	78.927	5.3 6.4	5.2	b3 i4		undergroun
7/26/77	165957.8		57.540	90.510	5.0		b3		
		Announced by ERDA(a);PNE(i4)	69.532	90.583	4.6		i4		undergroun
7/30/77	15657.8	Sesi	49.730	78.090	5.1		b3		undergroun
0/10/77	001044 7	E Kazakh	49.777	78.163	5.6		i4		מווסבו לו המווא
8/10/77 8/17/77	220200.3 42657.7	Baykal, [PNE]	50.950	110.780	5.2		b3		underground
u/ 1/////	920J/./	Seni E Kazakh	49.814	78.151	5.0		66		underground
8/20/77	215958.7	Siberia;Central Siberia(a,i4)	4 337	AA #33	5.3		i4		-
		Announced by ERDA(a); PNE(i4)	64.223	99.577	5.0		66		
7/01/77	25957.5	NZ(a, 66, 14)	73.376	54.581	4.8		14		
		Announced by ERDA (a)		101101	5.7 6.5	7 7	56 . a		underground
?/05/77	30257.8	Semi(a,b3); E. Kazakh (i4)	50.050	78.930	5.8	20 F	14 53		
		Announced by ERDA (a)	50.092		6.7		u3 i4		underground
/10/77	160003.3	Baykal, [PNE]	57.290		4.8		b3		
9/30/77	65955.6	W.Kazakh(bó,i4); N of Caspian	47.900		5.1		b6		underground underground
		Sea, ann. by ERDA(a);PNE(i4)			5.6	3.6			annet åt ogga
		[Probably to build storage cav	ities in A	strakban			•		

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DATE	TINE	LOCATION/COMMENTS	LATITUDE		DE ME	MS	S	YIELD RANGE	TYPE
10100/00									
10/09/77	105958.8		73.470	54.000			b3	•	underground
10/29/77	70157 7	NZ Pari da Ezho en de la como	73.625	53.158			i4		• •
10/27/77	09007.7	Semi (a,b3); E. Kazakh (i4)	49.780	78.160			63		underground
10/29/77	30702 9	Announced by DOE (a) <sup>9</sup> Semi (a,b6); E. Kazakh (i4)	49.841	78.174			i4		
•••••	007021	Announced by DOE (a)	50.059	78.907			66		underground
11/30/77	40657,5	Semi (a,b6); E. Kazakh (14)	49.957	78.931		3.9 3.5			
		Announced by DOE (a)	· · · · · · · · · · · ·	10.791	6.9				underground
12/25/77	40257.7		47.881	78.141			56		
		E Kazakh			5.0		i4		underground
							• ·		
03/19/78	34657.4	· ) = - · ) = · · · · · · · · · · · · · · · · ·	49.972	77.755	5.2		<b>b</b> 6		underground
		Announced by DOE (a)			5.4		i5		
03/26/78	35657.6		49.734	78.074	5.5		66		underground
		Announced by DOE (a)			6.4		i5		1
04/22/77	70167 7						611		
N77442777	30657.7	, , , _,	49.720	78.180		3.6			underground
		Announced by DOE (a)	49.720	78.175	5.7	3.3			
05/29/78	45657.6	Seni	40.000	78 044		3.39	611		
	1000/10	E Kazakh	49.890	78.200	4.7		F3		underground
06/11/78	25157.7		49.877 49.879	78.195 78.838	5.0		i5		
		Announced by DOE (a)	47.0/7	/0.079		4.4			underground
					7.0	4.3	13 - 611		
07/05/78	24657.5	Semi (a,b3); E. Kazakh (i5)	49.840	78.910	5.0	3.7			
		Announced by DOE (a)	49.839	78.906		3.9			underground
						3,41			
07/28/78	24657.6	Semi (a,b6); E. Kazakh (i5)	49.744	78.168	5.7	••••	b6		updoporound
		Announced by DOE (a)			5.9		i5		underground
						3.28			
08/09/78	175958.1	Siberia; E. Siberia(a); C.	63.650	125.340	5.1	3.7			underground
		Siberia(15); announced by	63.706	125.321	5.9	3.7	i5		
00/10/70	75067 7	DOE (a); PNE (15)							
08/10/78	/373/./	NZ(a, 56, 15)	73.335	54.792		4.3			underground
		Announced by DOE (a)			6.8	4.1			-
08/24/78	180004 0	Siberia;N. Central Siberia(a)	· E . 074		<b>.</b> .	3.96			
		C.Siberia(i5); announced by	03.8/V 45.810	112.560		3.7			underground
		ererer terteri annoanced by	03.710	112.541	5.2	3.5			
		DOE (a); PNE (15)				3.67	011		
08/29/78	23558.0		49.820	7 <b>8.</b> 100	5.2		b3		
		E Kazakh	49.839	78.008	5.4				underground
08/29/78	23706.4	Semi (a, b3, f3, i5); E. Kazakh (i5)	49.980		5.9				underenned
		announced by DOE (a)	50.008		6.9				underground
		[time unknown]			5.967			f3	
					+.012				
AD / 18 /70		[time unknown]				3.77			
09/15/78	23657.3	anne indendige den bestitte Britite Britite	49.998	78.925		4.4			underground
		Announced by DOE (a)			5.963	3.831		f3	

				-28-					
DATE	TIME	LOCATION/COMMENTS	LATITUD		IDE MI		<u>5 5</u>	YIELD RANGE	TYPE
					<u>+</u> .01	5 <u>+</u> .(	)32		
09/20/78	50257.0	Cast			7.0	4.2	2 i5		
V//2V//G	JV237.(	/ Semi E Kazakh	49.890	78.400			63		underground
09/21/78	145957.6			_	4.7		i5		•••••
v., <b>217, 0</b>	179/9/19	Siberia;NW Siberia(a); C. Siberia(i5); announced	66.530	96.260			b3		underground
		by DOE (a); PNE (i5)	56.541	86.252	4.9		i5		-
09/27/78	20458.2	NZ (a, b6, 15)	73.380	54 550	E /		i9 b11		
		Announced by DOE (a)	/3.300	54.559		4.5			underground
					0.3	4.2	: 15  2 b11		
10/07/7 <b>8</b>	235957.0	Siberia	61.530	112.870	5.2		52 DII 53		
		Central Siberia, PNE	61.500	112.890	5.5		03 15		underground
		[reported as 10/08/78]			0.0		0 611		
10/15/78	53557.0	Seai	49.597	78.242	5.1		b6		
		E Kazakh	49.756	78.261	5.5		i5		underground
10/17/78	45956.5	W.Kazak(b3,i5); N of Caspian	47.918	48.114	5.8	4.6	b6		underneued
		Sea, ann. by DOE(a); PNE (i5	) 47.906	48.209	6.3		i5		underground
		[Probably to build storage c	avities in	Astrakhan	;	4.0	1 511		
10/17/7B	176050 0	natural gas field.]							
10/1///0	135958.0		1 63.210	63.260	5.5	3.7	Ь3		underground
		<pre>(i5); ann. by DOE (a);PNE(i5)</pre>	) 63.207	63.194	5.8		i5		
10/31/78	41657.8	Repi (s. 17) - C. Landth (17)				3.6	1 611		
19/91//0	1100/.0	see says of the meaning that	49.760	78.120	5.2		b3		underground
		Announced by DOE (a)	49.886	78.137	5.5	_	i 5		
11/04/78	50557.5	Semi(a,bs,f3);E. Kazakh(i5)	50 084	70 007	<b>.</b> .		b11		
		Announced by DOE (a)	50.046 50.019	78.983		4.2			underground
			30.017	79.024		3.9			
					5.576 <u>+</u> .018			f3	
11/29/78	43258.1	Semi(a,b3); E. Kazakh (i5)	49.860	78.050	5.3	<u>1</u> .04	.4 b3		
		Announced by DOE (a)	49.920	78.089	5.6		i5		underground
11/29/78	43302.9	Semi(a,b3,f3); E. Kazakh(i5)	49.930	78.770		4.3			
		Announced by DOE (a)	50.004	78.951		4.2			underground
		Eunknown which 11/29/78 test	for f31		5.996				
15/14/20		Data tape not available			±.017				
12/14/78	44257.6		49.897	78.199	4.8		<b>b6</b>		underground
12/18/78	7505/ 7	E Kazakh	49.897	78.199	5.0		i5		anger år adna
12/10//5	13430"7	W.Kazakh(b3,15); N of Caspian	47.780	48.140	5.9	5.2	b3		underground
		Sea, ann. by DDE (a); PNE(i5)	47.972	48.258	6.4				
		[Probably to build storage can natural gas field.]	vities in i	Astrakhan		4.89	b11		
12/20/78	43257.3		40.005	<b>TO</b> ( <b>TO</b>					
		9681	49.885	78.172	4.7		bá,i:	5	underground
01/10/79	80000.0	W. Kazakh, PNE (16)			5 0		10		
01/17/79		W.Kazakh(b6,i6);N of Caspian	47,883	48.128	5.0 5.0		b2		underground
		Sea, ann. by DOE(a);PNE(i6)	47.985	48.212	5.0 6.5		bó ; 4		underground
		[Probably to build storage cav	vities in 4	strakhan		4.12	16 511		
		natural gas field.]		<u></u> 011011		7012	911		
02/01/79	41257.7	Semi (a,bó); E. Kazakh (i6)	50.111	78.381	5.4		b5		
					·				underground

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DATE	TIHE	LOCATION/COMMENTS		-29- Longitu	<u>de m</u> i	<u>8 H</u>	<u>IS</u> §	<u>}_</u>	YIELD_RANGE	
		Announced by DOE (a)	50.125	70 044	, ,			,		
			JV.12J	78,944	6.4		1 23 b	:6 :11		
02/16/79	40357.	9 Semi (a,b6); E. Kazakh (i6)	49.971	77.746	5.4			6		underground
AS 141 178	74.53	Announced by DOE (a)	50.018	77.781				6		ander graand
05/06/79	3165/.	6 Semi E Kazakh	49.800	78.120			р	3		underground
05/24/79	40700.	D Semi; E. Kazakh (i6)	49.869 50.000	78.247				6		2
05/31/79	55457.	5 Seni	49.855	78.000 78.193	4.9 5.2			2		underground
		E Kazakh	49.837	78.237	5.4		i	6 6		underground
							42 b	-		
06/23/79	25657.0	Semi(a,b6,f3); E. Kazakh (i6	49.918	78.915	6.3	4,				underground
		Announced by DOE (a)	49.935	7 <b>8.</b> 971	7.2		i	6		enter gr dang
					6.21				f3	
					<u>+</u> .01	-				
7/07/79	34657.5	Semi(a,b3,f3); E. Kazakh (i6	) 50.050	79.060	٩ ۵	4.( 5.(	02 51 0 61			
		Announced by DOE (a)	50.062	79.110	6.7	4.1	, u. 18			underground
					5.83	9 4.(		-	f3	
					<u>+</u> .02					
7/14/79	5955.2	H Kanalih (b7 i () a Daai ()					)4 51			
7 <b>4</b> Te 2 e	J / J J - L	W.Kazakh(b3,i6); Semi (a) Announced by DOE (a); PNE(i6	47.810	48.070		5.3				underground
		[Probably to build storage c	1 47.800 Avitige in	48.249	6.2		i6 18 b1			
		natural gas field.]		nəti akiidii		J.0	0 01	1		
7/18/79	31702.5	Sesi	49.900	77.830	5.2	4.2	b3	(		underground
		E Kazakh	49.966	77.927	5.2		ib			underground
8/04/79	35657.3	Conita b7 (7) - P - M - M - M - M					5 bi			
<b>.</b>	19891.9	Semi(a,b3,f3); E. Kazakh (i6) Announced by DDE (a)		78.940	6.1	5.5				underground
		mindances by Doc (a)	49.866	78.957	7.2	4 4	16 57		•	
					±.013			1	3	
							4 b1:	1		
3/12/79	175957.4		51.872	122.185	4.9		b6			underground
/18/79	75157 7	Central Siberia, PNE	61.909	122.087	5,4	•	ió			anael yr odno
	4010/10	Semi (a,b3,f3); E. Kazakh(i6) Announced by DDE (a)	49.930	78.980	6.1	4.3				underground
			49.961	79.020	7.2		15		_	
					6.170 ±.015			f	3	
/06/79	175957.7		54.060	99.620	4.9	<u>+</u> .v/	b3			
/ + + + 70	777	Central Siberia, PNE	64.126	99.554	4.5		15			underground
/14/79	73300.0		50,000	78.000	5.2		b2			underground
