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APPENDIX I TO THE MEMORANDUM FOR THE PRESIDENT

SUBJECT: Recommended Long Range Nuclear Delivery Forces 1963-1967 (S)

This Appendix summarizes the main factors I have taken into consideration in determining United States' requirements for Long Range Nuclear Delivery Forces in the years 1963-1967. The Appendix includes:

I. Recommended Force Levels and their Fiscal Implications;

II. The General Basis for My Recommendations on Force Levels;

III. The Basis for My Recommendations on Specific Weapon Systems.

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I. Recommended Force Levels and Their Fiscal Implications

I recommend that you approve, for inclusion in the FY 1963 budget, the procurement of the following operational missiles and aircraft to supplement our Long Range Nuclear Delivery Forces:

	Total Purchase Cost to Be Funded (Millions of Dollars)	FY 1963 NOA (Millions of Dollars)
a. 100 Minutemen Hardened & Dispersed	$ 461	$ 284
b. 50 Mobile Minutemen	935	270
c. 6 Polaris Submarines	1,072	963
d. 92 Skybolt Missiles	347	200
e. 100 KC-135 Tankers	287	270
Total for FY 1963 Decisions	$3,102	$1,987
Total Funding Requirements from Prior Years' Decisions		6,939
Total for FY 1963		$8,926

Moreover, I recommend that we adopt, for planning purposes, the force structure summarized in the table on the next page. In those cases in which the forces I am recommending differ from those recommended by the Navy and Air Force, the latter are shown in red beneath mine.

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RECOMMENDED FORCES [a]

	End-Fiscal Year						
	1961	1962	1963	1964	1965	1966	1967
Bombers							
B-52	555	630	630	630	630	630	630
B-47	1,125	855	585	450	225	--	--
B-58	40	80	80	80	80	80	80
Total Bombers	1,720	1,565	1,295	1,160	935	710	710
Air-Launched Missiles							
Hound Dog	216	450	522	522	522	522	336 [b]
Skybolt	--	--	--	--	322	690	1,150
Total GAM's	216	450	522	522	844	1,212	1,486
ICBM and Polaris Missiles							
Atlas	36	75	135	135	135	126	117
Titan	6	51	78	114	114	114	114
Minuteman R&D	--	--	150	600	700	800	900 [c]
Minuteman Mobile	--	--	--	--	50	100	100
Polaris	80	96	144	288	480	560	656
Total ICBM/Polaris	122	222	507	1,137	1,479	1,700	1,887
Other							
Quail	224	392	392	392	392	392	392
KC-135	400	440	520	620	640	640	640
KC-97	600	460	340	240	120	--	--
RB-47	45	45	45	45	--	--	--
RC-135	--	--	3	13	23	23	23
Alert Force Weapons [d]							
No. of Weapons	1,390	2,350	2,450	3,050	3,440	3,870	4,180
Megatons	1,530	2,750	3,300	4,350	4,740	5,130	5,450

[a] Numbers of aircraft and missiles are derived by multiplying authorized squadron unit equipment by the numbers of squadrons. They do not include R&D, Combat Training Launch or maintenance pipeline missiles or command support aircraft. Effective 1 August 1961, approximately 50% of the bombers will be on 15 minute ground alert. ICBM numbers represent operational launchers. Numbers of Polaris missiles represent the total number of missiles in operational submarines. Approximately 67% of these submarines will be on station or at sea. The table excludes 17 Regulus missiles in operational submarines from end-FY 61 to end-FY 64 and 5 at end-FY 65.

[b] This difference is a consequence of the difference in recommended B-52 forces.

[c] 1,000 by end-FY 68, 1,100 by end-FY 69, and thereafter.

[d] Bombers have flexibility in choice of weapons and yields. For purposes of this comparison, it was assumed that B-52's carry [redacted] bombs, plus air-launched missiles.

The estimated Total Obligational Authority required to procure and operate these forces over this period is shown in the following table. The difference between the Total Obligational Authority required to finance the forces I am recommending and that required to finance the forces recommended by the individual Services is shown on the second line. Over the five years, 1963-67, the cost of the aircraft and missiles recommended by the Air Force and the Polaris recommended by the Navy exceeds the cost of the forces I am recommending by approximately $10 billion. As will be shown later in this paper, the extra capability provided by the individual Service proposals runs up against strongly diminishing returns and yields very little in terms of target destruction. In my judgement, it is an increment not worth the cost of $10 billion over the five year period.

	Total Obligational Authority (Billions of Dollars)						
	FY 62	FY 63	FY 64	FY 65	FY 66	FY 67	FY63-67
Secretary of Defense Recommendations	9.3	8.9	8.0	5.6	4.7	4.1	31.3
Service Proposals over Secretary/Defense	+.6	+1.5	+1.6	+3.0	+2.2	+1.4	+9.7

The forces I am recommending for procurement in FY 1963 are compared with the recommendations of the Service Chiefs in the following table. The numbers represent operational aircraft or missiles.

	Secretary of Defense	Initial Recommendations of Chiefs: Chairman JCS	Army	Navy & USMC	Air Force	JCS 9-11-61 Recoms. e/
B-52 Aircraft	0	0	0 b/	0 b/	45 a/	45
Skybolt	92	92	0	0	92	92
KC-135 c/	100	100	100	100	120	100
Titan	0	18	0	0	18	18
Minuteman H&D	100	300 d/	100 d/	100 d/	600	300
Minuteman Mobile	50	50	0	0	50	50
Polaris	96	96	96	160	0	128

a/ 45 B-52's recommended by the Air Force for 1962 procurement.

b/ The Chief of Staff, USA, agrees "to a limited procurement of the system to minimize engineering and economic risks." The CNO and Commandant, USMC, believe "research and development should continue", and "budgetary planning should proceed, but the decision to allocate substantial funds for production should be delayed . . .".

c/ The Secretary of Defense, along with the Chief of Staff, USA, the CNO, and Commandant, USMC, recommend a total strength of 640 aircraft; the CJCS recommends 760, the Chief of Staff, USAF, 800. In each case, command support aircraft would be in addition to the numbers shown.

d/ These recommendations are for "at most" the stated number of missiles.

e/ During a discussion between the Secretary of Defense and the Chiefs, on September 11, 1961, they stressed their concern about the reduction in our nuclear capability as the B-47's were phased-out. The Secretary of Defense therefore added 5 Wings of B-47's to his recommendation for FY 1963 and FY 1964, bringing it to the level shown on page 2.

The aircraft and missiles recommended for procurement in FY 1963 by the Air Force and the Polaris submarines recommended for procurement in FY 1963 by the Navy would cost approximately $3.1 billion more to buy than the aircraft and missiles I am recommending. Of this, approximately $2 billions would require funding in FY 1962 and FY 1963.

As well as these forces, I will recommend at a later date that the Air Force be authorized to procure and operate a secure command and control system for SAC. Except for 20 KC-135's which will be available for use as airborne command posts, the cost of this system has not been included in the figures on page 3.

II. General Basis for Force Level Recommendations

The forces I am recommending have been chosen to provide the United States with the capability, in the event of a Soviet nuclear attack, first, to strike back against Soviet bomber bases, missile sites, and other installations associated with long-range nuclear forces, in order to reduce Soviet power and limit the damage that can be done to us by vulnerable Soviet follow-on forces, while, second, holding in protected reserve forces capable of destroying the Soviet urban society, if necessary, in a controlled and deliberate way. With the recommended forces, I am confident that we will be able, at all times, to deny the Soviet Union the prospect of either a military victory or of knocking out the U. S. retaliatory force. If the most likely estimates of Soviet forces prove to be correct, the forces I am recommending should provide us a capability to achieve a substantial military superiority over the Soviets even after they have attacked us.

The recommended forces are designed to avoid the extremes of a "minimum deterrence" posture on the one hand, or a "full first strike capability" on the other. A "minimum deterrence" posture is one in which, after a Soviet attack, we would have a capability to retaliate, and with a high degree of assurance be able to destroy most of Soviet urban society, but in which we would not have a capability to counter-attack against Soviet military forces. A "full first strike capability" would be achieved if our forces were so large and so effective, in relation to those of the Soviet Union, that we would be able to attack and reduce Soviet retaliatory power to the point at which it could not cause severe damage to U. S. population and industry.

