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SOVIET GROSS CAPABILITIES FOR ATTACK ON THE CONTINENTAL US IN MID-1960

Submitted by the

DIRECTOR OF CENTRAL INTELLIGENCE

The following intelligence organizations participated in the preparation of this estimate: The Central Intelligence Agency and the intelligence organizations of the Departments of State, the Army, the Navy, the Air Force, and The Joint Staff.

Concurred in by the

INTELLIGENCE ADVISORY COMMITTEE

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SOVIET GROSS CAPABILITIES FOR ATTACK ON THE CONTINENTAL US IN MID-1960

THE PROBLEM

To estimate Soviet gross capabilities for attack on the continental United States, as of mid-1960.¹

SCOPE

This estimate is made for a special, limited purpose, as a direct contribution to a study of Soviet net capabilities to attack the continental United States during the initial, nuclear phase of a general war occurring in mid-1960. For this purpose, Soviet initiation of general war with a nuclear attack on the continental US is *assumed*. Moreover, this estimate does not set forth the maximum capabilities which the USSR could acquire if it set a date for attack well in advance and determined to maximize its capabilities for such an attack. The estimate is not intended to consider all the aspects of a general war. In particular, it does not estimate the extent to which the scale of attack on the continental US would be reduced by the allocation of Soviet resources to attack on targets in other areas. Similarly, although reference is made to the suitability of various methods of attack in relation to the achievement of surprise, no estimate is made of the precise extent to which the scale of attack might be reduced if the USSR attempted to achieve surprise.²

Because of its limited scope and special purpose, this estimate is designated a Special National Intelligence Estimate for specially limited distribution.

FOREWORD

The problem of estimating Soviet capabilities three years or more in the future cannot be treated exclusively in terms of present indications of how these capabilities are developing. Current evidence is incomplete and sometimes even fragmen-

¹The term "gross capabilities" as used in this estimate means the maximum scale of attack by the forces estimated to be available in mid-1960, taking into account operational factors but not considering combat attrition. This estimate does not set forth the maximum capabilities which the USSR could acquire if it set a date for attack well in advance and determined to maximize its capabilities for such an attack.

²For discussion of considerations bearing on the achievement of surprise, see paragraphs 2-4, and the forthcoming NIE 11-3-57, "Probable Intelligence Warning of Soviet Attack on the US through Mid-1960."

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tary. Moreover, this estimate is more than usually difficult in that its terminal date approximates the estimated date of emergence of a major Soviet threat in the guided missile field. For these reasons, we are obliged to make our estimate of future capabilities not only on the evidence at hand but also on the basis of judgments of how Soviet leaders may assess their future general requirements.

The judgments which underlie our estimate of Soviet gross capabilities in mid-1960 are: (a) that throughout the period of this estimate the Soviet rulers will regard it as mandatory to strengthen their capabilities to attack the continental US, but that they will not do so with the intention deliberately to initiate general war at any specific date; (b) that while the Soviet rulers will consider that they will acquire increasing guided missile capabilities throughout the period, they must rely primarily on aircraft carrying nuclear weapons for long range attacks; and, consequently, (c) that the Soviet rulers will devote a substantial effort to the production of heavy bombers.³

³ The Special Assistant, Intelligence, Department of State, the Assistant Chief of Staff, Intelligence, Department of the Army, the Deputy Director for Intelligence, The Joint Staff, and the Director of Naval Intelligence, believe the following paragraph should be added to the FOREWORD:

While we believe these judgments provide the best basis for estimating Soviet gross capabilities in mid-1960, the USSR might decide to devote less effort to its heavy bomber program than we have estimated. Hence, we feel it necessary to emphasize that the gross capabilities described in this paper are those which the USSR *would* have with the forces which we believe it is likely to acquire by mid-1960, but we cannot say with confidence that these are the capabilities which it *will* have at that date.

CONCLUSIONS

A. *Capabilities for Air Attack.* We believe that in mid-1960 the USSR would place chief reliance in attacks on the continental US upon aircraft carrying nuclear weapons. In mid-1960 the USSR will probably have about 1,500 long-range bombers in operational units, including about 700 BADGER jet medium bombers, 500 BISON jet heavy bombers, and 300 BEAR turboprop heavy bombers.⁴ It will probably have developed a substantial inflight refueling capability. Its most powerful nuclear bombs could have yields

of at least 20 MT. Moreover, by mid-1960, the capacity of the forward base areas could have been increased sufficiently to stage simultaneously the entire long-range bomber and tanker force estimated for that date. (*Paras. 5, 14-20, 26-28, 48, 52*)

B. *Maximum Air Strike Force.*⁵ Under the circumstances outlined above, the USSR in mid-1960 could launch from its forward bases about 1,150 mission aircraft in an initial attack, including 270 BISONS and 230 BEARS on two-way un-

⁴ The Assistant Chief of Staff, Intelligence, Department of the Army, believes it unlikely that a force of this magnitude and composition will be developed. See his footnotes to paragraph 14 of the DISCUSSION.

⁵ The Assistant Chief of Staff, Intelligence, Department of the Army, does not concur in the mid-1960 strike capabilities estimated in CONCLUSIONS B and C. See his footnotes to paragraphs 14 and 62 of the DISCUSSION.

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refueled missions, 115 BIONS on two-way refueled missions, and 535 BADGERS on one-way missions. Of these aircraft, about 910 could arrive in target areas, not considering combat losses. (Paras. 58-62)

C. Should the USSR elect to employ only heavy bombers in an initial strike from forward bases, about 610 could be launched, of which about 485 could arrive in target areas. If heavy bombers were launched from home bases, the numbers launched and arriving in target areas could be about 720 and 570, respectively. (Paras. 58-61, 63)

D. *Guided Missile Attack.* Missiles launched from submarines probably would be used in coordination with nuclear strikes by aircraft. In mid-1960, the USSR may have available about 30 submarines equipped to launch guided missiles, including about eight nuclear-powered submarines. Their missiles could probably carry high-yield nuclear warheads at supersonic speeds to ranges up to 500 n.m. We believe that the earliest possible date by which the USSR could have a limited number of intercontinental

ballistic missiles (ICBM) available for operational use is mid-1960. If available, ICBMs would almost certainly be used to augment attacks by manned aircraft. Mission aircraft could employ supersonic air-to-surface missiles of 55 n.m. range to deliver high-yield nuclear warheads against selected targets. (Paras. 39-43, 48, 65-68)

E. *Clandestine Attack.* The clandestine delivery of nuclear and other weapons of mass destruction might also be attempted, but we estimate that this form of attack would probably be employed only against a few selected targets. Sabotage of certain key installations might occur concurrently with or immediately following the initial Soviet attacks. (Paras. 8-11, 48, 69-74)

F. *The Surprise Factor.* The USSR would have to consider the advantages of the maximum chance of surprise as against the maximum weight of attack. An all-out effort to maximize the chance of attaining surprise would force the USSR to limit the size and type of effort it employed in initial attacks. (Paras. 2, 63, 65, 71, 74)

DISCUSSION

I. GENERAL CONSIDERATIONS

Soviet Objectives

1. In conducting attacks against the continental US, the USSR would probably have the following major military objectives:

- a. To destroy or neutralize US capabilities for nuclear retaliation;
- b. To deliver attacks on US military installations, forces, and communications in order to prevent effective operational deployment of US military forces; and

c. To deliver attacks on urban, industrial, political, and psychological targets in the US in order to reduce to the maximum extent practicable the mobilization of US military and industrial strengths.

Implications of Soviet Efforts to Achieve Surprise

2. A maximum Soviet attack on the continental US, involving utilization of all or most of the capabilities discussed in this estimate,

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would require such substantial preparations as almost certainly to result in the loss of surprise. If, however, the USSR attempted to attack without warning it would probably be forced to accept major restrictions with respect to substantial mobilization, redeployment, or unusual movement of Soviet forces.⁶ Thus, the USSR would have to consider the advantages of the maximum chance of surprise as against the maximum weight of attack.

3. In planning initial attacks on continental US targets, the timing and strength of the Soviet effort would be determined largely by recognition of the need for neutralizing the most immediate threat to Soviet security — a nuclear attack by US forces and Allied forces, wherever disposed. The Soviet timetable

would almost certainly call for virtually simultaneous assaults on other target systems.

