TOP SECRET

ENCLOSURE 1

REPORT OF THE NET CAPABILITIES EVALUATION SUBCOMMITTEE

3 November 1954

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THE PROBLEM

To assess the net capabilities of the USSR, in the event of general war in mid-1957, to inflict direct injury upon the continental United States and key U. S. installations overseas, primarily in the initial phases of the war, during which all or most of the Soviet stockpile of nuclear weapons might be expended.

APPROACH TO THE PROBLEM

1. Assessing Soviet net capabilities to inflict injury upon the United States involves estimating the strength the USSR is likely to bring to bear in an attack and calculating the extent to which the force of the blow is likely to be reduced by U. S. defenses.

2. As directed, we have considered only those U. S. defense forces and weapons that are called for in presently approved programs and that seem likely to be in effective use as of mid-1957. In view of this fact and the fact that certain critical Soviet military capabilities are estimated to be changing rapidly as of mid-1957, the analysis presented in this report cannot be considered valid in any sense for any other period except mid-1957.

3. In the process of assessment, it has been necessary at many stages to assign concrete values to Soviet offensive capabilities and intentions or U. S. defensive capabilities, many of which are of an uncertain character and quantity when projected into the

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mid-1957 period. As a result the margin of error at almost every step in this assessment of net capabilities may be large -- possibly as much as 25 to 50 percent in respect to many key factors -- and the final answer is of course subject to substantial error or at least appreciable doubt.

4. In these circumstances, inherent in the problem presented because of its broad scope and its projection into the future, we have tried to give the most useful and realistic estimate possible by making and recording our findings as to the most probable value of critical factors at every stage. Throughout we have made our calculations with as much mathematical precision as possible but, recognizing that the information and estimates with which we are working seldom make such precision realistic, we have consistently rounded numerical values in the interests of simplicity.

5. While we often point out minimum and maximum values that might be assigned in each case and indicate that adoption of the upper or the lower limit values rather than the most probable value would make a great difference in the assessment, we have not tried to make alternative assessments based on minimum and maximum extremes. We feel that the cumulative bias, upward or downward, of a series of such extreme values would be tremendous and would result in a portrayal of a most unlikely situation. In this particular problem the net estimate would then show Soviet capabilities, if rated consistently in terms of maximum values, on such a magnified scale

that it would be folly for the United States to accept them as real and try to match them or, if rated consistently in terms of minimum values, on such a reduced scale that it would be extremely dangerous for the United States to accept them as real and allow U. S. defenses to drop to a parallel level.

6. The approach we have adopted has the advantage that our errors with respect to each of the successive factors considered are as likely to fall on one side of our finding of the most probable values as on the other — some erring in being above and some erring in being below the true situation — and therefore in a rough sense are likely to cancel one another out.

7. What we have then is an assessment built on a series of probabilities. It is likely to be in error in either direction. It is possible, if a series of factors have been erroneously weighted in the same direction, that the margin of error is very large. Nevertheless, we believe that it is the most reasonable assessment it is possible to make, in the time allowed and with the basic information now available, with respect to Soviet net capabilities to inflict direct injury upon the continental United States and key overseas installations in the event of general war in mid-1957.

DISCUSSION

PART I: SOVIET CAPABILITIES AND INTENTIONS

Probable Circumstances in Which the USSR Would Initiate General War in Mid-1957*

8. According to agreed national intelligence estimates, the USSR is unlikely deliberately to initiate general war through 1957, largely because of the West's greater war-making potential, larger stockpils of nuclear weapons, and superior capabilities for air delivery of nuclear weapons. It is also agreed that, nevertheless, the USSR would not be deterred from initiating general war if Soviet leaders came to believe that the security of the USSR was imminently endangered by the U.S. and its allies, particularly if they came to believe that the Western nations had decided to attack the USSR. In these circumstances, Soviet leaders would almost certainly try to strike the first blow.

9. The Soviet military establishment, reflecting an emphasis on massive ground, tactical air, and submarine strength, is clearly adapted to a continental strategy of seizing and holding key areas on the Eurasian land mass. It seems clear, however, that the USSR

* This analysis, based on estimates of Soviet capabilities and intentions appearing in agreed national intelligence, is drawn mainly from NIE 11-4-54, "Soviet Capabilities and Probable Courses of Action through mid-1959", approved by the Director of Central Intelligence and the Intelligence Advisory Committee on 14 Sep 54, and from SNIE 11-7A-54, "Soviet Gross Capabilities for Attacks on the U.S. and Key Overseas Installations through 1 July 1957", approved by the Director of Central Intelligence and the Intelligence Advisory Committee on 14 September 1954. NIE 11-4-54 is at Annex A and SNIE 11-7A-54 is at Annex B.

has been gradually giving greater weight to long-range forces and weapons, particularly to nuclear warfare capabilities, designed to permit the USSR to strike directly at its principal enemy, the U. S. Soviet strategic air, long-range submarine, guided missile, and nuclear weapons capabilities probably will have improved markedly by ~~by~~ 1957. Nevertheless, development of Soviet long-range military capabilities is not likely to have proceeded far enough by 1957 to permit the USSR to rely on decisively defeating the U. S. by direct attack on the continental U. S.

10. We believe that Soviet leaders would estimate that in event of Soviet initiation of general war:

a. The U. S. and UK would almost certainly undertake an immediate all-out strategic air offensive against the USSR employing nuclear weapons;

b. Initially the NATO forces under SHAPE would attempt to defend Western Europe as far forward as possible but could do so over an extended period against a full-scale Soviet buildup only if major reinforcements and logistic support were forthcoming from the U. S.;

c. Allied defensive capabilities in other Eurasian areas would be limited initially except that most of the Pacific offshore island chain could probably be successfully defended against Communist amphibious attack in the initial phase of the war;

d. If the allies could be ejected from most of the Eurasian land mass they would probably be unable to return in such strength as to threaten the Soviet Bloc seriously unless the USSR had first been critically weakened.

Basic Soviet Strategic Objectives and Concepts

11. The basic Soviet objectives in a general war probably would be to:

a. Protect from attack the war-making capabilities of the USSR in particular and the Soviet Bloc in general;

b. Cripple or neutralize insofar as possible the war-making capabilities of the chief enemy, the U. S.;

c. Drive the forces of the U. S. and its allies so far back from the center of Communist power that a successful counteroffensive would be difficult or impossible;

d. Add to the Soviet Bloc as much as possible of the war-making resources of Eurasia and deny these to the West.

12. Recognizing that the USSR cannot be certain of inflicting a swift and decisive defeat on the U. S. itself in the first phase of general war, Soviet leaders would probably initially pursue a more limited course; that is, preservation of Soviet war-making capacity and destruction or neutralization of U. S. and allied war-making capacity sufficiently to leave the Soviet Bloc in a position of relative superiority after the first phase of the war. We believe that Soviet leaders in attacking the U. S. and key overseas

installations would have the following major objectives:

a. To destroy swiftly or cripple U. S. capabilities for nuclear retaliation;

b. To deliver such an attack on urban, industrial, and psychological targets in the U. S. as would prevent, or at least hinder, the mobilization of the U. S. war potential and its projection overseas; and

c. To inflict such destruction on U. S. overseas installations as to hamper or prevent U. S. reinforcement and logistical support of overseas forces.

They would consider that these attacks could only be carried out with maximum effectiveness in the earliest stages of a general war. They would calculate, moreover, that if these attacks were reasonably successful in neutralizing U. S. ability to strike directly at the USSR and to reinforce U. S. and allied defenses overseas, the USSR could then overrun Eurasia with relative ease, neutralize the UK and Japan, and place itself in a favorable position for the ultimate defeat of the U. S.

13. In our view, Soviet leaders would recognize the overwhelming importance of blunting the retaliatory air blow that they expect would be directed at the USSR upon initiation of hostilities. They would probably consider that only through achieving a high degree of surprise could they expect, in 1957, to achieve the desired success in neutralizing U. S. and allied air power and naval power, as well as inflicting substantial damage on the U. S. We believe that, in order

to achieve as much surprise as possible, the USSR would probably be willing to delay the mobilization and assembly in forward areas of additional ground forces. Soviet leaders probably would calculate that if initial Soviet air offensives were successful, the vital U. S. ability to reinforce overseas defenses would be severely impaired and that this advantage would, on balance, make it worthwhile to delay bringing to bear the full weight of the Soviet ground offensive.

14. Because the U. S. and its allies will almost certainly retain a margin of superiority in nuclear weapons through 1957, the USSR probably would prefer a war, if one became necessary, in which nuclear weapons were not used. Nevertheless, the Soviet leaders would probably calculate that the U. S. would not permit itself to be deprived of its most powerful weapon in this period and would certainly retaliate against Soviet attack by a nuclear counteroffensive, whether or not the USSR had already used nuclear weapons. In any case, in view of the vulnerability of the USSR to U. S. nuclear attacks and the great advantage of the initiative in such attacks, we believe that the Soviet leaders would almost certainly feel that they could not risk leaving the initiative to the U. S. in this critical area of warfare. Equally important, we believe that they would consider it necessary to employ nuclear weapons to permit reduction of the retaliatory power of the U. S. and its allies. We therefore believe that the USSR would regard attacks employing nuclear weapons against U. S. and allied strategic installations and forces as a vital first

move in any war plan. We consider it almost certain that a portion of the Soviet nuclear stockpile would be employed against certain key U. S. installations and forces outside the continental U. S. Soviet leaders probably would not consider, however, that they would need more than a relatively small number of weapons to achieve sufficient success in the Eurasian land battles to permit Soviet forces to overrun or at least dominate Western Europe.

15. The main Soviet land campaign in the event of war would be against Western Europe because it is:

a. The area of chief allied strength outside the U. S. itself;

b. The best allied base area for offensive operations against the USSR; and

c. The area whose resources could most quickly and effectively be converted to Soviet use.

In our view other Eurasian land campaigns would be undertaken, either simultaneously or after the main assault in Western Europe, only insofar as other forces were available and could be committed without competing for resources needed in Western Europe.

16. Initially the USSR would employ its naval forces for:

a. Defense of the USSR against U. S. and allied carrier attacks;

b. Attack on U. S. and allied sea communications in immediate combat areas, i.e., Western Europe;

c. Longer range attack on U. S. and allied Atlantic and Pacific lines of communication primarily to prevent reinforcement of combat theaters; and

d. Submarine-launched guided missile attacks on coastal targets.

The Strategic Air Campaign

17. The primary initial Soviet objective in war would be to protect the USSR and preserve its war-making capacity against the crippling damage which might be inflicted by U. S. and allied air attack. The Soviet leaders would retain optimum air defense strength in the USSR, if necessary at the expense of the initial weight of their Eurasian campaigns. However, despite probable improvements in Soviet air defense by 1957, it is unlikely that Soviet leaders would regard the Soviet air defense system as adequate to prevent substantial numbers of attacking aircraft from reaching targets in the USSR. Therefore, the USSR would also give overriding priority to air attacks on U. S. and allied strategic air forces and installations, world-wide, including those in the Far East.

18. The allocation of long-range aircraft and nuclear weapons to particular areas and targets would be governed by the Soviet leaders' judgment as to where they would need to strike in order to achieve the maximum possible reduction in the retaliatory power and war-making capability of the West. We believe that nuclear weapons and long-range aircraft beyond those designated to strike at U. S.

and allied retaliatory power would be employed primarily to inflict as much damage as possible on urban-industrial targets in the U. S. Soviet leaders might calculate that even partial destruction of U. S. war-making capacity, together with the psychological effects of such attacks, would seriously hamper U. S. ability to fight the war and might even critically weaken U. S. will to fight.

19. Soviet leaders would probably recognize that their strategic air capabilities (including bases, long-range aircraft, inflight refueling, etc.) would have to be strained to the utmost and their long-range air forces probably almost entirely expended in order to strike an effective blow at continental U. S. targets in the face of U. S. air defenses as of mid-1957. Nevertheless, we believe that they would attempt such an attack because of the overriding importance of such targets, particularly U. S. retaliatory power, and the value of even partial success in these efforts. An additional consideration in favor of this course of action would be the probability that even partially successful attacks on the continental U. S. would indirectly support their Soviet ground campaigns through reducing NATO will to resist in Western Europe and interfering with U. S. ability to reinforce overseas theaters.

20. In our view the Soviet leaders would consider it unnecessary to attack industrial or urban centers in continental Western Europe, but we believe they would reserve a few nuclear weapons for such

attacks in case they should prove necessary as part of political and psychological warfare campaigns to end resistance in this area. We believe that there would be an allocation of nuclear weapons for attack on British air installations, ports, and other urban centers, along with heavy air attacks with non-nuclear weapons, to insure early achievement of the high-priority political and military objective of eliminating the UK from the war.

Soviet Resources for Attack on the U.S. and Key U.S. Installations Overseas*

21. In mid-1957, among the forces and weapons available for attacks on the U.S., the USSR would place chief reliance on its capability for overt military attack with nuclear weapons delivered by long-range aircraft. Soviet reliance on this form of attack stems from:

a. The limited capabilities of conventional naval forces, ground forces, and airborne forces against the continental U.S.;

b. The security difficulties inherent in the delivery of large numbers of nuclear weapons by clandestine means;

c. The insufficient development of other methods of delivery of nuclear weapons on a large scale;

d. The insufficient development of other weapons of mass destruction, or handicaps involved in their large-scale use; and

* This analysis is drawn mainly from SNIE 11-7A-64, "Soviet Gross Capabilities for Attacks on the U.S. and Key Overseas Installations through 1 July 1957", at Annex B.

g. The availability of far northern air bases, from which air operations against the U. S. are least susceptible to detection.

22. Nuclear Weapons.* The main limiting factor in Soviet capabilities as of mid-1957 will be the size of the Soviet stockpile of nuclear weapons.** There will probably be enough fissionable material available in mid-1957 to permit the fabrication of about 800 medium-yield nuclear weapons equivalent in explosive force of 20,000 to 100,000 tons of TNT, or on the average, 60,000 tons of TNT. (Hereafter we refer to this class of weapons as the 60 KT weapon.) The range of yields of weapons actually stockpiled could be very large, since by 1957 Soviet technological capabilities will probably permit production of weapons with yields as large as the equivalent of 10 million tons of TNT (10 MT) or as small as the equivalent of 500 tons of TNT ($\frac{1}{2}$ KT).

23. The USSR can build its stockpile around any combination of such weapons. Soviet military requirements will govern the

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* Throughout this assessment, the analysis of Soviet nuclear weapons capabilities is based on information and estimates provided by the Joint Atomic Energy Intelligence Committee and the Armed Forces Special Weapons Project. For the most part the information supplied by these agencies represents an updating and pinpointing of estimates published in NIE 11-3-54 (Limited Distribution), "The Soviet Atomic Energy Program to mid-1957", approved by the Director of Central Intelligence and the Intelligence Advisory Committee on 16 Feb 1954.

** In all of the generalizations presented herein about Soviet fissionable material and nuclear weapons, the margin of error is such that actual Soviet resources could be as low as one half or as high as twice the figures given.

actual allocation of fissionable material to various types of weapons. Nevertheless, even with thermonuclear reactions, which greatly multiply the force of the weapons, the larger bombs require more fissionable material. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

24. The Soviet stockpile in mid-1957 would probably contain a variety of types of weapons, but in this assessment we have simplified the problem of measurement and quantification by considering the stockpile to be entirely 5 MT, 60 MT, and 10 MT class weapons and considering these weapons to be distributed by types according to any formula indicated by Soviet military requirements. Within the 5 MT class, the USSR could have small-dimension weapons with a very low yield (about 1 MT) for clandestine operations, and we assume that they would have such weapons in 1957. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

** This ratio is a simplification of detailed information and estimates supplied by the Joint Atomic Energy Intelligence Committee and the Armed Forces Special Weapons Project.

3.3(b)(9), 6.2(a)

25. Aircraft. Soviet capabilities for air attacks on the continental U. S. will also be limited by the numbers and types of aircraft available in the Soviet long-range air force in 1957. The estimated operational strength of Soviet long-range aviation in mid-1957 is as follows:

	Mid-1957
TU-4 piston medium bomber	700
Type 39 jet medium bomber	650
Type 37 jet heavy bomber	50
TOTAL	1,400

All of these aircraft can carry small-yield or medium-yield nuclear weapons, and the Type 37 probably can carry a 10 Mt weapon.

26. In addition to these long-range aircraft, the USSR can attack most U. S. overseas installations with the IL-28 jet light bomber, now standard equipment in the Air Force of the Soviet Army, and with the similar Type 35 jet light bomber of Soviet Naval Aviation. The estimated operational strength of units employing these jet light bombers is as follows:

	Mid-1957
Air Force of Soviet	2,300
Naval Aviation	850
TOTAL	3,150

These aircraft can carry small-yield or medium-yield nuclear weapons.

27. The performance characteristics of these aircraft are described in great detail in agreed national intelligence estimate SNIE 11-7A-54, which is at Annex B. The range figures used in this assessment and presented here are based on maximum performance (eliminating most of the fuel reserve and disregarding other safety factors) rather than on normal U.S. military mission flight profiles, since Soviet operational plans for a war in 1957 would almost certainly call for stretching limited Soviet resources to the utmost and disregarding safety factors insofar as practicable.

28. The range of Soviet aircraft could be extended considerably above ordinary military mission levels by inflight refueling, provided that the USSR by mid-1957 creates a tanker fleet, modifies mission aircraft fuel systems, and conducts appreciable operational training in inflight refueling. Although we now have no intelligence that the USSR is actually employing this range-extension technique, no serious technical problems are involved, and the USSR probably will establish a tanker fleet of approximately 550 aircraft by mid-1957.* All or most of these tanker aircraft may be converted TU-4's scheduled to be phased out of the long-range air force in the 1954-1957 period as a result of the introduction of jet bombers. On one-way missions, with one inflight refueling, the combat range of the TU-4 and the Type 39 could be increased from approximately 3700 nautical miles to

* This estimate is made in NIE 11-4-54, "Soviet Capabilities and Probable Courses of Action through mid-1959", at Annex A.

approximately 5000 nautical miles, and the combat range of the Type 37 could similarly be increased from approximately 6000 nautical miles to approximately 8000 nautical miles.

29. The jet bomber aircraft have an additional performance capability in the event that the USSR should elect to commit them on one-way missions. By limiting fuel reserves — and limiting the amount of refueling, if this technique is employed — in such a way as to bring the aircraft over the target with only one hour of fuel remaining, the USSR could bring the Type 37 over the target at a maximum altitude of about 55,000 feet and the Type 39 at a maximum altitude of about 50,000 feet.

30. Bases. The areas most suitable geographically for launching air attacks against the U. S. are the Kola Peninsula base area, the Leningrad base complex, and the Chukotski and Kamchatka base areas in Northeast Siberia. Great circle routes from all these bases except the Leningrad complex initially avoid overflight of nations friendly to the U. S. and therefore are most advantageous for staging surprise attacks. The Leningrad complex could also be used in a surprise attack provided aircraft detoured the several hundred miles necessary to pass north of Scandinavia. Other base areas are too remote for optimum performance and strike patterns in attacks on the U. S. with the exception of the Baltic-East Germany base area, from which great circle routes to the U. S. pass over Western Europe or Scandinavia and where the security of preparations for a large operation would be comparatively low.

31. By 1957, the USSR could, by a major base-improvement effort, develop the capacity of the Kola, Leningrad, Chukotski, and Kamchatka areas sufficiently to permit staging through these areas alone approximately 1,000 long-range bomber aircraft in a single air operation against the U.S. This would probably be the maximum capability of the USSR in mid-1957.

32. In such a maximum effort against the continental U.S., even if refueling were employed and even though the forward bases were used for staging all aircraft, most of the aircraft would have to fly one-way missions in order to cover targets in various areas of the U.S. The Type 39 cannot reach the continental U.S. on a two-way mission from any of the Soviet forward base areas, even if refueled in flight. The TU-4 can only reach the Pacific Northwest area of the continental U.S. on a two-way mission from Soviet Siberian forward bases, even if refueled in flight. The Type 37, of which there will probably be 50 in operational units in mid-1957, has a substantial capability for two-way missions against the continental U.S., if refueled in flight, and could reach targets in any part of the U.S. except in the southeastern quarter of the country. On one-way missions, with inflight refueling, the TU-4 can reach targets in any part of the U.S. and the Type 39 can reach targets anywhere in the western and northeastern areas.*

* Maps in SNIE 11-7A-54, "Soviet Gross Capabilities for Attacks on the U.S. and Key Overseas Installations through 1 July 1957", at Annex B, illustrate in greater detail these capabilities of Soviet long-range aircraft.

33. Guided Missiles. The probable state of development of Soviet guided missiles is examined in detail in an agreed national intelligence estimate, which indicates that the USSR will not have an intercontinental guided missile in mid-1957.* It also indicates that, although the USSR can now have available an air-to-surface guided missile, the range of this missile would be so short for the next several years that the USSR probably would consider that nuclear weapons might be more effectively delivered directly by aircraft. The main types of guided missiles that could be available and sufficiently effective for Soviet offensive use in mid-1957, therefore, would be the improved V-1 missile, the subsonic turbojet pilotless aircraft, and the improved V-2 ballistic missile. All of these missiles are suitable for land-based use against U. S. forces and installations overseas. Either the improved V-1 or the pilotless aircraft also could be used for submarine-launched attacks on U. S. ports and coastal areas. These missiles could carry warheads accommodating small-yield or medium-yield nuclear weapons (up to 60 KT yield) by 1957, but their reliability to function properly is likely to be only 40-60 percent and the accuracy of all these missiles probably would be markedly inferior to that obtainable by either visual or radar bombing.

* This analysis, based on agreed national intelligence, is drawn mainly from NIE 11-6-54, "Soviet Capabilities and Probable Programs in the Guided Missile Field", approved by the Director of Central Intelligence and the Intelligence Advisory Committee on 5 October 1954. NIE 11-6-54 is at Annex C.

The Problem of Strategic Warning*

34. From the Soviet point of view the achievement of surprise in initial attacks is complicated by the danger of giving the U. S. and its allies strategic warning of Soviet intentions.** Soviet leaders will be extremely apprehensive — probably more apprehensive than the actual facts would warrant — that the U. S. might discover Soviet preparations for attack and promptly launch from encircling bases a preventive air attack on the USSR. The normal Soviet deep suspicion of U. S. motives and intentions would almost certainly have increased as a result of the heightened tension bound to exist in mid-1957 in the event that circumstances seem to Soviet leaders to require them to go to war, as we are obliged to assume in this assessment.

35. We believe that a Soviet initiation of general war by attacks on the U. S., its allies, or key overseas installations would almost certainly be preceded by heightened political tension. While such tension would in itself constitute warning that war was becoming more likely, the indications of Soviet preparations which would probably

* This analysis, based on agreed national intelligence, is drawn mainly from SNIE 11-8-54, "Probable Warning of Soviet Attack on the U.S. through mid-1957", approved by the Director of Central Intelligence and the Intelligence Advisory Committee on 14 September 1954. SNIE 11-8-54 is at Annex D.

** By "strategic" warning, we mean warning of enemy intentions received (through intelligence) before attacking forces reach the tactical defense system.

be obtained could be interpreted as evidence of preparations for defense or as part of a war of nerves. Therefore, Soviet behavior in a period of heightened political tension would not necessarily give specific warning of a Soviet intention to attack. Nevertheless, intelligence could probably give warning of the USSR's increasing war readiness and could probably chart the trend toward a period of maximum danger. This would almost certainly be true if, as we assume in this assessment, a major effort has been made to develop the bases, training and equipment of the Soviet long-range air force to a point where only minimum preparations would be required in advance of a large scale attack.

36. The USSR probably would sacrifice the advantages of full-scale mobilization, which would give the U. S. a generalized strategic warning as much as four to six months prior to D-day, and instead would begin the ground battle in Western Europe with only the forces currently stationed in East Germany. This ground battle would be planned to occur simultaneously or after the air attack on the continental U. S. and key overseas installations. Even so, the minimum preparations which the USSR would have to take to assemble its forces in East Germany in forward positions, to put them in a state of readiness to attack, and to provide support after the attack began would probably require about 15 days. We believe that warning of the probability of such attack could be given about one week in advance, but the period might vary from a few hours to as much as

10 days, depending on the seasonal patterns of Soviet military activity.

37. Soviet preparations to receive a retaliatory blow from allied air power would probably provide some indicators of Soviet attack. Minimum preparations would probably include the alerting of air defense forces and the civil defense organization, preparations of military units and installations for air defense, the dispatching of submarines to locate U. S. carrier forces, the evacuation of key personnel or even considerable segments of population from potential target areas, and some measures to increase Soviet ability to recuperate from nuclear blows. If these steps were taken, they would probably provide a warning period of as much as a week or 10 days, and, taken in conjunction with other indicators, would greatly increase the definiteness of any warning U. S. intelligence might be able to give.

38. Warning of the air attack on the continental U. S., if the forward base areas had already been improved as we must assume in this assessment, would depend almost entirely on indications of the staging of aircraft through the advanced bases. A reduced scale attack (50 - 100 aircraft) might stage through the forward bases with complete surprise, but preparation for a large-scale attack (500 - 1,000 aircraft) is likely to cause U. S. or allied intelligence to discover the movement of aircraft to the advanced bases. If U. S. or allied intelligence discover the movement of aircraft to the staging bases, warning of an impending attack could be given at least

six hours before take-off, or approximately twelve hours before attacking aircraft would reach any part of the U. S. and Allied tactical early warning radar screens. We believe this degree of warning would be almost certain if continuous radar, photographic, or other reconnaissance had been established within range of the Soviet forward air bases.

39. If U. S. overseas installations were to be attacked simultaneously, the additional preparations which would be necessary might not add significantly to the risks of detection. The long-range air arm would already be in a maximum condition of readiness and the readying of the IL-28 light bomber units for attacks on U. S. installations in Western Europe, the UK, and some parts of the Middle East, might be accomplished without serious additional risk of detection. Nevertheless, Soviet planners would have to reckon with the possibility that preparations for an all-out operation employing simultaneously around 2,000 bomb-carrying aircraft might give away the whole show.

40. The USSR would take great pains to compress warning time to the absolute minimum, but even so would probably in common prudence make the planning assumption that a large-scale attack on the U. S. and key U. S. overseas installations would afford the U. S. some strategic warning, ranging from a period of a few hours to several days, and would plan its attack accordingly.