We should reject the "minimum deterrence" extreme for the following reasons:

a. Deterrence may fail, or war may break out for accidental or unintended reasons, and if it does, a capability to counter-attack against high-priority Soviet military targets can make a major contribution to the objectives of limiting damage and terminating the war on acceptable terms;

b. By reducing to a minimum the possibility of a U. S. nuclear attack in response to Soviet aggression against our Allies, a "minimum deterrence" posture would weaken our ability to deter such Soviet attacks.

On the other hand, we should reject the attempt to achieve a "full first strike capability" for the following reasons:

a. It is almost certainly infeasible. The Soviets could defeat such an attempt at relatively low cost. For example, we do not now have any prospect of being able to destroy in a sudden attack Soviet missile submarines at sea. Nor would we be able to destroy a sufficiently high percentage of a large hard and dispersed ICBM force.

b. It would put the Soviets in a position which they would be likely to consider intolerable, thus risking the provocation of an arms race;

c. It would be very costly in resources that are needed to strengthen our theatre forces.

The forces I am recommending will provide major improvements in the quality of our strategic posture: in its survivability, its flexibility, and its ability to be used in a controlled and deliberate way under a wide range of contingencies.

Target Destruction Requirements

The following list of high priority targets (aim points) in the Soviet Union has been derived from studies performed in June 1961 by the Staff of the Net Evaluation Subcommittee, under the direction of Lieutenant General Thomas Hickey. (The estimates have been rounded to the nearest 50 in each category to avoid a misleading impression of accuracy.)

	End-Fiscal Year	
	1965	1967
Urban-Industrial Aim Points	200	200
Bomber Bases	150	150
Support Airfields	50	50
Defense Suppression	300	300
Nuclear Storage and Production	50	50
Naval and Submarine Bases	50	50
Soft IRBM Sites (4 missiles per site)	100	100
Soft ICBM Sites (2 missiles per site)	100-300	50-200
Hard ICBM Sites (1 missile per site)	200-500	400-1100
Total	1200-1700	1350-2200

There are inevitably uncertainties, especially about details, when looking so far into the future. However, taken as a whole, I am satisfied with this target system as a basis for force planning.

The 200 Urban-Industrial targets and the 150 bomber bases have the highest priority in the sense of required degree of assurance that we can destroy them. The capability to destroy the Urban-Industrial targets is our power to deter attacks on our own cities. The Bomber Bases contain the part of the Soviet Forces that can cause us the most damage if not attacked, and also the part most vulnerable to attack. In the event of thermonuclear war, it is important that we destroy the maximum possible number of Soviet long range bombers. The 150 targets listed here represent a fairly generous allowance for this purpose. They include about 50 bases now known or estimated to be supporting long-range air operations, about 60 now known or estimated to be supporting light bomber operations, most of which would be usable as recovery bases for the long-range bombers, and about 30 staging bases on which the medium bombers depend for range enough to reach the United States.

However, the other targets are also potentially important and worth attacking. The Supporting Airfields (potential recovery and dispersal bases), Nuclear Storage and Production sites, and Naval and Submarine bases all can support delivery of nuclear weapons on the United States. The IRBM sites represent a threat to our Allies and our theatre forces, and are most economically attacked by a system such as Minuteman. The Defense Suppression targets, air defense control centers, interceptor bases, and surface-to-air missile sites, can be effectively attacked by the air-launched missiles Hound Dog and Skybolt. Their destruction would drastically reduce the defense opposition faced by our manned bombers. The number 300 shown here is probably a generous allowance for the purpose. For example, SAC is now estimating a requirement to destroy 160 defense suppression targets in 1968.

The size and basing (i.e. degree of hardening and dispersal) of the Soviet ICBM force in 1965 and 1967 is now a matter of considerable uncertainty. Everything we know about the Soviet long-range nuclear delivery posture to date suggests that the most likely configuration for first-generation ICBM sites will be 2 missiles per site and soft. Such sites would present attractive targets for our forces. However, hard and dispersed basing for their next generation of ICBM's would be such a logical choice for the Soviets that the possibility must be considered reasonably likely even though there is no evidence now to suggest that the Soviets are hardening their missiles.

There are also uncertainties about the performance of our forces in striking back after a Soviet attack--uncertainties associated with the weight and effectiveness of possible Soviet attacks, the ability of our forces to survive under attack, the reliability of our missiles, and the ability of our forces to penetrate Soviet defenses. But these uncertainties are not unbounded. One can place reasonable quantitative limits on them and estimate the effectiveness of our forces under alternatively optimistic and pessimistic assumptions.

This is what has been done in the following analysis. The survival reliability, and penetration factors used are all based on the general assumption that the war begins with a well planned and well executed Soviet attack, with limited warning, against our forces in a state of normal peacetime alert, and that we are hitting back after being attacked. Thus the following estimates do not represent maximum capabilities under the most favorable circumstances. For example, they exclude cases in which we strike first, or cases in which we are attacked during a period of tension and alert. These cases have been excluded because we are testing the adequacy of our forces, and therefore must look at unfavorable circumstances.

Within the general assumption of a well planned Soviet attack, optimistic, median, and pessimistic survival, reliability, and penetration factors have been chosen to reflect the range of uncertainty. It is possible to imagine outcomes lying outside this range, but their likelihood appears small. The optimistic factors represent favorable, but attainable performance. The great weight of likelihood appears to be between the optimistic and median cases. The combination of all of the pessimistic factors describes a very unfavorable and relatively improbable case. For example, it is assumed that in 1967, only 1-1/4 per cent of the manned bombers reach the bomb release line and 90 per cent of the Titans and 70 per cent of the fixed Minuteman missiles are destroyed before launch. These factors were chosen to produce an answer to the question "What happens if everything goes badly"? (The details of the assumed factors, together with an explanation of their choice can be found in Annex 1 to this Appendix.)

The pessimistic factors do not include an allowance for attrition by Soviet anti-ICBM defenses. We recognize that the Soviets do have a large R&D program in this area. However, we are pursuing a vigorous program of development of penetration aids (decoys and multiple warheads) and we expect to be able to penetrate Soviet defenses in this period. Moreover, if attrition by Soviet ICBM defenses appears at all likely, we will be able to compensate for it in large measure by concentrating our forces on the top priority targets.

The following results are shown in terms of expected percentages of the targets or value in each category destroyed. In the case of Urban-Industrial Floor Space (and Urban Blast Fatalities), the estimates are of damage to the contents of the 170 largest cities (down to a population

of 90,000) which contains approximately 80 per cent of the total industrial floor space of the Soviet Union and approximately 50 million out of a total of 210 million people.

The estimates of total population fatalities are percentages of the Soviet total. The "Unsheltered" case corresponds to the effects expected in a population without extensive civil defense preparation, but taking advantage of what shelter is normally available. The "Sheltered" case corresponds to fallout shelter for 40 per cent of the urban population and 20 per cent of the rural. The "At Least" reflects the fact that the estimates do not include fallout from attacks on isolated military targets. (The effects on surrounding cities of attacks on naval bases are included in the estimates.)

The assumed number of Soviet ICBM sites varies between the optimistic cases (in which the low end of the range is used) and the pessimistic cases (in which the high end is used). Therefore, the percentages shown should not be interpreted as representing fractions of the same numbers.

Two forces and two years are shown on pages 9 and 10.

I. Those forces I am recommending for End-Fiscal Year 1965 and 1967, and

II. Those forces proposed by the individual Services (though not jointly by the JCS) for the same years.

The calculations suggest that either force would provide us with a powerful capability to carry out the objectives mentioned earlier. However, as I indicated earlier, the extra capability provided by the individual Service proposals runs up against strongly diminishing returns and yields very little in terms of extra target destruction.

Moreover, the theatre forces were not included in these calculations, though SIOP '62 includes about 270 alert aircraft and missiles from these forces. On the other hand, with the exception of the defense suppression targets, no targets in China or the other satellites were included. However, we do not now expect China to develop a significant long range nuclear delivery force in the time period under consideration. If she does, and a change seems indicated, there will be time for us to increase our forces appropriately.