4. Since Soviet attacks on the continental US would be tantamount to general war, the USSR would have to prepare at the same time to commit military forces against targets and areas overseas. While Soviet capabilities for attacking overseas bases, forces, and areas are outside the scope of this estimate, it is pertinent that Soviet requirements for such attacks would not only affect the size and weight of the forces the USSR would actually commit against the continental US, but also the degree to which surprise could be achieved in attacking the continental US. In mid-1960, the USSR probably could not count upon being able to achieve surprise against both the continental US and US and Allied bases and forces elsewhere.

MAJOR FACTORS AFFECTING SOVIET CAPABILITIES AGAINST THE CONTINENTAL US

II. AVAILABILITY OF MASS DESTRUCTION WEAPONS

Nuclear Weapons⁷

5. The USSR is continuing to give high priority to the development and production of nuclear weapons. We estimate that the USSR could now have nuclear bombs with yields ranging from 0.5 KT to 10 MT. We also estimate that by 1957-1958, the USSR could increase the yield of its most powerful nuclear bombs to at least 20 MT, and by mid-1960 could further increase the economy of use of nuclear materials in these very large-yield weapons. In addition, warheads with yields of 500 KT or greater could be provided for use in submarine-launched surface-to-surface missiles and in air-to-surface missiles by 1957-1958, and for use in ICBMs as they become available. (For the yields of particular warheads, see NIE 11-2-56.)

6. Available evidence is inadequate to justify a calculation of the probable Soviet stockpile of nuclear weapons of various types and yields.

Within the limits of nuclear weapons technology and of fissionable materials availability, the actual stockpile developed during the period of this estimate will be determined by Soviet military requirements, as currently visualized by Soviet planners and as revised during the period.⁸

7. *Radiological Warfare.* During the period of this estimate, it is most unlikely that the USSR will be able to stockpile militarily significant quantities of radioactive materials for use in radiological warfare weapons. However, the USSR will possess nuclear weapons

⁶ For extended discussion of the problem of achieving surprise, see NIE 11-6-55, "Probable Intelligence Warning of Soviet Attack on the US Through Mid-1958," published 1 July 1955. This paper will be superseded by the forthcoming NIE 11-3-57, covering the period through mid-1960.

⁷ For details, see NIE 11-2-56, "The Soviet Atomic Energy Program," published 8 June 1956 (Limited Distribution). This paper will be superseded in early 1957 by NIE 11-2-57.

⁸ Arbitrary future stockpiles based on various assumptions are presented in NIE 11-2-56.

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capable of producing widespread radioactive fall-out, and these weapons could be used primarily for that purpose.

Biological Warfare

8. Relatively little is known about the nature and magnitude of the Soviet BW program, particularly its offensive aspects. However, accumulated evidence shows that the USSR almost certainly has an active BW research and development program encompassing anti-personnel, antilivestock, and possibly anti-crop agents. The causative organisms of at least four human diseases (anthrax, tularemia, plague, brucellosis) and of two animal diseases (foot-and-mouth disease, rinderpest) are believed to be under consideration as BW agents.

9. Based on a general appreciation of Soviet capabilities in this field, we estimate that in mid-1960 the USSR could be prepared to disseminate BW agents both covertly and overtly. The USSR already has the capability for clandestine BW attack against personnel in buildings or concentrated in relatively small areas, and for such attack against livestock and certain crops. The small amounts of BW agents required could be introduced into the US clandestinely or, in some cases, produced near the sites of their planned employment. They could be employed by saboteurs using a wide variety of disseminating devices, some of which could be procured locally. We believe covert BW attack could be highly effective against livestock and moderately effective against humans and crops. With regard to overt delivery, relatively large quantities of BW agents would probably be required. Soviet capabilities for this means of attack would therefore be limited by the infeasibility of stockpiling large quantities of most BW agents in prolonged storage.

Chemical Warfare

10. The USSR has a well-established CW research and development program, which we believe emphasizes the development of nerve agents. In addition to agents of the tabun and sarin types, the USSR is believed to be working on the more persistent, extremely

lethal nerve agents of the "V" series as well as agents having psychogenic effects.

11. The Soviet stockpile of standard CW agents, in bulk and in munitions, is estimated to have been 140,000 metric tons at the end of World War II. Although there is no direct evidence that the USSR is currently engaged in large-scale production of CW agents, a stockpile of a similar magnitude probably represents the minimum which the USSR maintains in peacetime. Losses caused by deterioration and in reloading into newer munitions in the intervening period have probably been made up with nerve gases. By 1960, the Soviet CW stockpile will probably consist mainly of nerve gases, including limited quantities of "V" agents.

12. We have no firm evidence of Soviet CW munitions development since World War II, when the USSR had munitions suitable for delivery by both ground weapons and aircraft flying at speeds up to about 250 knots. The USSR is probably developing spray tanks, bombs, and unfuzed containers for use by higher speed aircraft. We believe the USSR is technically capable of modifying its present bomb and warhead designs to permit the delivery of CW agents by jet aircraft and by certain guided missiles.

III. WEAPONS DELIVERY SYSTEMS — AIRCRAFT

Soviet Long-Range Aviation

13. As of 1 October 1956, Soviet Long-Range Aviation is estimated to have been composed of 61 bomber regiments with an actual strength of 1,405 bomber aircraft in operational units: i. e., 745 BULL piston medium bombers, 585 BADGER jet medium bombers, 40 BISON jet heavy bombers, and 35 BEAR turbo-prop heavy bombers.⁹ We have no evidence

⁹The Assistant Chief of Staff, Intelligence, Department of the Army, does not believe that the available evidence warrants the above estimate of the number of BULL bombers (745), the total number of bombers (1,405), or the number of regiments (61), in Soviet Long-Range Aviation.

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of any tanker aircraft in operational units at present.¹⁰ All Long-Range Aviation units are based in the European USSR except the Third Long-Range Air Army, which is in the Soviet Far East and has an estimated actual strength of 220 BULLS and 25 BADGERS.

14. We estimate that in mid-1960 Soviet Long-Range Aviation will probably comprise 56 bomber regiments and a tanker force possibly equivalent to 15 regiments.^{11 12} The bomber force will probably consist of some 1,500 aircraft, including 700 BADGERS, 500 BISONs, and 300 BEARS.¹³ Evidence in support of this estimate is found in: (a) the rapid increase in the number of Long-Range Aviation regiments from 48 in January 1956 to 61 in October 1956; (b) the trend toward replacement of BULLS by more modern aircraft since 1954; (c) the apparent intent to build up a heavy bomber force implicit in the development of BISON and BEAR aircraft and their introduction into operational units, now in an early stage; and (d) current indications of the development of an inflight refueling capability.

15. The foregoing estimate of the size and composition of Soviet Long-Range Aviation

^{10 11} Discussion of tanker strength will be found in paragraphs 18-21.

¹² The Assistant Chief of Staff, Intelligence, Department of the Army, does not concur in the numbers of regiments shown in this sentence. While some tanker regiments or their equivalent in smaller units will probably be included in Soviet Long-Range Aviation by mid-1960, there is in his opinion no adequate evidence to indicate that the total of bomber and tanker regiments will be in excess of previously estimated bomber regiments. Some or all of the bomber regiments which may have been formed in addition to the 48 held as of 1 January 1956 may be destined to become tanker regiments. In this case, many of the tanker regiments estimated to be in existence in mid-1960 would be included in a 56 regiment level. It would not seem justifiable to estimate an *additional* 15 regiments, over and above recent increases which may represent the initial phases of the formation of tanker regiments.

¹³ The Assistant Chief of Staff, Intelligence, Department of the Army, does not concur in the estimate of the mid-1960 heavy bomber strength (500 BISON and 300 BEAR) presented in this

is subject to all the uncertainties implicit in any estimate of a situation to be expected three years in the future. However, it is consistent, not only with the considerations enumerated in the preceding paragraph, but also with estimated Soviet strategic requirements for high-performance, long-range bombers in the event of general war, including requirements for nuclear air attack on the continental US. It is also within estimated Soviet aircraft production capabilities, although the proportion of aircraft production facilities assigned to heavy bomber production would have to be increased. We believe it unlikely that the USSR will curtail its heavy bomber force at least until it has achieved a substantial operational capability with an intercontinental ballistic missile. Such a capability almost certainly will not be achieved during the period of this estimate.