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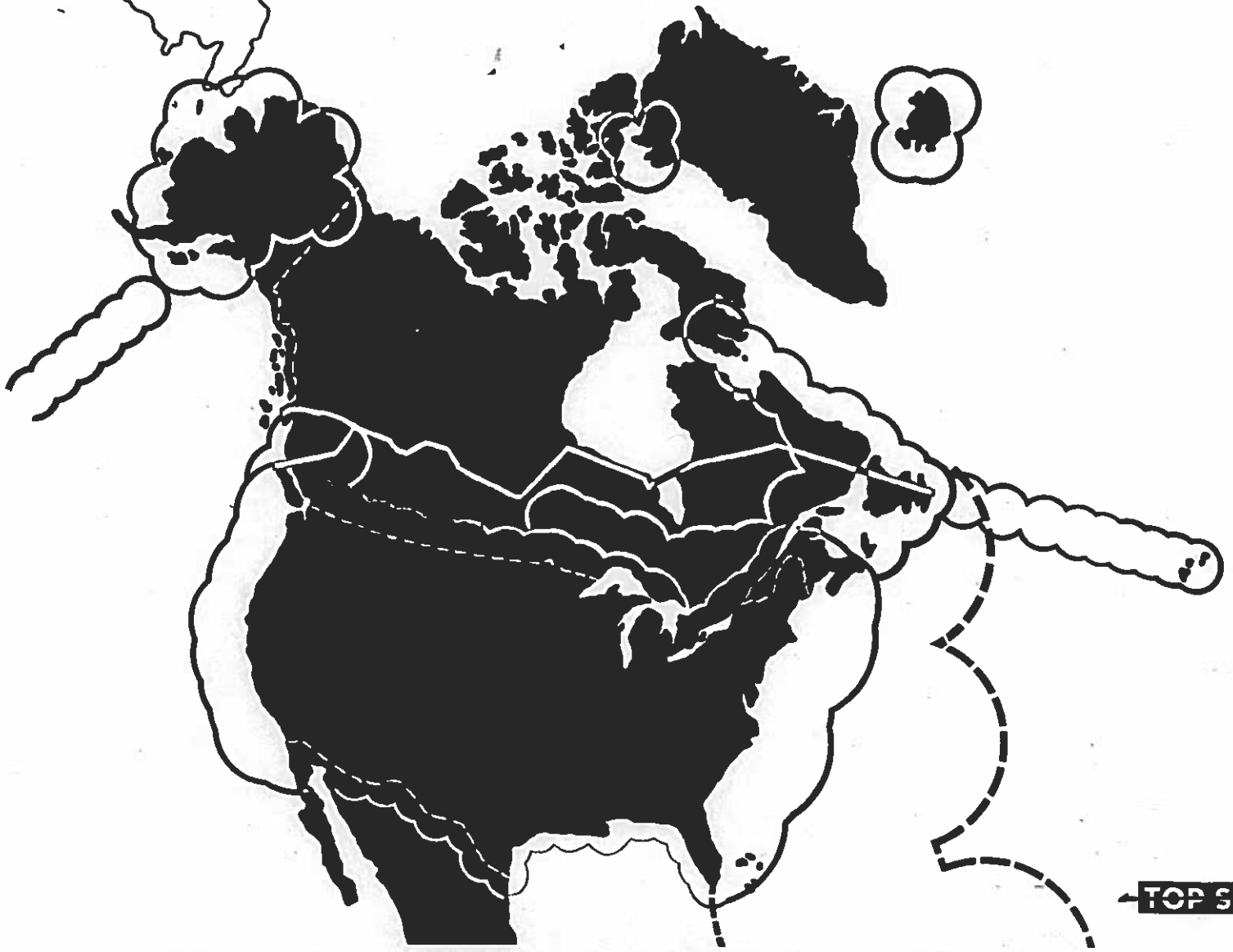
RADAR AND LOFAR PROGRAMMED MID- 1957



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Soviet Estimate of U. S. Defenses

41. Soviet leaders probably are able to get an accurate general impression of the character and effectiveness of the U. S. defense system from Soviet intelligence sources and from unclassified U. S. publications. Although they will probably not be confident of the completeness and precision of their evidence, Soviet planners probably would be aware of most of the developments affecting their chances of successful attack on the continental U. S. These U. S. defense developments programmed for the 1957 period and likely to be in effective operational use as of mid-1957, are examined in specific detail in a subsequent section of this assessment. In general they are the main elements of the U. S. defense system set forth in the Progress Report on the Status of Military Continental U. S. Defense Programs* and include (as of mid-1957):

a. A warning line across Central Canada (55°) and seaward extensions of airborne and shipborne warning radar, which together probably would give the U. S. early warning of an attack of any appreciable size when the bombers are about 750 nautical miles from U. S. borders. (This amounts to approximately one and one-half hours tactical warning of the approach of jet bombers to U. S. cities nearest the borders.)

* Department of Defense Progress Report to the National Security Council on Status of Military Continental U.S. Defense Programs as of 1 June 1954, issued by the Office of the Secretary of Defense, 25 June 1954, at Annex E. See in particular Table of Defensive Forces, page 7, and Map of Radar Coverage, page 24, of that Report.

b. The U. S. land-based prime radar system, including the Canadian-U. S. Northeast Air Command system in the Newfoundland-Labrador area, which provides contiguous coverage for ground-controlled interception out to a distance of about 50 - 150 nautical miles (the distance depending on altitude of aircraft observed) from U. S. borders and/or the northeast Canadian shoreline.

c. The U. S. coastal radar barriers, composed of picket ships, Texas Towers, and airborne early warning and control aircraft, which extend contiguous coverage for ground-controlled interception about 300 miles seaward from the U. S. Atlantic and Pacific coasts.

d. An Alaskan land-based radar system, which provides contiguous coverage for early warning and ground-controlled interception out to a distance of about 50 - 150 nautical miles from the Alaskan shoreline (the distance depending on the altitude of aircraft observed).

e. U. S. Air Force fighter interceptor forces assigned the mission of defense of the continental U. S., which total roughly in the neighborhood of 60 to 70 squadrons and 1700 to 1800 aircraft, all of them jet aircraft, most of them all-weather interceptors, and a number of them armed with air-to-air guided missiles.

f. The U. S. Army anti-aircraft system, which — in addition to conventional gun batteries — includes approximately 60 battalions of surface-to-air guided missiles (NIKE I) capable of inflicting very high losses on aircraft flying between 5,000 and 60,000 feet altitude within ranges of 25 nautical miles from the 23 defended areas, which include the most important cities of the U. S. and several U. S. heavy-bomber bases.

g. An effective anti-submarine sound surveillance network of shore-based, deep-water acoustic listening stations (LOFAR) in the Atlantic coastal area (not in the Pacific in 1957), which provides a high probability of detection of diesel-driven snorkeling submarines out to ranges of 150 - 300 nautical miles.

42. In very general terms this continental U. S. defense system as of mid-1957 will appear to the USSR to be capable of inflicting heavy losses on aircraft attacking the continental U. S. at altitudes between about 5,000 and 45,000 feet. Mainly because of deficiencies of the standard radars used for search, ground-controlled interception, airborne interception and fire-control, the entire defense system is not nearly so efficient at very high altitudes (50,000 feet and above) or at very low altitudes (500 feet to 5,000 feet). At very high altitudes, continuous tracking by search and control radar becomes difficult and interceptor aircraft performance becomes poor. At very low altitudes the range of search and control radar is severely limited by its "line of vision" characteristics and airborne radars

become increasingly ineffective because of "ground-clutter" or "sea-clutter" on the scope. Soviet planners are likely to know these general characteristics of the defense system, including the deficiencies of U. S. radars in operational use, through their intelligence sources, submarine reconnaissance of U. S. radar emissions, and Soviet experience with their own radar equipment. They may not, however, be certain that the U. S. does not have other undetected equipment that would overcome some of these deficiencies.

43. In overseas areas where there are key U. S. installations, Soviet planners would also know the general character of U. S. force deployments as well as local warning in defense systems as of mid-1957. They would anticipate much lower attrition in attacks against targets in these areas than against continental U. S. targets because of the much shorter distance from base to targets and the relatively lower state of development of local defenses.

Allocation of Nuclear Stockpile

44. Since the Soviet nuclear weapons stockpile is the main limiting factor in Soviet capabilities for military operations in mid-1957, the first step in Soviet planning for an attack on the U. S. probably would be an allocation of nuclear weapons to various areas of the world and various methods of attack. The objective would be to assign the maximum weight on targets in the continental

U. S. consistent with other essential requirements. 3.3(b)(3), 3.3(b)(9), 6.2(a)

3.3(b)(3), 3.3(b)(9), 6.2(a)

3.3(b)(3), 3.3(b)(9), 6.2(a) We believe the Soviet planners in mid-1957 would make an allocation of nuclear resources in accordance with this technique somewhat as follows:

ALLOCATIONS OF NUCLEAR WEAPONS

Attacks	Fissionable Material Units Equivalent to 60 KT Weapons	Percentage of Nuclear Stockpile
Air Attack on U.S.		
Submarine-guided missiles on U.S.		
Clandestine Attacks on U.S.		
TOTAL D-day Attack on U.S.		
Air Attack on U.S. Key Installations Overseas		
Submarine-guided missiles on U.S. Key Installations Overseas		
TOTAL D-Day Attack on U.S. Key Installations Overseas		
D-day attack on UK and Canada		
*Initial Reserve for: a) Reattack on U.S. b) Reattack overseas and in Eurasian land battles c) Attack on additional metropolitan targets in Eurasia (for political purposes)		
TOTAL		

3.3(b)(3), 6.2(a)

* A number of nuclear weapons would be recovered from abort aircraft scheduled for D-day attacks and would constitute an additional reserve equalling perhaps as much as 15-20% of the entire original stockpile.

45. The initial general reserve established in this allocation would have to be kept very small, because Soviet leaders would realize that an early, devastating blow on the continental U. S. would be virtually the only hope of Soviet victory. The comparatively small number of nuclear weapons available to the USSR in mid-1957, coupled with the limitations of the Soviet air force, makes it appear likely that the Soviets would try to do the whole job at once — that is, to attack the U.S. retaliatory forces and the urban-industrial structure of the U.S. simultaneously. Accordingly, the Soviets probably would expend almost all their nuclear stockpile, other than a reserve, at the earliest possible time after the initiation of hostilities — that is to say, within a period of a very few days.

46. The USSR would consider it a military necessity, nevertheless, to preserve a small number of nuclear weapons for reattack on selected targets, in case the margin of resistance either in the U.S. or in the Eurasian land battle seemed slim and military success might hinge on an actual military capability for limited reattack and/or the psychological warfare capability of giving the impression of reserve nuclear strength. The USSR would also feel it necessary to have a few weapons that could be expended on major urban industrial areas in Germany, France, Spain, Turkey, and Japan, for example, if necessary to give token backing to psychological warfare campaigns designed to neutralize these countries at an early stage of the war. A total of 80 weapons or 10 percent of the entire stockpile is probably an absolute minimum for these purposes.

47. This reserve would be supplemented by weapons recovered from aircraft which abort on long-range missions. Perhaps 50-80 percent of the aborting aircraft from the total long-range attack force could be recovered and -- since a 20-25 percent abort rate is anticipated on such attacks -- this recovery would provide a considerable additional reserve of nuclear weapons. The successful exploitation of this recovered reserve would, however, depend a great deal on whether or not the U.S. strategic air offensive succeeded in striking heavily at Soviet air bases and aircraft in the USSR and the Soviet Bloc generally during the first days of the war. Soviet planners, knowing as they must that the U.S. would try to launch such an offensive, might not rely on this recovery except as a bonus factor to make acceptable what would otherwise be a very tight situation with respect to reserve nuclear weapons.

48. The UK is both the most important of the European allies of the U.S. and the one least likely to succumb to Soviet psychological pressures designed to cause them to cease resistance. The presence of U.S. strategic bases and forces in the UK makes it inevitable that the USSR would have to hit these targets on D-day. It would also be necessary to assign some forces to strike at British RAF bases and forces capable of mounting attacks on the USSR with British nuclear weapons, which will be available at least in limited numbers by 1957. We believe the USSR would allocate an additional number of nuclear weapons sufficient to cause heavy damage to key UK cities and ports.

Since these attacks could be combined with heavy attacks by jet light bombers armed with conventional bombs, Soviet leaders might hope that a relatively small number of nuclear weapons would succeed in knocking the UK out of the war almost at once. Probably [redacted] 3.3(b)(6), 3.3(b)(9) [redacted] 3.3(b)(6), 3.3(b)(9) Together with a minimum allocation of nuclear weapons for token raids on three or four Canadian cities, designed to reduce British hopes that the war could continue on the basis of support from the Western Hemisphere, the British requirements would call for [redacted] 3.3(b)(6), 3.3(b)(9) [redacted] We believe this allocation is severely limited considering the effect prompt neutralization of the UK would have on U.S. and Allied will to resist.

49. The USSR would rely mainly on its ground, air, and naval forces — armed with conventional weapons — to neutralize U.S. installations and forces overseas. Some of these are of such high priority in terms of U.S. ability to continue to prosecute the war, however, and particularly in terms of U.S. ability to mount an early air offensive against the USSR, that D-day attack with nuclear weapons would be essential. We have examined a long list of U.S. overseas targets which the U.S. armed forces considered to be suitable for Soviet attack with nuclear weapons and conclude that a number of them, particularly pre-strike strategic air bases, are almost certain to be attacked by the USSR. [redacted] 6.2(a) [redacted] 6.2(a)

6.2(a)

6.2(a) Even this number would be inadequate for the objectives of the overseas attack if they were not accompanied by very heavy air raids with conventional high explosive bombs.

50. Soviet planners probably might allocate some fissionable material for nuclear warheads of land-based guided missiles, particularly the improved V-2 type, to be used in the European land battle. In mid-1957 the USSR probably could have in limited operational use an improved V-2 ballistic missile capable of ranges up to about 900 nautical miles.* This missile would appear to offer the advantages of relative invulnerability to interception, all-weather capabilities, and the possibility of surprise attack.

3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a) The USSR is unlikely to be able to use larger yield weapons as missile warheads in 1957. The functional reliability of such guided missiles would, however, probably be only about 50 percent and the probable aiming error would be such that any European target that could be attacked by land-based guided missiles could be attacked with much greater accuracy by IL-28's.

* For details of probable Soviet guided missile capabilities, see NIE 11-6-54, "Soviet Capabilities and Probable Programs in the Guided Missile Field", at Annex "C".

In view of the limited supply of nuclear weapons available to the USSR in mid-1957, this greater bombing accuracy of the Il-28's, plus the low functional reliability of the guided missile as of mid-1957, probably would outweigh in Soviet minds the advantages of large-scale use of guided missiles with nuclear warheads at least in the initial phases of the land battle.

51. On the other hand, the USSR might use turbojet pilotless aircraft (with a range of about 500 nautical miles and a guidance system effective up to 200 nautical miles) for launching from submarines against continental U.S. and overseas targets difficult to attack with piloted aircraft. We believe this method of attack would be sufficiently advantageous in 1957 to warrant Soviet allocation of a small amount of fissionable material for this purpose. Avoiding the Atlantic LOFAR area, Soviet submarines could attack critical U.S. military bases at Panama, in the Azores, Oahu, and Guam. They also could strike at ports on the Pacific coast of the U.S., such as Seattle and San Diego.

6.2(a)

6.2(a)

roughly delimits the maximum nuclear warfare effort which the USSR could afford to mount against the continental U.S. in air attacks or, alternatively, by clandestine means. The allocation of a small amount of fissionable material to clandestine blows and the allocation of the bulk of the stockpile (about 65 percent) to air attacks are based upon the following considerations concerning the clandestine delivery problems.

The Clandestine Attack*

53. The USSR has and almost certainly will try to exploit capabilities for clandestine attack in the continental U.S. and in key U.S. installations overseas. The Soviet planners are not likely to rely heavily on local Communists, both for fear of defection and also because of the possibility that local agents would be apprehended by U.S. security forces before they could execute their missions (a) in the event of hostilities or (b) in a crisis likely to lead to hostilities. Soviet leaders would almost certainly not entrust to non-Soviet Communists the actual date of their initiation of hostilities. The Soviet planners might be willing, however, to place in critical spots, especially in the U.S., a relatively small number of highly trained, carefully indoctrinated agents for important clandestine missions, particularly those employing nuclear weapons. The security requirements from the Soviet point of view would be greatly reduced once the war had begun, because defection or detection of an agent

* This analysis is drawn mainly from SNIE 11-7A-54, "Soviet Gross Capabilities for Attacks on the U.S. and Key Overseas Installations Through 1 July 1957", at Annex "B", paragraphs 63-67, 74, and 75.

would not be so critical to the general Soviet plan of attack as before R-hour. The incidence of clandestine activity can be expected to increase once hostilities had begun, and agents could be introduced in numbers for post D-day efforts.

54. Sabotage employing conventional methods and weapons such as arson and ordinary high explosives (as distinct from attacks with weapons of mass destruction) probably would be attempted by local Communists and other Communist agents, especially after D-day, both in the U.S. and overseas. In the same way, strikes in critical industries and incitement to civil disorder probably would be attempted both before and after D-day, both in the U.S. and overseas and would undoubtedly cause losses in war industries and a reduction of U.S. war-making capacity. We do not believe that these types of clandestine attacks would be sufficiently certain of results or predictable in timing for Soviet planners to rely on them to affect the outcome of the war materially. They might also consider using biological or chemical warfare clandestinely, but probably would conclude that, considering the operational problems involved, the results would be too uncertain and too unpredictable to rely on as a significant element in the initial large scale effort. After the initial phase of the attack, clandestine delivery of biological warfare might be attempted against crops, animals, or population, not only for the physical damage that could be done but also for the psychological effect and the strain that would fall on medical and security forces.

55. We believe Soviet leaders would, however, attempt the delivery of a small number of nuclear weapons for attacks on high priority targets difficult to destroy in air attacks, calculating that the damage inflicted in this way would be great enough to warrant the risks of detection involved. These risks might be viewed by Soviet leaders as serious, in view of the possibility that essential Soviet advance preparations for war in a period of international tension would have alerted U.S. forces. Taking into account the overwhelming importance to the USSR of striking the main blows on the continental U.S. before the U.S. could possibly launch its strategic air offensive against the USSR, we believe Soviet leaders would be unwilling to take any appreciable risk of permitting the premature discovery of Soviet nuclear weapons in the U.S. Considering the known limitations of the means of physical detection, the USSR could probably introduce into the U.S. and might be able to detonate in place a number of nuclear weapons by clandestine means. The fact that a number of clandestine weapons might be employed without detection would not weigh so heavily in Soviet thinking as the fact that there would be an appreciable chance of detection in any large-scale clandestine operation. We believe the Soviet leaders would be extremely fearful of prompt U.S. retaliation with nuclear attacks on the USSR if a Soviet nuclear-weapons operation in the U.S. were prematurely uncovered.

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* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

*56. Soviet planners would probably consider very seriously attempts to introduce merchant ships into key U.S. ports with nuclear weapons in their holds to be detonated in the harbor. They would indoubtedly be well acquainted, however, with U.S. Coast Guard procedures for search and redirection of suspicious vessels, including all those owned or operated by Soviet Bloc nations, planning to enter any of the principal harbors of the U.S. In a period of tensions Soviet planners probably would expect these security efforts to be intensified. The resulting uncertainty as to the time at which a bomb could be detonated in the harbor area would introduce a great operational uncertainty in planning for coordination of such an attempt with initiation of hostilities and a full-scale air attack. This uncertainty, plus a chance of detection through defection of Soviet agents or discovery by search parties, makes it unlikely that the USSR would attempt this method of clandestine attack in major ports which could be hit by air attack. Other ports could be attacked in this manner with relative immunity from detection or search, but the Soviet nuclear weapons stockpile in mid-1957 would militate against diversion of resources to secondary targets — particularly since the risk of discovery through defection would continue to be a serious deterrent in the minds of Soviet planners.

*57. As a result of all these considerations, the USSR might forego the advantages of clandestine attack with nuclear weapons altogether, but we believe on balance that Soviet leaders would

* On this and related paragraphs, see IIC comments and the Subcommittee remar thereon, at Appendix IV.

consider it comparatively safe if they limited the sabotage teams to a very small number, kept the number of men who would actually employ nuclear weapons even more limited, and retained all nuclear material in safe diplomatic quarters until D-day. We do not believe the USSR would be willing to allow any of its agents to have nuclear weapons in their possession prior to D-day except in the Soviet Embassy in Washington, D. C., or possibly, other Soviet Embassies in the Western Hemisphere, where the combination of diplomatic immunity and the close control of personnel possible in a closely guarded area should prevent premature disclosure. Diplomatic quarters in the New York area might be used alternatively or in addition to those in Washington.

*58. Accordingly, Soviet planners would examine the most suitable targets for clandestine attack in the continental U. S., including major metropolitan areas, isolated industrial areas containing key facilities, U. S. Strategic Air Command heavy bomber bases most remote from Soviet air base areas, and nuclear weapons storage sites.** We believe they might arrive at something close to the following conclusions and devise an attack of something like the following (always keeping in mind the dangers of entrusting the date of the initiation of hostilities to agents in foreign countries):

a. Washington, D. C. is a high-priority target. It is exceptionally well defended against air attacks, and it is

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* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

** Detailed studies of a number of specific targets of these kinds were made by the IIC at Annex "F" and the ICIS at Annex "G".

especially vulnerable to clandestine attack because of the presence of the Soviet Embassy. It is mainly a political target, which would pay great extra dividends in panic and confusion if attacked in the first blow of the war and with a degree of complete surprise that would not be possible in air attack. The USSR could flash a signal to execute the prearranged plan to trusted Soviet Embassy officers only a short time before the first bombs were scheduled to fall on the first targets to be hit by air attack. Therefore, Washington should be attacked on D-day with a nuclear weapon of approximately 10 MT yield, previously introduced in disassembled pieces under diplomatic seal. The weapon should be assembled shortly before D-day in a highly secure area in the Embassy building by a few agents especially trained for the job. Agents responsible for the weapon would set the bomb to go off at about the same time that the first bombs fall (H-hour, 1500 Washington time), and then would attempt to escape. As reinsurance against the possibility that the detonation would be unsuccessful for any reason, Soviet planners would also put Washington on the target list for air attack.

b. Carswell Air Force heavy bomber base (Texas) and MacDill Air Force medium bomber base (Florida) are high priority targets that are difficult to attack successfully by air because of their location. They are especially

vulnerable because of the parking of aircraft on the aprons in close proximity to one another. While Carswell probably should be attacked by air, since it is a heavy bomber base and among first-priority military targets in the U.S., the aircraft attacking may fail to get through, and reinsurance by clandestine attack would be an attractive policy. MacDill might not be included in the plan of air attack, since it is a medium bomber rather than a heavy bomber base, but it is a key point for the movement of aircraft to North Africa. The USSR could send special sabotage agents to the Soviet Embassy in Mexico, or in some other Caribbean country, a few weeks in advance of the attack, and nuclear weapons (about 2 60 KT bombs and 6 small weapons) could be introduced through diplomatic channels prior to D-day. These agents and one or more colleagues working from the Soviet Embassy in Washington would try to arrange in advance for sabotage teams:

3.3(b)(9), 6.2(a)

(2) to move immediately after H-hour though the U.S. is completely alerted, to send two small craft, each with one 60 KT bomb, to attempt to reach the water area immediately adjacent to MacDill Air Force Base and detonate the bombs, underwater if possible.

c. Grand Coulee Dam is an isolated installation of great industrial importance and could be breached by small nuclear weapons detonated against the base of the dam. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

d. Conventional sabotage attempts, employing incendiary bullets against transformers and other inflammable equipment and material, should be made against such targets as the two tetraethyl lead plants which account for the bulk of tetraethyl lead production in the U.S.; the Ethyl Corporation at Baton Rouge, Louisiana; and the E.I. Dupont de Nemours Company, Chambers Works, Deepwater, New Jersey. Other conventional sabotage efforts might be organized on a wide scale, but the USSR probably would not give sensitive information about war plans and timing to teams entrusted with these tasks and would not rely on anything except bonus results in the critical first few weeks of the war.

Targets for Air Attack On the Continental U.S.

59. In planning the air attack on the continental U.S. in accordance with the strategic concepts described above, Soviet military planners would examine U.S. targets and target systems with

special attention to their relative importance to U.S. retaliatory capabilities and general U.S. war-making capacity, as well as their relative vulnerability to attack. We have examined detailed studies of critical U.S. targets and their relative vulnerability, including general metropolitan industrial concentrations, selected key industrial targets, population centers, government-control centers, nuclear energy facilities, and military bases and installations.*

60. Most military targets in the continental U.S. are too widely dispersed to constitute first-priority targets for nuclear weapons. Certain installations, however, such as heavy bomber bases and the headquarters of the U.S. Strategic Air Command probably would be prime targets for nuclear weapons, since their destruction would affect immediately and directly U.S. retaliatory air attacks on the USSR. Main naval bases and major ports also might be attacked, since their destruction would affect immediately and directly U.S. capabilities for supporting military operations in Eurasia, particularly where they are located in relatively large urban-industrial bases. In addition, many critical military installations and headquarters are located within urban-industrial complexes and would suffer in attacks aimed at industrial targets.

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* These studies, at Annex H, include the following:
ODM Study, "Relative Vulnerability of Non-Military Target System in U.S. as of mid-1957", 13 August 1954.
FCDA Study, "Relative Vulnerability of U.S. Population Centers", 11 August 1954.
AEC Study, "Relative Vulnerability of Nuclear Energy Programs".
Military Staff Study, "Estimate of Likely and Alternate U.S. Industrial Targets and World-wide Military Targets", 7 September 1954.

61. In examining possible urban-industrial targets in the U.S., Soviet planners would consider attacking isolated industrial targets that are critical to U.S. war-making capacity or they might select for attack urban-industrial areas that would damage some particular segment of the U.S. economy, such as military end-item production capacity; transportation; basic materials like steel, copper and aluminum; the electronics industry; the petroleum industry; or electric power. Actually, we believe it is likely in mid-1957 that the USSR would select a target system simpler than one requiring selective attacks on key industries. Attacks on general industrial concentrations, which are identical for the most part with targets high on the priority lists of population centers and government control centers, would probably seem to Soviet planners to offer the simplest, surest, and most remunerative target system for attacks on urban-industrial areas in the continental U.S.

62. Most of the large cities of the U.S. are in areas near the coasts or the Great Lakes region, easily identifiable from the air under visual or radar conditions, and close enough to the U.S. perimeters to place attacking aircraft under defensive fire the minimum amount of time. Because the main metropolitan areas are so extensive and so heavily industrialized, accuracy in bombing with nuclear weapons would be relatively unimportant and area-saturation attack patterns would pay heavy dividends. Within these metropolitan areas are the bulk of U.S. urban populations, large percentages of key

industries, transportation and communications centers, key personnel in business and government, and a great part of the most highly developed U.S. community facilities and services, both public and private. Selection of metropolitan areas as a target system thus would not only strike at U.S. economic strength across the board, including substantial portions of most war-supporting industry, but would deliver a severe shock to U.S. will and ability to fight by causing large population casualties and disrupting the most important U.S. government control and community service systems.