COMPARISON OF TARGET DESTRUCTION CAPABILITIES OF ALTERNATIVE FORCES END FISCAL YEAR 1965

	Percent Expected Kill					
	Optimistic		Median		Pessimistic	
	I	II	I	II	I	II
Population and Industry						
Urban-Industrial Floor Space (or Urban Blast Fatalities)	88	88	80	80	69	69
Total Population Fatalities, Unsheltered, at least	43	43	33	33	25	25
Partly Sheltered, at least	35	35	26	26	20	20
Military Targets						
Bomber Bases	99	99	88	93	58	80
Support Airfields	97	99	52	76	7	37
Defense Suppression	76	87	38	38	7	7
Nuclear Storage & Production	96	98	69	69	6	5
Naval & Submarine Bases a/	98	98	62	62	7	7
Soft IRBM Sites	96	100	45	80	5	5
Soft ICBM Sites	99	100	45	88	14	59
Hard ICBM Sites	71	75	16	19	1	1

Alert Force Weapons Summary	Alert Force Total		Delivered on Target					
			Optimistic		Median		Pessimistic	
	I	II	I	II	I	II	I	II
Weapons b/	3446	4059	2482	2993	1107	1487	399	691
Megatons	4740	5600	3386	4112	1560	2077	574	951

a/ Successful attack would render the bases inoperable but, of course, would leave untouched missile submarines at sea.

b/ There are 1,685 Alert Weapons and 2,542 Alert Megatons in SIOP-62.

COMPARISON OF TARGET DESTRUCTION CAPABILITIES OF ALTERNATIVE FORCES
END FISCAL YEAR 1967

	Percent Expected Kill					
	Optimistic		Median		Pessimistic	
	I	II	I	II	I	II
Population and Industry						
Urban-Industrial Floor Space (or Urban Blast Fatalities)	84	84	79	79	68	68
Total Population Fatalities,						
Unsheltered, at least	37	37	32	32	25	25
Partly Sheltered, at least	30	30	26	26	19	19
Military Targets						
Bomber Bases	98	99	94	99	81	99
Support Airfields	99	99	72	96	7	78
Defense Suppression	88	95	50	67	9	10
Nuclear Storage & Production	95	95	46	79	0	31
Naval & Submarine Bases	97	97	54	54	12	12
Soft IRBM Sites	99	99	85	92	2	96
Soft ICBM Sites	99	99	82	97	43	97
Hard ICBM Sites	54	77	7	25	1	5

Alert Force Weapons Summary	Alert Force Total		Delivered on Target					
			Optimistic		Median		Pessimistic	
	I	II	I	II	I	II	I	II
Weapons	4180	5890	3028	4578	1508	3826	638	1912
Megatons	5450	7620	3417	5295	1726	3320	740	2272

Relationship of Recommended Force to Soviet Force

The direct comparison of force numbers as such is less important than the ways in which we base and operate our forces. For example, we could out-number the Soviets three to one in ICBM's and still have an inadequate deterrent posture if our missiles were soft and concentrated. However, the force increments which I am recommending are all in a protected mode, hard and dispersed, or mobile.

Given a well protected posture, relative numbers are still important for several reasons:

a. A large Soviet superiority in ICBM's could overcome the protection afforded our ICBM's by hardening and dispersal and make it possible for the Soviets to destroy most our fixed-base forces in a missile attack.

b. A large Soviet superiority in missiles would worsen the outcome of a thermonuclear war.

c. A large Soviet superiority in ICBM's would be likely to have a very unfavorable impact on Soviet aggressiveness in the cold war.

Therefore, we have no intention of letting ourselves be seriously out-numbered in ICBM's by the Soviet Union.

How many ICBM's will the Soviet Union have in the mid-1960's? The answer is intrinsically uncertain because it is still subject to Soviet decisions which may not yet have been made, and which will be influenced by our own decisions. However, we do know a good deal about their posture today. We are able to estimate that the Soviets now have from 25 to 50 operational ICBM launchers. Their ICBM build-up appears to be deliberately paced, not a crash program. On the basis of what has been observed so far, the Soviets will have from 200 to 400 ICBM's in mid-1964. But even if the most pessimistic (Air Force) estimates prove to be valid, in mid-1964 we will still equal the Soviet Union in ICBM's at about 850 each. This will be combined with a substantial U. S. superiority in all other categories of long range nuclear delivery systems.

Moreover, if the Soviet Union exceeds our most pessimistic estimates and builds up a much larger force by 1965 or 1967, we are confident that we will find out about it in time to expand our program appropriately. As a hedge against this unlikely possibility, we are expanding our Minuteman production capacity to over 60 missiles a month. When this is done, the lead time for hard and dispersed Minuteman ICBM's will be about 26 months. Therefore, we will have a great deal of flexibility to expand the program at a later date if it should prove to be necessary to do so.

In other categories of long range nuclear delivery systems, we will have a substantial superiority. Soviet long range aviation now comprises about 1,000 medium bombers (or tankers), and about 150 heavy bombers (or tankers), equipped with air-to-surface missiles. The heavy bomber category is far more significant than the medium bomber category. We will have 630 heavy bombers, plus almost as many tankers. Because the Soviets would have to use some of their bombers as tankers, this will mean an effective U. S. heavy bomber force approximately four or more times as large as that of the Soviets.

The USSR now has about 20 conventionally powered submarines which are probably capable of launching short-range ballistic missiles (approximately 150-300 nautical miles), though not while submerged. By 1963, the Soviets could probably introduce nuclear powered submarines with a submerged launch system employing medium range ballistic missiles. There is no evidence to suggest that the Soviets have a program approaching our Polaris program, either in size or quality.

III. Basis for Recommendations on Specific Weapon System Choices

Within the general quantitative requirements for additional long range nuclear delivery systems, suggested by the above considerations, the following are the reasons for my specific program recommendations:

B-52's

The Air Force has proposed the procurement of 52 additional B-52's (45 wing unit equipment plus 7 command support) with FY 1962 funds. The cost of procuring and operating these aircraft, with (30) associated tankers and Skybolt missiles, for a 5 year period would be about $1.4 billions. My reasons for recommending against this procurement are the following:

a. We already have a large force of intercontinental bombers. In mid-1965 it will comprise 630 B-52's, 80 B-58's and, if we do not decide to phase them out sooner, 225 B-47's. The alert B-52's and B-58's alone will be able to carry about 1500 bombs plus 1,000 air launched missiles. The alert B-47's will be able to carry another 200 bombs.

b. An examination of the target system shows that most targets, and all of those of the highest priority, are best attacked by missiles; first, because the targets are soft, fixed, and of known location, and therefore vulnerable to missile attack; second, in the case of the military targets, the missiles reach their targets much faster than do bombers, and therefore would be more effective in catching enemy bombers and missiles on the ground; and third, our missile systems have a much greater survival potential and endurance in the wartime environment, and therefore can be used with more control and deliberation.

c. The bombers are soft and concentrated and they depend upon warning and quick response for their survival under attack. This is a less reliable means of protection than hardening and dispersal or mobility. Moreover, it means that the bombers must be committed to attack very early in the war and cannot be held in reserve to be used in a controlled and deliberate way.

d. Bombers are expensive. For the same cost (in total five year system costs) as a wing of B-52's with tankers and Skybolts, we can buy 250 Minutemen hardened and dispersed, or 6 Polaris submarines.

GAM-87 Skybolt

Air defense studies indicate that the most effective means for penetrating air defenses are low altitude penetration and defense suppression, both of which are more effective than attempting to outrun the defenses at high altitude. The Skybolt is intended to provide a major improvement in the penetration capability of the programmed B-52 force at a relatively low cost. The 800 Skybolt missiles on alert bombers ought to be able to overcome almost any Soviet defense and make it possible for the bombers to go into their targets and attack them with gravity bombs. The total cost for 1150 Skybolts for the period FY 1962-1967 is estimated to be $1.6 billion.

KC-135

Twenty-seven squadrons of KC-135's (540 operational aircraft) have been procured through FY 1962. Air Force studies indicate that 800 KC-135's are required, with most of the increment going to support the B-52 force. (About 70 KC-135's are required to support TAC, 20 for command posts, and 80 to support the B-58 fleet.) However, beyond approximately 470 tankers, more KC-135 are not required to enable the B-52's to reach their targets. Rather, the basis for the Air Force stated requirement for more tankers is to improve the ability of the bombers to penetrate enemy defenses by allowing them to chose more favorable routes or to fly more at low altitude. Improved penetration capability achieved this way and Skybolt for defense suppression are not both required. Moreover, Skybolt appears to be more effective. Therefore, in my judgement, the expenditure of approximately $1.1 billions to procure 160 extra tankers and operate them for 5 years is not required. The force of 640 tankers which I recommend will provide 470 to support the B-52's; 80 for the B-58's; 70 to support TAC; and 20 for command posts.