16. Soviet Long-Range Aviation will probably continue with its present aircraft types throughout the period. An improved model of the BISON is probably now becoming available, and improved versions of both the BEAR

sentence. The presently estimated 1 October 1956 force level of 40 BISON would have to be increased at an average rate of more than 10 per month to achieve this level while present evidence indicates that production is continuing at about two to three per month, a rate which has remained roughly constant for some time. Achievement of the above force level would require that additional facilities presently producing other aircraft would have to be devoted to BISON production in the near future and that all factories achieve optimum or near optimum production rates. An increase in the production rate of BEAR aircraft would also have to be achieved since continuation of the present production rate would not achieve this force level. While it is possible that some increase in production may be planned and achieved, a more realistic estimate of the mid-1960 heavy bomber force level should be somewhat lower. To properly reflect the uncertainties inherent in this estimate heavy bomber strength should be stated as a bracket between the force which a continuation of present production would achieve and the optimum force level shown in paragraph 14. Such a bracket would indicate the following mid-1960 heavy bomber force level:

BISON: from 180 to 500
BEAR : from 240 to 300

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and the BADGER will probably appear in 1957.¹⁴ At current rates of introduction into operational units, Long-Range Aviation will have achieved its full estimated complement of BADGERS by mid-1957; continued production at present rates could provide an appreciable reserve of BADGERS by the end of the period. BULLS will probably have been entirely phased out of long-range bomber units by mid-1959; serviceable BULLS surplus to the needs of Long-Range Aviation will be available for some time for a variety of uses.

Inflight Refueling

17. We now have good evidence that the USSR is developing an inflight refueling system, and we believe that during the period of this estimate it will achieve a substantial inflight refueling capability. Soviet planners have almost certainly recognized the potentiality of inflight refueling to overcome to some extent the geographic disadvantage they face in the application of their strategic air power against the continental US. On the basis of comparative speed and altitude capabilities of Soviet long-range aircraft, and of their comparative capabilities to reach US targets on refueled and unrefueled missions from Soviet bases, we believe Soviet planners will seek to provide a refueling capability primarily for BISON aircraft. One refueling by a compatible tanker¹⁵ could approximately double the area of the continental US that could be reached by an improved BISON on a two-way mission from Chukotski. The BEAR's greater combat radius would make refueling less essential to its operations, although its capabilities to reach targets in continental US from interior Soviet bases could be increased substantially by this means. Refueling would increase BADGER capabilities to reach targets in the

continental US, but against most targets would still not make two-way BADGER operations possible.¹⁶

18. We therefore believe that during the period of this estimate the USSR's chief requirement for tanker aircraft would stem from the desirability of refueling a substantial number of its BISONS. To provide reasonably flexible support for a force of 500 BISON bombers, some 350 compatible tankers would be required. To meet this requirement, the USSR could employ one or a combination of the following alternatives: (a) produce BISON tankers; (b) produce BEAR tankers; (c) develop and produce a new heavy aircraft designed specifically as a tanker. BISONS and BEARS could be used as convertible tanker-bombers by employing bomb-bay tanks, but such tankers would not be fully compatible insofar as range extension is concerned.

19. We know of no tanker production or tankers in operational units in the USSR at present. By mid-1960, the USSR could acquire 350 heavy tankers as well as a bomber force of the size estimated in paragraph 14. However, in order to do so, it would in the near future have either to increase production rates at facilities which we estimate will be in the heavy bomber program, or to open additional production facilities. We doubt that the USSR will produce as many as 350 heavy tankers during the period of this estimate, in view of the probability that the bomber program will have priority over the tanker program, and the fact that to produce the estimated number of heavy bombers will itself require an early increase in the facilities allocated to the heavy bomber production program (see paragraph 15).¹⁷

¹⁴ For estimated performance characteristic of Soviet long-range bombers, see Annex C.

¹⁵ As used in this estimate, "compatible" means having characteristics of speed and altitude suitable to the bomber employed, and a transfer capability sufficient to add 35 percent to the range of the refueled bomber.

¹⁶ For refueled and unrefueled coverage of continental US, see Annex B, Maps and Summary Charts.

¹⁷ The Assistant Chief of Staff, Intelligence, Department of the Army, considers that aircraft production programs in the USSR are probably geared to the achievement of an inflight refueling capability compatible with its bomber force by 1960, and that the requirement for tankers is one of a number of factors which would militate against the production of a bomber force of 500 BISONS and 300 BEARS as forecast in paragraph 14. The size of the tanker force, therefore, is subject to the same elements of uncertainty which attend bomber strength (see his footnote to paragraph 14).

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20. Therefore, we estimate that in mid-1960 the USSR will be building toward, but will probably not have achieved, a force of 350 heavy tankers. We believe that, without interfering with currently estimated Soviet bomber production programs, the USSR could, by mid-1960, have a force of some 150 heavy tankers. This could be accomplished by continuing the production of BEAR type aircraft at existing facilities.¹⁷

(See footnote, page 7.)

21. The USSR could develop a BADGER tanker force as an interim measure, for the purpose of increasing the range of some BISON bombers for which compatible tankers were not available. Refueling by a BADGER tanker could increase the radius of a BISON by some 500 n.m., and the range by some 1,000 n.m., although the net gain in radius/range in any particular operation would be limited by the route flown and refueling point employed. In addition, BADGER tankers could be employed as compatible tankers for BADGER bombers.

Base Areas

22. We estimate that there are some 525 operational airfields in the Sino-Soviet Bloc with permanent surfaced runways of 5,000 feet or longer. They are distributed as follows:

	(Minimum Runway Length (feet))					
	9,000	8,000	7,000	6,000	5,000	Total
USSR	9	39	19	167	44	278
European Satellites	2	47	45	36	1	131
Asiatic Communist Countries	7	23	54	32	116	
	11	93	87	257	77	525

23. Given standard conditions,¹⁸ we estimate take-off distances for Soviet long-range bombers as follows:

¹⁸ Normal take-off technique and take-off engine power, no wind, sea level elevation, temperature 59 degrees F., permanent surfaced runway. At 0 degrees F., ground run requirements for take-off of jet bombers would be about 25 percent less than under standard conditions. Ground run requirements for propeller-driven bombers would also be reduced, but the difference would not be as great as for jet bombers.

Type	Take-off Weight (lbs.)	Ground Run (ft.)	Ground Run to Clear 50-ft. Obstacle (ft.)
BULL	140,000	5,230	7,825
BULL (modified)	135,750	4,800	7,125
BADGER	150,000	4,200	6,300
BADGER (improved)	170,000	4,800	7,100
BISON	365,000	6,400	9,100
BISON (improved)	365,000	5,300	8,200
BEAR	300,000	6,000	9,000
BEAR (improved)		no data available	

24. There are approximately 27 airfields in the USSR believed to be home bases for operational Long-Range Aviation bomber units, three in the Far East, and the remainder in the European USSR. In addition, a number of airfields associated with command and/or training units, factory production and delivery, and testing and development are in effect an integral part of the base structure of Soviet Long-Range Aviation. As indicated by the table in paragraph 22, many other airfields in the Sino-Soviet Bloc have runways suitable for medium bomber operations and some have runways suitable for heavy bombers. These airfields could be used as auxiliary airfields to insure maximum aircraft dispersal away from home bases, but the actual designation of such auxiliary fields within the Soviet Long-Range Aviation base structure cannot be verified. Physical limitations on dispersal, and probable requirements for limiting ground stay to a minimum, would make dispersal and revetment at forward staging bases in the Arctic unlikely.

25. We estimate that Soviet planners are now developing air facilities to meet their anticipated requirements for the next 10 years or more. Progressive extension of runways at Long-Range Aviation home bases from current 8,200-foot lengths to 9,000 feet or more is believed to be under way. In the case of new runway construction at bases, it is estimated that weight-bearing capacities are being made adequate for heavy bombers of all types programmed, and that runway lengths will generally exceed 11,000 feet.