/15/79	40700.0	E Kazakh Seni	EA		5.2		i6			
	1 V / VV • V	E Kazakh	50.000	78.000	4.6		b2			underground
/24/79	32958.4	NZ(a,b6,i6)	73.370	54.580	4.6		ió			
		Announced by DOE (a)	73.335	54.729	5.7 5.5	413	53 16			underground
						4.15				
(27/79	41257.4	Sani	49.743	78.051	4.5		56			underground
	145050 0	E Kazakh			5.4		İ٥			under är odlig
/04/79	ມປະບຸກິບໄດ້ເປັ	Siberia;W. Siberia(i6);East	60.560	71.440	5.4	8.7	b3			underground

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of Ural Mts, snowned by         60.650         71.525         5.6         16           00E (a): PME (e],18) believed designed to hasten the flow of all in the Salve of Islad (rel)         113.09         4.9         5.6         underground           707.77         20556. 2         Semi (sic)         61.554         113.09         4.9         5.3         16         underground           718.77         41657.6         Semi (sic)         73.38         5.4         5.3         16         underground           718.77         41657.6         Semi (sic)         73.38         54.807         5.8         16         underground           718.77         7958.6         M.Kazakh (b6.16); M.of Caspin 47.806         48.155         5.8         16         underground           724.79         5575.6         M.Kazakh (b6.16); M.of Caspin 47.806         48.176         4.6         16         underground           724.79         5575.6         M.Kazakh (b6.47,79         48.177         6.4         16         underground           724.79         55576.6         Semi (sight 49.937         79.059         6.0         4.4         16         underground           7377         31656.7         Semi (sight 49.947         77.241         5.8         16         <	<u>TE 11</u>	IME	LOCATION/COMMENTS	LATITUDE	-30- Longitui	DE <u>M</u> B	MS	<u> </u>	YIELD RANGE	Туре
DDC (a)P PMC (a)L (a)DE believed designed to hasten         DDC (a)PMC (a)L (b) believed designed to hasten         DDC (a)PMC (a)L (b) believed designed to hasten           /07/79         205956.9         Semi (sic1)         61.55         113.099         5.78         5.6         underground           /18/79         41557.6         Semi (sic1)         61.53         113.099         5.78         5.6         underground           /18/79         70958.3         X2 (a,bb,ib)         73.338         54.807         5.8         6         underground           /18/79         70958.3         X2 (a,bb,ib)         73.338         54.807         5.8         6         underground           /18/79         70958.4         W.Kazakh/bb,ib/J W.of Caspian 47.806         48.103         5.9         6.0         underground           /18/79         70955.5         W.Kazakh/bb,ib/J W.of Caspian 47.806         48.103         5.9         6.0         4.4         6         underground           /18/79         70555.6         W.Kazakh/bb,ib/J W.of Caspian 47.806         49.17         7.057         6.0         4.4         6         underground         5.9         6.0         4.4         6         underground         5.9         6.0         4.4         6         1.0         1.0			of Ural Mts. announced by	L0 150	71 595	5.0		.,		
107779       20555, 7.       Sexi (s:1)       31.564       113.059       5.3       16       underground         1/18/79       41657.4       Sexi (s:1)       31.58       113.059       5.3       16       underground         1/18/79       41657.4       Sexi (s:1)       51.85       113.059       5.3       16       underground         1/18/79       70958.3       N2 (a,b,b,16)       73.33       54.807       5.8       56       underground         1/18/79       70958.3       N2 (a,b,b,16)       73.33       54.807       5.8       56       underground         1/24/79       55956.6       M.Kazakh (b,16) (N.of Caspian 47.806       48.158       5.8       56       underground         1/24/79       55956.7       Sexi (an.b,6,16) (N.of Caspian 47.806       48.158       5.8       56       underground         1/24/79       55961.6       M.Kazakh (b,16) (N.of Caspian 47.806       48.158       5.8       56       underground         1/2577       31656.7       Sexi (a.b,6,173) (E. Kazakh (b,179.4       61       1.6       underground         1/21/79       31657.5       Sexi (a,b,6,13) (E. Kazakh (i,6)       47.943       5.90       3.97.74       4.10       511         21/79 </td <td></td> <td></td> <td>DOE (a); PNE (e1,i6) believed</td> <td>designed</td> <td>to haster</td> <td>0.0 1</td> <td></td> <td>15</td> <td></td> <td></td>			DOE (a); PNE (e1,i6) believed	designed	to haster	0.0 1		15		
Dentral Siberia, PNE         01304         11304         14.97         16         undergrount           /18/79         4157.5         Seai         49.783         78.119         5.2         56         undergrount           /18/79         7058.3         N2 (a,b,b,i6)         73.338         54.807         5.9         b6         undergrount           /18/79         7058.3         N. (a,b,b,i6)         73.338         54.807         5.9         b6         undergrount           /18/79         7058.3         N. (a,b,i6)         73.338         54.807         5.9         b6         undergrount           /18/79         7058.5         M. Kazah/(b6,i6); N. of Caspian 47.806         48.138         5.8         b6         underground           /24/79         55956.6         M. Kazah/(b6,i5); K. of Caspian 47.806         48.139         7.9         5.4         16         underground           /129/79         71656.5         Seai         (a,b,f3); E. Kazah/(ib) 49.957         79.059         6.0         4.4         b6         underground           /29/79         71656.5         Seai         (a,b,6,f3); E. Kazah/(ib) 49.964         78.823         6.0         4.4         4.4         b1           /2/79         43557.5	107/70 00	FR6/ -	the flow of oil in the Salya	oil field	(e1)					
118.79       118.79       13.059       5.3       16         118.79       1457.6       Seai       49.783       78.118       5.2       5.4       16         128.79       70058.3       NZ (a,bb,16)       73.338       54.807       5.9       5.4       16       underground         128.79       70058.3       NZ (a,bb,16)       N.of Caspian 47.806       48.158       5.8       5.6       5.6       underground         124.79       53956.4       M.Kazakh (bb,16), N.of Caspian 47.806       48.158       5.8       5.8       5.6       5.6       underground         124.79       5155.5       Seai (a,b,6,13) E. Kazakh (16)       49.957       79.059       6.0       4.4       5.6       underground         129.79       7155.5       Seai (a,b,6,13) E. Kazakh (16)       49.957       79.059       6.0       4.4       5.6       underground         30.77       45257.8       Seai (a,b,6,13) E. Kazakh (16)       49.951       78.200       4.3       5.0       1.6       underground         20/79       45257.5       Seai (a,b,6,13) E. Kazakh (16)       49.840       78.242       7.2       1.6       5.998       4.080       5.0       1.6       1.0       1.6       1.0	707779 - 20	5956.9				4.9		<b>b</b> 6		Baderaround
<ul> <li>142/7 413/2 5 Beat 49,783 78.118 5.2 56 underground 5.4 16 underground 5.4 16 underground 5.9 56 underground 6.6 16 5.9 56 underground 6.6 16 5.9 56 underground 6.6 16 5.9 56 16 underground 6.6 16 5.9 56 16 underground 5.9 51 10 11 10 110 110 110 110 110 110 110</li></ul>			Central Siberia, PNE	61.839	113.059	5.3				anaar it sama
E         Kazakh         97,703         12,12         0.5,4         1	/18/79 4	1657.6	Seni	48 707	70		3.79			
/18/79       70958.3       NZ (a,b6,i6)       73.338       54.807       5.9       b6       underground         /24/79       55956.6       M.kzash(b6,i6); M.of Caspian 47.806       48,158       5.8       b6       underground         /24/79       55956.6       M.kzash(b6,i6); M.of Caspian 47.806       48,158       5.8       b6       underground         /24/79       55956.6       M.kzash(b6,i6); K.of Caspian 47.806       48,158       5.8       b6       underground         /23/79       31656.9       Seei (a,b6,471); E. Kazah(i6) 49,957       79,059       6.0       4.4       b6       underground         /23/79       31656.9       Seei (a,b6,473); E. Kazah(i6) 49,967       79.059       6.0       4.4       b6       underground         /23/79       4557.5       Seei (a,b6,473); E. Kazah(i6) 49,860       78.227       4.9       i6       underground         /2/79       45657.6       Seei (a,b6,473); E. Kazah(i6) 49,964       78.827       7.2       i6       5.998 4.080       f3         /21/79       45657.6       Seei (a,b6,473); E. Kazah(i6) 49,964       78.827       4.7       i6       underground         /21/79       4516.57.6       Seei (a,b6,473); E. Kazah(16) 49,964       78.827       5.1       17				47./03	/8.118					underground