Titan II

The 18 extra Titan missiles proposed by the Air Force would cost approximately $372 millions to procure and operate for 5 years. The Titan II has a substantially larger payload than Minuteman. It will be able to deliver [redacted] rather than [redacted] warheads now programmed for Minuteman. But the total system cost of a Titan II is about four times that of a Minuteman hard and dispersed. At equal cost, four Minutemen are to be preferred to one Titan because, first, they are less vulnerable, and second, they provide more target coverage.

Moreover, we already plan to have a substantial force of Atlas and Titan which should be adequate for those special purposes requiring large payloads. Therefore I do not recommend procurement of additional Titans.

Minuteman Hard and Dispersed

Minuteman H & D has the lowest system cost of any of our ICBM's at about $5.5 millions per missile in 5 year costs. It is clearly the preferred way to acquire more ICBM's. However, I am not recommending that we procure more than 100 in FY 1963 because our over-all force requirements do not make it necessary. The difference between the Air Force proposed procurement of 600 missiles in FY 1963 and the 100 I am recommending, in 5 year system costs, is approximately $2.75 billions.

Mobile Minuteman

Mobile Minuteman would serve as a hedge against our being heavily outnumbered by the Soviet ICBM force, a low Soviet CEP, or unexpected failure of the hardened Minuteman to meet estimated blast resistance--conditions lowering the survival potential of hard and dispersed Minuteman. It would also serve as a hedge against unexpected advances in Soviet anti-submarine warfare capability that would reduce the security of Polaris. However, Mobile Minuteman may have troubles of its own, including wartime fallout (which may reduce substantially its wartime endurance), peacetime sabotage and espionage and operational problems associated with the transport of explosives and attempted random operation. Moreover, if we were to complete the Air Force recommended program of 300 Mobile Minutemen, Mobile Minuteman would cost about 2.5 times as much per missile as Minuteman hard and dispersed.

Therefore, we are not yet certain that Mobile Minuteman will be required. The action I am recommending is in the nature of lead time reduction on the missile production program. If the combination of contingencies favoring Mobile Minuteman does not occur, I shall reconsider the decision and recommend cancellation of the production program.

Polaris

This system has the most survival potential in the wartime environment of any of our long range nuclear delivery systems. Polaris missiles do not have to be launched early in the war, they can be held in reserve and used in a controlled and deliberate way to achieve our wartime objectives. For example, Polaris is ideal for counter-city retaliation. However, as the calculations shown above indicate, the force already programmed is large and can cause great damage to the population and industry of the Soviet Union. This reduces the urgency

of more Polaris missiles. Consequently, I recommend that we procure 6 more Polaris submarines in FY 1963. The cost, on a 5 year basis, of the 6 submarines will be about $930 millions less than the cost of the 10 submarines proposed by the Navy.

APPENDIX I

ASSUMED OPERATIONAL FACTORS FOR 1965 AND 1967 TARGET DAMAGE CALCULATIONS

All assumptions are characterized alternatively as Optimistic, Median, or Pessimistic.

I. Assumed Soviet ICBM Force

	Optimistic		Median		Pessimistic	
	1965	1967	1965	1967	1965	1967
Number of:						
ICBM's	400	500	750	1000	1100	1500
Soft Sites (3 psi)	100	50	200	125	300	200
Hard Sites (300 psi)	200	400	350	750	500	1100
Yield	7MT	10MT	7MT	10MT	7MT	10MT
CEP	1 n.mi.	.8 n.mi.	.7 n.mi.	6 n.mi.	.5 n.mi.	.5 n.mi.
Reliability	.7	.75	.75	.8	.8	.85

The Soviets are assumed to apply their forces against ours in a roughly optimal fashion. Thus, for example, Titan I will have a considerably lower survival rate than Atlas F of equal blast resistance because the concentration of missiles makes it a more attractive target. Only the effects of a Soviet missile attack are included in our force survival rates. It is assumed that we launch our surviving missiles before Soviet bombers arrive. The validity of this assumption does depend on our having a survivable high level command and control system.

II. Assumed Survival, Reliability, and Penetration Factors

The probability of a missile or aircraft delivering its weapon to the target can be thought of as the product of three factors:

Survival Rate under enemy attack or SR,

Reliability Rate or RR,

Penetration Rate through enemy defenses or PR.

For any given Soviet force level, the Survival Rate of our forces will vary with our force size. The forces proposed by the individual Services will therefore have higher survival rates than the forces recommended by the Secretary of Defense because they are larger. In those cases in which they differ, the Survival Rates associated with the forces I am recommending are designated by (I), those associated with the individual Service proposals, by (II).

The assumed factors are shown in the tables which follow. To avoid a misleading impression of spurious accuracy, all factors have been rounded to the nearest .05. An explanation of the basis for the assumptions follows the tables.

Table I - Assumed Survival, Reliability and Penetration Factors, by Weapon System, End-FY 1965

	Optimistic	Median	Pessimistic
Alert Bombers			
SR	1	.50	.10
RR	.95	.90	.90
PR	.75	.50	.25
Yield/CEP			
Atlas D (Soft)			
SR	.10	.05	.05
RR	.80	.70	.55
PR	1	1	1
Yield/CEP			
Atlas E			
SR	.20	.20	.10
RR	.80	.70	.55
PR	1	1	1
Yield/CEP			
Atlas F			
SR	1	.60	.30
RR	.80	.65	.50
PR	1	1	1
Yield/CEP			
Titan I			
SR	.50	.30	.10
RR	.80	.65	.50
PR	1	1	1
Yield/CEP			
Titan II			
SR	1	.70	.40
RR	.85	.65	.50
PR	1	1	1
Yield/CEP			
Minuteman (Avg. of R&D & Mobile)			
SR(I)	1	.75	.5
SR(II)	1	.85	.70
RR	.85	.65	.50
PR	1	1	1
Yield/CEP			
Polaris A-3			
SR	1	1	1
RR	.75	.60	.50
PR	1	1	1
Yield/CEP			
Hound Dog on Alert B-52's			
SR	1	.50	.10
RR	.75	.75	.75
PR	.80	.70	.60
Yield/CEP			
Skybolt on Alert B-52's			
SR	1	.50	.10
RR	.70	.55	.40
PR	1	1	1
Yield/CEP			

III. Basis for Assumed Operational Factors

No great precision can be claimed for these factors. The use of an optimistic-pessimistic range is intended to indicate the existence of uncertainty. However, the ranges can be taken to include all values having a substantial likelihood.

Alert Bomber Survival Rate

In the optimistic case, we receive tactical warning and act on it fast enough to launch all of the alert bombers. In the pessimistic case, for any of a number of possible reasons, 90 per cent of the alert bombers are caught on the ground. In the median case, half the alert bombers get off. This can be taken as an approximation to the results of a 25 per cent airborne alert, though in the case of an airborne alert, the fact that it is known which bombers will survive attack should make more efficient targeting possible.

Bomber Penetration Rate

The range .75 - .50 is roughly consistent with SAC estimates. The improvement to .80 in 1967 is associated with effective air defense suppression. The .25 pessimistic assumption describes a case in which the Alert Force has been mostly caught on the ground, in which only a small force survives, penetrates in an uncoordinated way, and without effective air defense suppression.

ICBM Survival Rates

These are explained by the assumed Soviet Forces.

Missile Reliability Rates

The optimistic numbers are Service estimates or design objectives. The pessimistic numbers are based on estimates made in WSEG Study No. 50.

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September 23, 1961

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APPENDIX I TO THE MEMORANDUM FOR THE PRESIDENT

SUBJECT: Recommended Long Range Nuclear Delivery Forces 1963-1967 (S)

This Appendix summarizes the main factors I have taken into consideration in determining United States' requirements for Long Range Nuclear Delivery Forces in the years 1963-1967. The Appendix includes:

I. Recommended Force Levels and their Fiscal Implications;

II. The General Basis for My Recommendations on Force Levels;

III. The Basis for My Recommendations on Specific Weapon Systems.

* * * * * * * * * * *

I. Recommended Force Levels and Their Fiscal Implications

I recommend that you approve, for inclusion in the FY 1963 budget, the procurement of the following operational missiles and aircraft to supplement our Long Range Nuclear Delivery Forces:

	Total Purchase Cost to Be Funded (Millions of	FY 1963 NOA Dollars)
a. 100 Minutemen Hardened & Dispersed	$ 461	$ 284
b. 50 Mobile Minutemen	935	270
c. 6 Polaris Submarines	1,072	963
d. 92 Skybolt Missiles	347	200
e. 100 KC-135 Tankers	287	270
Total for FY 1963 Decisions	$3,102	$1,987
Total Funding Requirements from Prior Years' Decisions		6,939
Total for FY 1963		$8,926

Moreover, I recommend that we adopt, for planning purposes, the force structure summarized in the table on the next page. In those cases in which the forces I am recommending differ from those recommended by the Navy and Air Force, the latter are shown in red beneath mine.