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26. Because of the range limitations of available Soviet bombers, the launching of strikes against the continental US at present would probably involve staging through one or more of five base areas within the USSR — the Chukotski Peninsula, the Kamchatka Peninsula, the Central Arctic area, the Kola Peninsula, and the Leningrad area. (If overflight of Scandinavia were to be avoided in an initial strike from Leningrad, a dog-leg route over the Kola area would be necessary.) For purposes of this estimate, these five potential staging areas are designated "forward" base areas.¹⁹ In each of these areas, airfields suitable for long-range bombers exist, although the Leningrad area is the only one of the five now occupied by units of Long-Range Aviation. Bases in East Germany and Poland could also be used, but because of the likelihood that surprise would be sacrificed by the necessity of overflying West Europe, as well as the lower security of preparations in the Satellites and vulnerability to NATO forces, this area would not be a likely choice for staging initial strikes against the continental US.

27. Air base development over the past few years in the forward base areas has improved the capability of these areas for supporting long-range bomber staging operations. In the Kamchatka, Kola, Chukotski, and Central Arctic areas, there are now 29 airfields with runways long enough to accommodate Soviet long-range bombers.²⁰ Information is incomplete concerning load-bearing capacity, aircraft servicing, maintenance, storage, and personnel facilities at almost all of these airfields, but we estimate that 10 could stage either medium or heavy bombers, and that 19 others could stage medium bombers. In addition, there are at least 23 airfields in the Leningrad area capable of staging medium bombers, of which three are present home bases of Long-Range Aviation, capable of staging heavy bombers. In summary, we estimate that, for

¹⁹ Annex A and D (the latter in limited distribution under separate cover) cover air facilities, weather conditions, and airfield capacities in these base areas.

²⁰ In addition, there are eight airfields whose runway characteristics indicate a marginal capability for long-range bomber operations.

purposes of Long-Range Aviation operations against the continental US, there are available in the five forward base areas 52 airfields capable of staging medium bombers, of which 13 are also capable of staging heavy bombers.

28. There are indications that airfield development in the forward base areas is continuing, and it is within Soviet capabilities to have developed adequate facilities for sustained long-range bomber operations in any of these areas by 1960. We believe that runways are being developed with length, surface, and weight-bearing standards similar to those at Soviet Long-Range Aviation home bases. We estimate that by 1960, with the construction facilities and personnel now in the area concerned, three new airfields suitable for heavy bomber staging operations could be developed in the Kola area, three in the Leningrad area, and two each in the Chukotski, Central Arctic, and Kamchatka areas. Improvement of support facilities at existing potential staging bases in these areas could be carried out concurrently without major interference with the construction effort.

29. In each of the forward areas there are bases, in addition to those considered suitable for staging long-range bombers, which could be utilized for the fighter aircraft which the USSR would also require in any operation conducted from these areas. In certain forward areas there are only a few such additional bases at present. If necessary, by mid-1960 the USSR could provide additional facilities for fighter protection of its long-range bomber staging bases, and for surface-to-air missile defenses.

Other Factors Affecting Soviet Air Operations

30. *Reconnaissance.* The USSR is not known to have developed long-range reconnaissance aircraft as such. It is possible that during the interval between now and mid-1960 the USSR, employing existing long-range bomber types, might build up a pattern of activity along the early warning lines of the North American continent, not only to determine their location, capabilities, and vulnerabilities, but also to increase the problem of recog-

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nizing the approach of an actual attack. It is unlikely that the USSR would jeopardize surprise by unusual reconnaissance activity immediately preceding an actual attack.

31. *Weather Forecasting.* The USSR has for years devoted considerable effort, with a high degree of success, to both short-period and long-period meteorological forecasting. We believe that it has the forecasting capability to support long-range air operations. This capability plus extensive experience in meteorological research in the extreme northern latitudes, weather reporting facilities in Siberia and on ice floes in the Central Arctic basin, and constant access to regularly broadcast North American weather reports and forecasts should enable the USSR to predict both route and target weather with reasonable accuracy.

32. *Navigation Aids.* The USSR has available through open sources virtually complete target and navigation data on North America and its approach routes. It is probable that in the event of a surprise attack certain Western electronic navigational aids would be available during at least part of the flight. For example, meteorological reports are regularly broadcast in the United States and Canada. It is also possible that clandestinely placed navigational beacons might be used for aircraft homing. We estimate that Soviet navigational radar equipment is capable of better performance than the US World War II equipment which the USSR acquired.

33. *Electronic Countermeasures (ECM)*

a. Soviet Offensive Capabilities. Soviet ECM development is rapidly approaching, if it has not already reached, the point at which ECM will constitute a major threat to US air defense capabilities. Within the past year or so the USSR has entered actively into developing techniques for the tactical employment of CHAFF. We have evidence that CHAFF has been used in training exercises against Soviet ground-based radars, and we estimate that CHAFF would be widely used in a Soviet air attack. In addition, we estimate that Soviet capabilities for airborne jamming of both communications facilities and radar will materially increase during the period. The

USSR has conducted some jamming training exercises against its own airborne radars, and we believe that active airborne jamming would be used against US radar, communications, and navigation facilities in the event of Soviet attacks in mid-1960. However, even in 1960 Soviet active airborne jammers for use against radars at frequencies above the X-band will probably be limited in quantity. We have no evidence of Soviet use of decoys, or of the modification of aircraft specifically for ECM use, although we consider both to be within Soviet capabilities.

b. Vulnerabilities. The concentration of all known Soviet blind-bombing and AI radars in the narrow frequency band 9,250-9,500 Mc/s increases the vulnerability of this equipment to ECM. The circuits of the only Soviet microwave radar studied in detail, the shipborne NEPTUNE, indicate that it is vulnerable to ECM and interference. Although such vulnerability may not extend to all airborne radars, it probably applies to at least some earlier sets, especially the MUSHROOM. Passive ECM receivers and radiation control are probably in use as anti-ECM techniques at present, but we believe the vulnerabilities outlined above will continue to exist for some time. However, Soviet airborne radar will eventually employ greater frequency spreading, and antijamming techniques employing the switch-tuning of magnetrons and klystrons to effect rapid changes in frequency may be under development.

34. *Evasion of US Radar.* The USSR almost certainly knows at least the general capabilities of US early warning radar equipment, coverage provided by the network, and weak and strong points of the system. With such knowledge it might expect that properly planned attacks could reduce the chance of detection by US radar. However, the use of some evasion techniques, particularly low altitude penetration, would require acceptance of reduced range or bomb load.

35. *Crew Training and Proficiency.* Flight training for Long-Range Aviation crews has increased in both intensity and scope during the past five years, especially since 1954, when jet bombers began to be introduced into the

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long-range bomber force. At present, we estimate that long-range bomber crews average at least 15-20 hours of flying time per month. The regular training program emphasizes the attainment of navigational and bombing proficiency during the hours of darkness and in bad weather. A 1955 manual for Soviet navigator-bombardiers indicates that they are required to achieve proficiency in the use of magnetic compass, pilotage, radio, celestial, and radar navigation techniques. They also probably receive extensive training in the utilization of ground-based electronic navigation aids, such as Shoran, direction-finding and distance-measuring equipment, and hyperbolic navigation systems. We estimate that the capabilities of Long-Range Aviation crews for landing and take-off under instrument flight conditions compare favorably with those achieved in the USAF.

36. The current trend in Long-Range Aviation training is believed to be toward larger-scale operations and longer-range flights out of home base areas, including bomber operations into and over the Arctic areas as well as simulated attacks on major Soviet cities. Last summer a large-scale temporary deployment of medium and heavy bombers was apparently conducted into the Satellites, probably to test the capabilities of the units involved to stage into and operate from forward areas. Considerable over-water flying has been undertaken during the past five years.

37. The current state of training in Soviet Long-Range Aviation leads us to estimate that at present the mounting of an initial attack against the continental US utilizing the bulk of the long-range bomber force would require several months of intensive preparatory training. However, a reduced scale of attack, still sufficient to deliver a devastating blow upon the US, could currently be mounted with a minimum of pre-strike preparatory activity. The current training program points to continuing improvement in air crew proficiency. Moreover, past Soviet personnel practices, which insure relatively little turnover in personnel over the years, indicate that improvements in proficiency will be cumulative during the period of this estimate.

Therefore, the over-all proficiency of Long-Range Aviation crews will almost certainly be much higher by mid-1960.