Announced by DDE (a)	/18/79 7	0958.3	NZ (a,b6,i6)	73.338	54.807					
24/79       53956.6       N.Kazakh(b6,ib); N.of Caspian 47,806       48.158       5.8       b6       underground         1000000000000000000000000000000000000			Announced by DOE (a)							underground
29/79       31652.9       b6       underground         29/79       31652.9       See, an. by DDE (a)       49,757       79,059       6.0       4.4       b6       underground         29/79       31652.9       Seei (a,b6,73); E. Kazakh(16) 49,957       79,059       6.0       4.4       b6       underground         30/79       45257.8       Seei (a,b6,73); E. Kazakh(16) 49,957       79,059       6.0       4.4       b6       underground         30/79       45257.8       Seei (a,b6,73); E. Kazakh(16) 49,894       78,269       4.9       16       underground         30/79       45257.8       Seei (a,b6,73); E. Kazakh(16) 49,894       78,843       6.0       4.4       b1         22/79       43657.5       Seei (a,b6,73); E. Kazakh(16) 49,894       78,843       6.0       4.4       b6       underground         50/79       43657.5       Seei (a,b6,73); E. Kazakh(16) 49,894       78,843       6.0       4.4       b6       underground         51/79       4557.6       Seei (a,b6,73); E. Kazakh (16)       49,868       78,827       4.7       16       underground         52/79       4557.6       Seei (a,b5,73); E. Kazakh (16)       47,964       78,527       16       1.1       1.1       1.1	/01/70 PI				•		3.90			
129,79       3155.9       Seei (a,b6,f3); E. Kazakh(ib) 49,957       79,059       6.0       4.4       b6       underground         29/79       3155.9       Seei (a,b6,f3); E. Kazakh(ib) 49,957       79,059       6.0       4.4       b6       underground         30/79       3155.9       Seei (a,b6,f3); E. Kazakh(ib) 49,957       79,059       6.0       4.4       b6       underground         30/79       45257.8       Seei (a,b6,f3); E. Kazakh(ib) 49,964       78,210       4.5       b3       underground         30/79       45257.5       Seei (a,b6,f3); E. Kazakh(ib) 49,894       78,827       4.9       i6       underground         32/79       43657.5       Seei (a,b6,f3); E. Kazakh(ib) 49,894       78,827       7.2       i6       underground         5.998       4.00       5.998       4.00       f3       ±.013       ±.022       4.24       b11         11/79       44156.8       Seei (a,b6,f3); E. Kazakh(i6) 49,964       78.827       6.1       4.1       b6       underground         13/79       456.57.5       Seei (a,b6,f3); E. Kazakh (i7) 49,964       78.827       6.1       4.1       b6       underground         13/79       456.57.5       Seei (a,b3); E. Kazakh (i7) 49,964       77.777	24/77 03	3736.6	W.Kazakh(b6,i6); N.of Caspian	47.806		5.8		b6		underground
natural gas field.3       9.947       79.059       6.0       4.4       b6       underground         28/79       31656.9       Seei (a,b6,f3); E. Kazakh (i6)       49.941       79.059       6.0       4.4       b6       underground         50/79       45257.8       Seei       49.910       78.210       4.5       b3       underground         50/79       45257.8       Seei       49.810       78.210       4.5       b3       underground         52/79       4557.5       Seei (a,b6,f3); E. Kazakh (i6)       49.840       78.843       6.0       4.4       b6       underground         52/79       43657.5       Seei (a,b6,f3); E. Kazakh (i6)       49.866       78.824       7.2       i6       underground         52/79       43557.6       Seei (a,b6,f3); E. Kazakh (i6)       49.866       78.827       6.1       4.1       b6       underground         1/79       4557.6       Seei (a,b6,f3); E. Kazakh (i6)       49.964       78.827       6.1       4.1       b6       underground         1/79       4557.6       Seei (a,b6,f3); E. Kazakh       49.968       77.777       5.1       i7       underground         1/79       4557.6       Seei (a,b3); E. Kazakh       49.98			Sea, ann. by DUE (a); PNE(i6)	47.759	48.177	5.4			1	
23/79 $31656.9$ Semi (a,b6,f3); E. Kazakh(i6) 49,957 Announced by DDE (a) 49,947 79,059 6.0 4.4 b6 announced by DDE (a) 49,947 79,059 6.0 4.4 b6 10 49,957 79,059 6.0 4.4 b6 10 49,957 79,059 6.0 4.4 b6 10 11 10 11 1			natural mas field 1	vities in i	Astrakhan		3.95	b11		
Announced by DOE (a)       49.941       79.041       6.6       16       announced by DOE (a)       5.990       3.970       3.974       f.       1.016       ±.017       ±.017       ±.016       ±.017       ±.017       ±.016       ±.017       ±.017       ±.016       ±.017       ±.017       ±.017       ±.016       ±.017       ±.016       ±.017       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017       ±.016       ±.017	28/79 31	1656.9		49.957	79 150	<u>ل</u> ۸	A .	њ£		
30/79       45257.8       Seai       49.810       78.210       4.5       5.5       underground         20/79       45657.5       Seai       (a,b6,f3); E. Kazakh(i6)       49.840       78.269       4.9       i6       underground         02/79       43657.5       Seai       (a,b6,f3); E. Kazakh(i6)       49.844       78.843       6.0       4.4       b4         02/79       43657.5       Seai       (a,b6,f3); E. Kazakh(i6)       49.844       78.843       6.0       4.4       b4         02/79       43657.5       Seai       (a,b6,f3); E. Kazakh(i6)       49.868       78.827       7.2       i6       underground         5.0       i6       5.0       i6       underground       5.0       i6       underground         71/79       45657.6       Seai       (a,b,f3); E. Kazakh(i6)       49.964       78.827       6.1       4.1       b6       underground         71/79       45657.6       Seai       (a,b,f3); E. Kazakh(i6)       49.968       77.777       5.1       i7       underground         4/80       52357.3       Seai       49.792       78.128       5.0       b6       underground         4/80       52357.4       Seai <td< td=""><td></td><td></td><td>Announced by DOE (a)</td><td></td><td></td><td></td><td></td><td></td><td></td><td><b>under</b>ground</td></td<>			Announced by DOE (a)							<b>under</b> ground
									f3	
90777       43257.8       Seat       49.810       78.210       4.5       b3       underground         22/79       43657.5       Seat       (a,b6,f3); E. Kazakh(i6)       49.840       78.287       4.9       i6       underground         22/79       43657.5       Seat       (a,b6,f3); E. Kazakh(i6)       49.868       78.843       6.0       4.4       b6       underground         22/79       43657.5       Seat       (a,b6,f3); E. Kazakh(i6)       49.868       78.824       7.2       i6       s.08       16       underground         11/79       44156.8       Seat       49.794       78.347       4.7       b6       underground         3/79       45657.6       Seat       (a,b6,f3); E. Kazakh(i6)       49.964       78.827       6.1       4.1       b6       underground         4/80       52357.3       Seat       (a,b7); E. Kazakh (i6)       49.964       77.777       5.1       17       underground         4/80       52357.4       Seat       (a,b7); E. Kazakh       49.960       78.810       5.3       17       underground         4/80       52357.4       Seat       (a,b7); E. Kazakh       17       16       5.3       17       underground <td></td>										
EKazakh       47.810       78.210       4.5       53       underground         EKazakh       49.840       78.269       4.9       16       3.08 bill       3.08 bill         02/79       43657.5       Sesi (a,b6,f3); E. Kazakh(16)       49.868       78.249       78.843       6.0       4.4 b6       underground         21/79       43657.5       Sesi (a,b6,f3); E. Kazakh(16)       49.868       78.824       7.2       16       5.998       4.080       f3         21/79       44156.8       Sesi (a,b6,f3); E. Kazakh(16)       49.794       78.347       4.7       b6       underground         13/79       45657.6       Sesi (a,b6,f3); E. Kazakh(16)       49.964       78.827       6.1       4.1       b6       underground         4/80       52357.3       Sesi (a,b6,f3); E. Kazakh (16)       49.968       77.977       5.1       17       underground         4/80       52357.4       Sesi (a,b3); E. Kazakh (17)       49.960       78.810       5.5       53       underground         4/80       5257.4       Sesi (a,b3); E. Kazakh (17)       49.960       78.810       5.5       53       underground         7/80       35657.4       Sesi (a,b3); E. Kazakh (17)       49.994       7	30/79 45	757 0	Soni		·		4.10	b11		