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Sep 23, 1961

RECOMMENDED FORCES a/

	End-Fiscal Year						
	1961	1962	1963	1964	1965	1966	1967
Bombers							
B-52	555	630	630	630	630	630	630
B-47	1,125	855	585	450	225	--	--
B-58	40	80	80	80	80	80	80
Total Bombers	1,720	1,565	1,295	1,160	935	710	710
Air-Launched Missiles							
Hound Dog	216	450	522	522	522	522	336 b/
Skybolt	--	--	--	--	322	690	1,150
Total GAM's	216	450	522	522	844	1,212	1,486
ICBM and Polaris Missiles							
Atlas	36	75	135	135	135	126	117
Titan	6	51	78	114	114	114	114
Minuteman R&D	--	--	150	600	700	800	900 c/
Minuteman Mobile	--	--	--	--	50	100	100
Polaris	80	96	144	288	480	560	656
Total ICBM/Polaris	122	222	507	1,137	1,479	1,700	1,887
Other							
Quail	224	392	392	392	392	392	392
KC-135	400	440	520	620	640	640	640
KC-97	600	460	340	240	120	--	--
RB-47	45	45	45	45	--	--	--
RC-135	--	--	3	13	23	23	23
Alert Force Weapons d/							
No. of Weapons	1,390	2,350	2,450	3,050	3,440	3,870	4,180
Megatons	1,530	2,750	3,300	4,350	4,740	5,130	5,450

a/ Numbers of aircraft and missiles are derived by multiplying authorized squadron unit equipment by the numbers of squadrons. They do not include R&D, Combat Training Launch or maintenance pipeline missiles or command support aircraft. Effective 1 August 1961, approximately 50% of the bombers will be on 15 minute ground alert. ICBM numbers represent operational launchers. Numbers of Polaris missiles represent the total number of missiles in operational submarines. Approximately 67% of these submarines will be on station or at sea. The table excludes 17 Regulus missiles in operational submarines from end-FY 61 to end-FY 64 and 5 at end-FY 65.

b/ This difference is a consequence of the difference in recommended B-52 forces

c/ 1,000 by end-FY 68, 1,100 by end-FY 69, and thereafter.

d/ Bombers have flexibility in choice of weapons and yields. For purposes of this comparison, it was assumed that B-52's carry [redacted] bombs, plus air-launched missiles.

The estimated Total Obligational Authority required to procure and operate these forces over this period is shown in the following table. The difference between the Total Obligational Authority required to finance the forces I am recommending and that required to finance the forces recommended by the individual Services is shown on the second line. Over the five years, 1963-67, the cost of the aircraft and missiles recommended by the Air Force and the Polaris recommended by the Navy exceeds the cost of the forces I am recommending by approximately $10 billion. As will be shown later in this paper, the extra capability provided by the individual Service proposals runs up against strongly diminishing returns and yields very little in terms of target destruction. In my judgement, it is an increment not worth the cost of $10 billion over the five year period.

	Total Obligational Authority						
	FY 62	FY 63	FY 64	FY 65	FY 66	FY 67	FY63-67
	(Billions of Dollars)						
Secretary of Defense Recommendations	9.3	8.9	8.0	5.6	4.7	4.1	31.3
Service Proposals over Secretary/Defense	+.6	+1.5	+1.6	+3.0	+2.2	+1.4	+9.7

The forces I am recommending for procurement in FY 1963 are compared with the recommendations of the Service Chiefs in the following table. The numbers represent operational aircraft or missiles.

	Secretary of Defense	Initial Recommendations of Chiefs				JCS 9-11-61 Recoms. e/
		Chairman JCS	Army	Navy & USMC	Air Force	
B-52 Aircraft	0	0	0 b/	0 b/	45 a/	45
Skybolt	92	92	0	0	92	92
KC-135 c/	100	100	100	100	120	100
Titan	0	18	0	0	18	18
Minuteman H&D	100	300 d/	100 d/	100 d/	600	300
Minuteman Mobile	50	50	0	0	50	50
Polaris	96	96	96	160	0	128

a/ 45 B-52's recommended by the Air Force for 1962 procurement.

b/ The Chief of Staff, USA, agrees "to a limited procurement of the system to minimize engineering and economic risks." The CNO and Commandant, USMC, believe "research and development should continue", and "budgetary planning should proceed, but the decision to allocate substantial funds for production should be delayed . . .".

c/ The Secretary of Defense, along with the Chief of Staff, USA, the CNO, and Commandant, USMC, recommend a total strength of 640 aircraft; the CJCS recommends 760, the Chief of Staff, USAF, 800. In each case, command support aircraft would be in addition to the numbers shown.

d/ These recommendations are for "at most" the stated number of missiles.

e/ During a discussion between the Secretary of Defense and the Chiefs, on September 11, 1961, they stressed their concern about the reduction in our nuclear capability as the B-47's were phased-out. The Secretary of Defense therefore added 5 Wings of B-47's to his recommendation for FY 1963 and FY 1964, bringing it to the level shown on page 2.

The aircraft and missiles recommended for procurement in FY 1963 by the Air Force and the Polaris submarines recommended for procurement in FY 1963 by the Navy would cost approximately $3.1 billion more to buy than the aircraft and missiles I am recommending. Of this, approximately $2 billions would require funding in FY 1962 and FY 1963.

As well as these forces, I will recommend at a later date that the Air Force be authorized to procure and operate a secure command and control system for SAC. Except for 20 KC-135's which will be available for use as airborne command posts, the cost of this system has not been included in the figures on page 3.

II. General Basis for Force Level Recommendations

The forces I am recommending have been chosen to provide the United States with the capability, in the event of a Soviet nuclear attack, first, to strike back against Soviet bomber bases, missile sites, and other installations associated with long-range nuclear forces, in order to reduce Soviet power and limit the damage that can be done to us by vulnerable Soviet follow-on forces, while, second, holding in protected reserve forces capable of destroying the Soviet urban society, if necessary, in a controlled and deliberate way. With the recommended forces, I am confident that we will be able, at all times, to deny the Soviet Union the prospect of either a military victory or of knocking out the U. S. retaliatory force. If the most likely estimates of Soviet forces prove to be correct, the forces I am recommending should provide us a capability to achieve a substantial military superiority over the Soviets even after they have attacked us.

The recommended forces are designed to avoid the extremes of a "minimum deterrence" posture on the one hand, or a "full first strike capability" on the other. A "minimum deterrence" posture is one in which, after a Soviet attack, we would have a capability to retaliate, and with a high degree of assurance be able to destroy most of Soviet urban society, but in which we would not have a capability to counter-attack against Soviet military forces. A "full first strike capability" would be achieved if our forces were so large and so effective, in relation to those of the Soviet Union, that we would be able to attack and reduce Soviet retaliatory power to the point at which it could not cause severe damage to U. S. population and industry.

We should reject the "minimum deterrence" extreme for the following reasons:

a. Deterrence may fail, or war may break out for accidental or unintended reasons, and if it does, a capability to counter-attack against high-priority Soviet military targets can make a major contribution to the objectives of limiting damage and terminating the war on acceptable terms;

b. By reducing to a minimum the possibility of a U. S. nuclear attack in response to Soviet aggression against our Allies, a "minimum deterrence" posture would weaken our ability to deter such Soviet attacks.

On the other hand, we should reject the attempt to achieve a "full first strike capability" for the following reasons:

a. It is almost certainly infeasible. The Soviets could defeat such an attempt at relatively low cost. For example, we do not now have any prospect of being able to destroy in a sudden attack Soviet missile submarines at sea. Nor would we be able to destroy a sufficiently high percentage of a large hard and dispersed ICBM force.

b. It would put the Soviets in a position which they would be likely to consider intolerable, thus risking the provocation of an arms race;

c. It would be very costly in resources that are needed to strengthen our theatre forces.