38. *Bombing Accuracy.* By mid-1960, most Soviet long-range bomber crews will probably have achieved the following levels of bombing proficiency:

Altitude (ft.)	Visual Bombing CEP (ft.)	Radar Bombing CEP (ft.)	
		Well- defined targets	Poorly- defined targets
50,000	2,900	2,400	3,100
40,000	2,100	2,000	2,700
30,000	1,400	1,700	2,300
20,000	900	1,400	2,100
10,000	400	900	1,600
5,000		800	1,400

IV. WEAPONS DELIVERY SYSTEMS — GUIDED MISSILES ²¹

39. We have no firm evidence that the USSR now has any offensive guided missiles available for operational employment against the continental US, although we believe that employment of missiles launched from aircraft or submarines is within present Soviet capabilities. We estimate that for some time after a particular missile system becomes operational, its system reliability ²² will probably be about 40-60 percent. By 1960 the reliabilities of earlier Soviet missile systems will almost certainly have been improved. In mid-1960 the USSR will probably have operational stockpiles of several types of missiles with nuclear warheads suitable for launching from submarines or aircraft in an attack on the continental US.

²¹ For a detailed study see the forthcoming NIE 11-5-57, "Soviet Guided Missile Capabilities and Probable Programs."

²² System reliability refers to the percentage of missiles which will function according to specifications from the launching area to detonation in the target area.

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Submarine-Launched Missiles

40. We estimate that any of the present Soviet long-range submarine types could be equipped to carry one to two guided missiles in topside stowage. The USSR could construct nuclear-powered submarines or conventional-powered submarines, about the size of the present Z class, to accommodate internally four missiles each of the size and weight of the Regulus I.

41. We estimate that Soviet turbojet missiles of the Regulus I type could have been available for launching from submarines since 1955. These missiles could have a maximum range of 500 n.m., with a high subsonic speed capability. A supersonic version could be available in 1957. Low-yield nuclear warheads could be employed at present and high-yield warheads beginning in 1957-1958. At present, with radar track-radio command guidance, a CEP of 0.5 n.m. could be achieved by employing a guidance submarine within 100 n.m. of the target, and a CEP of 1.0 n.m. could be achieved with a guidance submarine up to 200 n.m. from the target, assuming accurate positioning of the submarine. We estimate that by 1960 a CEP of 1-2 n.m. could be achieved at maximum missile range by employing an inertial guidance system supplemented by radar map-matching. By mid-1960, the USSR could have sufficient supersonic 500 n.m. turbojet missiles to equip the number of missile-launching submarines estimated in paragraph 45. We do not believe that the USSR is capable of developing significantly advanced submarine-launched missile systems, such as a submarine-launched IRBM, during the period of this estimate.

Intercontinental Ballistic Missiles (ICBM)

42. We estimate that at some time in the period 1960-1961 the USSR could achieve an initial operational capability with an ICBM with a 5,500 n.m. maximum range, a high-yield nuclear warhead, and a CEP of 5 n.m. We believe that the high priority the USSR would almost certainly assign to this missile system would dictate equipping the first operational unit with prototype weapons simultaneously with the decision to initiate series production. If the USSR succeeded in achiev-

ing an initial operational capability at the earliest time estimated (i. e., the beginning of the 1960-1961 time period), and simultaneously initiated series production, we believe that in mid-1960 it could have a stockpile of up to 25 ICBMs.

Air-Launched Missiles

43. The USSR is now technically capable of attacking targets with rocket-propelled glide bombs of 20 n.m. maximum range, launched from long-range aircraft and fitted with low-yield nuclear warheads. We estimate that air-to-surface missiles capable of carrying nuclear warheads to a maximum range of 55 n.m. could be placed in operation as follows: a subsonic interim version in 1956-1957 and a supersonic version in 1958. This missile would probably be equipped with semiactive homing guidance, and achieve a CEP of about 150 feet against ships or other well-defined radar targets. Beginning in 1957-1958, high-yield nuclear warheads could be employed. By mid-1960 the USSR could have a sufficient number of supersonic air-to-surface missiles of 55 n.m. range to meet the requirements of the attack described in paragraph 62.

V. WEAPONS DELIVERY SYSTEMS — OTHER FORCES

Airborne and Amphibious Forces

44. The USSR has considerable airborne and amphibious forces which could be used to attack certain US overseas bases and Alaska. Its capabilities for both these types of operation are insufficient to make them a threat against continental US.

Naval Forces

45. The USSR's large surface naval force, lacking aircraft carriers, is unsuited for transoceanic naval operations on any significant scale. On the other hand, the large and increasing Soviet submarine force is capable of carrying out large-scale operations off the US coasts. However, only those submarines capable of launching guided missiles could attack targets within the continental US. Although the evidence pointing to the

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existence of Soviet guided missile submarines is not conclusive, we believe that the USSR intends to produce submarines of this type during the period. However, we have no evidence to indicate how many it plans to construct or convert by mid-1960. We estimate that the USSR could now have about 10 guided missile submarines, all of which would probably be converted boats with topside stowage. We believe that by mid-1960, the USSR may have an additional 20 guided missile submarines with internal stowage, of which about eight could be nuclear-powered.

46. Although we have no firm evidence that the USSR has a nuclear-powered submarine, there is reason to believe that a program for development of such a submarine has reached an advanced stage. The state of power reactor developments in the USSR is such that an atomic submarine could be in operation well before 1960. We estimate that by mid-1960 the USSR could have up to 10 atomic reactors installed in submarines if it is willing to adopt a relatively simple, standardized design. If

emphasis were placed on improving designs, it is probable that no more than five atomic reactors for submarines would be built during the period. Nuclear-powered submarines would probably be capable of surfaced and submerged speeds of about 18 and 24 knots respectively, submerged endurance of 30 days or more, and cruising ranges at full speed in excess of 25,000 nautical miles.

47. The capability of the Soviet submarine force will probably be improved by a limited modernization of older types, including the installation of snorkel. Intelligence is lacking on a number of other factors essential to the development of an effective submarine force, such as mobile and permanent logistical support and the operating efficiency of the force, which is probably still inferior to that of US and German forces in World War II. There is, however, evidence of increased long-range patrolling activity, and intensified training of this and other types will probably raise performance standards during the period of this estimate.

PROBABLE SOVIET GROSS CAPABILITIES AGAINST THE CONTINENTAL US

Methods of Attack

48. We believe that in mid-1960 the USSR would place chief reliance in attacks on the continental US upon aircraft carrying nuclear weapons. ICBMs, if available in mid-1960, would almost certainly be used to augment attacks by manned aircraft, but not to replace any mission aircraft. Missiles launched from submarines probably would be used in coordination with nuclear strikes by aircraft. Clandestine delivery of nuclear and other weapons of mass destruction might also be attempted, but we estimate that this form of attack would probably be employed only against a few selected targets. Sabotage of certain key installations might occur concurrently with or immediately following the initial attacks.

VI. ATTACKS BY AIRCRAFT

49. Present Soviet capabilities for air attack on the continental US are restricted by the relatively small numbers of operational heavy bombers, the limited availability of megaton-yield nuclear weapons, the status of support facilities at Arctic bases, and the probable lack of a substantial inflight refueling capability. Improved aircrew proficiency, further improvement of Arctic bases, development of a substantial operational inflight refueling capability, and production of larger numbers of megaton-yield weapons and heavy bombers, all of which we believe will be realized, would result in a considerable increase in Soviet capabilities for attack on the continental US by mid-1960.

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50. During the early part of the period of this estimate, the BULL and the BADGER would be the principal aircraft available for attack on the continental US. In the latter part of the period, the USSR would almost certainly place chief reliance on the BISON and the BEAR for such attacks, with the BADGER playing a secondary role.