1/2/79       43657.5       Semi (a,b6,f3); E. Kazakh(i6) 49.894 Announced by DDE (a)       49.868       78.843       6.0       4.4       b6       underground         1/79       44156.8       Semi (a,b6,f3); E. Kazakh(i6)       49.868       78.824       7.2       i6       underground         1/79       44156.8       Semi (a,b6,f3); E. Kazakh(i6)       49.794       78.347       4.7       b6       underground         3/79       45657.6       Semi (a,b6,f3); E. Kazakh(i6)       49.964       78.827       6.1       4.1       b6       underground         4/80       52357.3       Semi (a,b6,f3); E. Kazakh (i6)       49.964       77.777       5.1       i7       underground         4/80       52357.4       Semi (a,b3); E. Kazakh (i7)       49.968       77.777       5.0       b6       underground         1/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         1/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.964       78.810       5.5       b3       underground         1/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.979       78.100       5.5       b3       underground         1/80 <td< td=""><td></td><td>23/19</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>underground</td></td<>		23/19								underground
<ul> <li>43637.5 Sesi (a,b6,f3); E. Kazakh(i6) 49,894 Announced by DOE (a)</li> <li>49.868</li> <li>78.843</li> <li>6.0</li> <li>4.4</li> <li>4.6</li> <li>49.868</li> <li>78.824</li> <li>7.2</li> <li>16</li> <li>5.998</li> <li>4.080</li> <li>4.24</li> <li>4.1</li> <li>4.24</li> <li>45657.6</li> <li>5esi (a,b6,f3); E. Kazakh(i6)</li> <li>49.964</li> <li>78.827</li> <li>4.1</li> <l< td=""><td></td><td></td><td>E NGLONI</td><td>47.340</td><td>78.259</td><td>4.9</td><td></td><td></td><td></td><td></td></l<></ul>			E NGLONI	47.340	78.259	4.9				
Announced by DOE (a)       49.868       78.824       7.2       i6       inter ground         1/79       44156.8       Semi       49.794       78.347       4.7       b6       underground         3/79       45657.6       Semi (a,b6,f3); E. Kazakh(i6)       49.794       78.347       4.7       b6       underground         3/79       45657.6       Semi (a,b6,f3); E. Kazakh(i6)       49.794       78.827       6.1       4.1       b6       underground         1/80       52357.3       Semi (a,b6,f3); E. Kazakh (i6)       49.385       77.937       4.9       b6       underground         1/80       52357.3       Semi (a,b3); E. Kazakh (i7)       49.968       77.777       5.1       i7       underground         1/80       52357.4       Semi (a,b3); E. Kazakh (i7)       49.968       77.777       5.1       i7       underground         1/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.968       78.10       5.5       b3       underground         /80       35657.5       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         /80       35657.5       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5 <t< td=""><td>2/79 43</td><td>657.5</td><td>Semi (a, b6, f3); E. Kazakh(i6)</td><td>49.894</td><td>78.843</td><td>4 0</td><td></td><td></td><td></td><td></td></t<>	2/79 43	657.5	Semi (a, b6, f3); E. Kazakh(i6)	49.894	78.843	4 0				
			Announced by DOE (a)							underground
			•						f3	
1/7944156.8Semi49.79478.3474.7b6underground $3/79$ 45657.6Semi(a,b6,f3); E. Kazakh (i6)49.96478.8276.14.1b6underground $3/79$ 45657.6Semi(a,b6,f3); E. Kazakh (i6)49.96478.8276.14.1b6underground $7.2$ i6 $5.0$ i.6i.1 $7.2$ i.6i.1i.1i.6 $4/90$ S2357.3Semi49.38577.937 $4.9$ b6underground $4/90$ S2357.4Semi49.79278.1285.0b6underground $4/90$ 40657.6Semi49.79278.1285.0b6underground $4/90$ 35657.4Semi (a,b3); E. Kazakh (i7)49.96078.8105.5b3underground $4/90$ 35657.8Semi (a,b3); E. Kazakh (i7)49.75078.1105.5b3underground $4/90$ 35657.8Semi (a,b3); E. Kazakh (i7)49.975778.1025.8i7underground $4/90$ 35657.8Semi (a,b3); E. Kazakh (i7)49.977978.1025.8i7underground $4/90$ 35657.8Semi (a,b3); E. Kazakh (i7)49.99079.0385.6b6underground $4/90$ 32657.5Semi (a,b3); E. Kazakh (i7)49.99079.0276.1i7underground $4/90$ 32657.5Semi (a,b3,f3); E. Kazakh (i7)49.99079.0276.1i7underground<										
E       Kazakh       47.774       78.37       4.7       b6       underground         13/79       45657.6       Semi (a,b6,f3); E. Kazakh(i6)       49.964       78.827       6.1       4.1       b6       underground         4/80       S2357.3       Semi       49.385       77.937       4.9       b6       underground         4/80       S2357.3       Semi       49.385       77.937       4.9       b6       underground         4/80       S2357.3       Semi       49.792       78.128       5.0       b6       underground         4/80       S2357.4       Semi       49.968       77.777       5.1       i7       underground         4/80       40657.6       Semi       49.968       77.777       5.1       i7       underground         5/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b3); E. Kazakh (i7)       49.990       79.038       5.6       b6       underground         2/80       32657.		154 0	Coni							
23/79       45657.6       Sesi (a,b6,f3); E. Kazakh(i6) 49.964 Announced by DOE (a)       78.827       6.1       4.1       b6 7.2       i6         4/80       52357.3       Sesi       49.395       77.937       4.9       b6 6.170       3.772       f3 ±.017         4/80       52357.3       Sesi       49.395       77.937       4.9       b6 8.170       underground         4/80       52357.3       Sesi       49.395       77.937       4.9       b6 8.170       underground         4/80       52357.4       Sesi       49.792       78.128       5.0       b6 9.0       underground         5/80       35657.4       Sesi (a,b3); E. Kazakh (i7)       49.946       78.808       6.5       i7         2/80       35657.8       Sesi (a,b3); E. Kazakh (i7)       49.757       78.10       5.5       b3 9.10       underground         2/80       32657.5       Sesi (a,b3); E. Kazakh (i7)       49.797       78.10       5.5       b3 17       underground         2/80       32657.5       Sesi (a,b6); E. Kazakh (i7)       49.979       79.038       5.6       b4 17       underground         2/80       32657.5       Sesi (a,b3,f3); E. Kazakh (i7)       49.970       78.860       5.7	.4777 77		•	49.794	78.347					underground
Announced by DOE (a)       7.2       i6       anderground         4/80       52357.3       Seai       49.385       77.937       4.9       b6       anderground         4/80       52357.3       Seai       49.385       77.937       4.9       b6       anderground         0/80       40657.6       Seai       49.792       78.128       5.0       b6       underground         5/80       35657.4       Seai (a,b3); E. Kazakh (i7)       49.966       78.10       5.3       i7         5/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.966       78.810       5.5       b3       underground         2/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.759       78.100       5.5       b3       underground         2/80       32657.5       Seai (a,b3); E. Kazakh (i7)       49.759       78.100       5.5       b3       underground         2/80       32657.5       Seai (a,b3); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         1/80       32657.8       Seai (a,b3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         1/80       23257.8       Seai (a,b3,f3); E. Kazakh (i7) <td>3/79 45</td> <td></td> <td></td> <td>AQ 044</td> <td>78 017</td> <td></td> <td></td> <td></td> <td></td> <td>-</td>	3/79 45			AQ 044	78 017					-
4/80       52357.3       Seei       49.385       77.937       4.9       b6         2/80       52357.3       Seei       49.385       77.937       4.9       b6       underground         0/80       40657.6       Seei       49.968       77.777       5.1       i7       underground         0/80       40657.6       Seei       49.792       78.128       5.0       b6       underground         5/80       35657.4       Seei (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Seei (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         1/80       32657.5       Seei (a,b3); E. Kazakh (i7)       49.979       79.038       5.6       b6       underground         1/80       32657.8       Seei (a,b3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         1/80       32657.8       Seei (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         1/80       23257.8       Seei (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3         1/80<			Announced by DOE (a)	77+709	/0.02/					underground
4/30       52357.3       Seai       49.385       77.937       4.9       b6       underground         4/30       52357.3       Seai       49.385       77.937       4.9       b6       underground         0/80       40657.6       Seai       49.792       78.128       5.0       b6       underground         5/30       35657.4       Seai (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7         2/80       32657.5       Seai (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         2/80       32657.5       Seai (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b6			·						47	