The forces I am recommending will provide major improvements in the quality of our strategic posture: in its survivability, its flexibility, and its ability to be used in a controlled and deliberate way under a wide range of contingencies.

Target Destruction Requirements

The following list of high priority targets (aim points) in the Soviet Union has been derived from studies performed in June 1961 by the Staff of the Net Evaluation Subcommittee, under the direction of Lieutenant General Thomas Hickey. (The estimates have been rounded to the nearest 50 in each category to avoid a misleading impression of accuracy.)

	End-Fiscal Year	
	1965	1967
Urban-Industrial Aim Points	200	200
Bomber Bases	150	150
Support Airfields	50	50
Defense Suppression	300	300
Nuclear Storage and Production	50	50
Naval and Submarine Bases	50	50
Soft IRBM Sites (4 missiles per site)	100	100
Soft ICBM Sites (2 missiles per site)	100-300	50-200
Hard ICBM Sites (1 missile per site)	200-500	400-1100
Total	1200-1700	1350-2200

There are inevitably uncertainties, especially about details, when looking so far into the future. However, taken as a whole, I am satisfied with this target system as a basis for force planning.

The 200 Urban-Industrial targets and the 150 bomber bases have the highest priority in the sense of required degree of assurance that we can destroy them. The capability to destroy the Urban-Industrial targets is our power to deter attacks on our own cities. The Bomber Bases contain the part of the Soviet Forces that can cause us the most damage if not attacked, and also the part most vulnerable to attack. In the event of thermonuclear war, it is important that we destroy the maximum possible number of Soviet long range bombers. The 150 targets listed here represent a fairly generous allowance for this purpose. They include about 50 bases now known or estimated to be supporting long-range air operations, about 60 now known or estimated to be supporting light bomber operations, most of which would be usable as recovery bases for the long-range bombers, and about 30 staging bases on which the medium bombers depend for range enough to reach the United States.

However, the other targets are also potentially important and worth attacking. The Supporting Airfields (potential recovery and dispersal bases), Nuclear Storage and Production sites, and Naval and Submarine bases all can support delivery of nuclear weapons on the United States. The IRBM sites represent a threat to our Allies and our theatre forces, and are most economically attacked by a system such as Minuteman. The Defense Suppression targets, air defense control centers, interceptor bases, and surface-to-air missile sites, can be effectively attacked by the air-launched missiles Hound Dog and Skybolt. Their destruction would drastically reduce the defense opposition faced by our manned bombers. The number 300 shown here is probably a generous allowance for the purpose. For example, SAC is now estimating a requirement to destroy 160 defense suppression targets in 1968.

The size and basing (i.e. degree of hardening and dispersal) of the Soviet ICBM force in 1965 and 1967 is now a matter of considerable uncertainty. Everything we know about the Soviet long-range nuclear delivery posture to date suggests that the most likely configuration for first-generation ICBM sites will be 2 missiles per site and soft. Such sites would present attractive targets for our forces. However, hard and dispersed basing for their next generation of ICBM's would be such a logical choice for the Soviets that the possibility must be considered reasonably likely even though there is no evidence now to suggest that the Soviets are hardening their missiles.

There are also uncertainties about the performance of our forces in striking back after a Soviet attack--uncertainties associated with the weight and effectiveness of possible Soviet attacks, the ability of our forces to survive under attack, the reliability of our missiles, and the ability of our forces to penetrate Soviet defenses. But these uncertainties are not unbounded. One can place reasonable quantitative limits on them and estimate the effectiveness of our forces under alternatively optimistic and pessimistic assumptions.

This is what has been done in the following analysis. The survival reliability, and penetration factors used are all based on the general assumption that the war begins with a well planned and well executed Soviet attack, with limited warning, against our forces in a state of normal peacetime alert, and that we are hitting back after being attacked. Thus the following estimates do not represent maximum capabilities under the most favorable circumstances. For example, they exclude cases in which we strike first, or cases in which we are attacked during a period of tension and alert. These cases have been excluded because we are testing the adequacy of our forces, and therefore must look at unfavorable circumstances.

Within the general assumption of a well planned Soviet attack, optimistic, median, and pessimistic survival, reliability, and penetration factors have been chosen to reflect the range of uncertainty. It is possible to imagine outcomes lying outside this range, but their likelihood appears small. The optimistic factors represent favorable, but attainable performance. The great weight of likelihood appears to be between the optimistic and median cases. The combination of all of the pessimistic factors describes a very unfavorable and relatively improbable case. For example, it is assumed that in 1967, only 1-1/4 per cent of the manned bombers reach the bomb release line and 90 per cent of the Titans and 70 per cent of the fixed Minuteman missiles are destroyed before launch. These factors were chosen to produce an answer to the question "What happens if everything goes badly"? (The details of the assumed factors, together with an explanation of their choice can be found in Annex 1 to this Appendix.)

The pessimistic factors do not include an allowance for attrition by Soviet anti-ICBM defenses. We recognize that the Soviets do have a large R&D program in this area. However, we are pursuing a vigorous program of development of penetration aids (decoys and multiple warheads) and we expect to be able to penetrate Soviet defenses in this period. Moreover, if attrition by Soviet ICBM defenses appears at all likely, we will be able to compensate for it in large measure by concentrating our forces on the top priority targets.

The following results are shown in terms of expected percentages of the targets or value in each category destroyed. In the case of Urban-Industrial Floor Space (and Urban Blast Fatalities), the estimates are of damage to the contents of the 170 largest cities (down to a population

of 90,000) which contains approximately 80 per cent of the total industrial floor space of the Soviet Union and approximately 50 million out of a total of 210 million people.

The estimates of total population fatalities are percentages of the Soviet total. The "Unsheltered" case corresponds to the effects expected in a population without extensive civil defense preparation, but taking advantage of what shelter is normally available. The "Sheltered" case corresponds to fallout shelter for 40 per cent of the urban population and 20 per cent of the rural. The "At Least" reflects the fact that the estimates do not include fallout from attacks on isolated military targets. (The effects on surrounding cities of attacks on naval bases are included in the estimates.)

The assumed number of Soviet ICBM sites varies between the optimistic cases (in which the low end of the range is used) and the pessimistic cases (in which the high end is used). Therefore, the percentages shown should not be interpreted as representing fractions of the same numbers.

Two forces and two years are shown on pages 9 and 10.

I. Those forces I am recommending for End-Fiscal Year 1965 and 1967, and

II. Those forces proposed by the individual Services (though not jointly by the JCS) for the same years.

The calculations suggest that either force would provide us with a powerful capability to carry out the objectives mentioned earlier. However, as I indicated earlier, the extra capability provided by the individual Service proposals runs up against strongly diminishing returns and yields very little in terms of extra target destruction.

Moreover, the theatre forces were not included in these calculations, though SIOP '62 includes about 270 alert aircraft and missiles from these forces. On the other hand, with the exception of the defense suppression targets, no targets in China or the other satellites were included. However, we do not now expect China to develop a significant long range nuclear delivery force in the time period under consideration. If she does, and a change seems indicated, there will be time for us to increase our forces appropriately.

COMPARISON OF TARGET DESTRUCTION CAPABILITIES OF ALTERNATIVE FORCES END FISCAL YEAR 1965

	Percent Expected Kill					
	Optimistic		Median		Pessimistic	
	I	II	I	II	I	II
Population and Industry						
Urban-Industrial Floor Space (or Urban Blast Fatalities)	88	88	80	80	69	69
Total Population Fatalities,						
Unsheltered, at least	43	43	33	33	25	25
Partly Sheltered, at least	35	35	26	26	20	20
Military Targets						
Bomber Bases	99	99	88	93	58	80
Support Airfields	97	99	52	76	7	37
Defense Suppression	76	87	38	38	7	7
Nuclear Storage & Production	96	98	69	69	6	5
Naval & Submarine Bases a/	98	98	62	62	7	7
Soft IRBM Sites	96	100	45	80	5	5
Soft ICBM Sites	99	100	45	88	14	59
Hard ICBM Sites	71	75	16	19	1	1

Alert Force Weapons Summary	Alert Force Total		Delivered on Target					
			Optimistic		Median		Pessimistic	
	I	II	I	II	I	II	I	II
Weapons b/	3446	4059	2482	2993	1107	1487	399	691
Megatons	4780	5600	3386	4112	1560	2077	574	951

a/ Successful attack would render the bases inoperable but, of course, would leave untouched missile submarines at sea.

b/ There are 1,785 Alert Weapons and 2,048 Alert Megatons in SIOP-62.

