29 JUL 1963

DCI Briefing to Joint Chiefs
of Staff
30 July 1963
1000 Hours

I a. What is the present position of the USSR in relation to that of the US in nuclear technology and weaponry in the field of strategic nuclear weapons, anti-missile missile defense and tactical nuclear weapons.

A. Strategic Nuclear Weapons

1. Comparison on a yield-to-weight basis

It is estimated that at the present time the US and USSR without further tests can achieve the yield-to-weight ratios in thermonuclear weapons shown in Chart I.

As you can see from the chart, the USSR appears superior to the US in yield-to-weight ratios in very high yield weapons. It is approximately equal to the US in medium and high yield weapons from 2 to 10 MT, though the US has an edge toward the lower end of this range. Below 2 MT the US has clear superiority in yield-to-weight ratios, and, in fact, we have detected no

Soviet thermonuclear device less than 600 pounds and less than 150 KT.

These same data are graphically depicted in Chart II in terms of actual US and USSR shots.

2. Very High Yield Weapons

The Soviets have demonstrated a device of 60 MT which could be scaled up to about 100 MT warhead at about 25,000 pounds. According to intelligence estimates, the Soviets probably have no missile at this time which will deliver their 100 MT warhead to ICBM ranges. Therefore, at this time, the Soviet's scaled-up 100 MT weapon is probably suitable only for delivery as an air-dropped bomb. However, even under a test ban the Soviets could develop a missile capable of delivering the 100 MT warhead to intercontential distances and in fact are believed to be currently developing larger rocket boosters, which will probably enable them to carry the 50-60 MT weapon to these distances.

The Soviets tested, in 1962, devices of a new design at 13 and 24 MT which can be weaponized both as bombs and warheads. We estimate that with the development of new re-entry vehicles, they can be used as warheads for the SS-6

ICBM with ranges of 6000 and 4500 n. miles for the 13 MT and 24 MT warheads respectively. We believe the Soviets have only a few of the SS-6 ICBMs deployed and in operational status.

Current estimates are that the SS-7 is the Soviet ICBM now being deployed in considerable numbers. The SS-7 has a 3 MT warhead at present, and is capable of conversion to 6 MT without further testing. While this is the largest yield capability attributed to the SS-7 for full 6,000 mile firings, we are presently examining the possibility that the USSR could attain even higher yields with this missile in reduced range firings which would still threaten US targets from existing Soviet bases.

The US has stockpiled bombs of 9 MT and 23 MT and is deploying the Titan II with a 9 MT warhead, scheduled to go to 10 MT in the future. Missile delivery capability for larger yield warheads would depend on development of a new vehicle or conversion to military use of one of the large space boosters now under development, such as Titan III or one of the Saturns.

The United States presently has the capability of designing for stockpiling, with no

additional tests, a 50 to 60 MT device at 30,000 pounds. Full weaponization would allow this device to be a laydown bomb with an additional 10,000 pounds of weight.

3. Medium to High Yield Weapons

In weapons with yields between 1.5 and 9 MT, the US and the USSR appear to have achieved comparable technology, with US showing some superiority toward the lower portion of this range. Currently deployed and soon to be deployed strategic systems involving aircraft and missile delivery for both the US and USSR have warheads in this range.

4. Relative Capabilities Against Hardened Sites

Chart III gives some concept of the relative effectiveness of different weapon yields against a hardened missile site (300 psi). Increased effectiveness against hardened missile sites is strongly dependent on either developing larger missile systems with very high yield warheads, or increasing the reliability and accuracy of present missile systems. The chart indicates that greater gains accrue from improving accuracy than from increasing warhead yields. At present

the US has a distinct advantage in the survivability of its strategic missile force, in that the majority of Soviet currently deployed missile sites are not hardened.