63. The primary exception to this area-bombing pattern, aside from the strategic air bases already mentioned, would probably be U.S. nuclear energy facilities. There are places in the production chain where the production of nuclear weapons might be broken for considerable periods of time as a result of the destruction of key facilities which have no counterpart in civilian industry. The AEC has duplicated and dispersed most of its prime production facilities and operates on virtually a full-mobilization base at all times to build up stockpiles as rapidly as possible. Nevertheless, the nuclear phase of a war in 1957 would be so critical, and the Soviet priority on reducing nuclear blows on the USSR would be so high, that some effort to disrupt U.S. nuclear energy production would almost certainly be attempted. Soviet planners probably would expect security arrangements at U.S. nuclear energy installations, especially stockpile storage sites, to be so tight that they could not count on

* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

sabotage or any other form of clandestine attack to succeed in doing serious damage.* Therefore, air attacks would probably be planned to strike at some critical part of the nuclear energy program.

64. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a) Considering the dispersion of the sites, the distance of most of them from large industrial areas, and the relatively high levels of U.S. defenses in most of the areas where there are sites, we do not believe that Soviet leaders would assign the large portion of their own nuclear weapons stockpile that would be necessary to bring air attacks home on these targets and effectively prevent their use for an extended period. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

65. Gaseous diffusion plants at Oak Ridge, Tennessee, Paducah,

* See detailed study by IIC at Annex F and ICIS at Annex G on vulnerability of certain storage sites to clandestine attack.

Kentucky, and Portsmouth, Ohio, where Uranium-235 is concentrated, would be critical targets. The "tops" of these plants at Oak Ridge and Portsmouth increase the concentration of U-235 from 10 percent, which is of no value in weapons, to weapon-level enrichment concentration of more than 90 percent. We believe the USSR would include one or two of the gaseous diffusion plants in their air attack, but we doubt that Soviet intelligence would know the detailed weaknesses of U-235 production, plant by plant, well enough to permit selecting the perfect targets. Accordingly, we have placed on our hypothetical Soviet list the two of these installations, Oak Ridge and Paducah, that are best known and are easiest to approach in air attacks aimed at other targets.

66. All U.S. production of plutonium takes place at Hanford, Washington, and Savannah River, South Carolina, and the Savannah River plant also has half of the U.S. capacity for production of heavy water for thermonuclear weapons. Destruction of the separations plants at these two facilities would stop plutonium production for an extended period, perhaps as much as two years. We believe Soviet planners would try to strike both of these plants, since their location and general function is well known.

67. Weapon fabrication facilities are more numerous than fissionable material production centers and can be more easily duplicated or replaced. With the exception of the fabrication facilities at Oak Ridge, Hanford, and Savannah River, they probably

would not be attacked. Feed material facilities (where ore is refined) and weapon laboratories probably would come lower on the priority list and probably would not be attacked except for the feed material facility in St. Louis, Missouri, which could be attacked as part of a raid on this large metropolitan area.

68. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a) It would be limited severely in scope because of the limitations of the Soviet nuclear weapons stockpile and the high level of attrition anticipated as a result of U.S. defensive action. It might, of course, vary considerably in accordance with special priorities and judgments of Soviet planners, but we believe it would be something like the following:

Strategic Air Command Heavy Bomber Bases and Headquarters

Limestone AFB.....Maine
Westover AFB.....Massachusetts
Fairchild AFB.....Washington
Ellsworth AFB.....South Dakota
Travis AFB.....California
Castle AFB.....California
Walker AFB.....New Mexico
Carswell AFB.....Texas
Biggs AFB.....Texas
Altus AFB.....Oklahoma
Offutt AFB (SAC Hqs.)...Nebraska

Nuclear Energy Program Installations

Oak Ridge
Paducah
Hanford
Savannah River

Metropolitan Industrial Areas

New York
Chicago-Gary
Philadelphia
Los Angeles
Detroit
Pittsburgh
San Francisco-Oakland
Boston
Cleveland
Buffalo
St. Louis
Washington, D. C.
Baltimore
Milwaukee
Norfolk

69. Thirteen of these fifteen cities are high, usually in the first fifteen or twenty of the cities listed, on any industrial or population priority target system. Washington, D. C., is included because of its vital importance as the national government control and population center, and Norfolk because it is a main naval base and a key port. Some cities which might well have been included in accordance with various priority listings, were excluded in order to make the whole target pattern, including the military and nuclear energy program targets, both feasible and well-balanced in terms of successfully conducting a large-scale air offensive. These fifteen cities which we think the USSR probably would attack

account for a total of over $30 billion value added annually by manufactures, which is more than one-third of the total for the entire U.S. They account for about half that amount, or $15 billion in value added by war industry alone. They have a total population of more than 40 million. In both general industrial importance and population, these fifteen cities bulk larger than the next one hundred and fifty cities in the U.S.* Extensive damage in these fifteen cities, together with the incidental industrial and other damage that might occur in some of the areas selected for attack as military or nuclear energy program targets, would strike a heavy blow at the U.S. economy and general war-making capacity.

U.S. Strategic Air Command Forces as a Target

70. The target list presented above is predicated on the probability that the USSR could not achieve effective surprise in attacks on the continental U.S. as of 1957. If this were not true, a great many more U.S. Strategic Air Command (SAC) bases would be included. In addition to the ten heavy bomber bases and SAC Headquarters, included in the target list, the USSR would attack the entire SAC base complex if it were feasible and there was a reasonable chance of catching a large part of SAC aircraft on the ground. At present this would include 16 medium bomber bases, plus about 15 to 20 airbases used as SAC depots, air-refueling service centers, reconnaissance and SAC fighter bases. By 1957 this complex

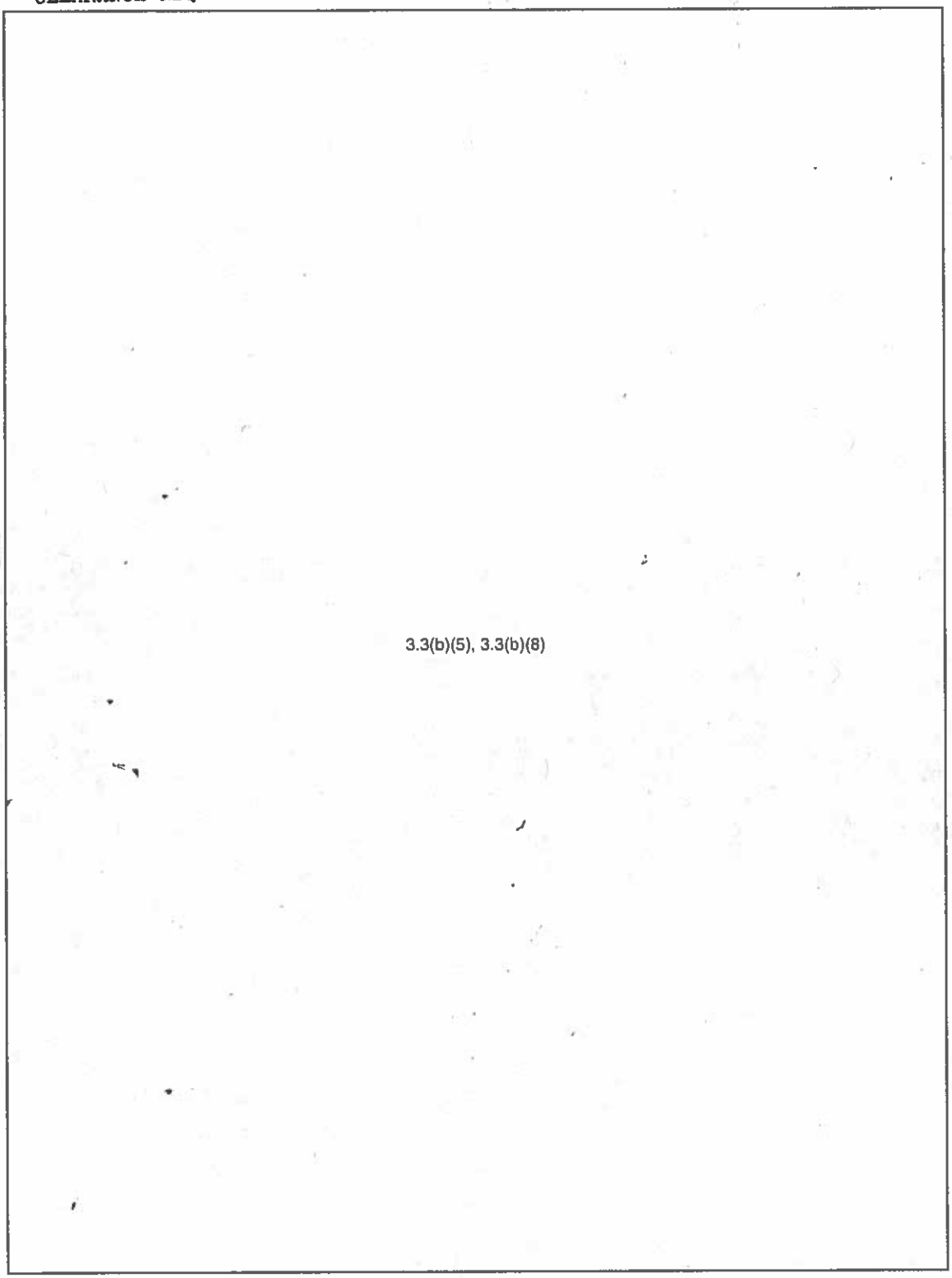
* See tabulations in Appendix A and Appendix B, Military Staff Study at Annex H.

probably will have grown considerably as a result of at least partial implementation of plans currently in preparation calling for 120 additional operating locations for the SAC striking force and a maximum of one heavy or medium wing per base.

71. In view of the probable size of the SAC base complex in the continental U.S. in 1957 and the warning time provided by the mid-Canada (55°) and seaward extensions of the early warning lines, Soviet chances of destroying a major part of SAC forces on their bases in 1957 is slight.

72. The most vulnerable area would be the West Coast, since the seaward extension of the early warning line will probably be only one-half complete (1,000 miles from Alaska toward Hawaii) with respect to surface vessels and one-third complete with respect to airborne early warning aircraft.* A limited number of long-range aircraft might try an end-run around this barrier, or a few aircraft might try to slip through either barrier at very low altitudes. We do not believe Soviet planners would rely on escaping detection in this way with aircraft in numbers sufficient to make an attack of any consequence. The most exposed SAC bases in the continental U.S. would receive 3.3(b)(5), 3.3(b)(8)

* For the status of the airborne element in the Pacific early warning line, see chart, "Forces and Deployment" 19 August 1954, which supersedes the information on this subject in the Department of Defense Progress Report previously cited. This chart is at Annex E, with the general Progress Report.



counteroffensive through damage to bases, facilities, and limited numbers of aircraft caught on the ground would be the maximum result of raids on the SAC complex. Thus delivering heavy attacks on U. S. cities, by which the USSR might hope to cripple U. S. war-making capacity and will to continue the war, becomes a more important objective than attacking the second-priority (medium-bomber) SAC bases. So long as the Soviet nuclear weapons stockpile is severely limited and SAC aircraft in substantial numbers are likely to be able to escape before Soviet attacks can be brought home, Soviet planners probably will not give overriding priority to attacks on all elements of the SAC complex in the continental U. S.

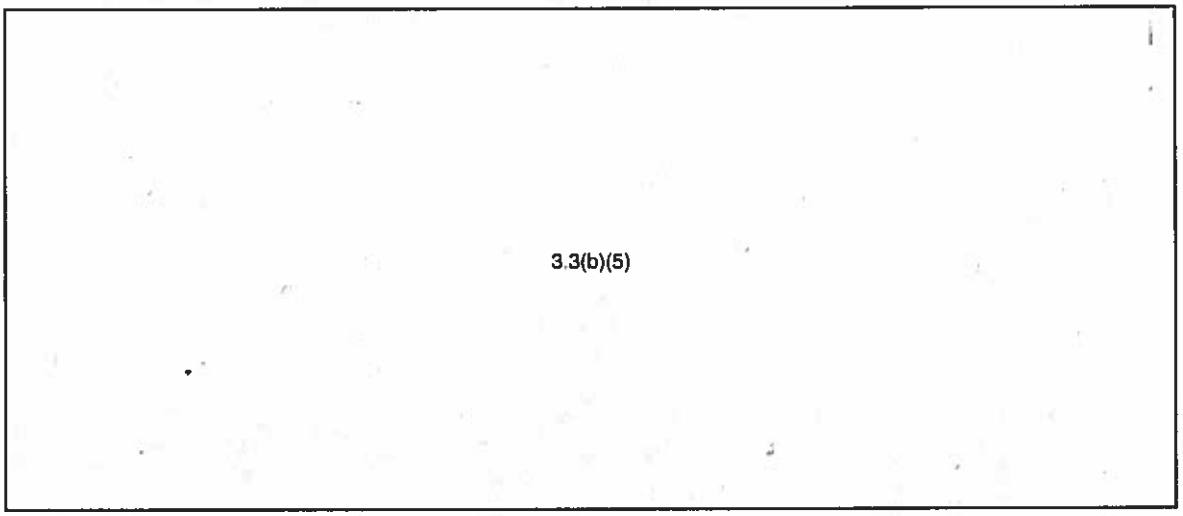
74. With respect to Soviet planning for attacks on SAC bases and forces overseas, the same considerations would apply but the situation would be different because: (a) distances are so much less that warning would be much reduced and regular reattack would be feasible; (b) defenses generally will not be so highly developed as in the continental U. S.; and (c) repeated large-scale raids with conventional weapons, supplementary to nuclear weapon raids, may so effectively neutralize air bases and alternate bases that SAC aircraft, even though they escaped the initial attack, might not be able to operate effectively from the areas under attack.

<u>The U. S. Air Counteroffensive and the Problem of Timing</u>

75. The difficulty of destroying SAC forces on the ground presents the USSR with serious difficulties in planning the timing

POSSIBLE COVERAGE OF USSR FROM US FORWARD AIR BASES

of its overseas and continental U. S. attacks. Not only is it probable in any event that a substantial portion of the U. S. strategic air force would survive initial attacks in mid-1957, but it is also likely that many of these aircraft could be employed



76. A state of high political tension in international affairs is implicit in any situation that would force the USSR to go to war in mid-1957 contrary to basic Soviet strategic interests, and many indications should have been received of increases in Soviet readiness for war that would necessarily have occurred if the USSR had developed its forward air bases and long-range air force to the point of undertaking attacks on the U. S.** In these circumstances, we believe

* On the vulnerability of U. S. carrier task forces, see Military staff study attached to Appendix I.

** These points are established in agreed national intelligence estimates. See NIE 11-4-54, "Soviet Capabilities and Probable Courses of Action through mid-1959" at Annex A; and SNIE 11-8-54, "Probable Warning of Soviet Attack on the U. S. through mid-1957" at Annex D.

that U. S. air forces of all appropriate commands would 3.3(b)(5), 3.3(b)(9)

3.3(b)(5), 3.3(b)(9)

77. This fact, plus the improbability that all or most of SAC could be destroyed in initial Soviet attacks, 3.3(b)(5), 3.3(b)(6)

3.3(b)(5), 3.3(b)(6)

completely interdicted. Nevertheless, Soviet planners could not afford to allow 3.3(b)(5), 3.3(b)(6)

3.3(b)(5), 3.3(b)(6)

3.3(b)(5), 3.3(b)(6) The main effort in Soviet planning would be to insure that critical elements in the attack, including particularly the whole force attacking the continental U. S., should be off their bases and on the way to targets before this period of time had elapsed.

78. This Soviet requirement of getting the attack off promptly is complicated by additional factors, namely the difficulties of marshalling, coordinating and launching a global attack involving several thousand aircraft, and the danger of premature disclosure of intent. After a long period of intensive preparation and training, Soviet planners could probably count on staging large numbers of aircraft through the forward bases in the Kola, Chukotski, and Kamchatka areas with considerable precision. Nevertheless, if the movement of the aircraft were detected by U. S. or allied intelligence when they left home bases, the U. S. would receive a minimum of about 6 hours warning before take-off time, or 12 hours before the first aircraft off would reach the U. S. radar screen. We believe Soviet planners would consider this amount of warning to be the minimum, since they could expect some timing errors, or operations and communications failures in any large-scale movement through the forward base areas. They would also realize that a well-balanced strike pattern of attack

against the widely-dispersed key targets in the continental U. S., employing aircraft with such different speeds as those of the TU-4 and the Soviet jet bombers, would require some staggering of take-off time if the raids are to arrive at times reasonably close to one another. Moreover, Soviet leaders would assume U. S. intelligence to be in a partial state of alert as a result of indications of increasing Soviet readiness for war and to be conducting continuous radar, photographic, and other reconnaissance around the Soviet periphery.

79. In consequence of these factors, we believe Soviet leaders would be extremely fearful that the USSR would be exposed to U. S. counterattack before getting its own forces under way. They would probably expect the U. S. to launch its strategic air offensive upon receipt of first certain intelligence of the movement of Soviet forces off the forward bases -- although this might be more a reflection of the way Soviet leaders themselves would react than a realistic estimate of U. S. action in the circumstances. They would realize that a full-scale U. S. attack, initiated while Soviet aircraft were on the ground preparing to take off, would substantially reduce Soviet capabilities for nuclear weapons attacks, 3.3(b)(5)

3.3(b)(5)

80. This situation confronts Soviet planners with a dilemma. They would like to launch their main attack on the continental U. S.

* This estimate is based on SM-857-54, "Study on the Reduction of Soviet Air Offensive Capabilities by U. S. and Allied Counter-Air Action", 28 September 1954, at Annex I.

and hold up the attack overseas in order to let the main attack get as much tactical surprise as the continental U. S. radar system allows. In so doing, however, Soviet planners would add some 8 or 10 hours — the minimum flying time from Soviet bases to continental U. S. targets — to the period during which the U. S. might react and launch a counterattack that would catch on the ground the entire Soviet bomber and tactical air force designated to attack U. S. overseas installations.

81. The alternative solution would be to start the war with attacks on U. S. bases overseas, thus maximizing chances of neutralizing the elements of U. S. strategic air strength that could first attack the USSR. If the main attack on the continental U. S. were launched within about 6 hours of the initial attacks overseas, Soviet planners could be reasonably sure of getting the main elements of their whole attack under way before U. S. counteroffensive could interfere. The disadvantage of this plan would be that U. S. defenses would be fully alerted (about 10 hours definite warning of hostilities) when the long-range force reached the continental U. S.

82. Since reduction of the initial attacks on the USSR and particularly on its main strategic air striking force would be the top priority Soviet objective and since the mid-Canada early warning line and its seaward extensions provide considerable tactical warning for most of the continental U. S. in any case, we believe the USSR in 1957 would adopt the second alternative method of timing Soviet attacks. This would mean that the USSR would ready its entire force for massive

air blows and then would initiate its offensive, hitting overseas targets initially and continental U. S. targets about 10 hours later. Attrition on the continental U. S. attacks would almost certainly be higher than if a "sneak" attack on the U. S. were attempted, but the main blow would be sure of getting off intact, and the large numbers of aircraft essential for raids on overseas targets would not run the risk of being caught on the ground. Furthermore, we believe this course of action would be in keeping with Soviet military doctrine and the habits of mind of Soviet leaders.*

The Small "Sneak" Attack

83. There is one way in which the USSR might attempt to escape the timing dilemma described above rather than accepting it and choosing the course of action we have indicated as probable. This way would be to launch a comparatively small number (50 to 100) of bombers against the continental U. S. in the first wave of the attack. Soviet planners might calculate that the movement of such a number would be unlikely to alert U. S. or allied intelligence and that chances would be excellent for this first wave to stage, take off, and reach the continental U. S. radar line without being detected. The preparation of forces for the overseas attack and a heavier main attack on the continental U. S. could begin as soon as the first wave

* See R. Garthoff, Soviet Military Doctrine. It is worth noting that up to now Soviet military doctrine, probably under the influence of Stalin's personal views, has heavily discounted surprise as a decisive factor in war and labelled it only "transitory" in effect. Also see N. Leites, Operational Code of the Politburo.

was on its way, and the overseas attack could be launched just prior to the time that the first wave hit the U. S. contiguous radar system.

84. If a "sneak" attack of this sort were reasonably sure of destroying most of SAC forces, we think the USSR would take the calculated risk of launching it. As indicated above, (paragraphs 70-74) Soviet planners probably would not rely on achieving such a high level of destruction and would be much concerned about the counterattack capabilities of the remaining SAC forces, particularly those overseas and in the carrier task forces at sea. This "sneak" plan would add enormously to the risks that would be involved in holding back the overseas attack by also holding back the main attack. While a "sneak" plan would call for getting the main attack forces staged to and through the forward bases before the earliest possible time of the beginning of a U. S. air counteroffensive, this would require a very tight schedule and constitute an operational problem of exceptional difficulty. If by chance the "sneak" force were detected shortly after take-off by U. S. or allied reconnaissance aircraft, reconnaissance submarines at sea, or other sources of warning near the flight path, there would be a period of at least a few hours during which U. S. air forces from the closest U. S. or allied bases could catch on the ground both the Soviet aircraft assigned to the overseas attack and the main element of the long-range bomber force. The threat from Alaska and the U. S. carrier task forces would be especially critical. Soviet planners would be

reasonably sure that a great part of the "sneak" effort would get through. Nevertheless, as in considering the clandestine method of attack, they would be preoccupied with the relatively small but appreciable chance that some part of the effort would be discovered, and that the U. S. might immediately launch its air offensive against the USSR, jeopardizing both the main attack on the continental U. S. and the large force assigned to strike overseas targets.

85. We cannot exclude the possibility that Soviet leaders would run this risk and adopt the "sneak" attack as a preliminary to their main attack on the U. S. This would probably be the case if Soviet leaders considered that the U. S. would not react to early reports of the "sneak" force or would be unable to arrive at any quick decision as to possible counteraction. If they should adopt this plan, there is no way of predicting the success or failure of the operation since the outcome would depend mainly on the degree of alertness of U. S. intelligence and air counteroffensive forces at the time of the attack. At the best, from the Soviet point of view, a "sneak" attack might get through to the radar warning lines undetected and do more damage to SAC forces on the ground than the USSR could hope to do under conditions of a much longer alert. In other respects the damage done by 100 aircraft used in a "sneak" attack would be about the same as if the same number of aircraft were used as part of a more massive attack. The defenses might be

less fully alerted in a "sneak" attack than in a mass attack, but this situation would be partly offset by the fact that the defense system as a whole would be much less thoroughly saturated.

86. At the worst from the Soviet point of view, premature detection of Soviet intentions might bring a disaster of the first magnitude for the Soviet air forces, a disaster that would virtually eliminate Soviet chances of winning the war. We believe the USSR would be unwilling to gamble for such high stakes in this way in mid-1957 and is more likely, as explained above, to take the safe course of attacking U. S. overseas targets first.

A Plan of Attack on U. S. Overseas Forces and Installations

87. If Soviet planners adopt the course of action (in respect to timing) that we have outlined (paragraphs 81 and 82), the USSR will initiate hostilities with a large-scale attack on U. S. and allied overseas bases, facilities, and forces around the world.* They would reach nearby targets with little or no tactical warning. The primary objective of these attacks would be the destruction of U. S. and allied counteroffensive capabilities, particularly strategic air capabilities. The aircraft would mainly be IL-28 jet light bombers, but some TU-4's would be used in order to reach the more distant overseas targets and guided missiles with nuclear warheads

* This plan of overseas attack is based in part on Army, Navy and Air Force studies of "Possible Soviet Methods of Attack" provided by the JCS in SM-858-54, 28 September 1954, and similar Service studies of "Vulnerability of Overseas Target Systems to Soviet Attack", SM-751-54, 24 August 1954. These studies are at Annex J.

would be launched from submarines against military installations at Panama, Oahu, Guam, and the Azores.

88. The timing of the overseas attack almost certainly would be adjusted to give the most favorable circumstances for the continental U. S. attack -- as much of which as possible should arrive at night. We believe that 2000 (Z) Greenwich mean time would be the most likely time for bombs to fall on the closest overseas targets, which includes those in the UK, Alaska, Western Europe (except Spain), the Near East, and the Far East. Most of these attacks would occur at dusk (Western Europe), about dawn (Far East), or in the morning (Alaska). It would be dark in Central Europe and most of Eurasia. The time of these first bombs on target, 2000 Z, we have called H-hour to simplify reference to other events, particularly the main air attack on the continental U. S., which would not occur until about 9 hours later (H + 9), when it would be dark in the U. S. The initial overseas strikes according to this plan would occur as follows:

(a) Aircraft from Soviet Bloc bases in Europe would attack targets in the UK and Western Europe (except Spain) at H-hour, which would be 2000 local time in the UK and 2100 local time in most of Western Europe.

(b) Aircraft from the Chukotski area would attack targets in Alaska at H-hour, which would be 1000 the same morning, local time.

(c) Aircraft from the Vladivostok area would attack targets in Japan and Okinawa at H-hour, which would be 0500 the next morning, local time.

(d) Aircraft from bases in the Southern Ukraine, the Caucasus, and the Ashkhabad area, would attack targets in the Middle East, the Persian Gulf, and Karachi area at H-hour, which would range from 2200 to 0130 local times.

(e) Aircraft from Soviet Bloc bases in Europe would attack targets in Spain and Northwest Africa at between H + 1 and H + 2, which would be 2200 or 2300 in Spain and 2100 or 2200 in North Africa.

(f) Aircraft from the Kola area would attack targets in the Northeast Atlantic area (Northeastern Canada, Greenland, and Iceland) shortly after attacks on the continental U. S. in anticipation of finding SAC aircraft staging through intermediate SAC bases in these areas, perhaps about H + 12, which would be 0400 or 0500 the following morning local time.

89. The nuclear weapons available for the overseas attack, as limited by the allocation of fissionable material described above (paragraphs 48-51), would permit only the highest priority overseas installations to be hit with nuclear weapons and even those, for the most part, only with small-yield (5 KT) weapons. The targets to which nuclear weapons delivered by air would be assigned include 5 U. S. air bases in the UK, 5 U. S. air bases in North Africa and the Middle East plus the Port Lyautey naval air facility, 5 U. S. air bases in the Northeast Atlantic area, 4 U. S. air bases in Alaska, 4 port and logistic support complexes in Europe, certain U. S. troop concentrations in Germany, and 3 U. S. base installations in the Far East. The total number of nuclear weapons allocated to overseas air attacks would be approximately 50 medium-yield (60 KT) and 150 small-yield (5 KT). In addition, the attack would include submarine-launching of about 15 guided missiles with medium-yield (60 KT) nuclear warheads.

90. In order to saturate U. S. and allied defenses overseas and to strike at a wide range of key U. S. installations which could not be hit with the nuclear weapons available, mass attacks by aircraft carrying conventional bombs would occur in addition to the strikes with nuclear weapons. The total air attack would require a force of about 2000 IL-28's, plus nearly 200 TU-4's for the overseas targets more distant from Soviet Bloc bases. Of this number only about 200 aircraft would carry nuclear weapons. The detailed list of approximately 120 U. S. overseas targets of critical military importance is attached as Appendix I, "The Overseas Attack". The general pattern of this attack is shown on the map, "Pattern of Attack, World-wide", facing paragraph ~~88~~ 99.