4/90       \$2357.3       Seai       49.395       77.937       4.9       b6       underground         0/80       40657.6       Seai       49.968       77.777       5.1       i7         0/80       40657.6       Seai       49.792       78.128       5.0       b6       underground         5/80       35657.4       Seai (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.966       78.808       6.5       i7       underground         2/80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.976       78.102       5.8       i7       underground         2/80       35657.5       Seai (a,b3); E. Kazakh (i7)       49.979       78.102       5.8       i7       underground         2/80       32657.5       Seai (a,b3); E. Kazakh (i7)       49.979       78.102       5.8       i7       underground         2/80       32657.5       Seai (a,b3); E. Kazakh (i7)       49.979       79.027       6.1       i7       underground         2/80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3       under									14	
E Kazakh       47.333       77.437       4.9       b6       underground         b/80       40657.6       Seai       49.968       77.777       5.1       i7       underground         b/80       40657.6       Seai       49.792       78.128       5.0       b6       underground         b/80       35657.4       Seai (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         /80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.9750       78.100       5.5       b3       underground         /80       35657.5       Seai (a,b3); E. Kazakh (i7)       49.9757       78.102       5.8       i7         /80       32657.5       Seai (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       23257.8       Seai (a,b3,f3); E. Kazakh (i7)       49.923       78.860								11		
E Kazakh       47.333       77.437       4.9       b6       underground         1/80       40657.6       Seai       49.968       77.777       5.1       i7       underground         1/80       40657.6       Seai       49.792       78.128       5.0       b6       underground         1/80       35657.4       Seai (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         /80       35657.8       Seai (a,b3); E. Kazakh (i7)       49.9750       78.100       5.5       b3       underground         /80       35657.5       Seai (a,b3); E. Kazakh (i7)       49.9759       78.102       5.8       i7         /80       32657.5       Seai (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       32657.8       Seai (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         /80       23257.8       Seai (a,b3,f3); E. Kazakh (i7)       49.923       78.860								•	-	
E Kazakh       49.968       77.777       5.1       i7         0/80       40657.6       Semi       49.792       78.128       5.0       b6       underground         0/80       40657.6       Semi       49.792       78.128       5.0       b6       underground         5/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.8       Semi (a,b3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       78.860       5.7       3.7       b6       underground <t< td=""><td>4/80 523</td><td>357.3</td><td>Seei</td><td>49.395</td><td>77 077</td><td></td><td>L</td><td></td><td></td><td></td></t<>	4/80 523	357.3	Seei	49.395	77 077		L			
0/80       40657.6       Semi       49.792       78.128       5.0       b6       underground         5/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.946       78.808       6.5       i7       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.979       79.038       5.6       b4       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       32657.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       78.860       5.7       3.7       b3       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.923<		i	E Kazakh							underground
E Kazakh       49.813       78.140       5.3       i7         5/80       35657.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.946       78.808       6.5       i7       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7         2/80       32657.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       79.027       6.1       i7         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.923       78.360       6.8       i7       underground	0/80 406		Seai .							هه
3/80       3565/.4       Semi (a,b3); E. Kazakh (i7)       49.960       78.810       5.5       b3       underground         Annnounced by DDE (a)       49.946       78.808       6.5       i7       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       78.860       5.7       3.7       b3       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.923       78.860       5.7       3.7       b3       underground	5/50		E Kazakh ,	49.913						underground
Annnounced by DOE (a)       49.946       78.808       6.5       i7         2/80       35657.8       Semi (a,b3); E. Kazakh (i7)       49.750       78.110       5.5       b3       underground         2/80       32657.5       Semi (a,b3); E. Kazakh (i7)       49.759       78.102       5.8       i7       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         2/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.027       6.1       i7       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.990       78.860       5.7       3.7       b3       underground         2/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.923       78.860       5.7       3.7       b3       underground	u/ev 356	12/.4			78.810	5.5				underground
Announced by DDE (a)       47.759       78.102       5.8       i7         1/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         1/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       b6       underground         1/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3       underground         1/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       b3       underground	2/80 754	57 0 0					i	7		-neri ài aquq
1/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.994       79.038       5.6       56       underground         1/80       32657.5       Semi (a,b6); E. Kazakh (i7)       49.990       79.038       5.6       56       underground         1/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.910       78.860       5.7       3.7       53       underground         1/80       23257.8       Semi (a,b3,f3); E. Kazakh (i7)       49.923       78.860       5.7       3.7       53       underground										underground
Announced by DOE (a)       49.990       79.027       6.1       i7         /80       23257.8       Semi (a,b3,f3); E. Kazakh(i7)       49.910       78.860       5.7       3.7       b3       underground         /80       23257.8       Semi (a,b3,f3); E. Kazakh(i7)       49.923       78.860       5.7       3.7       b3       underground	/80 326									•
/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 78.360 6.8 i7										underground
Announced by DOE (a) 49.923 78.360 6.8 i7	/80 232			9.910			-			
		A								underground
•							.400		F3	
			•							

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				-31-					
DATE	<u>TIME</u>	LOCATION/CONMENTS	LATITUDE	LONGITU	<u>de mb</u>	MS	<u>s</u> _	YIELD RANGE	TYPE
77/47 100	<b></b>				<u>+</u> .019	<u>+</u> .08	7		
07/13/80 07/31/90	E1900.0 33259.0		50.000	78.000			62		underground
V7701,30	00203.V	Semi E Kazakh	49.810	78,140	5.3		b3		underground
09/14/80	24739.3	Semi (a,b3,f3); E. Kazakh(i7)	49.812 AD 046	78.169	. –		i7		
• • • • • • •		Announced by DOE (a)	47.740	78.860 7 <b>8.88</b> 3	8.2 7.3	4.2	b3 i7		underground
			*****	/0.000	6.213	4.04		f3	
					<u>+</u> .030			10	
09/20/80	104000.0		50.000	78.000		-	b2		underground
09/25/80	62110.5		49.752	78.027	4.7		bć		underground
40/70/00	55700 A	E Kazakh	49.713	77.986	4.9		i7		-
09/30/80 09/30/80	55700.0	,	50.000	78.000			b2		underground
10/08/80	55700.0 55957.3	,	50.000	78.000	5.2		b2		underground
10/00/00		W Kazakh, PNE	46.790 46.748	48.290 48.288		3.7			underground
		[Probably to build storage ca			5.7		i7		
		natural gas field.]	AICLES IN	the world	ikiidn				
10/11/80	70957.2		73.360	54.920	5.7	4.0	b3		un den en en el
		Announced by DOE (a)	73.313	55.021	6.6	, . v	i7		underground
10/11/80	33414.3	Semi (a,b3,f3); E. Kazakh(i7)		79.100		4.2			underground
		Announced by DOE (a)	49.912	79.050	5.2		i7		encer gr bane
					5.918			f3	
					±.019	±.01	5		
11/01/80	125957.8		60.822	97.568	5.2		66		