We believe that Soviet knowledge of the effects of multimegaton warheads on hardened missile sites or upon associated electrical equipment is no better than that of the US. Thus they will continue to be faced with the same difficult yield extrapolation problems faced by US planners and both sides will be compelled to overdesign hardened missile sites to compensate for uncertainties in effects knowledge.

B. Anti-Ballistic Missiles

In designing an ABM system, the major parameters are reaction speed, missile performance, traffic handling capacity, decoy discrimination, evasion of blackout effects and warhead technology.

Analysis of nuclear tests detected and analyzed to date suggest the initial Soviet ABM system, the first segment of which may now be being constructed around Leningrad, may be considerably different from that envisaged by the US. The lack of detected tests involving the enhanced radiation principle and the

lack of thermonuclear devices with weights below 600 pounds suggest the USSR may be using a different kill mechanism or even a considerably larger anti-missile missile than the US.

Both sides have only incomplete information on kill and blackout effects in connection with ABM systems. The Soviets to date have conducted six tests at over 100,000 feet, as against ten US tests. (Chart IV) The US experience indicates that every altitude and every yield introduce significant differences in the effects produced, and it seems clear that neither side has all the data it would like. Thus, although the Soviet tests have been sophisticated enough to provide much developmental data, neither side can be confident of the effectiveness of any ABM system chosen on the basis of present data. In these circumstances, any ABM system widely deployed by either side probably will be overdesigned to compensate for uncertainties, and hence will be more costly than one which could have been designed with continued nuclear testing in the atmosphere and in space.

C. Tactical Weapons

The United States at present has in stockpile or planned for stockpile a number of nuclear

warheads for tactical purposes ranging in yield options from 20 tons to 1.5 MT. These weapons are planned for employment on the battlefield, in anti-submarine and anti-ship warfare, and against aircraft; they consist of warheads for artillery and mortar-fired projectiles, battlefield missiles, demolition munitions, bombs, depth charges, air-to-air missiles and surface-to-air missiles.

Although Khrushchev as recently as 1959 denied that he was going to give tactical weapons to his military, we believe that the USSR at present also has in stockpile a number of nuclear warheads for tactical use as bombs, artillery and mortar-fired projectiles, battlefield guided and unguided ballistic missiles, surface-to-surface aerodynamic missiles, surface-to-air missiles and torpedoes. The yield capabilities associated with these weapons extends from about 1 kiloton to more than a megaton. Soviet official statements suggest a capability down to tens of tons but there is no confirmatory evidence of this. It should be pointed out that data from small Soviet shots is less firm than that from the large yields.

The USSR is not known to possess, as yet, nuclear land mines; depth charges; air-to-air missiles; or highly mobile short range, very light weight, free

rockets with a nuclear capability.

In the light of our estimates about the USSR, the US is presently superior in design, diversity and numbers of nuclear weapons in most tactical systems. It should be noted that design criteria, such as the probable Soviet objective of minimizing the use of fissionable material per weapon, have generally resulted in Soviet tactical systems being larger, heavier and less mobile than those of the US.

There is no information indicating that the USSR has successfully designed and detonated low-yield thermonuclear devices with enhanced radiation and reduced fission or devices with the secondary heavily loaded with oralloy such as the US TUBA device. In the case of reduced fission devices the chance of collection and analysis of test debris is markedly reduced for low yield tests and thus the absence of debris analysis indicating the detonation of such devices in the 1961-62 test series cannot be considered conclusive negative evidence.

With unlimited underground testing over a period of years we believe the Soviets would be able to overcome the present US lead in light-weight thermonuclear warheads and in small diameter weapons for tactical employment. Both countries could continue

development of enhanced effects weapons, such as clean weapons for tactical use, minimum fission weapons for ABM application and, ultimately, pure fusion weapons. Eventually the two countries should approach the same physics limits in all these developments. In the case of thermonuclear weapons presumably the Soviets would be able to extrapolate up from underground tests at perhaps 200 kilotons to develop megaton warheads as we have done for MINUTEMAN.

I b. What level of confidence do you accord to these estimates.