91. The initial Soviet air attack on key U. S. installations overseas would be accompanied by air attacks on the prime military targets, ports, and industrial cities in the UK, using the stockpile of nuclear weapons reserved for this purpose. The USSR would also initiate a political and psychological warfare campaign to induce other allies of the U. S. not to fight and to prevent U. S. forces from using their territories. This campaign would include threats of nuclear attacks against the major cities of these countries, such as France, Spain, the Scandinavian countries, and Japan, and expenditure of a few nuclear weapons from the general reserve might be necessary for this purpose early in the war. Since the UK battle and the political warfare effort are not included in the subjects we

have been directed to study, these campaigns are not further examined in this assessment.

*92. As quickly as possible the USSR would also begin the land battle for Western Europe, using the Soviet ground and air forces previously in place in East Germany, and the Soviet maritime campaign, mainly in the first phase of the attack, employing submarines and naval aircraft to destroy U. S. and allied shipping and lay mines in European ports and sea lanes. The advance of the ground armies, the results of tactical air battles, and the development of the maritime campaign are not examined further in this assessment, since their decisive phases are unlikely to be reached in the period we have been directed to study, that is, the period during which most of the Soviet stockpile of nuclear weapons would be expended. According to our analysis of the 1957 situation, this period would include only the first few days of the war. The overseas attack would also be accompanied by widespread attempts at clandestine attack and sabotage (with conventional weapons), particularly at U. S. forward air bases. Some of these attempts undoubtedly would be successful, but we have not been able to measure the probable scale of success or the damage inflicted, and we therefore do not further examine the clandestine attack overseas.

A Plan for High-Altitude Attack on Targets in the Continental U. S.

93. We believe that one way which the USSR might try to overcome the obstacle presented by the U. S. defense system, if war comes in

* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

mid-1957, would be to exploit Soviet capabilities for penetrating the U. S. defenses at very high altitudes.

94. Soviet planners would realize that they could not in any case deliver an effective air blow against the continental U. S. without recourse to one-way missions. In the circumstances in which Soviet leaders are likely to have found themselves compelled to resort to war contrary to their basic strategic intentions, it would be necessary for Soviet military leaders to induce practically all of their long-range bomber crews to accept missions from which there would be very little chance of return. We think that, in order to preserve crew morale, encourage efficient performance over the target, and reduce voluntary or semi-voluntary aborts, the USSR would allow its aircraft about one hour fuel reserve at the target and instruct the crews to try to land in Mexico, Canada, or in designated areas at sea where submarine pickups would be attempted. Actually, however, the aircraft and crews dispatched to the continental U. S. would be considered by Soviet planners as expended, except for some aborts and a few crews that might be picked up at sea. Wholesale resort to one-way missions, while it would be an extreme measure, would be the only way in which the USSR could hope to win a war in 1957, and we believe that Soviet leaders would not hesitate to adopt such a policy if they decided war was necessary in that year.

95. In these circumstances the USSR would be able to extend the performance of its aircraft, particularly its new jet bombers, to

maximum ranges and altitudes. The Type-37 could arrive over target at about 55,000 feet on one-way missions, but there would be so few of these aircraft available that they would for the most part have to fly in formations with Type-39's and probably for their own protection would fly at the maximum altitude for the Type-39, which -- on one-way missions -- would be about 50,000 feet.

96. Under this plan of attack, we believe Soviet planners would allocate most of its high-speed, high-altitude aircraft to high priority urban targets and SAC bases in the industrial northeastern portion of the U. S. and, in smaller numbers, to the northwestern part of the country. Since all the Type-39's would have to be refueled to reach targets in the Atlantic and northeastern area, a major refueling effort would be involved. The most distant targets would be attacked by TU-4's.

97. The number of aircraft on the forward Soviet bases in this plan of attack would be about 900, of which approximately 775 would be mission aircraft and the remainder tankers. This number is nearly the maximum the bases would accommodate. An additional number of tankers sufficient to refuel the mission aircraft requiring it -- about 300 tankers -- would take off from rear bases, overfly the forward bases, refuel mission aircraft about 500 miles out, and return to the forward bases after the strike aircraft had left. Since many of the mission aircraft would only need additional fuel adequate for one or two hours flying time in order to reach target, it would be possible -- although operationally difficult -- to use a single tanker to refuel more than

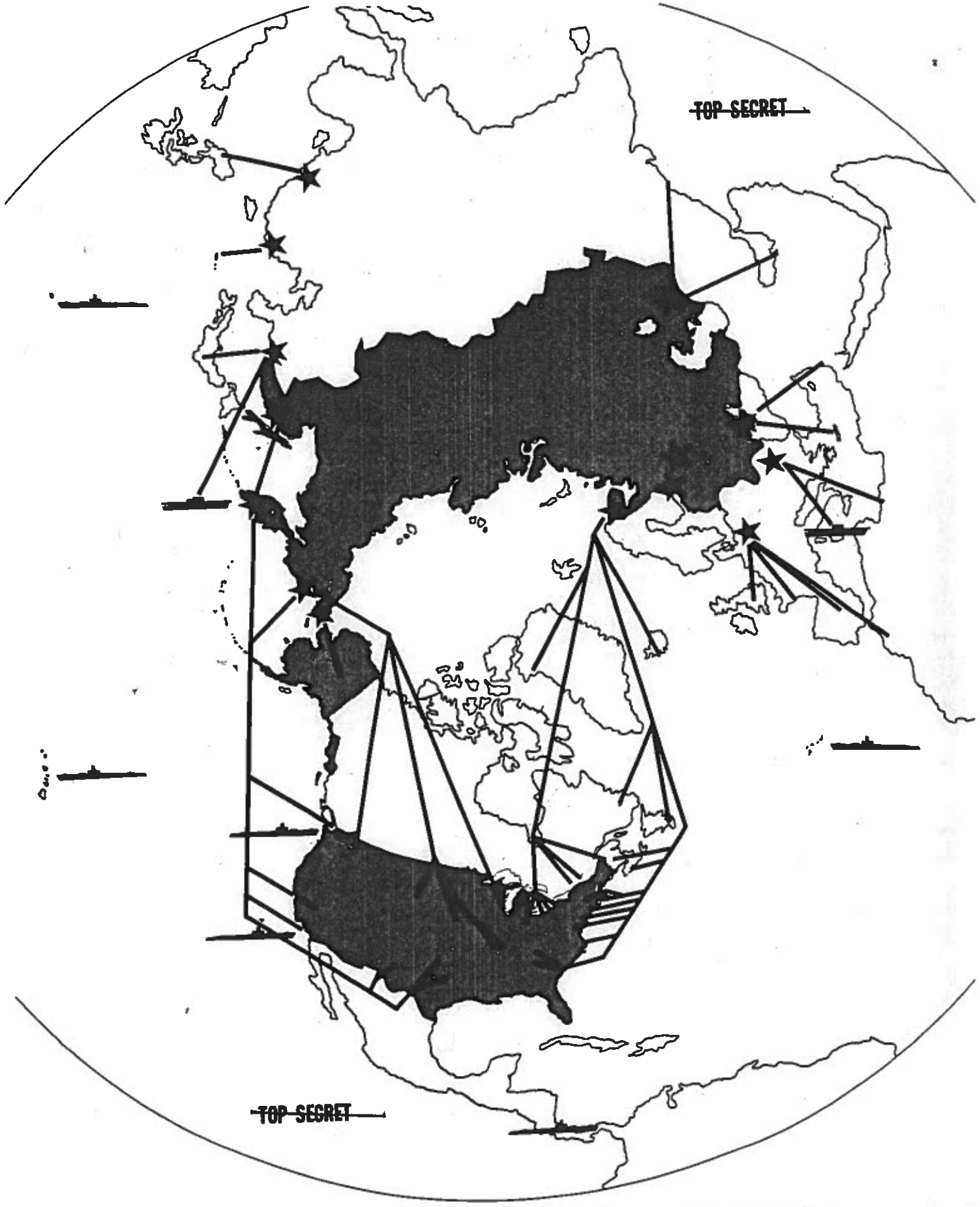
one aircraft in some cases and it would not be necessary to refuel at the optimum point for range extension. We have calculated that the USSR would allow one tanker per mission aircraft refueled, which should give a generous margin of safety for aborts by tankers or operational failures and still extend the ranges of some 425 mission aircraft sufficiently to bring each of them over its designated target in the continental U. S. with about one hour's fuel reserve.

98. The mission aircraft would include about 40 Type-37's, which would be all of the 50 estimated to be in operational units in 1957 that would be serviceable after movement from home bases to forward bases, 470 Type-39's, very nearly all of the 650 jet medium bombers that would be serviceable in the same circumstances, and 265 TU-4's.* Approximately 10 Type-37's, 180 Type-39's, and over 400 TU-4's would remain in the Soviet long-range air force, and only TU-4's would be immediately available in numbers for other operations.

99. Of the mission aircraft, approximately 85 would take off from the Kamchatka area, 210 from the Chukotski area, and 480 from the Kola-Leningrad area. The targets, the number of aircraft assigned to each, and other details of the attack, are set forth in Appendix II, "The High Altitude Attack on the Continental U. S.". The general pattern

* For this assessment, it was assumed that all mission aircraft staged through the forward Soviet bases. In accordance with estimates contained in SNIE 11-7A-54, "Soviet Gross Capabilities for Attacks on the U. S. and Key Overseas Installations through 1 July 1957", at Annex B, this involves deducting 10 per cent of the force for unserviceable aircraft and operational losses at home bases, and 15 per cent for similar reasons at the forward bases where maintenance would be more difficult.

PATTERN OF ATTACK - WORLD WIDE



of this attack is indicated on the map, "Pattern of Attack, World-wide", facing this page. In general terms, the bulk of the attack, including about 625 aircraft would be assigned targets in the 15 metropolitan areas designated for attack, about 100 aircraft would be assigned SAC bases as targets, and about 50 aircraft would be assigned to attack nuclear energy installations.

100. The major portion of the attack would be planned for simultaneous penetration at night of the U. S. contiguous radar system and the mid-Canada line by all jet aircraft and by the TU-4's crossing through the Southern Canada line to hit St. Louis and Paducah. Other attacks penetrate with TU-4's over the ocean areas after the jet attacks. The time difference would be necessary due to the comparatively slow speed of the TU-4 aircraft and the necessity for avoiding delay in launching the high-speed jet aircraft. If over-all simultaneous attacks were planned, time-spread between the take-off of the first and the last plane launched from the forward bases would be as much as 17 hours between the TU-4's going to Altus Air Force Base in Oklahoma and the Type-39's going to Fairchild Air Force Base in the state of Washington. The present attack has a ten hour take-off spread, which is much greater than Soviet planners would wish, but no radar barriers would be crossed before H-hour. TU-4's from Kola, taking off at H minus 6 for the southeastern United States, would only be nearing the coast of Greenland northwest of Iceland at H-hour.

101. For purposes of calculating base usage and flight routes, we have included a minimum attack on four Canadian cities as part of the initial strike on the Western Hemisphere. This attack is not examined further in this assessment. The general pattern of attack would be as follows:

(a) Attacks on Westover, Boston, New York and Philadelphia approach from the Kola area over the ocean route using Type-37's with Type-39's at New York and Philadelphia and Type-39's elsewhere. All aircraft are on one-way missions and the Type-39's must be air refueled.

(b) Attacks on Limestone, Buffalo, Pittsburgh, Cleveland, Detroit, and Chicago approach from the Kola area over Greenland and Hudson Bay using Type-39's refueled and on one-way missions. The Pittsburgh, Detroit, and Chicago attacks include five unrefueled Type-37's.

(c) Attacks on Milwaukee, Offutt and Ellsworth approach from the Chukotski area around the Alaskan radar and over Northern Canada, as do the attacks on Fairchild, and Hanford. These attacks use unrefueled Type-39's on one-way missions. TU-4's (unrefueled and one-way missions) use this route and penetrate the mid-Canada line simultaneously with the Type-39's and fly at low level in order to attempt to sneak through to St. Louis and Paducah.

(d) Type-39's (unrefueled and on one-way missions) attack Travis and Castle from Chukotski over the ocean route. TU-4's attacking San Francisco penetrate the contiguous radar system at low level shortly after the jets penetrate for Travis and Castle.

(e) The one-way attacks on Los Angeles, Biggs, Walker, Altus, and Carswell are by low level TU-4's over the ocean from Chukotski, penetrating after the northern attacks, and (with the exception of Los Angeles) the penetration would have to be in daylight.

(f) One-way low level TU-4's attack Baltimore, Washington, and Norfolk during pre-dawn hours from Kola via the ocean, penetrating the contiguous radar system several hours after the northern attacks. Other TU-4's continue on from this route to enter the coast south of Charleston in daylight hours to attack Savannah River and Oak Ridge.

102. The USSR would, if it could, use large-yield nuclear weapons in the attacks on U. S. metropolitan areas. Multi-megaton bombs probably will be available for Soviet use in 1957, and we believe the USSR by that time would have a weapon yielding in the neighborhood of 10 MT. The possibility of radio-active fall-out* from a ground burst of multi-megaton weapons interdicting habitation of a large area (perhaps 5,000 square miles for a 10 MT weapon) would be known to Soviet planners, and they would strain every effort to create such a situation in the industrial northeast section of the U. S.

103. In a high-altitude attack, however, the anticipated attrition would be so great that it would be prohibitive for the USSR to use multi-megaton weapons against more than a few major targets. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a) We believe the Soviet planners in 1957 would choose to attempt air delivery of 10 MT weapons on the New York metropolitan area, and on this area alone, spreading

* For basic information on the fall-out hazard, see AFSWP Report No. 507, "Radioactive Fall-out Hazards from Surface Bursts of Very High Yield Nuclear Weapons", May 1954, at Annex K.

the rest of their resources over a larger number of targets. Most of the Type-37 aircraft in the attack would be in this strike, since this type probably would be the only Soviet aircraft in 1957 able to carry so large a bomb. In other areas Soviet aircraft would carry 60 MT weapons insofar as possible. Nevertheless, even on so restricted a target list as the one selected, they would have to carry 5 MT weapons for attacks on smaller targets and on those metropolitan areas where the number of aircraft required to saturate the defenses would exceed the number of medium-yield weapons available. Every mission aircraft would carry a nuclear weapon except for those aircraft assigned electronic countermeasures (ECM) missions in strikes at the most heavily defended areas.

104. We believe that Soviet planners would consider ECM an important part of an attack on the continental U. S. and would feel that flexibility and initiative in employing ECM would rest with the offensive forces. Since Soviet planners, like our own, would have great difficulty in calculating the exact balance between offensive and defensive employment of ECM at any given time and in any given situation, we believe they would plan to saturate U. S. defenses without ECM and would hope for a substantial bonus effect if circumstances proved favorable. The New York metropolitan area would be the most important single target, as well as one of the most heavily defended, and we think the USSR would assign 60 special ECM aircraft to try to disrupt radar defenses in the New York-New Jersey-Philadelphia area. In addition, Type-37 aircraft

in small numbers in the Chicago, Detroit, and Pittsburgh strikes would carry special ECM equipment as well as medium-yield or low-yield nuclear weapons. All aircraft might carry relatively simple ECM devices and almost certainly would be equipped with passive receivers capable of recording U. S. radar transmissions, and indicating the optimum points (those closest to targets) where Soviet aircraft could enter the radar defense system on route to targets.

105. The anticipated large bonus effect from radio-active fall-out resulting from ground burst of a 10 MT weapon in the New York area would be supplemented by the clandestine detonation of a similar weapon in Washington at H-hour (1500 local time). The chances of the wind blanketing considerable metropolitan areas of the Atlantic Coast with fall-out from one or the other of the 10 MT explosions would be good. We think, however, the USSR would plan to attack Washington by air in any case as reinsurance in case of failure of the clandestine attack.

106. A final additional factor in the plan of attack on the Western Hemisphere would be the submarine-launched guided missile attacks on San Diego, and Seattle. These would occur at H-hour (1200 Pacific Coast time) and, with the clandestine attack in Washington, would be the first blows of the war against the continental U. S. The missiles would be launched from about 400 nautical miles away from targets, 2 missiles from each submarine, and an additional submarine would slip in to within 200 nautical miles of the targets for command guidance.

107. An attack based on this plan would, in our opinion, be a desperate gamble on the part of the USSR, involving the loss of most of the Soviet long-range air force in the first blows of the war. Such a war, however, might well be effectively decided — though not necessarily ended — in the first days, and the USSR might attempt an attack of this sort in the belief that the U. S. system of government and society could not stand up under the heavy damage that probably could be inflicted on the U. S. in an attack of this magnitude. This plan would not represent the way in which Soviet planners would wish to initiate a war but represents one way in which they might try to win it if they felt compelled to fight in mid-1957.

A Plan for Low-Altitude Attack on Targets in the Continental U. S.

108. If Soviet planners are aware of some of the critical deficiencies in the U. S. defense system, we believe they are likely to consider the probable costs of a high-altitude attack too great and develop a plan for striking the continental U. S. at minimum altitudes. This approach would sacrifice the advantages of "over-weather" flying and easier navigation, and would call for additional refueling of jet aircraft, since they would burn up about four times as much fuel while flying at very low altitudes as at optimum altitudes. Since lower attrition could be anticipated, a somewhat smaller number of mission aircraft would be required, and adequate tanker forces would be available for the refueling operation.

109. The key to the low-altitude attack would be the flight profile, which would call for most of the mission being flown at optimum cruising altitude, a rapid descent upon reaching the outer limits of the U. S. contiguous search and control radar system, an approach to target from that point on at minimum altitudes (below 1,000 feet over the sea and 2,000 feet over land), a rapid climb beginning between 5 to 10 minutes flying time away from targets (perhaps even less for jet aircraft), and bomb-release at the minimum safe altitude for delivering medium-yield (60 KT) weapons set for ground burst -- which would be about 5,000 feet.*

110. The entire attack could be scheduled to arrive over targets at night, when U. S. aircraft might find it impossible to intercept bombers at very low levels, if (a) TU-4's are used for the closer targets and all the overland approaches, (b) Type-39 jet bombers are refueled for the intermediate targets and sea approaches (where the shortest periods of low-level flight are required), and (c) Type-37's, refueled, are used for the long-haul targets in the southwestern and south central U. S. regions.

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* A plan of attack involving TU-4's (the slowest Soviet aircraft to be used) against New York (the largest metropolitan area to be attacked) indicates that as many as 60 aircraft could drop their bombs from about 5,000 feet in less than one minute and escape from the area. For this plan and a similar plan for jet aircraft, see Memorandum, HQ, USAF, 8 October 1954 and Memorandum, HQ, USAF, 20 October 1954, at Annex L

111. This use of the Type-39 would require low-level flight (and extraordinary fuel consumption) only for the relatively short time — not much more than a half hour — that it would take at 450 knots to travel to targets from the outer edge of the U. S. contiguous radar system on either coast. Refueling the mission aircraft flying the more extreme ranges could take place at optimum distances from forward Soviet bases, since fewer aircraft would be necessary in this attack and all tankers could operate from the forward bases. Approximately 100 Type-39's, attacking the more distant targets assigned to that type aircraft, could reach their targets only by special fuel conservation techniques and the elimination of nearly all fuel reserve.

112. As in the case of a high-altitude attack, under this plan all aircraft would be dispatched on one-way missions in order to permit optimum coverage of targets in various areas of the U. S. In view of the use of a large number of Type-39 jet medium bombers, a major refueling effort would be involved.

113. The number of aircraft which we believe Soviet planners would launch in an attack of this kind would be approximately 800 — of which about 515 would be mission aircraft and remainder tankers — and all of them would operate from the forward bases.* This force would represent

* This total is not quite as large as but very close in size to the scale of attack indicated in SNIE 11-7A-54 as most probable in mid-1957, and is well within the estimated capacity of the Soviet forward bases as they could be developed by 1957. SNIE 11-7A-54, "Soviet Gross Capabilities for Attacks on the U. S. and Key Overseas Installations through 1 July 1957" is at Annex B.

only a little more than one-third of Soviet long-range air strength and would leave the USSR a much more substantial reserve for reattack and other purposes.

114. The mission aircraft would include about 25 Type-37's, which would be all that would be required for the most distant targets, about 220 Type-39's, and 270 TU-4's. Approximately 25 Type-37's, over 400 Type-39's, and over 400 TU-4's would remain in the Soviet long-range air force. At least 600 of these should be immediately available for other operations, not counting those unserviceable as a result of staging operation.*

115. Of the mission aircraft, approximately 210 would take off from the Chukotski-Kamchatka area and 385 from the Kola-Leningrad area. In this attack some of the jet aircraft could be refueled and reach targets on the U. S. West Coast from bases in the Soviet Maritime Provinces. This would reduce the time spread on take-off and reduce the load on the Siberian forward bases. The only aircraft taking off from the Kamchatka base area would be about 35 Type-39's assigned to strike at Los Angeles. The targets, the number of aircraft assigned to each, and other details of the attack are set forth in Appendix III, "The Low Altitude Attack on the Continental U. S." The general pattern of this attack, which is approximately

* See footnote to paragraph 98 concerning the method of assessing serviceability in movements from home and forward bases.

the same as under the high altitude plan, is indicated on the map, "Pattern of Attack - World-wide", facing paragraph ~~100~~ 99. In general terms, the bulk of the attack, including about 450 aircraft, would be assigned targets in the 15 metropolitan areas designated for attack, about 45 aircraft would be assigned to SAC bases as targets, and about 20 aircraft would be assigned to attack nuclear energy installations.

116. The entire force in this attack could be launched within a period of about 7 hours. As in the case of the other plan, the launchings would be keyed in with the delivery of the first bombs on targets in the overseas attack, H-hour (2200 local time, Kola, or 0800 in the Chukotski area). The first aircraft off, the relatively slow TU-4's, would take off about H minus 4, and launchings from the forward bases would continue at intervals thereafter until H + 3. All aircraft would arrive over targets between midnight and dawn of the following morning, local time. The general pattern of attack would be as follows:

(a) Jet aircraft from the Kola area attacking East Coast targets over the sea approaches would be the first wave to arrive. They would require 8 1/2 or 9 hours flying time to their targets and would reach their targets about midnight, Eastern Standard time.

(b) The TU-4 bombers launched from the Kola area against targets in the industrial north central section of the U. S. would approach over Canada and would require about 18 hours flying time. These aircraft would be the first to take off, at H minus 4, and would arrive about 0500.

(c) The TU-4 bombers from the Chukotski area attacking targets in the central and northwest sections of the U. S. would approach over Canada and would reach targets after from 11 to 16 hours flying time.

(d) The Type-39 bombers attacking West Coast targets from the Soviet Maritime Provinces and those attacking Los Angeles from the Kamchatka area would take only a little more than 8 hours flying time and would therefore not leave until H + 3, the last departure time, in order to be able to arrive after dark.

(e) The Type-37 bombers from the Soviet Maritime Provinces attacking targets in the southwest and south central U. S. over the sea and Mexico would require about 11 or 12 hours flying time and would arrive at targets between midnight and 0200, local time.

117. In view of the impossibility of using multi-megaton nuclear weapons in low-altitude attacks, all aircraft in this attack would carry medium-yield (60 KT) weapons. In the absence of any chance of delivery of a multi-megaton weapon or of a fall-out bonus — except from the weapon detonated by clandestine means in Washington — the USSR would wish to use medium-yield weapons consistently and hit each metropolitan area heavily rather than adding small-yield weapons to the attack. This consideration, in view of the limited stockpile of nuclear weapons available, would be the controlling factor in holding the number of mission aircraft to about 500 rather than making the maximum effort visualized in the high-altitude attack.

118. In addition, each aircraft would carry the ECM passive receivers described above in the high-altitude attack plan (paragraph 104), so that they could enter the radar defense system at the optimum points en route to target. The USSR might, of course, also use considerable numbers of individual aircraft carrying special ECM equipment as in the other plan of attack. Since we are not sure how

such special aircraft could be used in coordination with the low-level approach, however, we have not included a major ECM effort as part of this plan.

119. This plan of attack, like the high-altitude plan described above, would include the launching of guided missiles on the U. S. Pacific Coast at H-hour (1200 Pacific Coast time) and would be accompanied by the clandestine attacks, also outlined previously.

120. This low-altitude plan of attack, if successfully executed, would probably insure a great deal more damage to the continental U. S. than the one previously analyzed, and although it is operationally much more difficult, we believe the USSR might select this method of attack if Soviet leaders felt compelled to initiate hostilities in mid-1957.

PART II: U. S. DEFENSIVE CAPABILITIES

The U. S. Air Defense System in Mid-1957

121. In calculating the probable success or failure of Soviet attacks on the U. S. and key U. S. overseas installations, we have tried to develop realistic, authoritative estimates of the availability of U. S. defense weapons as of mid-1957 and their probable performance characteristics as of that time. For the overseas installations, our calculations reflect the best information currently available to the Joint Chiefs of Staff as to armed forces deployment as of 1957 and the probable effectiveness of local air defense systems at that time.

For the continental U. S., we have relied mainly on the Department of Defense Progress Report already cited as at Annex B, but have checked critical factors in this area with the appropriate responsible military commands or authorities.