12/10/80	65957.3	Siberia,ann.by DOE(a);PNE(i7) Siberia		98.000	4.7		i7		
12/10/00	84747.4	W Siberia, PNE	61.686	66.999	4.6	3.7	b6	•	underground
12/14/80	34706.5		61.713	67.018 78.970	4.9		17		
•••••••		Announced by DOE (a)	77:0/V	/6.7/V	5.9 7.0	4-1	b3 i7		. underground
					5.953	7 97		f3	
		••			±.019			r <b>y</b>	
12/25/80	40707.5	Seei	50.001	77.973	4.5		55		underground
		E Kazakh			4.5		i7		ansei ĝi sana
12/27/80	40908.5	Semi (a,b3,f3); E. Kazakh(i7)	50.010	79.030	5.9		63		underground
		Announced by DOE (a)			5.9		i7		
					5.872			f3	
					<u>+</u> .023	<u>+</u> ,144	ļ		
03/29/81	40350.1	Semi (a,b3); E. Kazakh (i7)	49.980	79.020	5.6		63		underground
		Announced by DOE as 03/28/81	49.960	78.936	6.3		i7		anget åt offur
		which is probably same as							
		03/29/81 test due to time diff							
04/22/81	11711.4	Semi (a,b3,f3); E.Kazakh (i7)		78.900	6.0	4.7	b3		underground
		Announced by DOE as 04/21/81		7 <b>8.97</b> 7	7.0		i7		-
		which is probably same as 04/2	2/81 test		5.954			f3	
05/25/81	45957 3	due to time difference(a) W.Russia;Eur. USSR (i7);NW	10 305	27 /2/	±.015				,
~~~ <b>~~~</b> ##7₩1	1979712	USSR, ann. by DOE (a);PNE(i7)	68.205 48.192	53.656 53.689	5.5		66 :7		underground
05/27/31	35812.3	• • • • • • •	49.940	55.887 79.010	5.8 5.5		17 67		
		······································		/ I I V I V			44		underground

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DATE	TIME	LOCATION/COMMENTS		-32-					
		LUCHT LUN / UDINICHTS	LATITUDE	LONGITU	<u> 118</u>		<u>i s</u>	YIELD RANGE	Туре
		Announced by DOE as 05/26/81	49.963	78,992	<b>5.</b> 1		i7		
		which is probably same as 05 due to time difference (a)	/27/81 test	-			•••	•	
06/05/81	32200.0	Semi; E. Kazahk (17)	50.000	78.000	4.7		b2		
06/30/81	15712.7		49.736	78.082	5.0		56		undergroun
		E Kazakh	49.706	78.022	4.6		 i7		undergroun
07/05/81	35900.0		50.000	78.000	4.6		b2		undergroun
07/17/81	23715.7	Seei	49.790	78.170	5.2		b3		undergroun
0.0118.001	00740 0	E Kazakh	49.778	78.220	5.3		i7		under gr buit
08/14/81	22712.9		49.750	78.070	5.0		b3		undergroun
0.00.00		E Kazakh	49.779	78.078	5.3		i7		
09/02/91	40004.0		60.590	55.700	4.4		b3		undergroun
		Ural Mountains, PNE			4.6		i7		nungi di onu
09/13/81	21718.4	yyy	49.890	78.980	6.1	4.9	b3		underground
		Announced by DOE as 09/12/81	49.882	78.791	7.0		i7		under groun
		which is probably same as 09/	13/81 test		6.064	4.2	06	f3	
		due to time difference(a)			<u>+</u> .017			-	
9/25/81	45957.5	S¥ Russia	46.820	48.280	5.2		63		
		W Kazakh, PNE	46.778	48.242	5.5		i7		underground
9/26/81	50357.0	SW Russia	46.790	48.270	5.3		b3		
		W Kazakh, PNE	46.714	48.240	5.6		i7		underground
		[Series of two tests in the A	strakhan na	itural gas	s field	d.	• /		
<b>.</b>		probably to build storage cav	ities.]			-,			1
9/30/81	125500.0	Semi; E. Kazakh (17)	50.000	78.000	4.6		b2		undenessed
0/01/81	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		underground
0/19/81	35702.7	Semi (a,b3,f3); E. Kazakh(i7)	49.880	78.890	6.1	4.7			underground
		Announced by DOE as 10/17/81	49.981	78:877	7.1		i7		underground
		which is probably same as 10/	18/31 test		6.033	4.09		f3	
		due to time difference(a)			±.019				
0/22/81	135957.5	Sibería	63.790	97.540	5.1	•	b3		underground
		Central Siberia, PNE	63.755	97.570	4.6		i7		underground
1/20/81	45702.5		49.736	78.183	4.9		b6		underground
		E Kazakh	49.757	78.201	5.2		i7		annei di nava
1/29/81	33508.6	Semi (a,b6); E. Kazakh (i7)	49.860	78.857	5.6	4.0	66		underground
		Announced by DOE as 11/28/81	which is p	robably	6.7		i7		anger år ogna
		same as 11/29/81 test due to t	iae differ	ence (a)					
2/22/81	43102.6		49.840	78.210	5.1		b3		underground
		E Kazakh			4.9		i7		under ground
2/27/81	34314.2	Semi (a,b3,f3); E. Kazakh(i7)	49.900	78.860	5.2	4.4	b3		underground
		Announced by DOE as 12/26/81 w	which is pro	obably	7.3		i7		ander ground
		same as 12/27/81 test due to t	i <b>ae</b> differe	ence(a) (	6.242	4.108	5	- <del>f</del> 3	
					L.028				
/19/82	35611.0	Cani							
					5.4		b6		underground
/25/82			49.809		5.4		i8		
	vic∨V <b>u</b> ∎d	Semi (a,b3,f3); E. Kazakh(i8) Announced by DDE as 04/24/82			6.1				underground
		mmsulleed by sub as 04/74/97 -	49.999	78.976			i8		

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DATE	TIME	LOCATION/COMMENTS	LATITUDE	-33- Longitud	E MB	115	<u>s</u>	YIELD RANGE	TYPE
		which is probably same as 04,	195/05 due		1 000	• •			
		to time difference (a)	23/02 008		6.085 <u>+</u> .021			<del>1</del> 3	
96/11/82	105900.0		50.000	78.000		<u>T</u> .V	ъ2		
		E Kazakh			4.7		i8		underg
06/25/82	20304.2	Seai	49.795	78.158	4.9		b6		undore
	•	E Kazakh	49.783	78.197	4.7		i8		underg
07/04/82	11714.4		47,995	78.856		4.9			underg
		Announced by DDE as 07/03/82	50.047	78.799	7.0		i8		dilati d
		which is probably same as 07/	04/92 test		5.222	п.а	, f3		
		due to time difference (a). S	durface wav	es	<u>+</u> .026				
07/12/82	102900.0	masked by an earthquake (f3)	<b></b>						
VI112102	102700.0	Semi E Kazakh	50.000	78.000	7.0		b2		under g
07/30/82	210002.2				4.6		i8		-
V// J0/ 02	210002.2	Central Siberia, PNE	53.813	104.132		3.8	<b>b</b> 6		underg
07/31/82	70800.0	W. Kazakh; PNE (i8)	62.000	113.000	5.0		i 8		
		(Probably to build storage ca	47.000	48.000	4.0		b2		underg
		natural gas field.]	VICIES at I	HStrakhan					
08/23/82	24304.2		49.747	77 674					
		E Kazakh	50.000	77.971 78.000	4.7		66 10		undergi
08/28/82	90900.0	W. Kazakh; PNE (iB)	47.000	48.000	5.0 4.0		i8		
		[Probably to build storage can		to.vvv Setrokhon	4.0		b2		undergi
		natural gas field.]	TALLES EL P	13CI GENGH					
08/31/92	13100.5	Semi (a,b6); E. Kazakh (19)	49.920	78.812	5.4	3.5	b6		
		Announced by DOE as 08/30/82		78.834	6.3	4.5	i8		under gi
		which is probably same as 08/3		o time di	fferer	ice (	a)		
08/31/82	84000.0	W. Kazakh; PNE (i8)	47.000	48.000	4.6		b2.		undergr
		[Astrakhan natural gas field]							ander gr
09/04/82			50.000	78.000	4.1		b2,i8		undergr
09/04/82	175958.4		69.206	81.647	5.2	3.5	b6		under gr
AG / 15 / 65		• · · · · · · · · · · · · · · · · · · ·	69.175	81.691	5.2		i8		
09/15/82		Seai	50.000	78.000	5.2		b2		undergr
09/21/82		E Kazakh	_ ·		5.1		i8		
V7/21/92		· · · · · · · · · · · · · · · · · · ·	49.854	78.216	5.2		<b>b6</b>		undergr
09/25/82			47.909	78.229	5.5		i 8		
V// 23/ 62		· · · · · · ·	64.313	91.834	5.1		b6		undergr
10/01/82		•• •• ••	64.311	91.859	4.7		i9		-
			47.000	48.000	4.0		52		undergr
		[Probably to build storage cav. natural gas field.]	itles at A	strakhan					
10/10/82	45956.7	<b>A</b> • • •	L1 557						
		• · · • · · ·			5.3		b6		undergr
10/11/82	71458.2		73 <b>.39</b> 2		5.3		i8		
		• • • • • • • • • • • • • • • • • • • •	73.368		5.6 : 6.3		b5 ; 0		undergri
10/16/82			46.730		0.3 5.2 3		i8 54		
	1	W Kazakh, PNE 🛛 🖌	47.000		5.4		66 18		undergri
10/16/82	60457.2		16.748		J.9 5.2 3				
					5.3 5.3		05 i8		undergro

				-34-				
DATE	TIME	LOCATION/COMMENTS	LATITUDE	LONGITUD	E <u>MB</u>	<u>MS S</u>	YIELD RANGE	Түре
10/16/82	51457.3	N. Caspian Sea	46.743	48.213	5.4	3.1.56		
		W Kazakh, PNE	47.000	48,000	5:6	i B		underground
		Series of four tests at five	ainute int	tervals; [g	probab	lv = 2	5.9-6.2 Richter	underground
		to build storage cavities at	: Astrakhan	natural oa	as fip	ldl. Rer	orted	under ground
		lincorrectly] as a project t	o build a n	new waterwa	ay at '	the		
10/27/92	72800.0	Ural River (e2). W. Kazakh; PNE (i8)						
		W Kazakh, PNE	47.000 47.000	48.000	4.0	b2		underground
		[Probably to build storage c		48.000	4.0	i <b>8</b>		
		natural gas field.]	AAICIE2 9(	HSCFAKNAN				
11/21/92	61000.0	Ural;S.Ural, PNE (i8)	55.000	50.000	4.4	b2		
11/29/82	191900.0	Ural; S. Ural, PNE (i8)	55.000	50,000	4.1	62 62		underground
11/30/82	94900.0	W. Kazakh; PNE (18)	47.000	48,000	4.5	62 62		underground
		[Probably to build storage c	avities at	Astrakhan	•••			underground
		natural gas field.]				•		
12/05/82	33712.5	Semi (a,b6); E. Kazakh (i8)	49.928	78.869	6.1	4.4 b5		underground
		Announced by DDE as 12/04/82	50.000	78.000	7.1	i8		uner ground
12/25/82	47705 6	which is probably same as 12.	/05/82 due					
<u>کل روند رید</u>	72000.0	Semi (a,b6); E. Kazakh (i8) Announced by DOE (a)		78.095	4.8	3.4 66		underground
12/25/82	33514.1	Seei	50.000	78.000	4.9	i8		-
		E Kazakh	50.066 <b>50.000</b>	79.043 78.000	5.7	b6		underground
			JV: VV	/0.000	5.7	i8		
02/01/83	135500.0		47.000	48.000	4.3	b2		underground
02/24/83 02/25/83	141100.0	NCaspian Sea; W.Kazakh, PNE(19)		48.000	4.3	b2		underground
V2/20/00	03300.0	W. Kazakh; PNE (19)	47.000	48.000	4.2	b2		underground
		[Probably to build storage ca natural gas field.]	wities at A	istrakhan				-
03/0 <b>2/8</b> 3	84530.0	W. Kazakh (b9,19)	48.000	10 000	7 0			• .