In constructing our estimates of Soviet weapon capabilities the basic procedure is to combine geophysical yield data with data from the radiochemical analysis of debris, resulting in a calculation of the weight of the device which could have achieved the measured bang. These weights and the related yield-to-weight ratios are highly dependent on the quality of both recorded geophysical yield data and the samples of collected debris. Generally, debris data in its final form is more accurate than yield data.

In the case of yields above 100 KT, the estimated error in our determinations is in the range

of 20-30%. For yields below 100 KT this estimated error ranges from 40-100% (the latter for one measurement on small yields). With regard to assigning specific yields to a given warhead, the procedure involves a determination of the weight carrying capacity of a given missile by the missile community, then an assignment of a warhead based on its weight, on comparable periods of development, on collateral information, and, in a few cases, on apparent systems tests. It is thus quite possible, depending on specific Soviet decisions of which we have no knowledge, that the warhead yields assigned to the missiles are not in fact the ones which the Soviets are stockpiling. Our estimates tend to give the Soviets the maximum capability consistent with the data at hand.

II. To what extent will we be able to determine whether the USSR is testing clandestinely? What contribution can intelligence make toward supplementing the proposed detection system? If Soviet cheating is detected, how much information will the US be able to disclose in order to convince the world of their guilt without declassifying the US detection system or US intelligence that should be safeguarded?

A. Detection Capabilities

You are familiar with the detection capabilities of the principal intelligence asset in the nuclear test detection field, the AFTAC-operated Atomic Energy Detection System. This system as it now stands has a good chance of detecting atmospheric tests of 5 KT or greater detonated over the USSR and China. With the introduction of a satellite based detection system later this year, reasonable detection capabilities will be extended out to 100,000,000 km, although some problems remain in the 10 to 25 km altitude region.

Intelligence resources are helpful in complementing the current US AEDS and they would be useful in supplementing any future system. However, history has proven that many of our intelligence resources are highly perishable. Once it becomes known that we are using particular intelligence assets in establishing Soviet intentions or the existence of actual events, many sources have disappeared.

Clandestine efforts have been of little value in the past in detecting Soviet tests. A real value of the existence of agents, however, is that we believe the Soviets do not know what we obtain through

agents and hence cannot appraise the real risk they are taking.

1. High Yield Tests

High yield tests could not be contained underground and could not escape detection except in deep space. It is likely that a series of such tests would be needed to develop really important new weapon principles. Such tests, if conducted in deep space, would be very complex and subject to a high probability of malfunction in either the vehicle or instrumentation apparatus.

Our intelligence capability to detect the launching of Soviet space probes to lunar orbit distances and beyond is an important adjunct to the AEDS. Any Soviet launchings of space probes from their present Tyura Tam Range using present instrumentation would almost certainly be detected, especially if the Soviets continue utilizing earth parking orbits as a preliminary step to deep space penetration. Even a direct ascent from Tyura Tam would probably be identified. Were the Soviets to launch a space vehicle from a site other than Tyura Tam,

our capability to detect the vehicle would be somewhat reduced. A single direct ascent from such a site might escape detection but multiple or repetitive launches would rapidly increase the probability of detection.

2. Underwater Tests

Other than for effects information, it does not appear likely that the Soviets would have reason to conduct low yield underwater tests. Their present underwater testing experience probably gives them adequate effects information except at great depths. If the Soviets were to attempt cheating by conducting underwater tests, we believe that any such tests conducted in international deep water would probably be detected but that low yield underwater tests in remote sheltered areas would be difficult for us, if not impossible, to detect. Seismic shocks from underwater nuclear blasts around 1-2 KT can only be detected up to about a thousand miles away. We have some hydrophone capability but this is also of rather limited range. In addition, there is as yet no system deployed which will determine technically that the shocks came

from a nuclear blast rather than an earthquake.