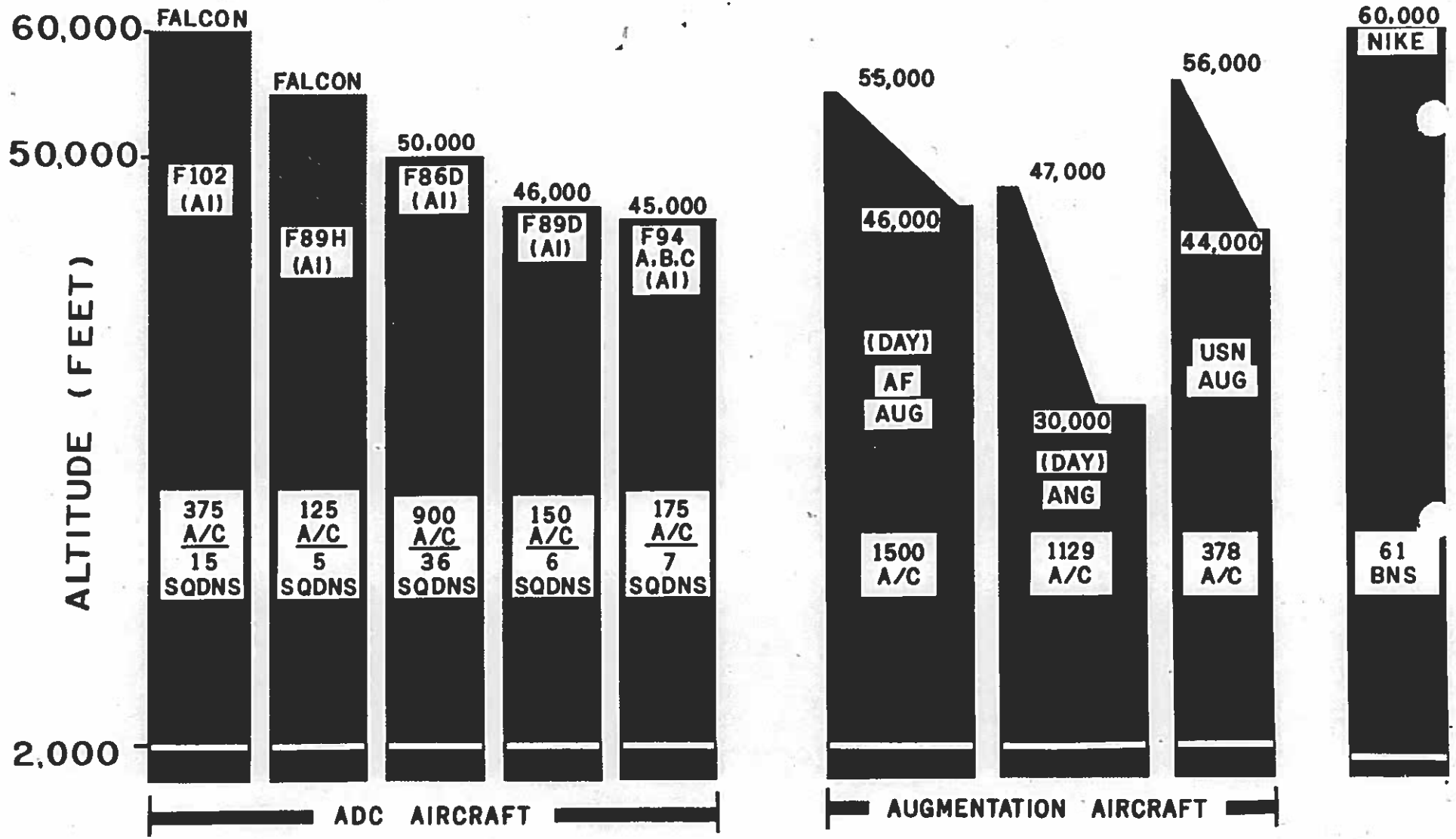
122. The continental U. S. defense system will be as described above (para. 48) and, as we pointed out, will be generally understood by Soviet planners. We have excluded from consideration in this assessment the Distant Early Warning (DEW) line in the Canadian far north, which might conceivably be installed by mid-1957 but which cannot in our opinion be considered a firm program at this time.

123. We have accepted the availability of the mid-Canada early warning line and its seaward extensions as fully operational by mid-1957, with the exception of the Pacific (Alaska to Hawaii) line, which will probably be only one half complete (extending 1,000 miles south from Alaska) with respect to shipborne radar and one third complete with respect to airborne radar. Under normal conditions the mid-Canada line and the Atlantic seaward extension would give a very high degree of probability of detection of aircraft passage (approximately 80 per cent for a single aircraft). The Pacific seaward extension would be a little less effective in the areas it covers, due to the fact that it would not have its full complement of airborne early warning aircraft.

124. The contiguous radar system has been evaluated as having the following performance characteristics:

a. Geographically the ground-controlled intercept radar

MAX. AND MIN. FIGHTING ALTITUDES AND OPERATIONAL SQUADRONS



coverage at 50,000 feet will extend approximately 250 nautical miles seaward off the West Coast, 350 nautical miles off the East Coast, 140 nautical miles north into Canada, and 100 nautical miles south of the southern U. S. border.

h. Radar ranges:

(1)	AEW&C Aircraft	- 150 n.m. at 50,000 feet 120 n.m. at low level
(2)	Texas Towers	- 120 n.m. at 50,000 feet 60 n.m. at low level
(3)	Picket Vessels	- 175 n.m. at 30-35,000 feet 50 n.m. at low level
(4)	Gap Filler Radar	- 50 n.m. at low level

125. In view of the strategic warning probably available and the certainty of 9 - 12 hours warning available in the continental U. S. as a result of our decision that the USSR would attack overseas first, all continental U. S. defense forces are considered to be in the highest state of alert when air attacks arrive. Continental Air Defense Command experience indicates that at any given time a certain number of aircraft would not be operational or would abort, and we have used the factor based on this experience, which indicates that 18 aircraft per squadron (of 25 assigned) would be available under these conditions.

126. The interceptor aircraft programmed for the fourth quarter of FY 1957, consisting of F-102's, F-86D's, F-89's (D's and H's), and F-94 C's totalling 69 squadrons, were considered available for

air defense, except that the F-102, which will be coming into operational use in the 1957 period, was considered to be operational in only 15 squadrons, 8 of which would be fully combat-ready. These forces would be augmented with Air National Guard, Tactical Air Force, SAC fighter squadrons, Navy, and Marine forces as presently planned, and they would be supplemented by the Canadian air forces. All of these forces are listed, with their planned base-deployment, in Tables of the War-Game Analysis prepared for us by a Continental Air Defense Command team of operations analysts. This Analysis is at Annex M.

127. With respect to F-102 availability and performance, as well as other critical weapon performance capabilities, we have adopted the estimates given us by Headquarters, U. S. Air Force in a special memorandum on the air defense system as of 1957.* This source provides the basis for three factors which are critical in calculating the probable high-altitude effectiveness of the defense system as of mid-1957:

a. The ground-controlled intercept radar stations responsible for major target areas and for most of the rest of the defense system will probably be capable of performing their functions at altitudes up to 58,000 feet with a high degree of reliability.

b. The F-102 probably will be able to operate and fight effectively at an altitude of 52,500 feet.

c. The F-102 (and the F-89H) will be armed with the FALCON

* HQ, USAF, memorandum, "Requirement for Information Concerning the 1957 Air Defense System," 10 September 1954, at Annex N.

guided air rocket, which has a relatively high kill probability and which (according to current preliminary estimates of a new launching technique) can be used against targets at altitudes up to about 10,000 feet above the altitude of the launching aircraft.

128. The NIKE-I battalions and the defended areas in which they probably will be installed as of mid-1957 are set forth in Table 2 of the War-game Analysis at Annex M. The defended areas include eighteen major U. S. metropolitan areas, the nuclear energy installation at Hanford, Washington, and four SAC heavy-bomber bases. For the most part, there is more than one battalion for each defended area, and there are four batteries capable of firing independently in each battalion.

War-gaming Analysis

129. The calculation of the kill effectiveness of the NIKE missile is based on factors developed by the Army Anti-Aircraft Command of the Air Defense Command from theoretical analysis, controlled experiments, and limited field testing. The process of calculation is described in Section 2 of the War-game Analysis at Annex M. In very general terms, it is based on the probability that every five or six NIKE missiles fired at attacking aircraft would on the average destroy one aircraft. This probability is about one-half what the weapons system itself is considered capable of achieving under ideal circumstances by mid-1957. The lower probability factor was used to allow for the

adverse effect of such things as electronic countermeasures, fire-control errors, failures in operational readiness, and errors of operating personnel. The effectiveness of the NIKE weapons system varies, of course, with the time of fire and would therefore be less for low altitude attacks.

130. The war-gaming technique for analyzing probable attrition of attacking aircraft due to interception in the air is much more complex and reflects a great deal more operational experience than was available for the NIKE calculations. The Continental Air Defense Command team of operations analysts, working under our direction and with guidance from the military services, charted the air battle and estimated probable deployment and allocation of defensive aircraft to individual hypothetical strikes by attacking aircraft. Every effort was made to hypothesize a realistic defensive situation and determine probable defensive actions on the basis of information that would be available to the defense forces in the circumstances visualized. Once the critical factor of the probable fighter-bomber ratio in each area is established in this way, the course of the ensuing air battles was reduced to quantitative factors expressing available time and normal probability for every stage in the continuous process of detection, interception, and kill of attacking aircraft. Every effort was made to assign quantitative values to these factors in a realistic way, allowing for reductions in effectiveness of the various elements in the defense system as a result of the operational situations as analyzed for each air strike. This process is described in detail in

the War-game Analysis at Annex N.

Critical Deficiencies

131. A critical deficiency of the air defenses of the U. S. that impressed itself upon us in our analysis is the apparent inability of the U. S. radar system at present to produce the results needed to defeat an enemy attack at very low altitude. Every function performed by the air defense system is affected. The presently installed search (surveillance) radar sets can detect aircraft at very low altitudes only at an unacceptably short range, because of limitations inherent in "line of vision" characteristics. The presently installed ground-controlled intercept radar is similarly limited in range and as a result is likely to have insufficient time to bring about the interception and destruction of enemy aircraft attacking at very low altitude. Airborne search and control radar is also seriously deficient in its ability to track a very low altitude aircraft because of its inability to discriminate a moving aircraft from the "clutter" partially obscuring its radar scope with reflections from the uneven surface of the ground or the water at sea. The current Ground Observer Corps represents an effort to remedy certain features of these deficiencies.

132. Interceptor aircraft are even more critically affected by this deficiency of radar at low altitudes than other elements of the defense system. Airborne radar installed in U. S. all-weather fighters is unable to function effectively below about 1,000 feet over the sea

or about 2,000 feet over the land because it cannot discriminate a moving aircraft at these altitudes from the ground or sea "clutter" depicted on the radar scope. Accordingly, any interceptor aircraft that has to rely upon its airborne radar fire control system as it must at night or in bad weather is unable to intercept or to engage an enemy at very low altitudes except by pure chance. Moreover, as a result of the limitations of presently installed search and control radar on the ground, day fighters and all-weather fighters operating in good weather in daylight cannot be adequately directed from the ground and probably are therefore also restricted to chance interception. Finally, due to similar radar limitations, the kill effectiveness of NIKE is critically reduced in defensive efforts against very low-flying aircraft.

133. At the other end of the altitude scale, we feel it necessary to point out the probability that Soviet capabilities to attack at extremely high altitudes may progressively improve, in the face of possible lack of capability of our radar system to operate effectively at those altitudes.

134. We realize that these deficiencies are known to responsible defense agencies and commands, and we are aware that efforts to remedy them are in process. Nevertheless, in our judgment, current programs and projects probably will not adequately remedy these deficiencies by as early as mid-1957.

135. These deficiencies put a high premium on low-altitude night attacks. We have examined the status of projects now under way for developing AMTI (Airborne Moving Target Indicator) equipment, which could discriminate a moving target by screening out ground and sea "clutter", and have concluded that such equipment is unlikely to be available as of mid-1957 under currently approved programs. Similarly, low-frequency search and control radar, which might considerably increase the range and certainty of detecting and tracking low-level aircraft, is also unlikely to be available under currently approved programs. These two factors are critical in our calculation of the results of a low-altitude attack on the continental U. S.

Probable Weight of the Attacks Delivered by Air

136. In calculating the net weight of weapons that might actually be delivered on target in the various possible Soviet air attacks previously discussed, we have deducted from the forces launched for each target the number of aircraft that probably would abort or fail to reach targets for reasons other than combat, using the agreed national intelligence factor of 20 percent for unrefueled mission aircraft and 25 percent for refueled mission aircraft. From the remaining forces, assumed to be the number actually attacking each defended area, we have deducted the number of aircraft indicated in the war game as probably destroyed — first — by U. S. intercepting fighters and — second — by NIKE and other anti-aircraft batteries. It is important to recognize that these figures represent mathematical probabilities only, and the actual situation might vary considerably

in either direction in any one case. Nevertheless, general as it is, this process represents the most sophisticated analysis we were able to make of probable attrition in Soviet air attacks on the continental U. S. as of mid-1957.

137. The calculation of the probable attrition and net weight of the attacks on overseas installations is based on a much simpler system of analysis and estimating by staff officers of the military services. The margin of error in our estimate regarding the overseas attacks is probably greater than in the more complex process developed for the continental U. S., but these estimates reflect the best information currently available.

138. <u>High Altitude Air Attack on the Continental U. S.</u> The results indicated by the War-game Analysis of the air battle that would occur in 1957 if the USSR attacked, and if it attacked with the large number of mission craft (about 775) visualized in the plan for high-altitude attack described above (para. 96), would be generally as follows:

SAC BASES	Launched	Attacking	Type a/c	Bombs on Target
Limestone AFB	9	7	Jet	4 5 MT
Westover AFB	24	18	Jet	8 5 MT
Fairchild AFB	9	7	Jet	3 60 MT
Ellsworth AFB	5	4	Jet	0
Travis AFB	7	5	Jet	0
Castle AFB	4	3	Jet	1 60 MT
* Walker AFB	5	4	TU-4	2 60 MT
* Carswell AFB	12	9	TU-4	2 60 MT
* Biggs AFB	5	4	TU-4	4 60 MT
* Altus AFB	9	7	TU-4	1 60 MT
Offutt AFB (SAC Hqs)	11	8	Jet	3 60 MT

* Daylight-visual bombing

AEC Installations	Launched	Attacking	Type a/c	Bombs on Target
* Oak Ridge	12	9	TU-4	2 5 MT
* Paducah	8	6	TU-4	1 5 MT
Hanford	19	14	Jet	3 5 MT
* Savannah River	8	6	TU-4	1 5 MT
Metropolitan Areas				
New York	79	59	Jet	1 10 MT; 3 5 MT**
Chicago-Gary	59	44	Jet	3 5 MT**
Philadelphia	65	49	Jet	4 60 MT
Los Angeles	52	39	TU-4	5 60 MT
Detroit	47	35	Jet	2 60 MT
Pittsburgh	32	24	Jet	0
San Francisco-Oakland	49	37	TU-4	4 60 MT
Boston	53	40	Jet	4 60 MT
Cleveland	20	15	Jet	0
Buffalo	30	23	Jet	2 5 MT
St. Louis	25	19	TU-4	4 5 MT
Washington, D. C.	40	30	TU-4	0
Baltimore	19	14	TU-4	1 5 MT
Milwaukee	35	26	Jet	3 5 MT
Norfolk	20	15	TU-4	1 5 MT
TOTALS	772	580		72**

* Daylight-visual bombing

** This New York attack and the Philadelphia attack each would include 3 ECM aircraft, not armed with nuclear weapons. Thus the total number of aircraft reaching bomb-release line would be 78, of which 72 would drop bombs, as indicated in the table

139. The details of the attrition that probably would be inflicted on Soviet forces in an attack of this kind are set forth in the War-game Analysis at Annex M and, in more general terms, in Appendix II. In summary, the probability is that 580 aircraft would reach the continental U. S. defense system and that approximately 500 of them would be destroyed before reaching bomb-release line, about half of

them by interceptor aircraft and half by NIKE fire. This means that approximately 85 per cent of the force reaching the U. S. defense system would be destroyed. It also means that of the 15 very large-yield weapons (10 MT) employed, only one would be delivered.

140. The number of bombs delivered on New York and Philadelphia would be reduced slightly as a result of the probability that some surviving aircraft would be carrying ECM equipment only. Thus the total number of nuclear weapons delivered in the air attack by the 78 surviving aircraft would be 72, of which 1 would be 10 MT yield, 35 would be 60 KT yield and 36 would be 5 KT yield. Metropolitan areas would be hit with 37 weapons, of which 1 would be 10 MT yield, 19 would be 60 KT yield, and 17 would be 5 KT yield. SAC bases would be hit by 15 weapons of 60 KT yield and 12 weapons of 5 KT yield. The four nuclear energy program installations would be hit by 7 weapons of 5 KT yield.

141. In addition, the guided missiles attacks on targets in the Western Hemisphere would probably succeed in placing 2 weapons of 60 KT yield on San Diego and 2 on facilities at the Panama Canal. The missiles launched at Seattle were indicated as destroyed by interceptor aircraft and NIKE. These calculations were based on the estimate that half of the four missiles launched at each of these targets would function perfectly and reach the targets if not destroyed. This results in San Diego being added to the list of cities hit and 2 weapons of 60 KT yield being added to the total probably delivered

by air in a high-altitude attack on the continental U. S. (The results of the clandestine attack are discussed separately below.)

142. Low-Altitude Air Attack on the Continental U. S. According to the factors used in calculating the results of the air battle that would occur in 1957 if the USSR attacked with the number of mission aircraft (about 515) visualized in the plan for low-altitude attack described above (paragraph 113), the attrition would be spectacularly less than in the high altitude attack because of the inability of the interceptor force to engage attacking bombers below 1,000 feet over the sea or below 2,000 feet over the land. While we believe the difficulties of the low-level approach are so great, particularly for the Type-39 jet medium bombers operating at extreme range, that the abort and gross-error rate might be even higher than the 20 - 25 per cent factor employed, for comparative purposes we have used the same rate in assessing the results of this attack in the high-altitude attack.

143. If all attacking aircraft arrive in darkness at the altitude indicated, the probable kill by interceptor aircraft would be so low that it has been assessed at zero. Chance visual interceptions and chance positioning of fighters where they could catch bombers in the few minutes of climb to bomb-release line would be the only exceptions to the zero rate of kill. Thus the total destruction of bombers would result from NIKE missile and anti-aircraft gun fire. The results indicated in our analysis would be generally as follows:

SAC BASES	Launched	Attacking	Type a/c	Bombs on Target
Limestone AFB	5	4	Type-39	2
Westover AFB	4	3	Type-39	2
Fairchild AFB	7	6	TU-4	2
Ellsworth AFB	7	6	TU-4	2
Travis AFB	5	4	Type-39	2
Castle AFB	3	2	Type-39	2
Walker AFB	3	2	Type-37	2
Carswell AFB	3	2	Type-37	2
Biggs AFB	3	2	Type-37	2
Altus AFB	3	2	Type-37	2
Offutt AFB (SAC Hqs)	4	3	TU-4	2
AEC Installations				
Oak Ridge	4	3	TU-4	2
Paducah	4	2	TU-4	2
Hanford	7	6	TU-4	2
Savannah River	4	3	Type-37	2
Metropolitan Areas				
New York	47	35	Type-39	19
Chicago-Gary	63	51	TU-4	20
Philadelphia	29	22	Type-39	10
Los Angeles	37	28	Type-39	18
Detroit	51	41	TU-4	7
Pittsburgh	42	34	TU-4	10
San Francisco-Oakland	37	28	Type-39	18
Boston	19	14	Type-39	6
Cleveland	27	22	TU-4	7
Buffalo	36	29	TU-4	6
St. Louis	6	5	TU-4	5
Washington, D. C.	16	12	Type-39	4
Baltimore	16	12	Type-39	7
Milwaukee	17	14	TU-4	2
Norfolk	6	5	Type-37	2
TOTALS	515	402		171

144. In general, the results of this air battle indicates that about 400 of the 515 aircraft launched would reach the U. S. defense system and that fixed defenses (NIKE and guns) would destroy about 230 of them, or about 55 per cent. This rate of kill is somewhat

less them in the high altitude attack because of the reduced time of fire for NIKE batteries in view of the low-level approach of the bombers. While very limited data is available to use as a basis of calculation, NIKE probably would also be reduced in effectiveness in such a low-level attack because of "line of vision" radar limitations and the effects of ground "clutter" on its radar at very low levels. These estimates are the best approximation of NIKE low-level performance that could be developed at this time.

145. Since this attack as planned used all 60 KT weapons, the results of this air attack would be the delivery of 171 medium-yield (60 KT) weapons on target, of which 141 would have hit U. S. metropolitan areas, 22 would have hit SAC heavy-bomber bases, and 8 would have hit nuclear energy program installations. To this total of weapons delivered by air in the continental U. S. should be added the 2 missiles of 60 KT yield delivered on San Diego, as indicated above.

146. If Soviet planners had anticipated this degree of success, they might well have developed a somewhat broader target system to be hit less heavily. On the other hand, we are not certain that Soviet planners would rely on U. S. deficiencies in defense at low altitudes to be so serious as present evidence available to us would indicate or that they would rely on these deficiencies to persist into the 1957 period. In any case, for purposes of comparison with the results of the high-altitude attack, we have retained the target list developed before analysis of the probable attrition in a low-altitude

attack. The results show several times greater probable weight of weapons delivered in a low-altitude attack than in a high-altitude attack.

147. Electronic Countermeasures. In this assessment we have allowed a minimum factor of reduction of the defense system effectiveness due to Soviet employment of electronic countermeasures (ECM). We believe the USSR would try to exploit ECM to the utmost of its capabilities and might even in individual cases reduce the effectiveness of U. S. defensive weapons to zero. In some cases, for example in the case of the airborne intercept radar of the F-102 or the FALCON guided air rocket, the effectiveness of weapons critical in our calculations of defense capabilities might be greatly reduced.* Since we have found it impossible to analyze the specific balance between offensive use and defensive use of ECM, we have been obliged virtually to disregard this important factor and make only the minimum allowance for reduced defense system effectiveness across the board that we believe would result from the initiative and greater flexibility of the offense.

148. Overseas Attacks. We have made very general estimates of the probable attrition and net weight of attacks that might be delivered on key U. S. installations overseas. They are presented in

* See an indication of this effect, along with a listing of other factors reducing theoretical kill probabilities, in HQ, USAF memorandum, "Requirement for Information Concerning the 1957 Air Defense System", 10 September 1954, at Annex H.

Appendix I, both for high-level and low-level attacks. In summary, we have estimated that attrition would vary between 5 per cent and 30 per cent, that all the targets attacked by nuclear weapons would be hit with several weapons each, and that the other attacks would result in a level of conventional bomb delivery that would reduce but not entirely interdict the operability of the installations. In all, between 110 and 120 small-yield (5 KT) weapons and about 40 medium-yield (60 KT) weapons probably would be delivered. In addition, about 135 to 180 conventional 500 pound bombs would be delivered on each of the targets attacked. The general military consequences of attacks of this weight on key U. S. installations overseas are examined below (paragraphs 213 - 221).

Results of the Clandestine Attack

149. The hypothetical clandestine attacks described above (paras. 53-58) are, of course, not susceptible to war-game analysis in the same sense as the air attacks; but we have had each of the elements of the clandestine attack examined in detail by the appropriate U. S. internal security authorities with a view to determining the probable success or failure of each mission. The findings in each case are presented in a joint report by the Interdepartmental Intelligence Conference and the Interdepartmental Committee on Internal Security, which is at Annex O.

150. The main element of our hypothetical clandestine attack would be the detonation of a 10 MT weapon in the premises of the

Soviet Embassy in Washington at about H-hour (1500 local time), as one of the first blows of the war. Such a weapon probably could be introduced safely in diplomatic shipments to the Embassy in accordance with present regulations and procedures, under which an occasional shipment weighing as much as 1,000 pounds can enter under diplomatic seal, uninspected and under constant guard by armed Soviet couriers. While it would take several weeks or even months for all components (most of which would weigh as little as 25 pounds) to arrive under normal conditions of courier traffic, the weapon itself could be assembled in a few days. 3.3(b)(9), 6.2(a) 3.3(b)(9), 6.2(a) would require trained technicians to assemble it. There is no way in which U. S. security officers could be sure of detecting such activity.

151. The main deterrent to Soviet employment of this means of attack would be the necessity for a considerable number of persons, including couriers and assembly technicians as well as the chief Soviet officials involved, to have in their possession before D-day disassembled components of the weapon or to have casual knowledge of special preparations for some operation. Fear of defections or of a fortunate intelligence break on the part of U. S. security officers would cause the USSR to restrict the scope of the operation and the number of people involved to the absolute minimum. Because of the

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* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

importance of the clandestine attack on Washington, the USSR would take maximum security precautions and reduce as much as possible the risk of discovery of the operation. Therefore the attack we have hypothesized for Washington could be mounted and probably would be successful. It would virtually obliterate the District of Columbia and would create a fall-out hazard extending over many square miles of adjacent areas, the number of which and the location of which would depend on wind conditions.* The damage done by this Washington attack is included in the general analysis of damage done to the continental U. S., presented below (paras. 156 - 212).

**152. The second element of the clandestine attack would be the attempts against Carswell Air Force Base in Texas and MacDill Air Force Base in Florida. 3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a)

3.3(b)(9), 6.2(a) The damage to the base is considered below in conjunction with the general damage done by air attack, which by way of reinsurance included the same target. In the case of MacDill, at Tampa, the limitations imposed by the requirement of operating after D-day, when the bay adjacent to the air base would almost certainly be closed to unauthorized craft, reduce the chances of the two small craft reaching the areas from

* For basic information on the fall-out hazard, see AFSWP Report No. 507 at Annex K.

** On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

which significant damage could be done so much that we have classed this effort as a failure.

*153. The clandestine attack on the Grand Coulee Dam described above might be successful, even though it could not occur until after D-day. Three simultaneous methods of approach to the dam could be employed, one by motor vehicle across the roadway on top of the dam, one by motor vehicle moving into the parking area adjacent to the pumping station, and one by an inflatable boat or self-propelled device launched in the reservoir above the dam. The guard force as presently programmed probably would not be able to prevent one or more of the small nuclear weapons being detonated in the water on the upper side of the dam. In these circumstances, if emergency security arrangements were not promptly made, the Grand Coulee Dam could be breached and become inoperable for a period of years. The damage in terms of industrial loss, particularly loss of electric power, is included below in the general assessment of damage. In addition, however, a breach in the Grand Coulee Dam probably would seriously damage the Chief Joseph, McNary, and Bonneville Dams and result in the inundation of some 30 towns, including Hanford and Portland.

154. Clandestine attacks using incendiary rifle fire against the transformers at the two tetraethyl plants (Baton Rouge, La. and Deepwater, New Jersey) described above would almost certainly be successful within

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* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

the first days of the war, and would completely stop the production of tetraethyl lead at these plants, which account for the greater part of total U. S. production. These attacks doubtlessly would be accompanied by many other attempts at sabotage but we have been unable to measure the probable extent or consequences of such clandestine efforts.

"155. This analysis of the results of clandestine attack on the continental U. S. is based on our hypothetical plan as set forth above (paras 53 - 58). There are, of course, other targets which may be just as important as the ones we have selected, and Soviet saboteurs might be equally capable of destroying them either by nuclear weapons or through conventional sabotage."**

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* On this and related paragraphs, see IIC comments and the Subcommittee remarks thereon, at Appendix IV.

** There are a number of critical resources that are essential to the war effort that could have been destroyed by conventional sabotage or by small clandestine nuclear weapons. For example, miniature anti-friction bearings are essential to certain aircraft instruments and other precision military equipment. 100% of the U. S. supply comes from two small plants in New Hampshire, one accounting for 60% and the other 40% of total output. Similarly, ADP crystals (ammonium dihydrogen phosphate) are an essential part of military sonar (underwater sound detection equipment) and are therefore necessary for antisubmarine operations. No substitute is available. Two producers account for 100% of total production. Very close tolerances must be maintained in cutting these crystals. Production know-how and special equipment is so important that replacement would be long delayed.

PART III: PROBABLE DAMAGE AS A RESULT OF SOVIET ATTACKS

Probable Damage Inflicted on the Continental U. S.