		PNE	47.000		3.8	69 40		underground
		[Probably to build storage ca	vities at A	strakhan	4.1	i9		
		natural gas field.]		SCI ANIIAII				
03/30/ <b>9</b> 3	41700.0	Seni	49.000	79.000	5.0	b2		under er d
		E. Kazakh	50.000		5.0	i9		underground
04/12/93	34105.2		49.815		4.9	b2		underground
)5/30/83	77714 =	E. Kazakh	49.815		5.0	i 9		anaei di nann
11111120	22244.2	Semi (a,b6); E. Kazakh (i9)	49.740		5.4	b5		underground
		Announced by DOE as 05/30/83	49.740	78.210		· 19		2
6/12/83	23643.6	which is probably same as 05/3	30/83 due t					
		Semi (a,b6); E. Kazakh (i9) Announced by DOE as 06/11/83	47.7V6		5.1 4	-6 66		underground
		which is probably same as 06/1	77:077  7/97 dom 4/	78.964	[	i9		
6/24/83	25611.1	Sesi	49.810				· •	
		E. Kazakh	50.000		4.7 5.0	66 19		underground
7/10/83	35957.1		51.308		5.3	19 b6		
		S. Ural Mountains, PNE	51.327	53.286		10 19		underground
	40457.1	Ural	51.340		5.3	b6		HARAMAN
		S. Ural Mountains, PNE		53.290		i9		underground
	40957.1	final			5.2	56		

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DATE	TINE	LOCATION/COMMENTS	LATITUDE	-35- Longitudi	MB	MS	<u>s</u> _	YIELD RANGE	TYPE
		S. Ural Mountains, PNE	51.357	53.301			i9		
		Series of three tests at fiv	e minute in	tervals:			e2	5.9-6.2 Richter	underground
		Iprobably to build storage c	avities at	Orenburg m	atura	1			under gi cana
		gas field]. Reported Lincor	rectly] to	be used to	buil	da			
17:00:07		new waterway at the Ural Riv							
07/28/83	34100.0	Semi E. Kazakh	49.000	79.000	5.0		b2		underground
08/18/83	140959 4	NZ (a,b6,19)	50.000	79.000	5.0		i9		-
	100/2010	Announced by DOE (a)	73.383	54.913	5.9	4.2	b6		underground
09/11/83	63310.4		73.373 49.978	54.839			i9		
		E. Kazakh	77.801	78.183 78.244	4.8		b6		underground
09/24/83	45957.1		46.816	48.291	5.1		i9		
		N of Caspian Sea, PNE	46.773	48.300	5.4		b6 i9	50-75 kt (e7)	underground
09/24/83	50457.2		46.817	48.279	5.0		17 55	50-75 kt (e7)	
		N of Caspian Sea, PNE	46.763	48.291	5.2		19	30-73 KL (8/)	underground
09/24/83	50957.5		46.860	48.272	4.9		b6	50-75 kt (e7)	undennessed
		N of Caspian Sea, PNE	46.872	48.214	5.2		i9	00 / 0 KL (E//	underground
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		ander åt ogna
9/24/83	51957.1	Ural	46.796	48.297	5.2		bó	50-75 kt (e7)	underground
		N of Caspian Sea, PNE	46.722	48.267	5.5		i9		ander ground
9/24/83	52457.4		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 a	inute inter	vals;			e2	5.9-6.2 Richter	underground
		Iprobably to build storage ca	vities at A	lstrakhan r	atura	1			
		gas field]. Reported Lincorr	ectlyj to t	e used to	build	a			
9/25/83	130957.7	new waterway at the Ural Rive NZ (a, b6, i9)		E1 105					
		Announced by (a)	73.348 73.341		5.8		b6	•	underground
0/06/83	14706.5		49.932	54.501 78.843	6. <b>4</b>		i9		
		Announced by DOE as 10/05/83		78.833	6.0		b6 19		underground
		which is probably same as 10/	05/83 due t	n time dif	feren	ce (s	17		
0/26/83	15504.B	Semi (a,b6); E. Kazakh (19)	49.921		6.1		b6		un din an ann d
		Announced by DOE as 10/25/83	49.833	78.856			i9		underground
		which is probably same as 10/2	26/83 due t		feren				
1/20/83	32704.4	Semi (a,b6); E. Kazakh (19)	50.066		5.5		b5		underground
		Announced by DOE as 11/19/83	50.000	78.000	6.4		i 9		annen år namn
		which is probably same as 11/2	20/83 due t	o ti <mark>ne</mark> dif	feren	ce (a	)		
1/29/83 2/26/83		Semi (a,b6); E. Kazakh (i9)	49.764	78.169			56		underground
		Announced by DOE as 11/28/83	50.000	78.000	5.5		i9		
	1004/ 0	which is probably same as 11/2	29/83 due t			:e (a	)		
11 201 00	42906.9	Semi (a,b6); E. Kazakh (19)	49.838		5.5		bó		underground
		Announced by DOE as 12/25/83	50.000	78.000	5.7		i 9		-
		which is probably same as 12/2	6/83 due ti	o time dif	ferenc	e (a	)		
2/19/84	35700.0	Semi (a,b2); E. Kazakh(i10)			7.0 4	.4	h2		underseened
	35703.4	251 stations	49.908		5.8 4				underground
		E. Kazakh	49.888	78.788	.0		i 10		
		Announced by DOE as 02/18/84 w					-		

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DATE	TIME	LOCATION/COMMENTS		-36- Longitud	E <u>M</u> B	<u>_ MS</u>	<u>S</u>	YIELD RANGE	TYPE
/07/04	07044	same as 02/19/84 due to tim	me difference	e (a)				•	
/07/94		3 Semi (a,b6)	50.022	78.978	5.6		bś		underground
	20798.4	4 249 stations	50.061	79.003	5.7		k		
		E. Kazakh	50.022	78,978	5.5		i10		
		Announced by DOE as 03/06/6	34 which is p	robably					
/29/84	51900.0	same as 02/19/84 due to tim ) Semi (a,b2); announced by I	Ne difference	e (a)			_		
		263 stations	49.937	70 017			62		underground
		E. Kazakh	47.737 49.934	79.017	5.9	4.3			
4/15/94	31700.0	) Seai (a,b2)	77+754	79.013	5 0		i10		
		244 stations	49.740	78.163	5.7	4.1			underground
		E. Kazakh	49.766	78.135	5.9		k = 10		
		Announced by DOE as 04/14/8	14 which is n	rohahlu	<b>J</b> a 7		i10		
		same as 04/15/84 due to tim	e difference	(a)					
1/25/94		Semi (a,b6)	49,934	78.915	6.0	5.0	<b>b</b> 6		
	10903.5	291 stations	49.953	79.940		4.7			underground
		E. Kazakh			7.0		i10		
		Announced by DDE as 04/24/8	4 which is p	robably					
		same as 04/25/84 due to tim	e difference	(a) .					
/25/84		Semi (a,b2)			5.5		b2		underground
	31312.4		49.980	79.060	6.0		k	-	ander ground
		E. Kazakh	49.949	79.060	5.6		i10		
		Announced by DOE as 05/25/8	4 which is pr	obabl y					
/23/84	25700.0	same as 05/26/84 due to time	e difference	(a)					
120104	23/00.0					4.4	59		underground
/14/84	10910.5	E. Kazakhstan Sami	50.000	79.000			i10		
•	10710.5		47.981			4.6	66		underground
		E. Kazakhstan	49.891		5.2	4.6	k		-
		Announced by DOE as 07/13/84	49.902	78.988	7.2		i10		
		same as 07/14/84 due to time	, which is pr	00201 y					
/21/84	25957.1	W. Kazakh(b6);Eur. USSR(k)	51.356		c .	•			
		141 stations(k); PNE	51.366	53.249 53.253	5.4		66, k		underground
/21/84	30500.0	W. Kazakh	01.000	30.233			i10		
-	30457.0	Eur. USSR, 176 stations	51.374	53.257	5.3	4.0	b2 k		underground
		PNE	51.384	53.271			i 10		•
/21/84	30957.0		51,353		5.3		b6		
		166 stations (k);PNE	51.366	53.275			i10		underground
		PNEs, series of three tests	at five minut	te interva	ls: a	11	•••		
		announced by DUE as 07/20/84	which is or	obably	-, -	-			
		same as 07/21/84 due to time	difference	(a)					
		[Probably to build storage c	avities at Or	engurg nat	tural				
11/84	100000 0	gas tield.]						•	
11104	195057 0	Ural;NW USSR (a);Ural MTs(i1)			5.1		b2		underground
	10373/.8	174 stations	65.025		i.3		k		3. 20110
25/84	195950 4	Announced by DOE(a); PNE(i10)	65.079		4,4		i10		
-0/97	100/00.0	W. Siberia(b6,110);NC USSR(a)			.4		06,k		underground
28/84	25955.5	209 stations (k); PNE Ural Nts(b6 k):23 stations(k)	61.889		.2		i10		
	# J	<pre>Ural Mts(b6,k);23 stations(k) PNE</pre>			.4		66,k		underground
		* /1m	61.000	56.000 4	.4	i	i 10		-

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DATE	TINE	LOCATION/COMMENTS	LATITUDE	-37- Longitud	<u>E mb</u>	<u>M</u>	<u>S S YIELD RANGE</u>	TYPE