The movement of surface ships necessary for the conduct of such tests would probably be revealed, for we carefully monitor all Soviet shipping. However, this is not true in the case of submarines and their movements are not always known. As the conduct of tests by submarines is both difficult and expensive, this seems an unlikely alternative. In summary, however, there appears little reason for conducting clandestine underwater tests when such tests can more easily be conducted underground, and without treaty violation.

3. Atmospheric Tests

Effects tests in the atmosphere or at high altitudes would have to be conducted at fairly high yields to obtain information the Soviets probably now lack and thus would be quite susceptible to detection by the AEDS.

How much the US would have to disclose of its detection system or of other parts of its intelligence system, should the USSR be detected cheating, really depends on the circumstances. Generally speaking, a strong US

unilateral reaction could be based on an assertion that the US had detected Soviet cheating, whereas a US decision to present proof to other nations would probably require disclosure of part of our detection mechanisms.

GAINS IN THERMONUCLEAR WARHEAD YIELD TO WEIGHT RATIOS FEASIBLE TO STOCKPILE · FROM 1961-62 NUCL. TESTS

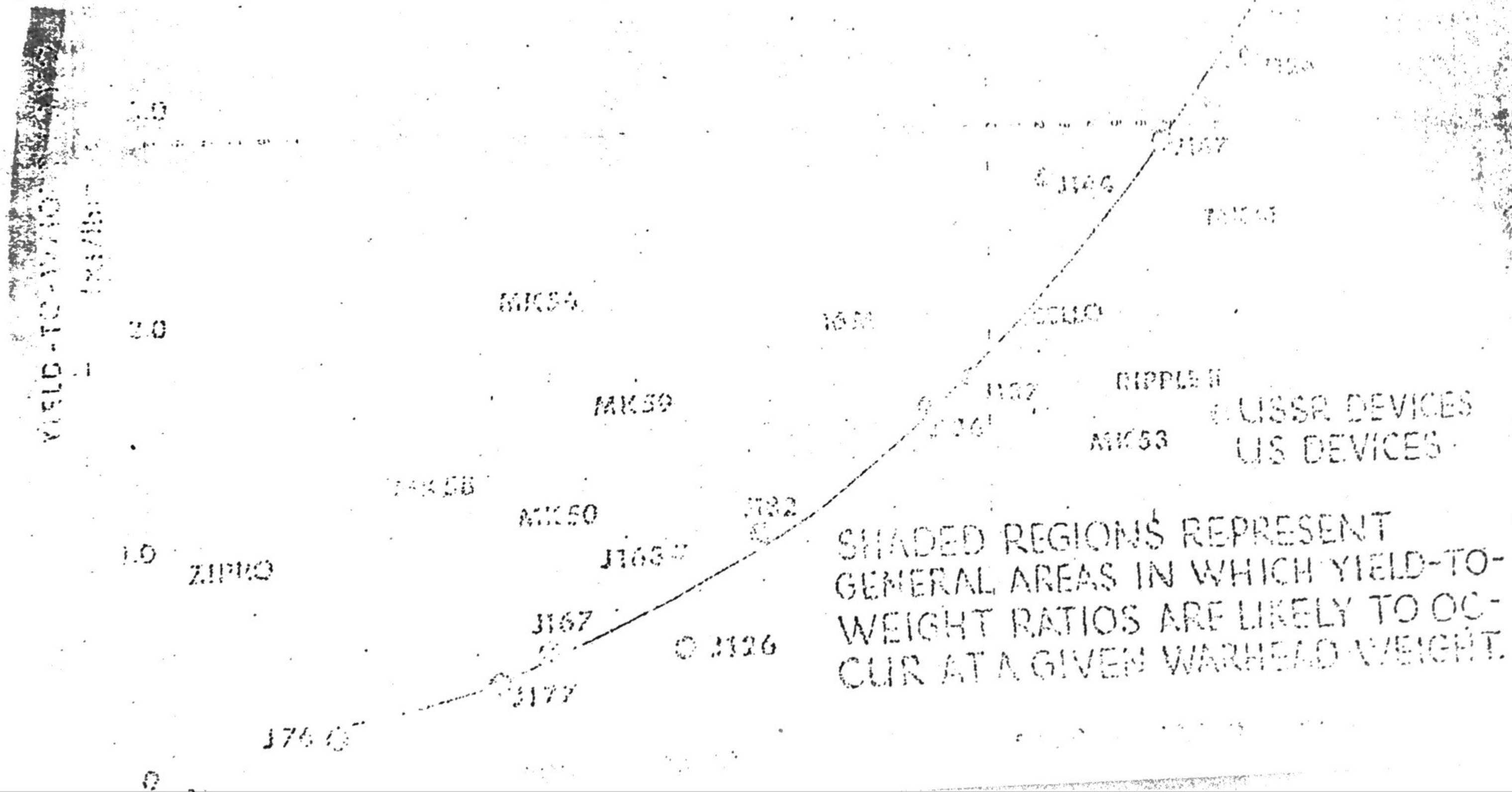
WARHEAD WT. CLASS	KT/LB PRIOR TO 1961		KT/LB AFTER 1962	
	US	USSR	US	USSR
100	0.1	*	1.0	*
200	0.9	*	1.3	*
400	1.1	*	1.5	*
600	2.0 [1]	0.4	2.0	0.65
2,000	1.0	0.9	2.5	1.3
4,000	1.5	1.0	2.5	1.9
6,000	1.5	1.2	2.0 [2]	2.3
10,000	2.3	*	2.3 [2]	2.9
13,000	*	*	*	3.2
19,000	*	*	*	4.0
25,000	*	*	*	4.0