156. We have attempted to compute the damage likely to be inflicted in Soviet attacks on the continental U. S. For purposes of increased realism, the pattern of bombs considered actually to have been dropped on each target was calculated on a basis that took into account the random factors that would be inherent in a large operation of the kind visualized. Random factors were introduced into determination of which of the attacking aircraft probably reached specific aiming points, and also into determination of the computed actual ground zeros in the light of the probable aiming error (CEP) of each separate strike.*

157. The two continental U. S. attack plans analyzed in this assessment included strikes at only a relatively limited number of metropolitan industrial targets, chosen for their strategic importance and tactical accessibility. Some industrial damage would have been done in addition, however, in urban areas adjacent to SAC bases and AEC installations. (Springfield, Mass., for instance, would probably be hit in attacks on Westover Air Force Base.) The comparatively limited target list, resulting from the limited Soviet supply of nuclear weapons and from the high attrition likely to be caused by U. S. defenses, prevented the breadth of the attack on U. S. industry

* This method of computation of random factors controlling theoretical ground zeros and aiming errors is described in detail in the Office of Defense Mobilization Staff Report, 20 October 1954, at Annex P.

from being as great as has hitherto been generally accepted as the inevitable consequence of an all-out enemy effort. The limited number of target areas also prevented consideration of attacking certain lucrative target systems, such as the producers of all major military end-items, rail transportation nuclei, electric power, and petroleum refining, that would have required a broader attack pattern. Nevertheless the inclusion of such major industrial production centers as New York, Chicago, Detroit, Pittsburgh, Cleveland, Los Angeles, Philadelphia, Boston, Buffalo, Baltimore, and St. Louis in the target list insured relatively heavy damage on some industries.

158. Fall-out Hazards. There has been insufficient time and very little basic information available to permit an analysis of the effect of residual radiation on industrial facilities, the industrial labor force, the population generally, and military installations. This problem would be especially serious in the region around Washington, D. C., and New York City in both attacks, and in the regions around all the other cities in the low altitude attack. (The fall-out would normally be in an easterly direction from the cities attacked, due to prevailing winds in the upper air.) The nature and the dimensions of the fall-out hazard are indicated in Armed Forces Special Weapons Project study at Annex K. We believe fall-out would add to industrial damage, loss of essential services, population casualties, and damage to military installations, but we have been unable to measure the additional injury inflicted on the U. S.

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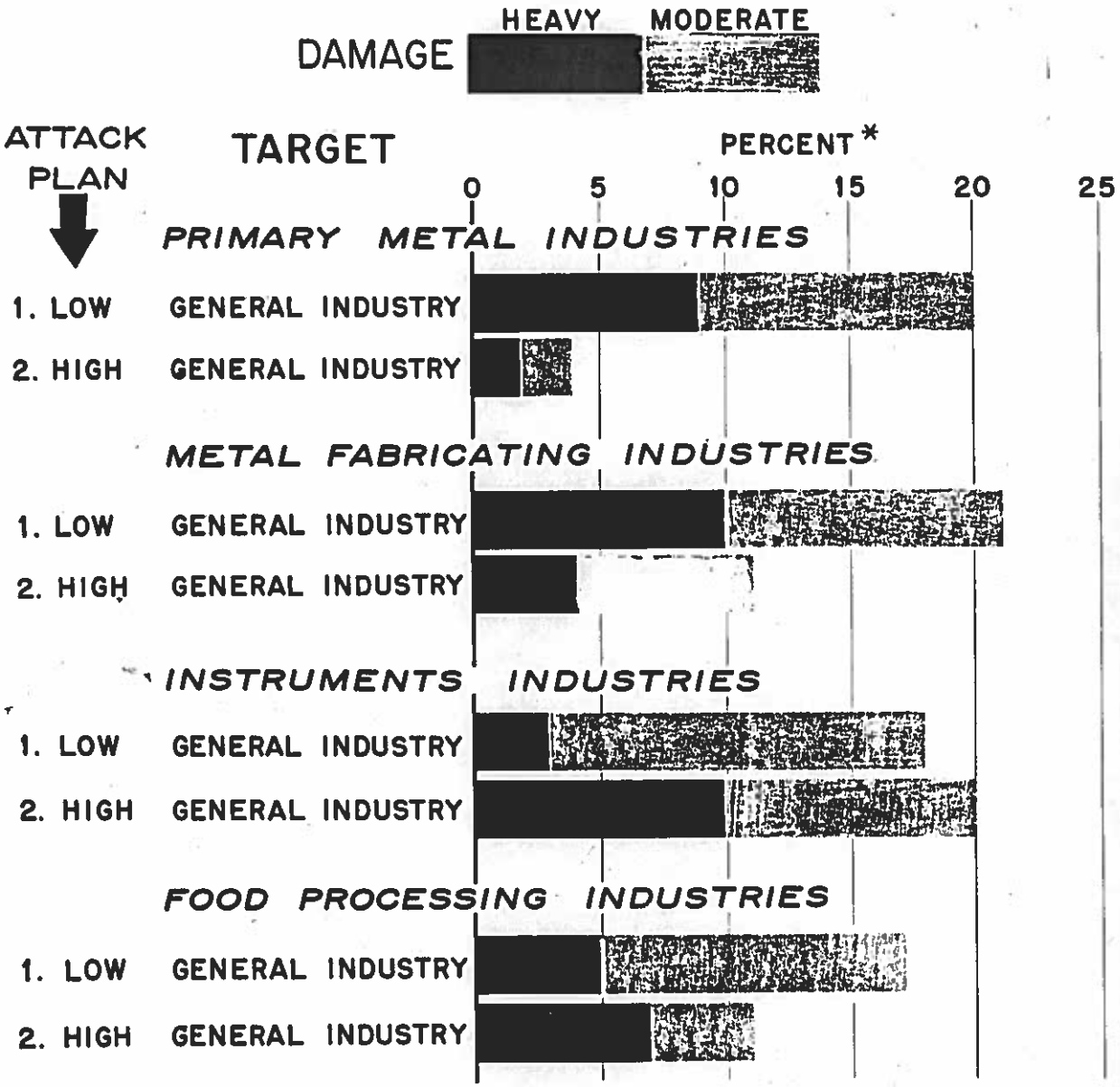
COMPARISON OF HIGH VERSUS LOW AIR ATTACK PLANS

SELECTED BROAD INDUSTRY GROUPS



* BASED UPON 1952 PLANT SHIPMENTS

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159. Detonation of Nuclear Weapons in Aircraft Destroyed.

Another factor that we believe would increase the damage to the continental U. S. above what our estimates indicate is the possibility that Soviet aircraft destroyed near U. S. metropolitan centers would have their nuclear weapons fused for detonation on impact. There was no realistic way we could determine where an attacking craft counted in our calculations as shot down would actually fall, and therefore, no way to decide whether it might accidentally hit areas where detonation of a nuclear weapon would cause significant damage. This would be especially true in the case of multi-megaton weapons, several of which were calculated to be shot down in aircraft near New York, though not reaching bomb release line. In our view, the USSR might in one-way missions of the kind visualized, arm the nuclear weapons to explode if the aircraft should be shot down. In this event, there would be some additional damage beyond what we have calculated, but there is no way of measuring how much.

General Industrial Damage*

160. For presentation purposes two broad damage categories, heavy and moderate, have been used to describe the condition of each industry or industry group after attack. The heavy category includes plants suffering a degree of damage that would range from complete destruction to retention of some limited salvage value. The moderate

* The industrial damage calculations presented herein are based on computations and studies by the Office of Defense Mobilization and the Office of the Secretary of Defense (Supply and Logistics). The summary reports from these two offices are at Annex P.

category includes plants suffering a degree of damage that would range from retention of considerable salvage value to a capacity for restoration to production within a few weeks.

161. Superficial damage insufficient to cause lengthy interruptions to productive capacity would occur beyond these damage categories. It should be noted, however, that relatively minor damage to facilities could result in extensive personnel losses if the plants had not been evacuated.

162. The general industrial damage, calculated in this manner, is presented in the following table.

COMPARISON OF EFFECTS OF HIGH VERSUS LOW ATTACK PLANS
Selected Industry Groups

Attack Plan	Industrial Group Target	Percent Damage 1/ Heavy	Moderate	Total
	Primary Metals Industries			
1. High	General Industry	2	2	4
2. Low	General Industry	9	11	20
	Metal Fabricating Industries			
1. High	General Industry	4	7	11
2. Low	General Industry	10	11	21
	Instruments Industries			
1. High	General Industry	10	10	20
2. Low	General Industry	3	15	18
	Food Processing Industries			
1. High	General Industry	7	4	11
2. Low	General Industry	5	12	17

1/ Based upon dollar value of 1952 Plant Shipments

In general, these calculations show that the low altitude attack caused the most serious destruction to primary metal industries. Plants of this industry group process metallic ores of all kinds into ingot or

slab form and also roll, draw, or extrude the metals into the standard shapes and forms used by metal fabricating plants. In the low altitude attack, plants accounting for 9 percent of 1952 shipments received heavy damage while plants accounting for 11 percent of 1952 shipments received moderate damage. The damage from high altitude attacks was less than one-fourth as great.

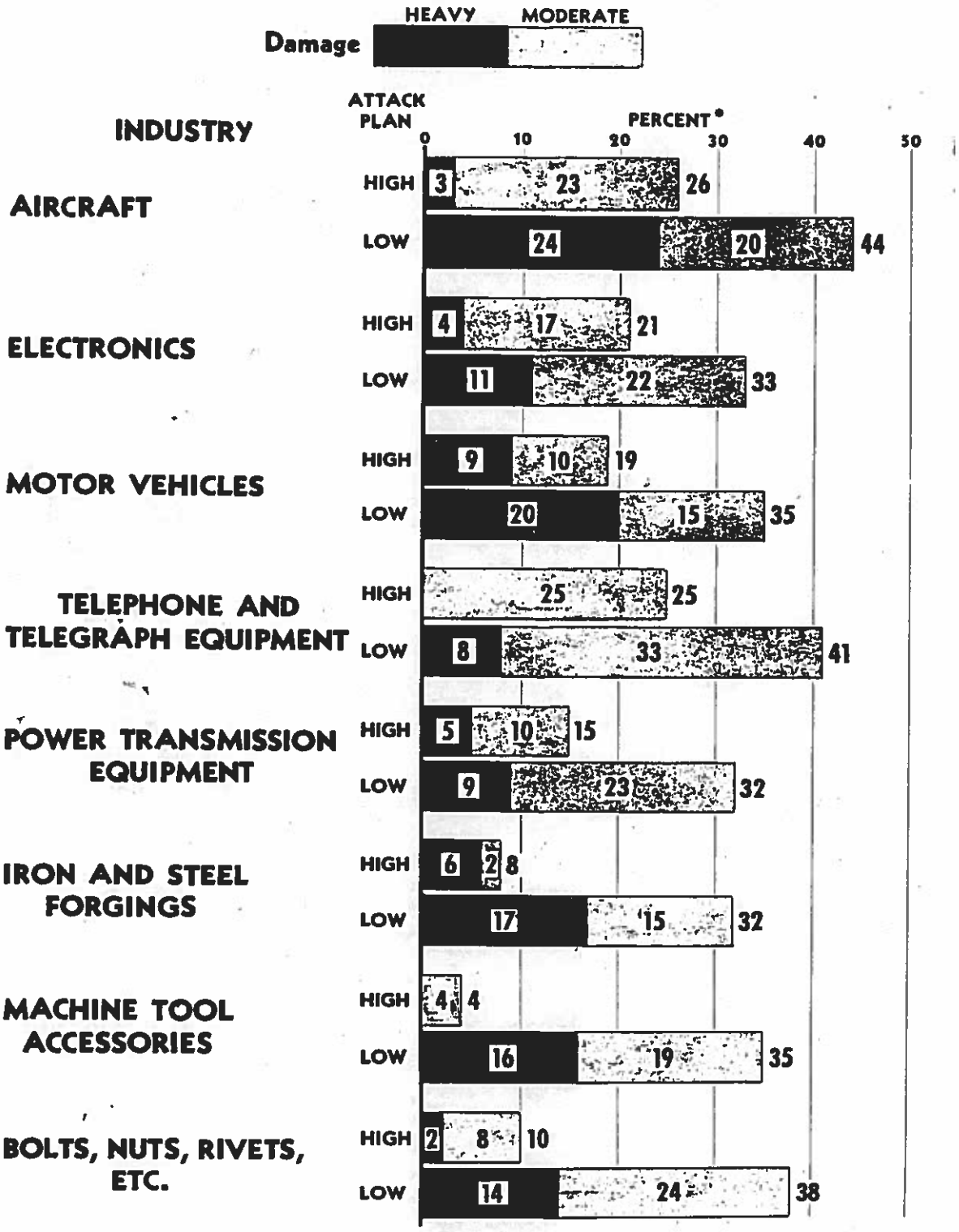
163. Steel works and rolling mills, which constitute a major part of this group, suffered almost the same amount of damage, 10 percent heavy and 11 percent moderate, in the low altitude attack. The damage levels in all of the high altitude attacks were very much lighter, due to complete destruction of the aircraft attacking Pittsburgh and the use of small-yield (5 KT) weapons on Chicago.

164. The breaching of Grand Coulee Dam would cause a temporary loss of about 10 percent of the nation's primary aluminum capacity at the nearby Kaiser plant. However, this would not be a crippling blow, since this industry emerged unscathed from the air attacks.

165. Metal fabricating industries received 10 percent heavy damage and 11 percent moderate damage in the low altitude attack, based, as above, upon individual plant shipments. Corresponding figures for the food processing industry are 5 percent and 12 percent, respectively, in the low altitude attack. The instruments industry received its heaviest total damage, 20 percent, from the attack which was delivered at high altitude.

COMPARISON OF HIGH VERSUS LOW AIR ATTACK PLANS

DAMAGE TO SELECTED CRITICAL INDUSTRIES



*Based upon 1952 Plant Shipments

166. Superficially, the broad industry summaries give the impression of "balanced" destruction. Unfortunately, this masks the imbalances in destruction which become apparent at a more detailed level. Certain vital industries were very hard hit, especially by the low-level attack. Detailed results for eight important industries are given in the following table, illustrated by the chart opposite this page.

COMPARISON OF HIGH VERSUS LOW AIR ATTACK PLANS
Damage to Selected Critical Industries

Industry	Attack Plan	Percent Damage 1/ Heavy	Moderate	Total
Aircraft	1. High	3	23	26
	2. Low	24	20	44
Electronics	1. High	4	17	21
	2. Low	11	22	33
Motor Vehicles	1. High	9	10	19
	2. Low	20	15	35
Telephone and Telegraph Equipment	1. High	-	25	25
	2. Low	8	33	41
Power Transmission Equipment	1. High	5	10	15
	2. Low	9	23	32
Iron and Steel Forgings	1. High	6	2	8
	2. Low	17	15	32
Machine Tool Accessories	1. High	-	4	4
	2. Low	16	19	35
Bolts, Nuts, Rivets, etc.	1. High	2	8	10
	2. Low	14	24	38

1/ Based upon 1952 Plant Shipments

167. Based upon 1952 value of shipments, 44 percent of the aircraft industry was damaged in the low-level attack. Twenty-four

per cent of this industry is in the "heavy" damage category and is, therefore, destroyed or out of production for many months. Restoration of any facilities in this category would require complete rebuilding and re-equipping, amounting to very heavy investment of scarce resources - men, material, and new production equipment. The 20 per cent receiving "moderate" damage would require extensive repairs to structures, major overhauls for some equipment and minor repairs to the remainder. Unpredictable fire damage could reduce many plants to burned-out hulks. Boeing plants in the Northwest would be handicapped by power shortages; however, this would probably be met by rationing of non-essential users.

168. The electronics industry received considerable damage from both the high and low attack plans. A large part of this damage was "moderate" and the plants probably could be rehabilitated, unless extensive fires occur. A large part of this industry is located in areas of Chicago, New York, and Philadelphia which are subject to a very serious fire hazard, including even firestorms.

169. The relatively heavy damage to the motor vehicle industry, 35 per cent from the low level attack and 19 per cent from the high level attack, is particularly serious. This industry is normally considered to be the backbone of this nation's reserve strength for military production. Aircraft engines, combat vehicles, airframes, guided missiles, and trucks would normally be turned out by this industry in large quantities during the second and third years of a war.

The plants of the industry tend to be very specialized, for peacetime efficiency, with the result that they are seriously interdependent and collectively vulnerable to isolated instances of damage.*

170. The damage to the telephone and telegraph equipment industry was comparatively high (25 per cent in high attack and 41 per cent in low attack). Most of the damaged plants were calculated to be only moderately damaged. However, the peak demand for this type of product will occur very early in the conflict -- to repair damaged communications facilities. During this critical emergency period little better than half of this vital industry would be in normal production.

171. The power transmission equipment industry** produces the gears, gear-boxes, shafts, friction bearings, universal joints, and similar highly fabricated mechanical components used in nearly all mechanical products. Damage amounting to 32 per cent in the low level attack would disrupt the flow of such components to producers of mechanical equipment. The high level attack caused damage to only 15 per cent of this industry.

172. Damage to the iron and steel forgings, machine tool accessories, and bolts, nuts, and rivets industries would amount to about one-third of capacity in the low level attack. Damage in the

* This statement is illustrated by the recent fire at a single transmission plant. Production schedules were seriously disrupted despite the fact that all the resources necessary for recuperation were undamaged.

** Exclusive of automotive power transmission equipment plants, which are included with the motor vehicle industry.

high level attack is much lighter. A large part of the damage is "moderate" and the plants could be salvaged or rehabilitated. It should be noted that a very large portion of all steel forgings are produced in a different industry — steel works and rolling mills — which received 10 per cent heavy damage and 11 per cent moderate damage in the low level attack. The damage to the machine tool accessories industry would materially retard both the conversion of undamaged plants to military production and the rehabilitation of damaged plants. A shortage of bolts, nuts, and rivets would be a serious handicap to all production.

173. Certain important industries escaped all attacks with little or no damage. For example, the explosives industry received no damage in either attack. The fertilizer industry, part of which is convertible to the manufacture of explosives, received relatively light damage (6 per cent in the low altitude attack). The vital petroleum refining industry received only 4 per cent heavy damage and 3 per cent moderate damage in the low altitude attack. Damage resulting from the high altitude attack was negligible.

174. All of these industries tend to be located away from the major industrial concentrations. While dispersion alone is no guarantee of immunity, crippling damage can be inflicted on a dispersed industry only by choosing it specifically as a target system. The enemy, therefore, in these attacks would lose the tremendous bonus effects resulting from attacks on industrial concentrations, and this would

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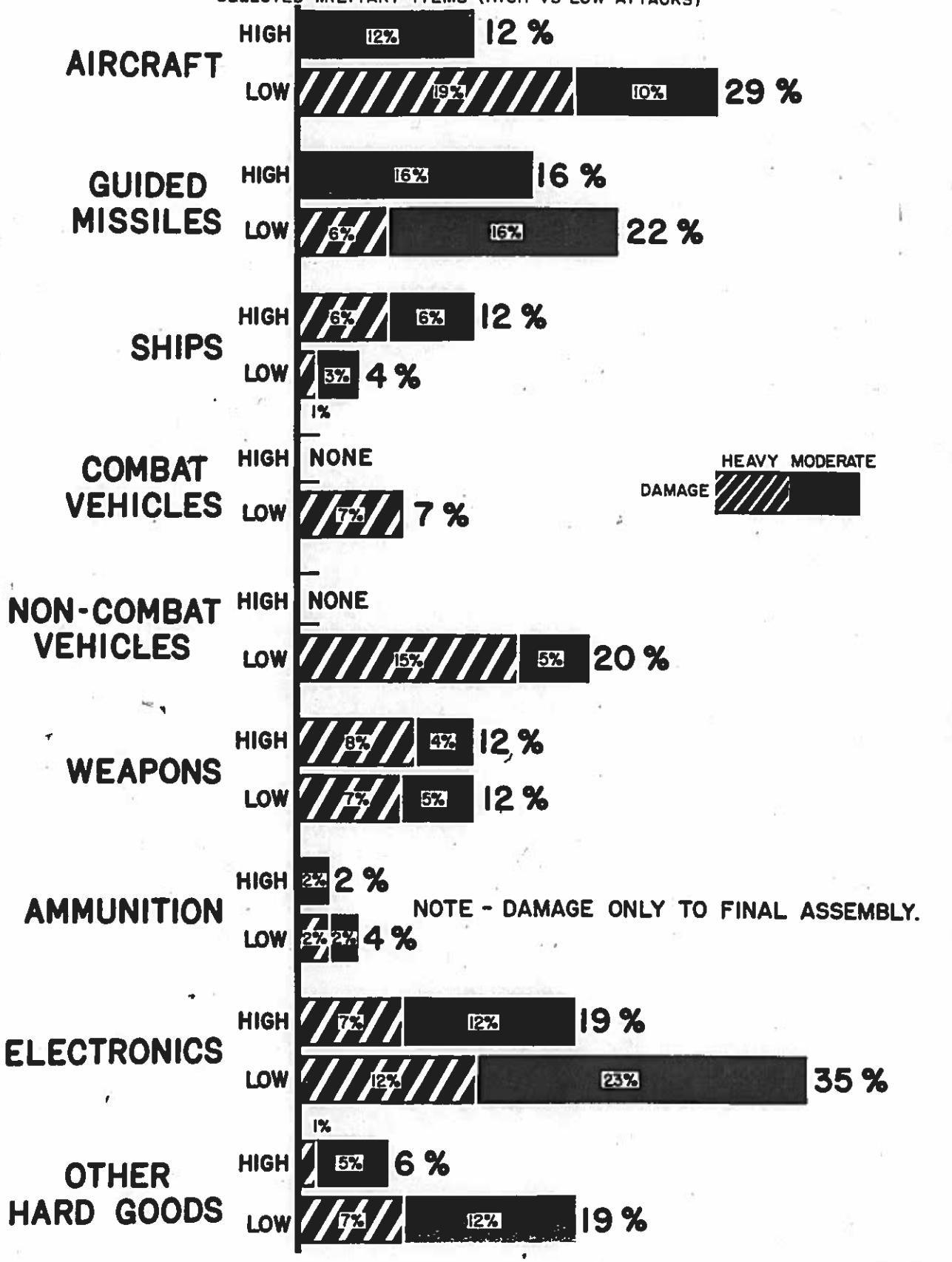
DAMAGE TO THREE YEARS PLANNED WAR PRODUCTION

SELECTED MILITARY ITEMS (HIGH VS LOW ATTACKS)



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leave the recuperative powers of the nation at a relatively high level.

175. The reduction in industrial output levels resulting from the damage summaries just presented would greatly exceed the damage percentages. The productive system is more complex and subject to external factors than is apparent from industry-wide damage totals. The continued smooth operation of any given plant depends not upon the survival of an appropriate fraction of supporting industries, but upon the survival of the particular plants which furnish materials and components to the plant in question. Since these supporting plants are parts of numerous industries located in many different areas, it is almost certain that some of the suppliers of each large plant would have been damaged. It is impossible to gauge the importance of this difficulty without a very careful analysis of supplier relationships on an individual plant basis. For certain key systems, in particular, it would appear to be highly desirable to identify second and third echelon suppliers of essential services, materials, and components, in order that the fate of a particular weapon system can be estimated accurately during the first 60 to 90 days following an attack.

Military End-Item Production.

176. An estimate of the results of the attacks on industry engaged in the production of military end-items is depicted on the chart facing this page. The damage (in heavy and moderate categories, as before) is presented in terms of the percentages of loss of the

dollar value of war production of military end-items as planned for the first three years of full wartime effort. As the chart illustrates, military aircraft (29 and 12 per cent), guided missiles (22 and 16 per cent), and electronics (35 and 19 per cent), suffer heavier damage than do most other military programs. The greater effect of the low-level attack is felt particularly in aircraft, non-combat vehicles (20 and 0 per cent), electronics and other hard goods (20 and 6 per cent). The computed results for ammunition (4 and 2 per cent) are misleading in that only end-item assembly capacity is measured. The actual damage to ammunition in these attacks is in the fabrication of shells and casings, for which no direct measure is presently available. The effect of employing random factors to determine computed actual ground zeros is evidenced by the damage to weapons production facilities (12 and 12 per cent) and to shipbuilding (4 and 12 per cent). In the latter case a more direct hit by a smaller weapon caused great damage.

177. In addition, the general industrial damage indicated above would have serious implications for military production. Communications difficulties would arise from damage to electronics, telephone and telegraph equipment and to the manufacturing facilities for these kinds of equipment (41 and 25 per cent). The loss of iron and steel forgings and power transmission equipment forecast difficulty in securing some vital components for military end-items. At best some allocating controls may be necessary. At worst, many military end-items may await completion and delivery for lack of components.

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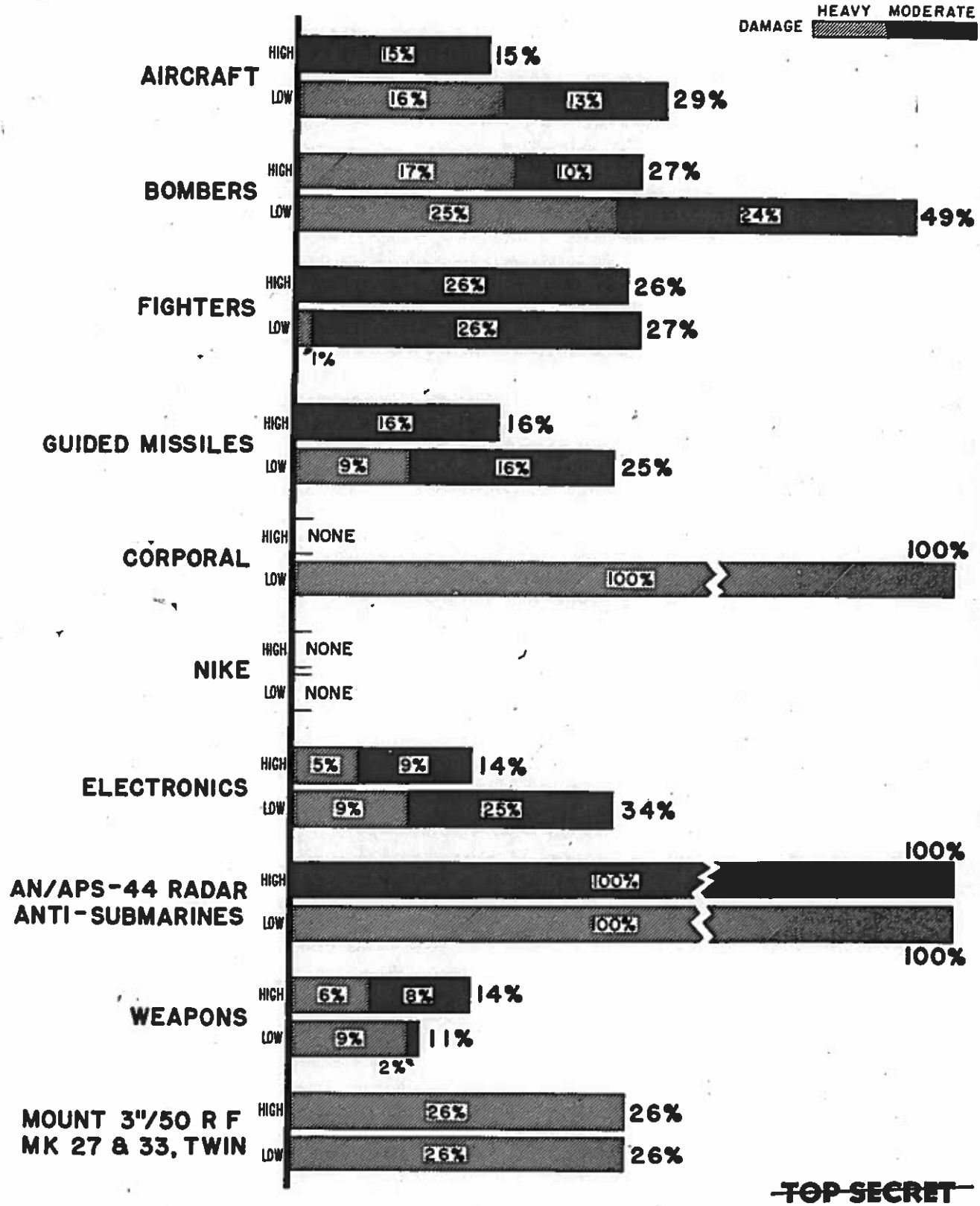
DAMAGE TO FIRST 6 MONTHS PLANNED WAR PRODUCTION

SELECTED MILITARY ITEMS (*HIGH VS LOW ATTACKS*)



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178. The most difficult military production problems would arise in connection with end-item production planned for the first six months of war. Undamaged plants already producing military items at D-day comprise the primary production sources for early war production. Undamaged plants not producing military end-items prior to the attack are unlikely to get into production within six months, even if some prior planning has been done. They will need trained supervisory staffs, specialized labor skills, special tools, blueprints, ready suppliers and redesigned production lines. Losses of active D-day producing facilities would be somewhat larger than those shown for the full three-year production loss. These losses, in terms of percentage of dollar value of war production of military end-items as planned for the first six months of war, are shown on the chart. The situation resulting from these losses probably would mean that the critical early phase of the war would be fought mainly out of existing stocks -- if the stocks are undamaged.