51. Without inflight refueling the BULL (maps 1-4)²³ would be unable to reach targets in the US on two-way missions even from forward bases unless it were modified,²⁴ in which case it could reach the Seattle area. The modified BULL could, without inflight refueling, reach all of the US on a one-way mission from Chukotski. The current BADGER would require inflight refueling in order to cover most of the important target areas in the US, even on one-way missions from forward bases, but an improved BADGER (see maps 5-8), which we estimate will be available in 1957, could carry out these one-way missions without inflight refueling. Two-way BADGER operations would be limited to northwestern US targets, even with refueling. In order to reach all targets in the US with the BISON (see maps 9-12, 17, 18), the USSR would have to employ one-way missions. However, on two-way refueled missions from forward bases, the improved BISON could reach targets in much of the western and northern portions of the US. The BEAR (see maps 13-16, 19, 20), if launched from the Chukotski Peninsula, could reach almost all of the US on two-way unrefueled missions, but from interior bases could reach only a small portion of the US. On two-way refueled missions, the BEAR could cover the entire US from forward bases and most of the US from interior bases.

Base Areas

52. We estimate that there are now 52 airfields in the forward base areas capable of staging long-range bombers, and that the USSR will continue to improve its forward base structure during the period of this estimate. By mid-1960, the capacity of the forward base areas could have been increased sufficiently to stage simultaneously the entire

long-range bomber and tanker force estimated for that date.

53. *Staging.* About a 10-hour flight would be required to move BULL aircraft from Far East home bases to Chukotski area bases, and about three to five hours from Western USSR bases to the Kola Peninsula. Flying times for BADGER, BISON, and BEAR aircraft would be about half as long. The USSR is fully capable of developing servicing and fuel storage and transfer facilities at its forward bases, if these facilities are not already available. For example, we believe the USSR has a fuel truck with a capacity of 6,000 gallons and a pumping rate of 240 gallons per minute. We estimate that, when BISON and BEAR bombers appear in service in large numbers, the USSR will have ground refueling equipment more compatible with the requirements of these aircraft. In order to service large numbers of long-range bomber aircraft at staging bases in forward areas, it would probably be necessary to increase present stocks of POL and servicing equipment and to establish or increase weapons stockpiles at these bases.

54. *Weather.* Weather and climatic conditions in the far northern staging areas would have a considerable impact on the timing and magnitude of attacks on the US.²⁵ During cold weather, requirements for high-speed refueling and heated shelter space for maintenance are among the critical problems which would be magnified as the numbers and size of aircraft increased. Moreover, the coordinated launching of a large-scale strike force comprising elements from widely separated base areas would probably be further complicated by varying weather conditions at the different bases. Cold weather problems would, however, be less critical with jet than with piston aircraft.

²³ The maps and summary charts in Annex B show ranges of which the various Soviet aircraft operating from various bases would be capable in attacks against continental US.

²⁴ E. g., stripped and altered for longer range in a manner similar to the US B 29B.

²⁵ See Annex A for an account of weather conditions in the various base areas.

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55. The USSR has demonstrated that it can effectively operate aircraft under extreme cold weather conditions. In addition, aircraft performance is improved by low ground temperatures in Arctic areas, since the higher density of cold air increases engine thrust and airfoil lift so that take-off distance may be reduced or maximum gross take-off weights increased. For example, at 0 degrees F. the ground run requirement for take-off of jet bombers would be about 25 percent less than under standard conditions (see paragraph 23). Ground run requirements for the BULL and the BEAR would also be reduced, but the difference would not be as great as for jet bombers.

56. The low temperatures of the Arctic region pose some special problems in the handling of nuclear weapons. However, virtually all of the components of nuclear weapons are better able to resist the effects of cold weather than are the delivery aircraft, and provision of adequate shelters and equipment to overcome the undesirable effects of cold weather on the bombs is a much simpler problem. We estimate that the USSR can successfully store and assemble nuclear weapons for use at Arctic bases under any weather conditions which will permit the operation of bombers.

57. *Scale of pre-strike preparations.* At present the preparations necessary for launching a maximum-scale attack from likely staging areas would probably require several months. We estimate that the USSR will continue to improve its base facilities and the training, logistics, and equipment of its Long-Range Aviation throughout this period, so that the time required for preparations for attack would be considerably reduced.

Assumptions Underlying Estimated Intercontinental Striking Forces

58. Although the variety in methods of employment and attack patterns open to the USSR makes it difficult to estimate which airfields the USSR might employ in an initial attack, sufficient intelligence is available to make a logical selection as to which of the forward airfields will be most suitable for staging bomber operations. Therefore, we be-

lieve that the most likely Soviet choices of base areas for an initial air attack against the continental US would be the Chukotski, Kamchatka, Central Arctic, Kola, and Leningrad areas. In addition, some BEAR aircraft could be launched from interior bases.

59. In order to determine the general order of magnitude of Soviet capabilities for an initial attack against the US in mid-1960, we have considered the available intelligence on runway lengths, POL, maintenance, other base facilities, and accessibility for supply purposes, and have arrived at an estimate of a probable maximum capacity of each of the forward bases for staging bomber aircraft. All bases that we have selected for the staging of heavy bombers have runway lengths of at least 7,900 feet and are considered to have an average maximum staging capacity of 30 heavy or 60 medium bombers. Those selected for staging medium bombers only have generally fewer base facilities, but have runways estimated to be at least 6,000 feet in length. Their maximum staging capacities are considered as varying from 30 to 60 medium bombers, depending on the facilities at each base.²⁶ Although usable on the basis of estimated aircraft performance figures, existing runways at many of these airfields are considerably below the standards normally associated with Soviet long-range bomber bases.

60. The following planning factors, based on US experience and estimated Soviet capabilities, have been assumed:

- a. 90 percent of aircraft at home base in commission after stand-down;
- b. 85 percent of those aircraft departing home bases can be launched from staging bases (includes attrition enroute to and while at staging bases);
- c. 80 percent of those bomber aircraft launched on unfueled missions will arrive in target area (excluding combat attrition);
- d. 75 percent of those bomber aircraft launched on missions utilizing inflight refueling will arrive in target areas (excluding combat attrition); and

²⁶ For estimated staging capacities of individual bases in each of the forward areas, see Annex D (limited distribution under separate cover).

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e. An allowance of one tanker aircraft provided for each bomber refueled in flight (compatible tanker assumed).

Maximum Strike Forces for Air Attack in Mid-1960

61. For the purposes of this estimate, the only factors used in determining the maximum bomber force the USSR could launch against the continental US in mid-1960 are the estimated strength of Soviet Long-Range Aviation, the estimated capacity of the forward staging areas, and the operational planning factors given in paragraph 60. Among the factors specifically excluded from the calculations are Soviet requirements for attack on areas outside the continental US, and for re-attack after the initial strikes. These factors would reduce the number of bombers actually committed to an initial attack on the continental US.

62.²⁷ We estimate that in mid-1960, Soviet Long-Range Aviation will include an increased number of bomber aircraft, a greater proportion of heavy bombers, and a tanker fleet adequate to support a portion of its heavy bomber force. By that date, the capacity of the forward staging areas could have been increased to permit the launching of the entire bomber force on a combination of refueled and unrefueled missions. Under these circumstances, and assuming that all aircraft were launched from staging bases rather than home bases, the maximum mid-1960 Soviet strike capability would be as follows:

	Available After Stand-down	Launched from Staging Bases	Arriving in Target Areas ^a
BADGER	630	535	428
BISON	450	382	300
BEAR	270	230	184
TANKER	135 ^b	115 ^b	---
Total	1,485	1,262	912

^a Not considering combat losses.

^b These figures assume that all tankers employed will be heavy tankers compatible with the BISON. This does not take into account the fact that BADGER tankers could be employed as an interim measure to refuel BISIONS or other BADGERS. (See paragraph 21.)

We have assumed the following method of employment:

	Two-Way Un-refueled	Two-Way Refueled	One-Way Un-refueled	Total Bombers Launched
BADGER	---	---	535	535
BISON	267	115	---	382
BEAR	230	---	---	230
Total	497	115	535	1,147

63. If the USSR attempted to achieve surprise, it could employ several alternative methods of attack against the continental US in mid-1960, at the cost of reducing the weight of attack:

a. The USSR could elect to employ only heavy bombers in an initial attack, launching them from the forward staging bases. In this case, as indicated in the table above, 612 could be launched in a combination of refueled and unrefueled two-way missions, and 484 could arrive in targets areas, not considering combat losses.

b. It could elect to employ only heavy bombers, launching them from home bases. In this case 720 could be launched and 569 could arrive in target areas, not considering combat losses. This alternative would require that all the BISIONS be employed on one-way missions and that almost all the BEARS be refueled if they were to be employed on two-way missions.

c. It could elect to employ medium as well as heavy bombers in various combinations designed to achieve the maximum weight of attack possible without jeopardizing surprise.