08/28/84	30459.0	Ural	51.000	58.000			50	
		Ural Mts, 24 stations	50.791	57.544			b9 k	underground
		PNE	61.000	56.000			к i10	
	PNEs; se	ries of two tests at five m	inute interval	s	7.7		110	
09/09/84	25906.3	Semi	49.873	78.208	5.0		b6	upporcerupd
	25906.4	E. Kazakh, 79 stations	49.869	78.176			k	uncer or ound.
		E. Kazakh			5.1		i10	
09/15/84	61500.0				. 5. 2		b2 ·	- underground
00117108		E. Kazałh	50.000	79.000	5.2		i10	,
09/17/84	20374/.4	C. Siberia (b5,110)	55.835	87.408	4.9		b6	underground
	20373/.3	C USSR, 124 stations	55.870	87.446	4.9		k	•
10/15/84	45700.0	PNE			4.5		i10	
19/13/84			50.000	80.000			69	under or ound
	4019211	E. Kazakh, 22 stations E. Kazakh	47.800	78.141	4.5		k	
10/25/94	53000.0		49.787	78.004			i10	
14/20/01	62957.5	-	77 774				b2	underground
	42/4.10	NZ SCALLUNS	73.370 73.365	54.955	5.9	4.7		
		Announced by DOE (a)	/3.583	54.979			i10	
10/27/84	15010.5		49.950	70 047	6 7		L7 : 10	
		376 stations	49.949	78.842 78.834	6.2			under ground
		Announced by DDE as 10/25/		robahly	9.4	4.4	K	
		same as 10/27/84 due to ti	me difference	(a): N7 (	2) [s	icl		
10/27/84	55958.5	W. Kazakh	47.044	47.919	4.9	161	b5	
	55957.1	SW USSR, 107 stations	46.857	48.098	5.0		k	underground
10/27/84	60500.0	W. Kazakh			•••		b2	- under en eue é
	60456.1	SW USSR, 100 stations	46.842	48.083	5.0		 k	underground
			46.843	48.023			i10	
		Series of two PNEs (110) a	t five minute	intervals.	•			
		[Probably to build storage	cavities at A	Astrakhan (	naturi	al		
** *** ***		gas field]						
11/23/84	35500.0		50.000	79.000	4.5		b2,i10	underground
10/00/04	33304.8	E. Kazakh, 30 stations	48.897	78.132	4.7		k	
12/02/84	71001 7	Semi (a,bó)	49,989	79.091	5.8			underground
	J17V <b>8.</b> J	283 stations E. Kazakh	49,993	79.072		4.6	k	-
			50.000	79.000	4.5		i10	
		Announced by DOE as 12/01/4 same as 12/02/84 due to tim	84 Which is pr	obably				
12/16/84	35500.0	Semi (a,b2)	e ditterence	(a)				
		312 stations	49.957	76 0/0		4.5		under ground
		E. Kazakh	50.000	78.962 79.000	5.1	4.5		
		Announced by DDE as 12/15/8	auluuv Ad which is on	77.000			i10	
		same as 12/02/84 due to tim	e difference	(2)				
12/23/84	35010.5	Semi (a,06)			5.0		bá	
		306 stations	49.861		6.0	4,1		underground
		E. Kazakhstan	50.000		7.3		i10	
		Announced by DOE as 12/27/8	14 which is pr	obably			• • ¥	
		same as 12/28/84 due to tis	e difference	(a)				
02/10/ <b>85</b>	32707.5	Semi	49.869	78.818	5.9	4.4	6.510 (7.2 MB in 510)	underground
								anael ĝi UUIU

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DATE	TIME	LOCATION/COMMENTS		-38- Longitude	MB	<u>NS</u>	S YIELD RANGE	<u>TYPE</u>
	32707 <b>.6</b>	Semi	49.877	78.816			c	
04/25/85	5708.5	Semi	49.907	78.932	5.9	4.1		undere
06/15/85	5700.0	Seai	50.000	79.000		4.5	b2	underg underg
	5700.7	Semi	49.378	78.989	7.2	4.5		anası â
		Semi; announced by DOE as	06/14/85 test,	205700.0			E	undorn
06/30/85	23900.0	Seai	50.000	79.000		4.4	- b2	underg
	23902.7	Semi	49.854	78.693		4.4	b10	underg
07/18/85	211457.5	W. Russia	65.965	40.754	5.0		b6	undergi
		Eur.USSR [PNE?]			5.5	3.6	b10	anası öl
07/20/85	5300.0	Semi	50.000	79.000	5.7		b2	
	5314.5	Semi	47.951	78.847	6.9		b10	undergr
07/25/85	31100.0	Seai	50.000	79.000	5.3		b2	
	31106.6	Semi	49.862	78.099	5.3		b10	undergi

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) = peaceful nuclear explosion PNE Sources: DoE, Summary of Foreign Nuclear Detonations, Through a. December 31, 1983 (published 9 January 1984), and Through December 31, 1984 (published May 22, 1985). a1. Date of announcement - not necessarily shot date. a2. AEC announced 10/24/58 that these tests were high yield, probable MT range. a3. Denotes that explosion was in Soviet territory but the test site was not identified. Swedish National Defence Research Institute (Forsvarets b. Forskningsanstalt or FOA), Nuclear Explosions 1945 - August 17, 1985. b1. DoE. b2. Hagfors Observatory. b3. International Seismological Centre. b4. Seismological bulletins. b5. Nuclear Explosions 1945-1972 Basic Data, I. Zander and R. Araskog, FOA4 report A4505-A1. b7. Seismological bulletins. b6. U.S. Department of the Interior/Geological Survey. b8. Monitoring Underground Nuclear Explosions, O. Dahlman and H. Israelson, Elsevier 1977. Seismological bulletins. b9. b10. Nils-Olov Bergkvist and Ingvar Nedgard, Nuclear Explosions in 1985 (Preliminary List), National Defense Research Institute, 1 January 1986. b11. Peder Johansson, <u>Yields Estimates of Soviet Nuclear</u> Explosions 1978-9, National Defence Research Institute, FOA Report C 20553-T1, September 1984. DoE Press Release. с. c1. AEC, announcement on 31 August 1953, dated 1 September 1953. David Holloway, "Soviet Thermonuclear Development," d. International Security, Volume 4, Number 3, Winter 1979/80, pp. 192-197, quoting in its entirety National Archives, Modern Military Branch. Record Group 318, Records of the U.S. Joint Chief of Staff, 1954-56, CCS 334 JIC (12-23-55) Section 3. e . Miscelaneous reports. e1. Thomas O'Toole, "Russia Uses Nuclear Blast to Free Oil," International Herald Tribune, 23 June 1980, p. c5.

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- e5. Herbert F. York, The Advisors: Oppenheimer, Teller and the Superbomb (S.F., Calif.: W. H. Freeman and Company, 1976).
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### Table 2

Summary of Known Soviet Nuclear Explosions, 1949-1985

		PRESUMED PU	RPOSE				_
Year	Number				LOCATIO		Cumulative
1949	1	1	<u>acerui</u> 0	<u>Semi</u> O	<u>NZ</u>	Other 1	Total
1950	õ	. Ō	ŏ	0		1	1
1951	2	2	ŏ	2	0	0	0
1952	ō	ō	ŏ	ő	0	0	3
1953	4	4 4	ŏ	4	0	0	3
1954	7	7	õ	4		0	7
1955	5	5	ŏ	2	0	7	14
1956	ΞŃ	9\	ŏ	Ŭ O	· 0 ·	3	19
1957		+182 15 +182	ŏ	2	0	9	28
1958	29/	29/	ŏ	0	4	9	43
1959	0	0	ŏ		26	3	902
1960	ŏ	ŏ	0	0	0	0	90
1961	50	50	0	0	0	0	90
1962	44	44	0	6	24	20	140
1963	0	0\	ŏ	10	32	2	184
1964	6.1	6 1	0	0	0	0	184
1965	. 9	31	0	4	2	0	190
1966	15 ;	13		. 9	0	0	199
1967	16 :	15 ;	2	12	1	2	214
1968	13 1	11 1	1 2	14	1	2	230
1969	15	11 /	4	10	1	2	243 .
1970		+163 9 +163	•	10	1	4	258
1971	20 8	12 :	4	8	1	4	271
1972	22 ;	13	8	11	1	8	291
1973	14	9	9	12	1	9	313
1974	20 :	17	. 5	6	З	5	327
1975	15	13	3	13	4	З	347
1976	17	15 :	4	10	З	2	362
1977	18/	13/	2 2 5	13	2	2	379
1978	27	20		11	2	5	4133
1979	29	20	7	18	2	7	440
1980	21		8	19	2	8	469
1981	21 214	18 16	3	17	1	З	490
1982	31		5	15	1	5	511
1983	27 <del>4</del>	15	16	14	1	16	542
1983	27	14	13	12	2	13	569
1985	7	17	10	16	1	10	596 ·
		6	1	6	0	1	603
Totals	603	493 1	10	286	119	198	603 <del>*</del>

#### Notes to Table 2

- 1. Includes tests whose location are unknown.
- The Stockholm International Peace Research Institute (SIPRI) 2. 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 The French Ministry of Defense estimates that 182 on. 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; <u>ibid</u>. 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; <u>ibid</u>. 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.

Ta	b	1	e	- 3

Known Nuclear Explosions at Semipalatinsk By Month

Year	Jan	Feb	Mar	Apr	Ma y	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1949 1950 1951 1952 1953								4	1	1			0 2 0 4 ? 2 0 2 0
1954 1955 1956				1 - E							2		?
1957 1958 1959									2				2
1960 1961 1962		1						2	5	1 4	3		0 0 6 10
1963 1964 1965 1966	1	4	1		1 1	1	1 1		1	1	- 1 1	1	0 4 9 12
1967 1968 1969	1 1	1 1	1	1 1 1	1 1	1 1 2	1 1 1	2 1 1	1 2 2 1	1 2	1 1	2 1 1	12 14 10
1970 1970 1971 1972	1	1	1 1 1 2	1	_2 1	1 3 1	2	_	1	1 2	1 1 1	2 1 2 3	10 8 11
1973 1974 1975	2	1 1	2	1	2		1 2 1	2	1 1	1 1	1	1	12 6 13 10
1976 1977 1978	1	I	1 2	1 2 1 1	1 1 1	1 2 1 1	2	1 2 1 2	1	2 1 2	1 1	2 2 1	13 11
1979 1980 1981		2	2	' 3 1	- 3 1 1	1 1 2 2	22222	2	2 3 5 2 3 1	2 2 2 1	3	4221233231	18 19 17
1982 1983 1984		1 1	1	1 1 2	1 1	2 2 1	1	1 2	2 3 1	1 2 2	2 2 1	2 3 1	15 14 12 16
1985  Total	7	1		1 		2	1 2 		2			3	6
TOPAT	1	11	17 2	20	19 2	28	30	23	37	30 2	24	40	286

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Ta	b]	le	4
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Known Nuclear Explosions at Novaya Zemlya By Month

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

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# Table 5

Summary of Explosions at Semipalatinsk and Novaya Zemlya

		1949-1985								1964-1985				
	-	umbe		Pe	rcent	ages	Nur	nbe			rcent	ages		
<u>Month</u>	Semi	ΝZ	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	Õ	10	3.8	0.0	3.4		
March	17	5	22	5.9	4.2	5.4	17	ō	17	6.5	0.0	5.8		
April	20	0	20	7.0	0.0	4.9	20	Ō	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	Ō	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		

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## Table 6

Known Soviet Nuclear Tests By Year With Estimated Yield

Year	Number Cun	<u>mulative Total</u>	Yield (kt)=	<u>Cumulative Yield</u> (kt)
1949	1	1	15	<u>15</u>
1950	Ō	1	0	15
1951	2	З	75	90
1952	0	З	ō	90
1953	4	7	360	450
1954	7	14	260	710
1955	5	19	1865	2575
1956	'9N	28	6135	85003
1957	15 ¦+18≈	43	10500	19000
1958	29/	902	31500	50500
1959	0	90	0	50500
1960	0	90	õ	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	433200
1967	16	230	2000 (	457200-455700
1968	13	243	1000	458200-458700
1969	15	258	1500	459700-460200
1970	13 :+162	271		2600- 462700-466700
1971	20	291	3000-5500 ;	3400 <sup>4</sup> 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/	4132	1000 /	489800-510600*
1978	27	440	1500	491300-512100
1979	29	469	1500	492800-513600
1980	21	490	1000	493800-514600
1981	212	511	1000	494800-515600
1982	31	542	1500	496300-517100
1983	272	569	1500	497800-518600
1984	27	596	1500	499300-520100
1985	7	603≈	400	499700-520500
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#### Notes to Table 6

 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 20	=	less than 20 kt 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	z	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, <u>Yields Estimates of Soviet Nuclear</u> 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 Défence, 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 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, <u>Organization et Functionnement de</u> <u>Centre d'Experimentation Nucleaire, Dossier No. 1</u>, "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.

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