179. The chart of losses of the first six months war production illustrates the type of total damage that may occur to facilities producing individual weapons. Items procured from a sole source of production are particularly liable to complete loss. The loss of the Corporal guided missile was complete in the low-level attack on the Los Angeles area. The plant producing the airborne anti-submarine warfare radar, AN/ARS-44, was attacked and destroyed in the low-level attack, on the Philadelphia area, and was damaged moderately to heavily in the high altitude attack. A sole source producer for the

first year of planned war production, this facility would probably not get back into production in six months time in a heavily bombed city.*

180. The military end-item data now available and used in this damage computation does not associate critical components and sub-assemblies with the end-items. Procedures for remedying this situation are under development, but at present this lack of end-item component identification seriously limits the evaluation of the indirect effects of bomb damage. Consequently, percentage damage estimates applied to military end items understate the damage that would actually be sustained. For example, the known high incidence of damage sustained in the electronics industry will affect adversely the manufacturing and final assembly of combat-ready aircraft, submarines, anti-aircraft weapons, all search and detection craft, all electronically controlled guns. Supporting communications systems necessary to navigation and early warning systems are affected and in turn affect the weapons systems of which they are a part.

181. The general conclusions which can be drawn from the data available are that the combined effects of damage to transportation, communications and power, coupled with losses of suppliers and

* As is brought out in the study by the Office of the Secretary of Defense (Supply and Logistics) at Annex P, selection of a slightly different attack pattern designed to hit Kenosha, Wisconsin, and Hartford, Connecticut would have resulted in the destruction or damage of a majority of military aircraft engine manufacturing capacity.

multiple effect losses of productive manpower, will create actual production losses much higher than indicated here. Reprogramming of military production after such an attack placed a premium on getting unusually rapid, accurate and readily interpretable damage reports to an operating center staffed and equipped to present results to higher authority for decision. There also would have to exist more rapid and accurate procedures available to: (a) formulate new plans, (b) translate plans into requirements, (c) translate requirements into assigned production capacities and (d) maintain throughout the identity of the strategic priorities of the requirements.

Damage to the Nuclear Energy Program.

182. The Soviet attacks on the Atomic Energy Commission facilities would significantly reduce the over-all production capacity as of 1 July 1957. The high level attack with 5 KT weapons would reduce the production capacity by roughly 25 per cent and the low-level attack with 60 KT weapons by roughly 50 per cent. However, the AEC production capacity, even if reduced by 50 per cent, would be greater in mid-1957 than it is today. Under the present program, and with no loss of facilities, the AEC plans to produce more than twice as much fissionable material in FY 1958 as in FY 1955.

183. It would probably take three to six months to regain the full capacity of the remaining plants after the attacks. This time period should also permit recovery from a flood at Hanford caused by breaching the Grand Coulee Dam.

184. The Soviet nuclear weapon attacks on the storage sites would not reduce the stockpile of weapons 3.3(b)(5) 3.3(b)(5) 3.3(b)(5) as of 1 July 1954, and in terms of damage potential about 20 times the potential as of 1 July 1954.

Loss of Essential Economic Services and Facilities

185. Shipping. Either of the attacks analyzed would reduce U. S. port capacity to only a fraction of normal peacetime capacity. Unless shipping is warned and evacuated, the shipping losses would be very heavy in dock areas. The heaviest damage occurs in New York City, but a large portion of the shipping facilities are also destroyed in Boston, Philadelphia, Baltimore, Norfolk, San Francisco, and San Diego. Sea communications with allies would be maintained but only at drastically reduced levels and only by the extensive use of lighterage and the use of secondary harbors.

186. Rail Transportation. The low level attack would result in loss of a substantial part of the nation's stock of freight cars and locomotives. The percentage loss in the northeastern United States would be especially high, due to heavier attacks in that area and the normally large number of cars on industrial sidings. The low level attack would also result in heavy damage to yards in Chicago, New York, St. Louis, Buffalo, Baltimore, Philadelphia, Boston, and San Francisco. Extensive re-routing of east-west traffic would be necessary to by-pass damage to Chicago and St. Louis. The clandestine attack on Washington, D. C. would sever the main north-south lines

along the eastern seaboard. By re-routing farther inland (to Harpers Ferry) operations at a fraction of normal capacity could continue. In New England and the Middle Atlantic States the need to by-pass the major cities would seriously handicap the flow of emergency supplies and production materials, as well as the evacuation of survivors. The breaching of Grand Coulee would destroy lines and bridges down-stream causing lengthy rehabilitation delays in the Northwest.

187. Electric Power. Loss of electric power through damage to generating and distribution facilities would be severe. However, such loss would not be as serious a problem in terms of recuperation as the direct damage to other industrial facilities, except in the Pacific Northwest where 1,964,000 kilowatts of capacity were lost in the breaching of Grand Coulee Dam.

188. In addition, those industries which supply equipment to the electric power industry were in relatively good condition as illustrated in the table below:

Producers of Electric Power Equipment

Industry	Attack Plan	Damage		
		Heavy	Moderate	Total
Rolling, Drawing and Alloying of Aluminum 1/	High	-	5	5
	Low	5	5	10
Rolling, Drawing and Alloying of Copper	High	-	5	5
	Low	6	11	17
Wire Drawing (from purchased rods & bars)	High	2	3	5
	Low	2	17	19
Insulated Wire & Cable	High	3	7	10
	Low	14	3	17
Power Transformers	High	-	-	-
	Low	-	14	14
Engines & Turbines	High	-	-	-
	Low	-	5	5

1/ Aluminum transmission wire is being used extensively in new transmission lines.

189. Generally the electric power industry probably could service its remaining industrial consumers after delays of a few weeks for repair and restoration of transmission lines and the erection of new by-pass lines.

190. Communications. The bulk of government international communications is handled over government-owned telegraph-type facilities with the gateway terminals located outside the major metropolitan areas. The remainder, together with all civilian communications, are handled over cable or radio facilities of the several common carriers, and terminals of radio facilities are also located outside the major metropolitan areas. Reduced service would result from these attacks until some change in operating procedures can be placed in effect, since the traffic-handling centers are in the metropolitan areas.

191. Of the total government requirement for domestic telephone service, a small part is handled with leased telephone service. This is also true of the major industry requirements, particularly those supplying defense materials. The remainder of the government requirement, together with practically all civilian requirements, is handled over the regular switch toll system. In general the switching locations are within the major metropolitan areas and, in the event of attack, disruption of service would occur in the terminal traffic to that city and to some extent would affect the through traffic going to points beyond the damaged city. However, in numerous cases by-pass

routes are provided around the cities which would permit continuity of handling despite attack on the city. Repair supplies are stored in small cities as well as within large metropolitan areas. The restoration of main telephone switching centers would be a serious problem that could not be met from supplies of replacement equipment on hand.

192. Practically all government-written telegraph messages and a large portion of industry messages are handled over leased telegraph systems provided by the telegraph and telephone companies. The restoration of main telegraph switching centers would be a serious problem that could not be met from supplies of replacement equipment on hand.

193. In general, the attacks would result in gravely curtailed service to the points attacked and some adverse effects to the points beyond because of likely damage to the through-trunk route in the attack area. Nevertheless, leased telephone and telegraph systems would carry the bulk of essential communications.

194. The extent to which radio services would be disrupted by an attack on major metropolitan centers is difficult to analyze. It is certain that such service would be seriously disrupted and curtailed, but a considerable proportion of the actual broadcasting facilities are located outside the congested areas and would probably remain serviceable. The lack of battery-operated receiving sets would seriously limit use of radio as a means of communicating with the public. In summary, it would appear that while the radio services are subject to considerable damage and interruption, surviving stations would be in a better position to carry on emergency functions than the telephone and telegraph industries.

195. Water. Both the high and low altitude attacks would seriously disrupt the water supply in those cities subject to attack. Water pressures, of course, would be decreased, and in many parts of the cities attacked, water would not be available in sufficient quantities to combat fires. Many undamaged industrial establishments in the cities attacked would have insufficient water for normal operations for some weeks after the attack.

The U. S. Monetary and Credit System

196. New York City is the center of the nation's financial system. Chicago is also a major financial center, and Washington, D. C. is the seat of the U. S. Treasury and the Federal Reserve System. The attacks on these cities alone would seriously cripple normal banking operations. Despite the severity of the blow to the banking system that would result from these attacks, it is believed that an emergency financial agency backed by government guarantees could be established within a period of 30 to 60 days. This agency could see that lines of credit were extended to bona fide producers of essential commodities.

197. During the chaotic period immediately following attack there might be serious local inflation in damaged areas, but the scale of this attack would not be sufficient to cause a flight from the medium of exchange to real goods. While prices might move to a somewhat higher level, the monetary and banking system could be made to function in such a way as not to hinder production in the undamaged segments of industry.

Summary of Industrial and Economic Effects

198. The industrial and economic facilities surviving these attacks probably could not be utilized efficiently for six months following the attack. As a result of the low-level attack, industrial output, as normally measured, would probably drop to one-third or one-half of pre-attack levels. During this period the nation would be wrestling with unprecedented problems such as:

a. Clearance of debris, and rescue and care of the injured.

b. Relocation of evacuees and survivors.

c. Restoration of essential services, including transportation.

d. Control of inflation and reestablishment of the credit system.

e. Reestablishing sources of supply throughout industry.

f. Psychological readjustment necessary to return to the prosaic tasks of efficient production.

199. After the initial period of readjustment, industrial production levels would climb rapidly, but would remain below the pre-attack levels during the first year. After 12 to 18 months, as the result of extensive overtime and large additions to the labor force, the peacetime levels might be equaled or even surpassed. However, the nation would have to get along with little or no capacity additions to its basic industries such as steel, copper, aluminum, electric power, and transportation. However, the more serious bottlenecks would occur in metal fabricating industries which produce end-items and components. The schedules of production for military end-items -- especially aircraft, aircraft engines, guided missiles,

and electronics — would have to be drastically reduced. Failure to make rational readjustments promptly would aggravate the basic capacity shortages and would result in even greater production losses than necessary. The magnitude of this reprogramming problem is not generally recognized at present and the necessary administrative machinery to cope with it efficiently is not in existence.

200. The high altitude attack would result in lower levels of destruction, and recovery would occur more rapidly. The blow to the U. S. economy would nevertheless be heavy.

Reduction of Government Services

201. In both the high and low altitude plans, Washington, D. C. was subjected to a clandestine attack with a 10 megaton weapon. The strategic warning prior to this clandestine attack probably would have permitted the Federal government to put into effect emergency relocation arrangements for dispersal of key personnel. All other metropolitan targets having concentrations of Federal personnel received the strategic warning which afforded Federal agencies time to disperse key personnel and activate emergency relocation programs.

202. In Washington, D. C., key Federal personnel designated to perform essential wartime functions might survive because of prompt movement to relocation centers upon receipt of the strategic warning. A vast majority (about two-thirds) of Federal and other government personnel in the Washington area would not be ordered to the relocation

centers, however, and these people would be casualties in the absence of any tactical warning.

203. In general, the government would be able to carry on its essential wartime functions at the national relocation centers and also at centers of field operations. While the Department of Defense would be handicapped temporarily, it could recuperate rapidly by drawing on its replacement schedules of personnel.

204. In addition, the attacks would seriously disrupt routine municipal government functions, because of the destruction of irreplaceable records, and would similarly affect state government functions in Boston, the only State Capitol hit. However, the basic fabric of U. S. local government, in the form of duly elected officials, would survive the attack and would be prepared to direct emergency activities.

Effects on Population*

205. Federal Civil Defense Administration (FCDA) policy is based on the belief that, given adequate warning, evacuation is the best way to minimize casualties. By 1957 it is expected that most, if not all, of our major cities will have well-developed, tested evacuation plans. It is also expected that plans for the feeding and care of the evacuees will be well advanced. At the same time, we realize that some people cannot and others will not leave cities. With the eight hours warning

* This analysis is based on a study prepared by the Federal Civil Defense Administration, a copy of which is at Annex Q.

available in the attacks analyzed, however, we estimate that between 80 per cent and 95 per cent of the population of all target cities except New York can be moved out of danger from the blast and thermal effects of weapons aimed at the city area. New York offers peculiar difficulties, and here we assume that only 50 per cent of the people have been moved. In Washington, D. C. and San Diego, both of which would be attacked at H-hour, there would be no warning.

206. In spite of evacuation and sufficient warning to enable people to find good shelter, casualties from the attacks ran high.* We estimate that the total for the high-level attack on industrial targets was about 4,400,000 of which about 2,000,000 were killed instantly or died in the first 24 hours. (In Washington, where there was no warning, about 1,000,000 were killed.) Of those surviving the first 24 hours, about 1,000,000 would probably die within 7 weeks, and 1,400,000 would eventually recover.

207. The result of the low-level attack is not greatly different. Many more planes reached the bomb-release lines and two cities, Cleveland and Pittsburgh, not struck in the high-level attacks, were heavily damaged. We estimate that total casualties, however, came to only 3,100,000 and the over-all load of surviving casualties on hospital and medical facilities would be lighter. The number of injured surviving the first 24 hours was 1,700,000, and about two-thirds of these, or 1,100,000 would require hospitalization for * varying lengths of time.

* The percentage of effectiveness of evacuation and the estimated casualties for each metropolitan area attacked are presented in the tables attached to the FCDA study, at Annex Q.

There are two main reasons why the low-level attack did not cause more casualties than the high-level attack. In the first place, the results of the random selections of actual ground zeros happened to favor the population, and in the second place, the absence of the 10 MT weapon on New York made a difference of one to one and one half million casualties in that area alone. This more than compensated for increases elsewhere.

208. To illustrate the effectiveness of evacuation in minimizing casualties, we have also calculated the casualties on the basis of warning, but no movement of people. The totals are as follows:

a. High-level attack, industrial targets
With evacuation 4,400,000
With no evacuation 9,600,000

b. Low-level attack on industrial targets
With evacuation 3,100,000
With no evacuation 5,100,000

209. In 1957, FCDA and the civil defense organizations of the States would be able to meet most of the demands put upon them by an attack of this magnitude. In the field of hospital facilities and medical supplies, over-all stocks available to the Federal, State and local authorities would be amply sufficient to meet estimated requirements except in the case of blood derivatives. The planning base is for 5,000,000 casualties surviving the first day. Severe but temporary shortages in hospital beds and medical supplies would be felt in four areas namely, Washington, New York, Philadelphia, and San Diego, but additional quantities might be flown in from Federal stockpiles within 24 hours. In these same areas there will be shortages of food and

housing, and public sanitation measures will be greatly overtaxed by the millions of evacuees.

210. Although Washington was destroyed, on the basis of prior warning, the emergency relocation sites probably would have been manned by skeleton staffs or cadres before the clandestine attack. FCDA, from its permanent headquarters in Battle Creek, Michigan, would be able to function immediately. Under the arrangements now in effect as part of the COMELRAD plan, FCDA and the emergency Presidential headquarters would be able to use all undamaged public information media to inform the people of the situation. FCDA believes that attacks of the nature and on the scale of those considered here would not cause a weakening of the will to fight on the part of the civilian population of this country.

211. Casualties in this evaluation include only those resulting from blast, heat, and initial nuclear radiation. This is, of course, unrealistic, since in the high-level attack a 10 MT weapon was dropped on New York City, since in the low-level attack all 141 60 MT weapons were surface bursts, and since in both attacks a 10 MT weapon was detonated in Washington. Fall-out from these bursts might greatly increase the casualty totals. Certain figures are available on the size and shape of the fall-out area, the hourly and total rates of radioactivity, and the general effect of meteorological factors. These are being studied as a basis for evaluation of a defense against fall-out radiation. Arrangements with the Weather Bureau for increased prediction coverage on the basis of effective winds are also under study, but many factors

are not yet understood clearly in their relation to the civil defense problems created by fall-out. This phenomenon, in the new magnitude given it by the surface burst of multi-megaton weapons, will seriously modify civil defense doctrine in almost all fields. Fire-fighting, rescue, welfare and supply (as well as evacuation) are all affected.

212. It is quite probable that radioactive fall-out from the Washington bomb would have seriously handicapped the evacuation of Baltimore, Wilmington, Philadelphia, Trenton and at least the New Jersey part of the New York area. Hundreds of thousands of people might have been caught by it while following their dispersal instructions to the letter. Similarly the 7 or 8 large weapons carried in aircraft which were shot down in the vicinity of New York area might have contaminated extensive areas.

Effect of Damage to U. S. Forces and Installations in the Continental U. S. and Overseas

215. We present only a very general evaluation of the effect of the Soviet attack on U. S. military bases, forces and installations at home and overseas. It is incomplete and inadequate, owing to the short period of time available for its completion after other data were in hand.

214. A comparison of the damage estimates resulting from both high-level and low-level attacks on U. S. military installations indicates little difference between the two attacks as regards over-all effect of damage on the capability of the U. S. military forces to carry out their assigned missions.

215. With respect to key installations overseas, the major damage inflicted by the initial Soviet bombing attacks would affect certain retaliatory forces and bases, including two Air Force medium bomber wings, two Sixth Fleet aircraft carriers, and the forces and facilities of the UK Bomber Command.

216. Port facilities directly supporting the U. S. Army and Air Force in Continental Europe and Japan would also be badly damaged. POL stocks and facilities would be reduced significantly. Beyond the damage caused by air attack, the results of the initiation of submarine and mining attacks on sea communications would have a seriously damaging effect during the initial phase of the war. The immediate effect of this damage would be to delay seriously U. S. efforts to resupply and reinforce our overseas forces and to reduce seriously the level of food and other essential supplies in the UK.

217. With respect to military forces and bases in the continental U. S., damage could be expected about as follows:

a. The most heavily damaged military targets in the continental U. S. would be the SAC heavy bomber bases. On the whole, however, SAC would retain the capability of carrying out retaliatory missions during the first 30 days of the war, with some delay in operations and some reduction in the weight of attacks.

b. Due to the period of warning of attack on the continental U. S., a very large percentage of combat aircraft and naval vessels probably would be clear of target areas prior to the time the

attacks are delivered. Therefore, the losses to these forces would be small.

g. The attacks on cities would cause only minor direct damage to the military establishment as a whole. This is largely due to the distance of most military installations from cities successfully attacked. On the other hand, damage to the vitally important port facilities from Boston to Norfolk on the East Coast, and from San Diego to San Francisco on the West Coast, would result in very serious delays in movements and shipments during the initial phase of the war.

218. Owing to the serious damage to U. S. ports and shipping facilities, our capability for outward shipments would be critically curtailed. Further, owing to the serious damage to certain European ports, it appears most probable that the bulk of shipments into Europe in the initial phase of the war would have to be landed through other less efficient ports or over open beaches. Accordingly, the bulk and rate of delivery of material to Europe would fall below optimum levels.

219. We have been unable to make an evaluation of such critical factors in the military situation as the psychological impact of nuclear warfare and heavy casualties on civilian employees, stevedores, warehousemen, truckers, railroad employees, and transport. Neither have we attempted to measure the impact on the U. S. industrial mobilization base of possible changes in priorities for shipment of supplies and reinforcements overseas.

220. The following general conclusions emerge with respect to the over-all capability of the military forces to implement the U. S. Emergency War Plan in the first 30 days of a general war. (The capability of U. S. military forces is considered only for the first 30 days because it has been impossible to explore fully the probable effect of casualties to the civilian population and damage to the civilian economy upon military operations.)

I. Army. The over-all effects of the specific Soviet attacks on U. S. Army forces and installations envisaged would not seriously impair initial U. S. Army combat capabilities. On the other hand, serious damage to ports in the U. S. and overseas would seriously delay resupply, reinforcement and replacements. Accordingly, the capability for sustained military operations beyond the first 30 days would be substantially reduced until such time as the damage had been offset.

a. Europe.

(1) U. S. Army Command Organization. There would be only insignificant damage to U. S. Army Headquarters in Europe and this would not materially affect the U. S. capability to direct military operations.

(2) Combat and Service Support Forces. There would be about 12 per cent casualties to troops in 30 concentrations, but this would not seriously affect U. S. capability to conduct initial military operations. The attack would interfere with the capability to conduct sustained military operations unless replacements and

reinforcements were provided.

(3) Resupply. Supply stocks remaining available would be generally adequate for the initial 30-day period, but early resupply, particularly of POL, would be required for sustained combat. Due to availability of reserve stocks overseas, reduced capabilities for resupply during the first 30-day period probably would not prevent the conduct of initial military operations. Nevertheless, the damage done in this period both in the continental U. S. and overseas might disrupt supply, replacement, and reinforcement plans to an extent that would prove critical in later months of the war.

b. Far East

U. S. Army Far East forces would be largely unaffected and the major impact of the damage in this area would fall on ports. The stockages objective in this area is generally 90 days with 40 days located in Korea and 50 days in Japan. The logistics situation would permit the implementation of war plans in this area.

c. Western Hemisphere

Overseas U. S. Army forces in the Western Hemisphere would be able to accomplish their missions of defense against land attack and support of other military forces. Although Port Whittier, Alaska, would be severely damaged, commercial facilities at alternate ports would be available. Resupply

could also be accomplished via the Alaskan highway. It is estimated that the Panama Canal was damaged to the extent that it would be inoperative for a period up to one week.

II. Navy. The Navy would not be seriously affected in its over-all capability to carry out the mission assigned in the first 30 days of a general war.

a. Atlantic and Mediterranean Areas. Though part of the striking fleet in the Mediterranean would have incurred serious damage, the bulk of U. S. naval offensive forces would have escaped damage in the initial Soviet attack. The scheduled strikes during the first 30 days could be made, though on a delayed time schedule. Anti-submarine warfare, amphibious warfare, mine warfare, and logistic support forces would not have been affected materially. Important base and supply areas in the Atlantic and Mediterranean would have been seriously affected. During the first 30 days, however, other base areas probably could adequately support the Second and Sixth Fleets.

b. Pacific, Far East and Alaska Areas. No significant damage would be effected on naval combat and logistic support forces in these areas. While the naval base areas at Pearl Harbor, Naha and Yokosuka would have been heavily damaged, adequate support for the first 30 days exists in logistic support vessels and remaining continental U. S. and outlying naval bases.

III. Air Force. USAF forces probably could operate effectively in carrying out their missions in the first 30 days of a general war.

a. SAC. Although 2 medium bomb wings deployed in the UK and

North Africa would be extensively damaged, the bulk of SAC heavy and medium bomb wing capability would not be materially affected. Loss of POL at staging bases would be the greatest handicap to operations in the first 30 days. Nevertheless, in view of the mobility of SAC aircraft and logistic support, and considering the air bases that would remain undamaged or partly undamaged, surviving SAC forces could carry out their retaliatory mission during the first 30 days. By D + 30 days, it is estimated that SAC sortie capability would be about 70 per cent of the normal capability under optimum conditions.*

b. Europe-North Africa Areas.

(1) Since the bulk of U. S. and allied tactical forces in the European area would not be destroyed and most tactical bases would remain operational, remaining tactical forces could be dispersed and commence offensive retardation operations. Sufficient tactical forces should remain in place on D-day to contribute significantly to these retardation operations. The USAF plan of gaining and maintaining air superiority to allow effective operations by U. S. and allied ground forces will be dependent upon the success of nuclear strikes against the more numerous aircraft and bases of the enemy tactical forces.

(2) Considerable damage would be inflicted on port facilities in the U. S., and heavy damage to port facilities

* This analysis of SAC capabilitiesis based on HQ, USAF, memorandum, 23 October 1954, at Annex E.

in Europe is indicated. This port damage, along with effective destruction of Air Force bases on the Northeast and Atlantic ferry route to Europe, would virtually eliminate deployment of additional tactical units to Europe during the first 30 days.

c. Pacific-Far East--Alaska-Middle East Areas. Because small damage would be done to their bases, strategic and tactical units could conduct operations contributing to the strategic defense of these areas for the 30-day period. Because of considerable damage to bases on the Pacific ferry route, post D-day deployments would have to proceed through Alaska. Sufficient bases in Alaska remain intact to allow limited operations through that area.

IV. Marine Corps. The forces and military installations of the U. S. Marine Corps are dispersed and located in relatively isolated areas. The base installations are located away from large key industrial cities and military complexes and would not generally be considered profitable targets for nuclear bombing attack. Therefore, the over-all effect of the Soviet attack would be negligible insofar as the capabilities of the Marine Corps to implement the Emergency War Plan is concerned.

221. In summary, we believe in general that the over-all effects of Soviet attack on U. S. military forces and bases in the continental U. S. and overseas probably would not seriously impair the capabilities of U. S. military forces for carrying out their emergency war plan

missions during the first 30 days of a general war, other than as a result of the considerable delays in mobilization, transport, and shipments caused by Soviet attack. It is probable that many military operations would be delayed in execution and reduced in rate and weight of attack, but the more mobile forces would be delayed comparatively little.