64. Allocation to ECM and Diversionary Tasks. All attacking bombers would probably possess some ECM capability in mid-1960. It is also possible that some portion of the aircraft in the attacking force would be assigned exclusively as specialized ECM aircraft for purposes which might include diversion and decoy use. Such aircraft would probably be employed to assist bombers in carrying out

²⁷ The Assistant Chief of Staff, Intelligence, Department of the Army, does not concur in the maximum mid-1960 Soviet strike capabilities as estimated in paragraphs 62 and 63. (See his footnote to paragraph 14.)

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attacks against extremely important targets, particularly those which would be involved in US retaliatory action.

VII. ATTACKS BY GUIDED MISSILES

Submarine-Launched Missiles²⁸

65. We believe that in mid-1960, submarine-launched missiles probably would be used in coordination with nuclear strikes by aircraft in any Soviet plan of attack against the continental US. In mid-1960, the USSR may have available about 30 submarine equipped to launch guided missiles. If the USSR attempted to achieve surprise in an initial attack in mid-1960, we believe that it would consider that the deployment of a relatively small number of guided missile submarines could be accomplished without jeopardizing surprise. This risk would be minimal in the case of nuclear-powered guided missile submarines, but no more than eight of these are likely to be operational in mid-1960.

66. Since the submarine must necessarily surface and remain surfaced for about five to 10 minutes to launch a missile, it would be vulnerable to radar detection during that time. If the submarine were operating at periscope depth while actively guiding a missile it would be vulnerable to both active radar and passive electronic intercept detection. Nuclear-powered submarines are likely to be large and would be just as vulnerable to active sonar detection as conventional submarines of comparable size. Any antisonar coatings available to the USSR would be difficult and costly to apply, would have a relatively short effective life, and would be ineffective at deep submergence because of distortion of the material under hydrostatic pressure. Based on US experience, a submerged nuclear-powered boat can be expected to be less noisy than a snorkeling diesel submarine at speeds below 17 knots, and thus less susceptible to detection by passive underwater intercept. However, at speeds above 17 knots the nuclear-powered boat would be at least as detectable. At submerged speeds below nine knots, the nuclear-powered boat would be virtually undetectable

²⁸ For estimated range coverage of continental US, see map 21, Annex B.

by LOFAR, and might even go undetected at submerged speed as high as 15 knots.

Intercontinental Ballistic Missiles (ICBM)

67. As indicated in paragraph 42, we believe that in mid-1960 the USSR could employ only a few, if any, ICBMs against the continental US. Because the system reliability, accuracy, and nuclear warhead yield of the ICBM are estimated to be considerably lower than those of manned bombers in mid-1960, we believe that any ICBMs available to the USSR at that date would be used to augment bomber attacks, rather than to replace any mission aircraft.

Air-Launched Missiles

68. A supersonic air-to-surface missile of 55 n.m. range could to some extent improve the capabilities of Soviet medium and heavy bombers to attack heavily-defended US targets. However, their warheads would have lower yields than available nuclear bombs and their guidance radar would restrict their effectiveness to well-defined targets.

VIII. CLANDESTINE ATTACK

Clandestine Delivery of Nuclear Weapons

69. We have no evidence as to any Soviet plans or preparations for clandestine delivery of nuclear weapons against the US. However, during the period of this estimate the USSR will be capable of producing nuclear weapons which could be smuggled into the US either as complete assemblies or as component parts of subassemblies. These could range from small-yield weapons (five kilotons or less), weighing a few hundred pounds and small enough to fit into the luggage compartment of an automobile, up to the highest-yield device the USSR was capable of producing. All of these weapons or devices could be designed to break down into transportable components. Those designed to give a relatively low yield would not require much labor or technical training for assembly. Considerably more labor and training would be required to assemble weapons designed to give high yields, and, once assembled, they would

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be more difficult to transport. The size and weight of any multimegaton device would tend to limit its use other than as a fixed installation in the hold of a merchant vessel, in a truck-trailer, or in premises with diplomatic immunity.

70. Considering the known limitations of the means of physical detection, the USSR could probably introduce into the US and detonate in place a considerable number of nuclear weapons by clandestine means. A variety of methods of clandestine delivery suggest themselves. Assembled weapons could be dropped by apparently friendly aircraft, detonated in the hold of a merchant ship, or sown as underwater mines by submarines and possibly by merchant ships. Either components or assembled weapons could be brought in under diplomatic immunity, smuggled across land or sea frontiers, introduced through normal import channels, or brought in as bonded merchandise awaiting transshipment.

71. In introducing nuclear weapons clandestinely into the US, the USSR would have to take into account not only the estimated chances of detection but also the consequences of detection, including the loss of surprise in any intended overt attack and the possible provocation of US military action. As the number of weapons clandestinely introduced was increased, the risk of compromise would grow. This increased risk would be less a function of the physical means of detection (the effectiveness of which is extremely limited) than of the possibilities of US penetration of the Communist apparatus, of the defection of a trusted agent, or of sheer accident. The USSR could not be confident that none of these mischances would occur. We conclude that, although clandestine attack with nuclear weapons might be made against specially selected targets, as a supplement to overt attacks, the use of large numbers of such weapons would probably be precluded by security considerations.

Clandestine Use of BW and CW Weapons

72. We estimate that the USSR has a capability for the clandestine delivery of BW

agents against targets in the continental US. Most BW agents are peculiarly adaptable to clandestine utilization, since detection of their intended use would be difficult. Even small-scale employment of BW agents against livestock could be highly effective. BW attacks against personnel concentrated in selected buildings could also be effective. Anticrop BW operations could be carried out clandestinely, with possible damaging effects under proper environmental conditions.

73. CW agents are not as suitable to clandestine operations as BW agents. The effects are more readily identifiable and a much greater effort would be necessary to deliver quantities required for lethal concentrations over large areas. Although it probably would not be feasible to accumulate CW agents or dissemination devices for more than limited attacks against population centers in the US, CW attacks against personnel in buildings could be effective. In this connection, psychochemical agents could be employed against key personnel in buildings or select groups in small areas.

Conventional Sabotage

74. The USSR is capable of subversion, espionage, and widespread sabotage in the US through the use of existing subversive elements and the placement of foreign agents. Sabotage could not be undertaken on a large scale prior to air attack without forfeiting surprise. Attempts to sabotage US transportation, industrial, and communications facilities, as well as military installations, could be expected concurrent with and immediately following surprise attack by the USSR. Communist Party members and adherents are capable of organizing saboteur units, of varying sizes and equipped with small arms and other suitable material, which could strike at specially selected and widely separated targets simultaneously and without warning. Whether these attacks would be timed with a surprise military attack or carried out after the initial attack would be dependent upon the Soviet appraisal of the relative advantages of such action.

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ANNEX A

BASE AREAS SUITABLE FOR LONG-RANGE BOMBER OPERATIONS

1. *Chukotski Peninsula.* As the result of runway construction believed to have been carried out at several airfields within the past three years, we believe that at least six airfields probably now have runways long enough for staging medium bombers and that at least five of these are suitable for heavy bomber operations. Three other airfields have runways whose characteristics indicate a marginal capability for medium bomber operations. Military air units are based on some airfields in the Chukotski area, but none are subordinate to Long-Range Aviation.

2. Air operations in this area are made difficult by several factors. Recent construction of long, surfaced runways indicates that climatic and logistical difficulties of this area are being overcome. However, ice and compacted snow runways are also still in use. There are some indications that the USSR is steadily improving its operational potential through installation of modern radio navigation facilities. In addition, the USSR has an ever-increasing fund of Arctic experience which can be applied to staging operations in this area.

3. Cold, wind, snow, and fog, which are prevalent throughout the area, tend to make operations difficult and hazardous. The most unfavorable weather conditions occur during November through March.¹ The most favorable conditions occur at all stations during the spring and early summer. Weather in

¹ In order to estimate the seasonal suitability of average weather conditions in potential staging areas, the percentage frequency of occurrence of those conditions which would handicap the mass movement of aircraft into or out of staging areas was computed. Two conditions were selected as a basis for analysis: (1) ceiling/visibility less than 300 feet/one mile; (2) temperature below -20° F., although with adequate preparations staging operations could be carried out successfully in temperatures below -20° F.

the interior is highly favorable during the summer months. Only those areas adjacent to the Chuckchee Sea or which lie along the Bering Sea coast have a relatively high incidence of unfavorable conditions during the midsummer months.