* NO MODERN DEVELOPMENTS IN THIS WT. CLASS IDENTIFIED TO DATE.

[1] NOT ACTUALLY DEMONSTRATED UNTILL 1962 TESTS.

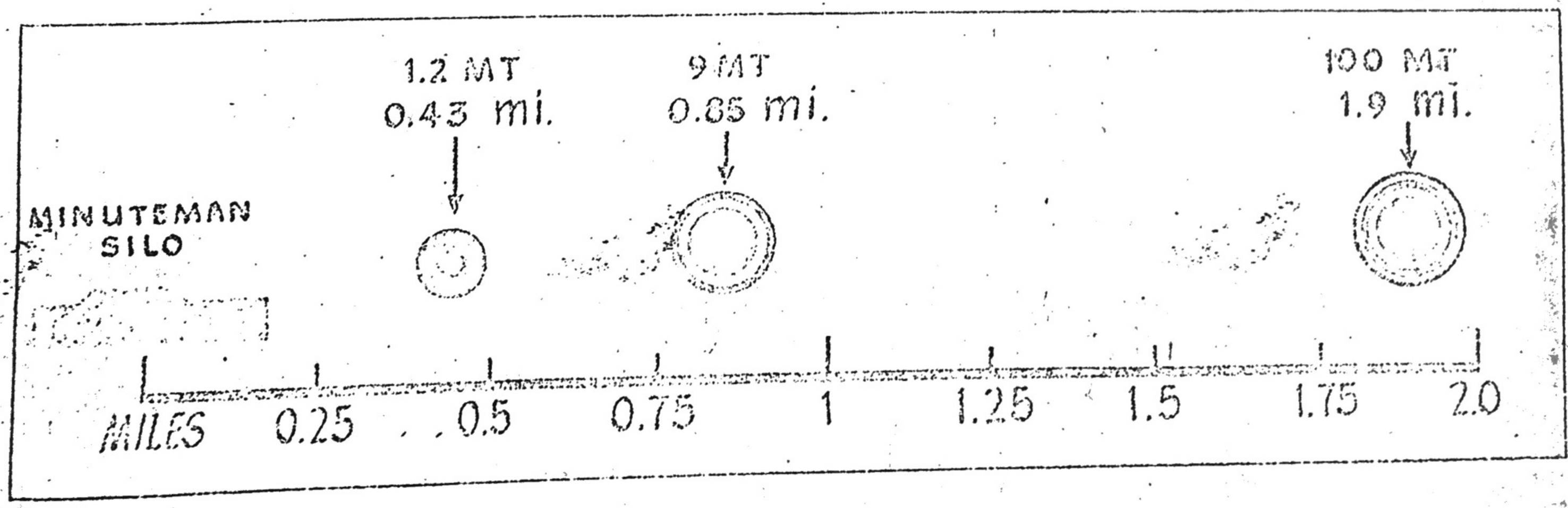
[2] NO ADDITIONAL TESTS CONTRIBUTING TO STOCKPILING IN THESE AREAS.