PART IV: OBITER DICTUM ON THE LIKELIHOOD OF WAR

222. By direction, this report has been prepared under the basic assumption that full-scale war between the USSR and the U. S. would begin during 1957. Although we have not been instructed to make a judgment as to the likelihood of war, certain factors which came to our attention in the preparation of this net estimate pertain to the likelihood of Soviet initiation of general war in mid-1957. In general, in the course of study of the probable circumstances and Soviet net capabilities, we have discovered little that would lead to a conclusion that general war would actually occur at that time.

APPENDIX I

OVERSEAS ATTACK

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK NUCLEAR	TYPE ATTACK CON	HIGH ALTITUDE* A/C OVER TARGET	HIGH ALTITUDE* BOMBS DELIVERED**	LOW ALTITUDE* A/C OVER TARGET	LOW ALTITUDE* BOMBS DELIVERED**
UNITED KINGDOM											
Alconbury	Air Base ARS	IL-28	25	15	21		x	15	135 Conv	19	171
Beaulieu	Air Base ARS	IL-28	25	15	21		x	15	135 Conv	19	171
Blackbushe	HB/MB pre&post Air Base	IL-28	8	15	7	x		5	5(5KT)	6	6(5KT)
Blyton	Air Base HB/MB pre&post	IL-28	8	15	7	x		5	5(5KT)	6	6(5KT)
Brize Norton	Air Base, MB op.HB pre & post	IL-28	8	15	7	x		5	5(5KT)	6	6(5KT)
Bruntingthorpe	Air Base MB/HB pre&post	IL-28	8	15	7	x		5	5(5KT)	6	6(5KT)
Burtonwood	Air Base HB post & depot	IL-28	25	15	21		x	15	135 Conv	19	171
Carnabt	Air Base S. Ftr ops	IL-28	25	15	21		x	15	135 Conv	19	171
Cholveston	Air Base MB ops	IL-28	25	15	21		x	15	135 Conv	19	171
East Kirkby	Air Base S. Ftr ops	IL-28	25	15	21		x	15	135 Conv	19	171
Elvington	Air Base MB/HB pre&post	IL-28	8	15	7	x		5	5(5KT	6	6(5KT)
Fairford	Air Base MB ops HB/R post	IL-28	25	15	21		x	15	135 Conv	19	171
Greenham Common	Air Base MB ops HB post	IL-28	25	15	21		x	15	135 Conv	19	171
Heathrow	Air Base MB ops	IL-28	25	15	21		x	15	135 Conv	19	171

* Probable attrition & bombs delivered in the overseas attack were calculated on the basis of both high-altitude and low-altitude approaches to targets. In the high-altitude attack aircraft were considered to be bombing from 30,000 feet. In the low-altitude attack, aircraft attacking in daylight were considered to be bombing from 30,000 feet, while aircraft attacking in darkness (Western Europe) were considered to have bombed from 1,000 feet (conventional bombs) and 5,000 feet (nuclear weapons)

** Conventional bombs on airbases were distributed as follows: 35 runways (1/2 time delay), 35 dispersal areas (fragmentation), 30 installations.

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK NUCLEAR	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Lakenheath	Air Base ARS	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Lindholme	Air Base ARS	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Marston	Air Base SF & FBops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Mildenhall	Air Base ARS	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Molesworth	Air Base FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Oakington	Air Base ARS ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Sandtoft	Air Base Refueling	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Scampton	Air Base ARS ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Spilsby	Air Base SF ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Stanstead	Air Base MR ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Sturgate	Air Base SF ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Swinderby	Air Base ARS ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Shepherds Grove	Air Base FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
St. Mawgan	Air Base FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Tabinham	Air Base SF ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Upper Heyford	Air Base MB ops Hb	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Valley	Air Base FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Wethersfield	Air Base FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv
Woodbridge	Air Base SF & FB ops	IL-28	25	15	21		x	15	135 Conv	19	171 Conv

Second Fleet (See Staff Study attached at end of this Appendix)

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
NORTH AFRICA - MIDDLE EAST											
Abu Sueir	Air Base MB/HB pre & post ASR	IL-28	6	15	5	x		5	5(5KT)	5	5(5 KT)
Adana	Air Base MB/HB pre & post SF	IL-28	6	15	5	x		5	5(5KT)	5	5(5 KT)
Beirut	Air Base ARS staging SF pre & post	IL-28	25	15	21		x	20	180	20	180
Ben Guerir	Air Base MB AFS ops HB pre & post	TU-4	6	15	5	x		5	5(5KT)	5	5(5 KT)
Boulhaut	Air Base SF ops	TU-4	10	15	8		x	9	180 Conv	9	180
Dhalhran	Air Base MB post strike ARS Stage	TU-4	11	15	9		x	9	180 Conv	9	180
Karachi	Air Base MB post strike	TU-4	11	15	9		x	9	180	9	180
Nouasseur	Air Base MB ARS ops HB/R pre & post	TU-4	6	15	5	x		5	5(5KT)	5	5(5 KT)
Sidi Slimane	Air Base MB ARS Ops MAW ops	TU-4	2	15	9		x	9	180	9	180
Wheelus	Air Base ARS MD & SF pre & post	TU-4	6	15	5	x		5	5(5KT)	5	5(5 KT)
Port Lyautey	Naval Air Facility	TU-4	2	15	2	x	x	2	2(5KT)	2	2(5 KT)
Med Fleet		IL-28	8*	15	6	x	x(Air &Sub)	6	6(3-5KT) (3-60KT)	6	6(3-5 KT) (3-60KT)

* Those IL-28 aircraft carrying nuclear weapons would have to be accompanied by about 100 other aircraft, armed with conventional weapons. For analysis of vulnerability of the fleets, see [illegible] study, attached at end of this Appendix.

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
PACIFIC											
Anderson -NW Guam		GM				x(Sub)			2(60KT)		2(60KT)
Hickman	Enroute Air Base	GM				x(Sub			1(60KT)		1(60KT)
Pearl Harbor	Naval Base & NAS	GM				x(Sub)			1(60KT)		1(60KT)
Subic Bay	Naval Station	IL-28	25	15	21		x	18	162	19	171
Cubi Point	Naval Air Station	IL-28	25	15	21		x	18	162	19	171
NORTHEAST COMMAND AND ATLANTIC											
Argentia	Enroute FB Naval Station NAS	TU-4	3	25	2	x		2	2(5KT)	2	2(5KT)
Ernest Harmon	Air Base ARS Enroute Base	TU-4	3	25	2	x		2	2(60KT)	2	2(60KT)
Goose Bay	Air Base MB pre&post & Enroute	TU-4	3	25	2	x		2	2(60KT)	2	2(60KT)
Keflavik	Air Base MB ARS HB post & Enroute	TU-4	3	25	2	x		2	2(5KT)	2	2(5KT)
Lajes	Air Base HB pre&post MB ops NAF	Sub GM				x			1(60KT)		1(60KT)
Santa Maria		Sub GM				x			1(60KT)		1(60KT)
Thule		TU-4	3	25	2	x		2	2(60KT)	2	2(60KT)
Panama Canal		GM				x(Sub)			2(60KT)		2(60KT)

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
ALASKA											
Elelson	Air Base ARS MB ops HB pre & post	IL-28	7	15	6	x		5	5(5KT)	5	5(5KT)
Kodiak	Naval Air Station	IL-28	1	15	1	x		1	1(5KT)	1	1(5KT)
Fort Richardson	Storage of reserve supply for Army & AF	IL-28	6	15	5	x		4	4(60KT)	4	4(60KT)
Port Whittier	Principal port for support of Army and Air Force	IL-28	6	15	5	x		4	4(60KT)	4	4(60KT)
Elmendorf	Air Base MB/MR ARS ops	IL-28	25	15	21		x	18	162	18	162
Ladd	Air Base Ftr Interceptor	IL-28	25	15	21		x	18	162	18	162
EURCPE											
ElCopero (Spain)	MB pre & post ARS	TU-4	11	15	9		x	8	160	8	160
Elevsis (Greece)	SF pre & post, MB emergency	IL-28	25	15	21		x	19	171	19	171
Foggia Amendola	ARS stage, SF pre & post	IL-28	25	15	21		x	19	171	19	171
Gardermoen(Norway)	MB pre & post	IL-28	25	15	21		x	19	171	19	171
Los Llanos(Spain)	MB pre & post	TU-4	11	15	9		x	8	160	8	160
Loc Palacios	MB pre & post	TU-4	11	15	9		x	8	160	8	160
Moron dela-Frontoria	MB pre & post	TU-4	11	15	9		x	8	160	8	160
San Jurjo(Spain)	SF, ARS ops.	TU-4	11	15	9		x	8	160	8	160

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Sola(Norway)	SF pre & post emergency MB	IL-28	25	15	21		x	19	171	19	171
El Djoma Sahim (Fr Morocco)	MB pre & post	TU-4	11	15	9		x	8	160	8	160
Torrejon (Spain)	MB ARS op	TU-4	11	15	9		x	8	160	8	160
Tymbakion(Crete)	ARS stage, MB pre & post, SF pre&post	IL-28	25	15	21		x	19	171	19	171
Toul/Rosiere	FB op	IL-28	25	15	21		x	19	171	19	171
Chaumont	FB op	IL-28	25	15	21		x	19	171	19	171
Champsley (Fr)	FB op	IL-28	25	15	21		x	19	171	19	171
Etain/Rouvres	FB op	IL-28	25	15	21		x	19	171	19	171
Laon/Athies	FB op	IL-28	25	15	21		x	19	171	19	171
Tirstrup(Denmark)	F.I.	IL-28	25	15	21		x	19	171	19	171
Chonnoviere	FB FI	IL-28	25	15	21		x	19	171	19	171
Coulommiers	FB op	IL-28	25	15	21		x	19	171	19	171
Vouziers	FB wing	IL-28	25	15	21		x	19	171	19	171
Hahn(Germany)	FI, FB	IL-28	25	15	21		x	19	171	19	171
Aviano	FB, FI	IL-28	25	15	21		x	19	171	19	171
Rimini	Day Fighter	IL-28	25	15	21		x	19	171	19	171
Cadiz(Spain)	Naval Facility N.S Port	TU-4	11	15	9		x	8	160	8	160

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Suda Bay (Crete)		IL-28	25	15	21		x	19	171	19	171
Catania Sicily		IL-28	25	15	21		x	19	171	19	171
Pozzuoli (Italy)		IL-28	25	15	21		x	19	171	19	171
Rhine River Bridges	Essential escape or re-supply route bottleneck for major US Army, Europe	IL-28	25	15	21		x	19	171	19	171
Trois Fontaines & Captieux Depots	Contains all ammunition reserve for US Army, Europe	IL-28	25	15	21		x	19	(171)	19	1(171)
Dongas-Saint Nazaire Port Complex	Terminus for POL & shipping in support of Army and AF	IL-28	5	15	4	x		4	4(60KT)	4	4(60KT)
Bourdeaux-La Pallice Port Complex	Major port for materiel & personnel support of Army & Air Force areas	IL-28	8	15	7	x		6	6(60KT)	6	6(60KT)
Verdun-Dongas-Melun-Chalon-Metz-Complex	Contains storage areas & marshalling yards for critical materiel reserves including POL for support of Army & AF	IL-28	18	15	15	x		14	14(10-5KT) (4-60KT)	14	14(10-5KT) (4-60KT)
Leghorn Italy Port Complex	Major US port for support of US forces in Southern Europe	IL-28	5	15	4	x		4	4(60KT)	4	4(60KT)
Kaiserslautern Depot Complex	Contains a major portion of US Army operating combat materiel reserves	IL-28	25	15	21		x	19	171	19	171
Orleans, France	US ICC Hqs & Control Center	IL-28	25	15	21		x	19	171	19	171

TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Bridges & tunnels along US Lcc in France	Essential to the resupply of US combat forces in Europe	IL-28	25	15	21		x	19	171	19	171
Toul Engineering Depot	Essential Engineer Supply	IL-28	25	15	21		x	19	171	19	171
US Army Hqs Heidelburg, Ger. Thionville, Fr. Seckenhein, Germ. Stuttgart, Germ. Des Loges, Fr. Salzburg, Austria	Essential Command & control installations for US Army forces in Europe	IL-28	25	15	21		x	19	171	19	171
Troop concentrations of US 7th Army in Germany	Normally no troop concentrations exist above Regimental Combat team size. However, the cumulative impact of the loss of a significant portion of these troops requires consideration of net Soviet capabilities to attack them	IL-28	39	15	33	x		30	30(5KT)	30	30(5KT)
FAR EAST											
Itazuke (Japan)	ARS, post strike, FB	IL-28	25	15	21		x	19	171	19	171
Kadena	ARS, MB op HB pre and post enroute	IL-28	25	15	21		x	19	171	19	171
Yokota	MB and ARS op	IL-28	25	15	21		x	19	171	19	171
Misawa	FB op	IL-28	25	15	21		x	19	171	19	171
Clark	FB op	IL-28	25	15	21		x	19	171	19	171

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TARGET		A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C ATTACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Tsuiki	FB	IL-28	25	15	21		x	19	171	19	(171)
Itami	FB op	IL-28	25	15	21		x	19	171	19	(171)
Pt of Naha Okinawa & N.S	Essential to US Army Mission for Support of SAC	TU-4	2	15	2	x		2	2(5KT)	2	2(5KT)
Kadona AFB	Okinawa	IL-28	7	15	6	x		5	5(5KT)	5	5(5KT)
Yokahama-Tokyo Port Complex	Major pt for support of US & Japanese forces including main supply depots and industrial facilities. Also contains essential command facilities for US & Japanese forces	IL-28	5	15	4	x		4	4(60KT)	4	4(60KT)
Pusan Pt Korea	Main port for support of US & Korean Forces	IL-28	25	15	21		x	19	171	19	(171)
Inchon Pt Korea	Secondary pt for support of US & Korean forces	IL-28	25	15	21		x	19	171	19	(171)
Moji Shimowo Zaki (Port Japan)	Main link between Honshu & Kyushu & essential for the support of US, Japanese & Korean forces. Includes general supply depot and industrial facilities in vicinity of Moji.	IL-28	25	15	21		x	19	171	19	(171)
Pt of Aomori Japan	Main link between North Honshu & Hokkaido. Essential for the support of forces in Hokkaido.	IL-28	25	15	21		x	19	171	19	(171)

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TARGET	A/C TYPE	NUMBERS LAUNCHED	% ABORTS	A/C AT-TACKING	TYPE ATTACK ATOMIC	TYPE ATTACK CON	HIGH ALTITUDE A/C OVER TARGET	HIGH ALTITUDE BOMBS DELIVERED	LOW ALTITUDE A/C OVER TARGET	LOW ALTITUDE BOMBS DELIVERED
Yokosuka, Japan	Fleet support									
Iwakuni, Japan	NAF	25	15	21		x	19	171	19	(171)
Atsugi, Japan	NAS	25	15	21		x	19	171	19	(171)
	IL-28	25	15	21		x	19	171	19	(171)

Seventh Fleet (See staff study, attached at end of this Appendix)

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(Attachment to Appendix I)

NOTE: The following discussion indicates why the U.S. Fleets listed above do not figure more conspiciously as D-day targets as they might in view of their great strategic importance.

DAMAGE TO CV TASK FORCE FROM A-BOMB ATTACK

1. The problem of attacking a carrier task force at sea is different from the other missions of the Soviet in a surprise attack in 1957. It is estimated that the percentage operational aborts will be the same as for other aircraft of the same type making runs of approximately the same distance.

2. The additional search problem will degrade the average of the enemy capability. The targets may not be found in the anticipated location. The probability of this condition is very great. It cannot be anticipated how far and in what direction from the anticipated location the carriers will be found, if at all. If the enemy employs scouts to find the target, the element of surprise will be lost. This in turn will require greater numbers of mission aircraft to bring the attack home. Scouts in the area one hour or more in advance of the attack would permit the task force to alert all U.S. forces and permit greater defensive effort throughout the theatre.

3. At night or in weather the problem of target identification is great. Radar approaches will not enable the enemy to determine which of the many ships is the carrier. The attack might well be brought home to the wrong ship or even to non-combat ships.

4. Attacks with KT bombs must be brought to within 3000 feet for significant damage to be done to modern aircraft on a carrier deck, and to 1000 feet to sufficiently damage a carrier to require repairs at shipyards. 60 KT bombs must be brought to within 3000 feet in order to put the carrier out of action for an extended period. Normal dispersal at sea will require the carriers to be attacked separately. One bomb will in no case damage two carriers.

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5. If the carrier task force has airborne early warning aircraft on station, the probability of detecting the raid is high - on the order of 90 per cent. The probability is also high that few if any enemy would reach bomb release point.

6. The foregoing is based upon enemy aircraft which have the capability of conducting a search operation, and is also based upon sufficient non-bomb carrying aircraft being in the attack force to insure that the mission aircraft receive no more than their share of the defensive effort. It is estimated that a total of 100 aircraft are required in the attack force to saturate the defenses.

7. Under the foregoing conditions, considering attrition from navigational errors, ability to locate the task force, ability to identify the carriers from among the other ships, attrition from antiaircraft fire, and attrition from fighter aircraft, it will require 13 bombs to sufficiently damage one of 3 CVs in a task force to prevent it from launching retaliatory aircraft. The foregoing estimate is the same for all areas within reach of Soviet air in which carriers might be operating.

8. As a result of the foregoing considerations and in view of the marginal ability to inflict any significant damage under many conceivable conditions, it is concluded that the employment of A-bombs against carrier task forces at sea is not a sound course of action in initiating general war if numbers of bombs and numbers of aircraft are limited.

APPENDIX II

HIGH ALTITUDE ATTACK ON CONTINENTAL US

US SAC BASES AND AEC INSTALLATIONS

TARGET SAC BASES	AIRCRAFT LAUNCHED	A/C AT-TACKING	KILLS BY INTERCEPT	A/C REMAIN-ING	KILLS BY AAA	A/C OVER TGT	BOMBS DROPPED	TAKE OFF BASE	TYPE A/C	DISTANCE TO TGT	ETEN ROUTE (HRS) TO TARGET	DEPAR-TURE TIME	ETA OVER TARGET (LOCAL TIME)
1. Altus AFB, Okla	9	7	6	1	-	1	1-60KT	Kam*	TU4R	5026	22.2	H	1212
2. Biggs AFB, Tex	5	4	0	4	-	4	4-60KT	Kam	TU4R	4582	20.2	H	0912
3. Carswell AFB, Tex	12	9	7	2	-	2	2-60KT	Kam	TU4R	5001	22.1	H	1206
4. Castlo AFB, Calif	4	3	2	1	-	1	1-60KT	Chuk**	T39	2870	6.0	H/4	2206
5. Travis AFB, Calif	7	5	3	2	2	0	0-5KT	Chuk	T39	2835	5.9	H/4	2200
6. Ellsworth AFB, SD	5	4	1	3	3	0	0-60KT	Chuk	T39	2972	6.2	H/4	2318
7. Fairchild AFB, Wash	9	7	1	6	3	3	3-60KT	Chuk	T39	2538	5.4	H/4	2206
8. Limestone AFB, Maine	9	7	0	7	3	4	4-5KT	Kola	T39R	3554	7.8	H/2	0136
9. Walker, AFB, NM	5	4	2	2	-	2	2-60KT	Kam	TU4	4712	20.8	H	0948
10. Westover AFB, Mass	24	18	10	8	-	8	8-5KT	Kola	T39R	3823	8.4	H/1	0048
11. Offutt AFB, Nebr	11	8	5	3	-	3	3-60KT	Chuk	T39	3182	6.6	H/4	0042
AEC INSTALLATIONS													
12. Oak Ridge, Tenn	12	9	7	2	-	2	2-5KT	Kola	TU4R	4431	21.8	H-6	0648
13. Paducah, Ky	8	6	5	1	-	1	1-5KT	Chuk	TU4	3577	15.4	H-1	0454
14. Hanford, Wash	19	14	7	7	4	3	3-5KT	Chuk	TU39	2658	5.6	H/4	2218
15. Savannah River, Ga	8	6	5	1	-	1	1-5KT	Kola	TU4R	4241	21.1	H-6	0606

* Kam - Kamchatka (R-Refueled in flight)
** Chuk - Chukotski Base Area (H- "H-Hour" = 2000Z)

TARGET	AIRCRAFT LAUNCHED	A/C ATTACKING	KILLS BY INTERCEPT	A/C REMAINING	KILLS BY AAA	A/C OVER TGT	BOMBS DROPPED	TAKE OFF BASE	TYPE A/C	DISTANCE TO TGT	ETEN ROUTE (HRS) TO TARGET	DEPARTURE TIME	ETA OVER TARGET (LOCAL TIME)
US INDUSTRY													
16. New York	79 (38-ECM (26-5KT (15-10 Meg	59	26	33	26	7	(3-ECM (3-5KT (1-10 Meg	Kola	T39 & T37R	3873	8.5	H/1	0036
17. Chicago-Gary	59	44	22	22	19	3	3-5KT	Kola	T39 & T37R	3719	8.1	H/2	0054
18. Philadelphia	65 (22-ECM 43-60KT	49	19	30	23	7	(3-ECM (4-60KT	Kola	T39 & T37R	3928	8.6	H/1	0042
19. Los Angeles	52	39	9	30	25	5	5-60KT	Kam	TU4	3919	17.3	H-2	0342
20. Detroit	47	35	14	21	19	2	2-60KT	Kola	T39R & T37R	3549	7.8	H/2	0136
21. Pittsburgh	32	24	17	7	0	0	0-60KT	Kola	T39R & T37R	3664	8.0	H/2	0148
22. San Francisco-Oakland	49	37	5	32	28	4	4-60KT	Chuk	TU4	2785	12.2	H-1	2312
23. Boston	53	40	20	20	16	4	4-60KT	Kola	T39R	3733	8.2	H/1	0036
24. Cleveland	20	15	10	5	5	0	0-5KT	Kola	T39R	3609	7.9	H/2	0142
25. Buffalo	30	23	9	14	12	2	2-5KT	Kola	T39R	3549	7.8	H/2	0136
26. St. Louis	25	19	15	4	-	4	4-5KT	Chuk	TU4	3457	14.9	H-1	0424
27. Washington, D.C.	40	30	9	21	21	0	0-5KT	Kola	TU4	4045	19.9	H-6	0406
28. Baltimore	19	14	4	10	9	1	1-5KT	Kola	TU4	4045	19.9	H-6	0406
29. Milwaukee	35	26	13	13	10	3	3-5KT	Chuk	T39	3316	6.9	H/4	0100
30. Norfolk	20	15	4	11	10	1	1-5KT	Kola	TU4	4066	20.0	H-6	0412

APPENDIX III

LOW ALTITUDE ATTACK ON CONTINENTAL U.S.

TARGET	AIRCRAFT LAUNCHED	A/C ATTACKING	KILLS BY AAA*	A/C OVER TARGET	60KT BOMBS DROPPED**	TAKE OFF BASE	TYPE A/C	DISTANCE TO TGT	ET ENROUTE (HRS) TO TGT	DEPARTURE TIME	ETA OVER TARGET (LOCAL TIME)
SAC BASES											
1. Altus AFB, Okla	3	2	0	2	2	Maritime P	T37R	5711	12	H	0200
2. Biggs AFB, Tex	3	2	0	2	2	Maritime P	T37R	5267	11.1	H	0006
3. Carswell AFB, Tex	3	2	0	2	2	Maritime P	T37R	5686	12	H	0200
4. Castle AFB, Calif	3	2	0	2	2	Maritime P	T39R	4004	8.5	H/3	2330
5. Travis AFB, Calif	5	4	2	2	2	Maritime P	T39R	4006	8.5	H/3	2330
6. Ellsworth AFB, SD	7	6	4	2	2	Chuk***	TU4	2972	13.3	H	0218
7. Fairchild AFB, Wash	7	6	4	2	2	Chuk	TU4	2538	11.3	H	2318
8. Limestone AFB, Maine	5	4	2	2	2	Kola	T39R	3554	7.8	H	2348
9. Walker AFB, NM	3	2	0	2	2	Maritime P	T37R	5397	11.3	H	0018
10. Westover AFB, Mass	4	3	1	2	2	Kola	T39R	3823	8.4	H	2324
11. Offutt AFB, Nebr	4	3	1	2	2	Chuk	TU4	3182	14	H	0400
AEC INSTALLATIONS											
12. Oak Ridge, Tenn	4	3	1	2	2	Kola	T37	4381	9.7	H	2342
13. Paducah, Ky	4	2	0	2	2	Chuk	TU4	3577	15.4	H-1	0424
14. Hanford, Wash	7	6	4	2	2	Chuk	TU4	2658	11.8	H	2348
15. Savannah River, Ga	4	3	1	2	2	Kola	T37	4241	9.4	H	0024

* No kills were considered to have been made by interceptors
** All aircraft were considered to be armed with one 60KT bomb
*** Chuk - Chukotski Base Area

(R = Refueled in flight)
(H = "H-Hour" = 2000Z)

TARGET	AIRCRAFT LAUNCHED	A/C ATTACKING	KILLS BY AAA	A/C OVER TARGET	GCI CT BOMBS DROPPED	TAKE OFF BASE	TYPE A/C	DISTANCE TO TGT	ET ENROUTE (HRS) TO TGT	DEPARTURE TIME	ETA OVER TARGET (LOCAL TIME)
U.S. INDUSTRY											
16. New York	47	35	16	19	19	Kola	T39R	3873	8.5	H	2330
17. Chicago-Gary	63	51	31	20	20	Chuk	TU4	3378	15	H	0500
18. Philadelphia	29	22	12	10	10	Kola	T39R	3928	8.6	H	2336
19. Los Angeles	37	28	10	18	18	Kamchatka	T39R	3919	8.2	H/3	2312
20. Detroit	51	41	34	7	7	Kola	TU4R	3650	18.2	H-4	0512
21. Pittsburgh	42	34	24	10	10	Kola	TU4R	3664	18.3	H-4	0518
22. San Francisco-Oakland	37	28	10	18	18	Maritime P	T39R	3956	8.3	H/3	2318
23. Boston	19	14	8	6	6	Kola	T39R	3733	8.2	H	2312
24. Cleveland	27	22	15	7	7	Kola	TU4R	3650	18.2	H-4	0512
25. Buffalo	36	29	23	6	6	Kola	TU4R	3600	18	H-4	0500
6. St. Louis	6	5	0	5	5	Chuk	TU4R	3457	14.9	H	0454
27. Wash. D.C.	16	12	8	4	4	Kola	T39R	4045	9	H	2400
28. Baltimore	16	12	5	7	7	Kola	T39R	4045	9	H	2400
29. Milwaukee	17	14	12	2	2	Chuk	TU4R	3323	14.4	H	0424
30. Norfolk	6	5	3	2	2	Kola	T37	4066	9	H	2400