COMPARISON OF TARGET DESTRUCTION CAPABILITIES OF ALTERNATIVE FORCES END FISCAL YEAR 1967

	Percent Expected Kill					
	Optimistic		Median		Pessimistic	
	I	II	I	II	I	II
Population and Industry						
Urban-Industrial Floor Space (or Urban Blast Fatalities)	84	84	79	79	68	68
Total Population Fatalities, Unsheltered, at least	37	37	32	32	25	25
Partly Sheltered, at least	30	30	26	26	19	19
Military Targets						
Bomber Bases	98	99	94	99	81	99
Support Airfields	99	99	72	96	7	78
Defense Suppression	88	95	50	67	9	10
Nuclear Storage & Production	95	95	46	79	0	31
Naval & Submarine Bases	97	97	54	54	12	12
Soft IRBM Sites	99	99	85	92	2	96
Soft ICBM Sites	99	99	82	97	43	97
Hard ICBM Sites	54	77	7	25	1	5

Alert Force Weapons Summary	Alert Force Total		Delivered on Target					
			Optimistic		Median		Pessimistic	
	I	II	I	II	I	II	I	II
Weapons	4180	5890	3028	4578	1508	3826	638	1912
Megatons	5450	7620	3417	5295	1726	3320	740	2272

Relationship of Recommended Force to Soviet Force

The direct comparison of force numbers as such is less important than the ways in which we base and operate our forces. For example, we could out-number the Soviets three to one in ICBM's and still have an inadequate deterrent posture if our missiles were soft and concentrated. However, the force increments which I am recommending are all in a protected mode, hard and dispersed, or mobile.

Given a well protected posture, relative numbers are still important for several reasons:

a. A large Soviet superiority in ICBM's could overcome the protection afforded our ICBM's by hardening and dispersal and make it possible for the Soviets to destroy most our fixed-base forces in a missile attack.

b. A large Soviet superiority in missiles would worsen the outcome of a thermonuclear war.

c. A large Soviet superiority in ICBM's would be likely to have a very unfavorable impact on Soviet aggressiveness in the cold war.

Therefore, we have no intention of letting ourselves be seriously out-numbered in ICBM's by the Soviet Union.

How many ICBM's will the Soviet Union have in the mid-1960's? The answer is intrinsically uncertain because it is still subject to Soviet decisions which may not yet have been made, and which will be influenced by our own decisions. However, we do know a good deal about their posture today. We are able to estimate that the Soviets now have from 25 to 50 operational ICBM launchers. Their ICBM build-up appears to be deliberately paced, not a crash program. On the basis of what has been observed so far, [redacted] the Soviets will have from 200 to 400 ICBM's in mid-1964. But even if the most pessimistic (Air Force) estimates prove to be valid, in mid-1964 we will still equal the Soviet Union in ICBM's at about 850 each. This will be combined with a substantial U. S. superiority in all other categories of long range nuclear delivery systems.

Moreover, if the Soviet Union exceeds our most pessimistic estimates and builds up a much larger force by 1965 or 1967, we are confident that we will find out about it in time to expand our program appropriately. As a hedge against this unlikely possibility, we are expanding our Minuteman production capacity to over 60 missiles a month. When this is done, the lead time for hard and dispersed Minuteman ICBM's will be about 26 months. Therefore, we will have a great deal of flexibility to expand the program at a later date if it should prove to be necessary to do so.

In other categories of long range nuclear delivery systems, we will have a substantial superiority. Soviet long range aviation now comprises about 1,000 medium bombers (or tankers), and about 150 heavy bombers (or tankers), equipped with air-to-surface missiles. The heavy bomber category is far more significant than the medium bomber category. We will have 630 heavy bombers, plus almost as many tankers. Because the Soviets would have to use some of their bombers as tankers, this will mean an effective U. S. heavy bomber force approximately four or more times as large as that of the Soviets.

The USSR now has about 20 conventionally powered submarines which are probably capable of launching short-range ballistic missiles (approximately 150-300 nautical miles), though not while submerged. By 1963, the Soviets could probably introduce nuclear powered submarines with a submerged launch system employing medium range ballistic missiles. There is no evidence to suggest that the Soviets have a program approaching our Polaris program, either in size or quality.

III. Basis for Recommendations on Specific Weapon System Choices

Within the general quantitative requirements for additional long range nuclear delivery systems, suggested by the above considerations, the following are the reasons for my specific program recommendations:

B-52's

The Air Force has proposed the procurement of 52 additional B-52's (45 wing unit equipment plus 7 command support) with FY 1962 funds. The cost of procuring and operating these aircraft, with (30) associated tankers and Skybolt missiles, for a 5 year period would be about $1.4 billions. My reasons for recommending against this procurement are the following:

a. We already have a large force of intercontinental bombers. In mid-1965 it will comprise 630 B-52's, 80 B-58's and, if we do not decide to phase them out sooner, 225 B-47's. The alert B-52's and B-58's alone will be able to carry about 1500 bombs plus 1,000 air launched missiles. The alert B-47's will be able to carry another 200 bombs.

b. An examination of the target system shows that most targets, and all of those of the highest priority, are best attacked by missiles; first, because the targets are soft, fixed, and of known location, and therefore vulnerable to missile attack; second, in the case of the military targets, the missiles reach their targets much faster than do bombers, and therefore would be more effective in catching enemy bombers and missiles on the ground; and third, our missile systems have a much greater survival potential and endurance in the wartime environment, and therefore can be used with more control and deliberation.

c. The bombers are soft and concentrated and they depend upon warning and quick response for their survival under attack. This is a less reliable means of protection than hardening and dispersal or mobility. Moreover, it means that the bombers must be committed to attack very early in the war and cannot be held in reserve to be used in a controlled and deliberate way.

d. Bombers are expensive. For the same cost (in total five year system costs) as a wing of B-52's with tankers and Skybolts, we can buy 250 Minutemen hardened and dispersed, or 6 Polaris submarines.

GAM-87 Skybolt

Air defense studies indicate that the most effective means for penetrating air defenses are low altitude penetration and defense suppression, both of which are more effective than attempting to outrun the defenses at high altitude. The Skybolt is intended to provide a major improvement in the penetration capability of the programmed B-52 force at a relatively low cost. The 800 Skybolt missiles on alert bombers ought to be able to overcome almost any Soviet defense and make it possible for the bombers to go into their targets and attack them with gravity bombs. The total cost for 1150 Skybolts for the period FY 1962-1967 is estimated to be $1.6 billion.

KC-135

Twenty-seven squadrons of KC-135's (540 operational aircraft) have been procured through FY 1962. Air Force studies indicate that 800 KC-135's are required, with most of the increment going to support the B-52 force. (About 70 KC-135's are required to support TAC, 20 for command posts, and 80 to support the B-58 fleet.) However, beyond approximately 470 tankers, more KC-135 are not required to enable the B-52's to reach their targets. Rather, the basis for the Air Force stated requirement for more tankers is to improve the ability of the bombers to penetrate enemy defenses by allowing them to chose more favorable routes or to fly more at low altitude. Improved penetration capability achieved this way and Skybolt for defense suppression are not both required. Moreover, Skybolt appears to be more effective. Therefore, in my judgement, the expenditure of approximately $1.1 billions to procure 160 extra tankers and operate them for 5 years is not required. The force of 640 tankers which I recommend will provide 470 to support the B-52's; 80 for the B-58's; 70 to support TAC; and 20 for command posts.

Titan II

The 18 extra Titan missiles proposed by the Air Force would cost approximately $372 millions to procure and operate for 5 years. The Titan II has a substantially larger payload than Minuteman. It will be able to deliver [redacted] rather than [redacted] warheads now programmed for Minuteman. But the total system cost of a Titan II is about four times that of a Minuteman hard and dispersed. At equal cost, four Minutemen are to be preferred to one Titan because, first, they are less vulnerable, and second, they provide more target coverage.

Moreover, we already plan to have a substantial force of Atlas and Titan which should be adequate for those special purposes requiring large payloads. Therefore I do not recommend procurement of additional Titans.

Minuteman Hard and Dispersed

Minuteman H & D has the lowest system cost of any of our ICBM's at about $5.5 millions per missile in 5 year costs. It is clearly the preferred way to acquire more ICBM's. However, I am not recommending that we procure more than 100 in FY 1963 because our over-all force requirements do not make it necessary. The difference between the Air Force proposed procurement of 600 missiles in FY 1963 and the 100 I am recommending, in 5 year system costs, is approximately $2.75 billions.