YIELD-TO-WEIGHT RATIO VS WARHEAD WEIGHT FOR VARIOUS DEVICES



SECRET

Approxinate Maximum Distance at which Various Yields will Severely Damage Minuteman Silo



HIGH ALTITUDE TEST EXPERIENCE

	US EXPERIENCE		USSR EXPERIENCE	
7	ARGUS III (1.7 KT)			
6				
5		STARFISH (1400 KT)		
4				
3	ARGUS II (1.7 KT)		JOE 105 (~1 KT)	JOE 160 (~200 KT)
2	ARGUS I (1.7 KT)	CHECKMATE (10 KT)	JOE 109 (~1 KT)	JOE 163 (~200 KT)
1	TEAK (4000 KT) ORANGE (4000 KT)	KINGFISH (200 KT) BLUEGILL (200 KT) TIGHTROPE (10 KT)	JOE 98 (~200 KT)	JOE 172 (1300 KT)
	1958	1962	1961	1962

TOP SECRET RESTRICTED DATA

U.S. & U.S.S.R. NUCLEAR WEAPONS SYSTEMS

20 DECEMBER 1962

STRATEGIC

SYSTEM	RANGE (n.m.)	WARHEAD WT. (lbs.)	PLANNED OR POSS. YLD. (KT) BASED ON NUCL. TEST SER. OF: 1958 & earlier	1961 & 1962	FUTURE SERIES
INTERCONTINENTAL BALLISTIC MISSILES					
ATLAS D	5,500	1,665	1,450	3,700	5,500
ATLAS E	"	3,300	4,500	8,000	12,000
ATLAS F	6,300	"	"	"	"
TITAN I	5,500	"	"	"	"
TITAN II	"	6,190	9,000	10,000	15,000
"		8,500	-	-	20,000-40,000 or 15 @ 250 ea.
MINUTEMAN	5,500-7500	550	800	-	1,200
"	" "	600	1,200		1,300
"	" "	750	-	1500 or 3@ 250 ea.	2250 or 3@ 350 ea.
[illegible]-6	6,000	7,000	6,000		
"	"	5,500	-	10,000-13,000	-
"	4,500	9,000	-	20,000-24,000	-
[illegible]-7	6,000	3,000	3,000	-	-
"	"	~3,500	-	5,000-5,200	-
[illegible]-8(IF SMALL)	"	~ "	3,000		-
[illegible]-8(IF LARGE)	"	~17,500	-	40,000-60,000	-
SUB-LAUNCHED BALLISTIC MISSILES					
POLARIS A-1+2	1,500	717	500	1,500	2,250
"	1,200	"	1,200	"	"
POLARIS A-3	2,500	795	3@ 200 ea.	3@ 250 ea.	3@ 375 ea.
POLARIS	-	1,000	-	2,000	3,000
[illegible]-N-4	300	3,500	2,700[2]	5,000-5,800	-
[illegible]-N-5	650	500	-	1,500	-
SUB-LAUNCHED CRUISE MISSILES					
REGULUS I	500	2,800	1,900	6,000	9,000
[illegible]-N-3	300	2,200	10 to 1,500	3,000	-
AIR-TO-SURFACE MISSILES					
HOUND DOG	200-600	1,650	11 to 1100	3,700	5,500
[illegible]-2	100	2,200	10[2] to 2000	3,000	-
[illegible]-3	350	5,000	6,000	10,000-13,000	-
[illegible]-4	UNKNOWN	UNKNOWN	-	-	-
INTERMEDIATE AND MEDIUM RANGE BALLISTIC MISSILES					
THOR	1,500	1,669	1,450	3,700	5,500
JUPITER	"	"	"	"	"
MRBM	300-2,000	300	-	400	600
[illegible]-3	2,200	3,000	3,000[2]		
"		3,500			
[illegible]-4	1,020	2,200	150[2] 600[2] 1,500 2,000[2]	3,000-3,800	-
[illegible]-5	630	"	" " " "	3,000	-