Mobile Minuteman

Mobile Minuteman would serve as a hedge against our being heavily outnumbered by the Soviet ICBM force, a low Soviet CEP, or unexpected failure of the hardened Minuteman to meet estimated blast resistance--conditions lowering the survival potential of hard and dispersed Minuteman. It would also serve as a hedge against unexpected advances in Soviet anti-submarine warfare capability that would reduce the security of Polaris. However, Mobile Minuteman may have troubles of its own, including wartime fallout (which may reduce substantially its wartime endurance), peacetime sabotage and espionage and operational problems associated with the transport of explosives and attempted random operation. Moreover, if we were to complete the Air Force recommended program of 300 Mobile Minutemen, Mobile Minuteman would cost about 2.5 times as much per missile as Minuteman hard and dispersed.

Therefore, we are not yet certain that Mobile Minuteman will be required. The action I am recommending is in the nature of lead time reduction on the missile production program. If the combination of contingencies favoring Mobile Minuteman does not occur, I shall reconsider the decision and recommend cancellation of the production program.

Polaris

This system has the most survival potential in the wartime environment of any of our long range nuclear delivery systems. Polaris missiles do not have to be launched early in the war, they can be held in reserve and used in a controlled and deliberate way to achieve our wartime objectives. For example, Polaris is ideal for counter-city retaliation. However, as the calculations shown above indicate, the force already programmed is large and can cause great damage to the population and industry of the Soviet Union. This reduces the urgency

of more Polaris missiles. Consequently, I recommend that we procure 6 more Polaris submarines in FY 1963. The cost, on a 5 year basis, of the 6 submarines will be about $930 millions less than the cost of the 10 submarines proposed by the Navy.

APPENDIX I

ASSUMED OPERATIONAL FACTORS FOR 1965 AND 1967 TARGET DAMAGE CALCULATIONS

All assumptions are characterized alternatively as Optimistic, Median, or Pessimistic.

I. Assumed Soviet ICBM Force

	Optimistic		Median		Pessimistic	
	1965	1967	1965	1967	1965	1967
Number of:						
ICBM's	400	500	750	1000	1100	1500
Soft Sites (3 psi)	100	50	200	125	300	800
Hard Sites (300 psi)	200	400	350	750	500	1100
Yield	7MT	10MT	7MT	10MT	7MT	10MT
CEP	1 n.mi.	.8 n.mi.	.7 n.mi.	6 n.mi.	.5 n.mi.	.5 n.mi.
Reliability	.7	.75	.75	.8	.8	.85

The Soviets are assumed to apply their forces against ours in a roughly optimal fashion. Thus, for example, Titan I will have a considerably lower survival rate than Atlas F of equal blast resistance because the concentration of missiles makes it a more attractive target. Only the effects of a Soviet missile attack are included in our force survival rates. It is assumed that we launch our surviving missiles before Soviet bombers arrive. The validity of this assumption does depend on our having a survivable high level command and control system.

II. Assumed Survival, Reliability, and Penetration Factors

The probability of a missile or aircraft delivering its weapon to the target can be thought of as the product of three factors:

Survival Rate under enemy attack or SR,

Reliability Rate or RR,

Penetration Rate through enemy defenses or PR.

For any given Soviet force level, the Survival Rate of our forces will vary with our force size. The forces proposed by the individual Services will therefore have higher survival rates than the forces recommended by the Secretary of Defense because they are larger. In those cases in which they differ, the Survival Rates associated with the forces I am recommending are designated by (I), those associated with the individual Service proposals, by (II).

The assumed factors are shown in the tables which follow. To avoid a misleading impression of spurious accuracy, all factors have been rounded to the nearest .05. An explanation of the basis for the assumptions follows the tables.

Table I - Assumed Survival, Reliability and Penetration Factors, by Weapon System, End-FY 1965

	Optimistic	Median	Pessimistic
Alert Bombers			
SR	1	.50	.10
RR	.95	.90	.90
PR	.75	.50	.25
Yield/CEP		[redacted]	
Atlas D (Soft)			
SR	.10	.05	.05
RR	.80	.70	.55
PR	1	1	1
Yield/CEP		[redacted]	
Atlas E [redacted]			
SR	.20	.20	.10
RR	.80	.70	.55
PR	1	1	1
Yield/CEP		[redacted]	
Atlas F [redacted]			
SR	1	.60	.30
RR	.80	.65	.50
PR	1	1	1
Yield/CEP		[redacted]	
Titan I [redacted]			
SR	.50	.30	.10
RR	.80	.65	.50
PR	1	1	1
Yield/CEP		[redacted]	
Titan II [redacted]			
SR	1	.70	.40
RR	.85	.65	.50
PR	1	1	1
Yield/CEP		[redacted]	
Minuteman (Avg. of R&D & Mobile)			
SR(I)	1	.75	.5
SR(II)	1	.85	.70
RR	.85	.65	.50
PR	1	1	1
Yield/CEP		[redacted]	
Polaris A-3			
SR	1	1	1
RR	.75	.60	.50
PR	1	1	1
Yield/CEP		[redacted]	
Bound Dog on Alert B-52's			
SR	1	.50	.10
RR	.75	.75	.75
PR	.80	.70	.60
Yield/CEP		[redacted]	
Skybolt on Alert B-52's			
SR	1	.50	.10
RR	.70	.55	.40
PR	1	1	1
Yield/CEP		[redacted]	

Table II - Assessed Survival, Reliability, and Penetration Factors, by Weapon System, End-FY 1967.

	Optimistic	Median	Pessimistic
Alert Bombers			
SR	1	.50	.10
RR	.95	.90	.90
PR	.80	.50	.25
Yield/CEP	[redacted]		
Atlas D (Soft)			
SR	.10	.05	.05
RR	.80	.75	.70
PR	1	1	1
Yield/CEP	[redacted]		
Atlas E [redacted]			
SR	.10	.05	.05
RR	.80	.75	.70
PR	1	1	1
Yield/CEP	[redacted]		
Atlas F [redacted]			
SR	.15	.10	.10
RR	.80	.75	.70
PR	1	1	1
Yield/CEP	[redacted]		
Titan I [redacted]			
SR	.10	.05	.05
RR	.80	.75	.70
PR	1	1	1
Yield/CEP	[redacted]		
Titan II [redacted]			
SR	.30	.20	.10
RR	.85	.80	.70
PR	1	1	1
Yield/CEP	[redacted]		
Minuteman (Avg. of R&D and Mobile)			
SR(I)	.95	.65	.30
SR(II)	1	.85	.75
RR	.85	.80	.75
PR	1	1	1
Yield/CEP	[redacted]		
Polaris A-3			
SR	1	1	1
RR	.75	.75	.75
PR	1	1	1
Yield/CEP	[redacted]		
Hound Dog on Alert B-52's			
SR	1	.50	.10
RR	.75	.75	.75
PR	.80	.70	.60
Yield/CEP	[redacted]		
Skybolt on Alert B-52's			
SR	1	.50	.10
RR	.75	.70	.60
PR	1	1	1
Yield/CEP	[redacted]		

III. Basis for Assumed Operational Factors

No great precision can be claimed for these factors. The use of an optimistic-pessimistic range is intended to indicate the existence of uncertainty. However, the ranges can be taken to include all values having a substantial likelihood.

Alert Bomber Survival Rate

In the optimistic case, we receive tactical warning and act on it fast enough to launch all of the alert bombers. In the pessimistic case, for any of a number of possible reasons, 90 per cent of the alert bombers are caught on the ground. In the median case, half the alert bombers get off. This can be taken as an approximation to the results of a 25 per cent airborne alert, though in the case of an airborne alert, the fact that it is known which bombers will survive attack should make more efficient targeting possible.

Bomber Penetration Rate

The range .75 - .50 is roughly consistent with SAC estimates. The improvement to .80 in 1967 is associated with effective air defense suppression. The .25 pessimistic assumption describes a case in which the Alert Force has been mostly caught on the ground, in which only a small force survives, penetrates in an uncoordinated way, and without effective air defense suppression.

ICBM Survival Rates

These are explained by the assumed Soviet Forces.

Missile Reliability Rates

The optimistic numbers are Service estimates or design objectives. The pessimistic numbers are based on estimates made in WSEG Study No. 50.