TACTICAL

SYSTEM	RANGE (n.m.)	WARHEAD WT. (lbs)	PLANNED OR POSS. YLD. (KT) BASED ON NUCL. TEST SER. OF: 1958 & Earlier	1961 & 1962	FUTURE SERIES
SHORTER RANGE BALLISTIC GUIDED MISSILES					
PERSHING	400	395	40 & 440	600	900
REDSTONE	175	3300	425 & 3800	8000	12000
CORPORAL	75	1000	0.09 to 47	1000	2700
SERGEANT	"	950	40 & 150	"	"
LACROSSE	16	307	1.7 & 10	400	600
[illegible]S-2	350	~3000	30 to 200	–	–
[illegible]S-1a	90	"	30 to 200	–	–
[illegible]S-1b	150	1200	"	650	–
LAND-LAUNCHED CRUISE MISSILES					
MACE	1200	1650	11 to 1100	3700	5500
[illegible]-C-1	300	1000-2000	Up to 1500	–	–
FREE ROCKETS					
HONEST JOHN	21	902	2 & 30	–	–
LITTLE JOHN	10	151	1.7 & 10	–	–
[illegible]RSG-1	13	3000	~15*	–	–
[illegible]RSG-2	10	1300	"	–	–
[illegible]RSG-3	16	1300	~15	–	–
[illegible]RSG-4	22	700	"	–	–
TUBE ARTILLERY					
[illegible]0 mm Gun	10	600	2 to 45	–	–
Howitzer	8	243	1.9	10	–
[illegible]5 mm Gun	13.5-17	147-170	–	–	5-10
[illegible] mm Howitzer	26	118	0.3	1.3	2-5
[illegible]5 mm AFAP	6.9	130-140	–	–	2-8
DAVY CROCKETT	2.2	60	0.02	0.18.5	–
[illegible]mm Howitzer	2.9-4.7	–	–	0.02-0.4	–
[illegible]0 mm Mortar	10	1700	5°-30°	–	–
[illegible]0 mm Gun	12	700	"	–	–
[illegible]0 mm Gun-How.	16	225	~ 2	–	–
SURFACE-TO-AIR MISSILES					
NIKE HERCULES	80	902	2, 20 & 30	–	–
TALOS-W	50-100	455	2	–	–
TERRIER	20	151	1.7	–	–
TYPHON	200	–	10	–	–
NIKE ZEUS[a]	75	395	200	600	900
[illegible]-1	20-25	300	5-25	–	–
[illegible]-2	20-25	300	"	–	–
[illegible]	UNKNOWN	UNKNOWN	–	–	–

OTHER US NUCLEAR WEAPON SYSTEMS WITHOUT IDENTIFIED USSR NUCL. PARALLELS

[illegible]-Air Missiles – New Soviet AA-4 missile could have nuclear warhead

[illegible]-Ship Weapons – Specific Soviet nuclear weapon systems unidentified – Torpedoes reported

[illegible] Land Mines – No Soviet ADM's identified

[illegible] Torpedo Bombs or Pods – No Soviet counterparts identified