4. The status of base logistical support facilities required to stage long-range strike operations from the Chukotski area is unknown. The area is accessible only by air and by sea during the ice-free season, and supply problems would be difficult. However, the USSR is considered capable of stockpiling the necessary supplies. Moreover, the area's staging potential could be markedly increased by 1960. By using construction elements already available in the area the USSR could build two additional concrete surfaced runways suitable for staging heavy bombers by 1960.

5. *Kola Peninsula.* The Kola Peninsula has at least 14 bases with runways long enough for staging medium bombers. At least one of these airfields would be suitable for heavy bombers. Permanent-surfaced runways can be constructed throughout the area without difficulty as it is relatively free of permafrost.

6. Prevailing climatic conditions, while a restrictive factor on air operations, are relatively more favorable than in other regions of the Soviet Far North. In general, the most favorable conditions occur in the late spring and early summer. In late summer and early autumn, conditions are favorable except at bases adjacent to the cold waters of the White Sea. However, during May through October conditions are favorable at all locations over 90 percent of the time. In winter, conditions are less favorable due to the more frequent occurrence of low ceilings and poor visibilities. Extremely cold temperatures are relatively infrequent, and occur less than 10 percent of the time at any base.

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7. The status of base logistical support facilities required to conduct long-range bomber strikes from airfields in this area is unknown, but it is considered that logistics would not be an important limiting factor. Supply routes by rail and road are open to the Kola Peninsula on a year-round basis, although logistical support of large-scale air operations would still pose difficulties under extreme weather conditions. Moreover, the staging potential of the area could be readily increased. With construction elements already in the area, three additional concrete-surfaced runways suitable for heavy bombers could be constructed by 1960.

8. *Central Arctic.* An airfield construction and development program in this area has been in progress since early 1949. The development program was carried out for Polar Aviation of the Northern Sea Route Administration, but at least seven airfields now in existence probably have runways of sufficient length to handle the staging of medium bombers. Of these, three are probably suitable for the staging of heavy bombers. Two other airfields in this area have runways with marginal capabilities for medium bomber operations. However, logistical support would be difficult, probably requiring heavy stockpiling. Construction elements in the area could build two additional runways suitable for heavy bombers by mid-1960.

9. The major handicap to air operations in this area arises from the frequency and persistence of extremely low temperatures. For example, at Tiksi over 50 percent of all observations during January record temperatures lower than -20° F. Jet engines, however, are less adversely affected by low temperatures than piston engines and jet take-off requirements are considerably reduced. The summer months are not very favorable due to the high frequency of fog in the coastal belt.

10. *Leningrad.* This area contains at least three home bases of Long-Range Aviation units equipped with BULL and BADGER aircraft. These bases probably have runways of sufficient length for heavy bomber operations. Three additional runways suitable for heavy bombers could be constructed by mid-

1960 by employing airfield construction units now in the area. Improvement of existing airfields would require only a minimum of additional construction, as there are already 20 other airfields in the Leningrad area with concrete runways long enough for medium bomber operations. None of these additional bases, however, are known to be associated currently with Long-Range Aviation operations. Operations from this area by long-range aircraft would offer the advantage of a temperate climate and good logistical support.

11. The bases in this area have the most favorable weather during the late spring and summer, when about 97 to 99 percent of the time is favorable for operations. Even during autumn and winter 88 to 90 percent of the weather is favorable at all bases. There appears to be little difference between nighttime and daytime weather except during September, October, and November. During these months, reduced visibility sometimes occurs during the early morning hours. Temperatures below -20° F. occur less than five percent of the time at all bases.

12. *Kamchatka-Sea of Okhotsk Area.* Only two airfields in this area are considered adequate for medium bombers, and only one of these is considered suitable for heavy bombers. Three other airfields have runways with marginal capabilities for medium bomber operations. Long-range staging capabilities from this area are therefore estimated to be extremely limited, but two additional runways could be constructed to accommodate heavy bombers by 1960.

13. The weather in this area is relatively favorable for air operations. Throughout the year the weather on the east coast of Kamchatka Peninsula is the most favorable in the entire area. In the Magadan area the best weather occurs during the early spring and autumn.

14. *Baltic-East Germany.* Poland and the Soviet Zone of Germany have a total of at least 70 airfields from which medium and heavy bomber operations could be mounted against the US and US bases in Western Europe. However, a disadvantage of this area as a base for air attacks on North America is that

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Great Circle routes pass over nations friendly to the US. In addition, it would be more difficult than in other forward base areas to maintain security of preparations, and the area is more vulnerable to NATO attack. However, climatic conditions are most favorable and there would be relatively few logistical problems. This base complex is served adequately by all types of transportation.

15. The bases located in the Baltic coastal area are most suitable for air operations dur-

ing April through August, when favorable conditions occur about 97 percent of the time, both day and night. The least favorable period is December through March, when frequency of favorable conditions drops to about 75 percent. However, the unfavorable conditions occur most often during the night and early morning hours. The mid-day hours are favorable for operations about 85 percent of the time. Very low temperatures are rare in this area.

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ANNEX B

MAPS AND SUMMARY CHARTS

I. GENERAL

The following maps show estimated Soviet long-range aircraft and submarine-launched guided missile radius/range capabilities under selected conditions against the continental US through mid-1960. The maps depicting the capabilities of the BISON (nos. 9-12) and BADGER (nos. 5-8) are based on estimated performance characteristics of improved versions of these aircraft estimated to be available in mid-1956 and in 1957, respectively. The estimated capabilities of the standard versions of these two aircraft types are shown in boxes included on the appropriate maps. The estimated capabilities of the modified BULL and improved BEAR are shown in boxes on the maps dealing with the standard versions of these aircraft.

Estimated range coverage under refueled conditions is particularly difficult to depict since many different routes and refuel points could be used by Soviet strike forces. Therefore, it should be noted that this coverage assumes certain routes and refuel points, and under different assumptions the indicated coverage would be somewhat altered.

II. RANGE COMPUTATION

In all cases the estimated coverage is based on ranges calculated in accordance with

standard US military mission profiles. For estimating ranges under *unrefueled* conditions it has been assumed that Great Circle routes would be flown, although such flights would have to transit major Western warning and defense positions. For *refueled* flights, however, routes indicated show possible approaches intended to avoid overflight of major Western defense and warning systems. Total ranges indicated assume a Soviet refueling capability permitting a range extension of approximately 35 percent.

III. BASE MAP

The base used for all maps is a simplified version of a US target system which Soviet planners might seek to attack. It is intended only to indicate the general geographical distribution of possible US targets, and should not be considered as a definitive picture of the US target complex. Moreover, it does not reflect programmed changes or other changes likely to occur between now and mid-1960.

IV. SUMMARY CHARTS

These charts are included for convenience in comparing the radius/range capabilities of all Soviet long-range bombers, if launched from the Chukotski, Kola, or Moscow areas. They are based on the same calculations and assumptions used in preparing the maps.

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ANNEX C

TABLE I

ESTIMATED PERFORMANCE OF SOVIET LONG-RANGE AIRCRAFT
(Calculated in accordance with US Mil-C-5011A (Spec))

CONDITIONS	BULL	Modified ^b BULL	BADGER	Improved ^c BADGER (1957)	BISON	Improved ^c BISON (1956)	BEAR	Improved ^d BEAR (1957)
<u>Combat Radius/Range (nm.)</u>								
a. 25,000-lb. bomb load one refuel ^a	-	-	-	-	2200/4300 3000/5800	2500/4700 3400/6400	3500/6600 4750	3400/6300 4600
b. 10,000-lb. bomb load one refuel ^a	1700/3100 2300/4200	2000/3600 2700/4900	1500/2900 2050/3900	1900/3700 2550/5000	2450/4800 3300/6500	2750/5300 3700/7200	3900/7600 5300	3800/7300 5100
c. 3,500-lb. bomb load one refuel ^a	1950/3500 2650/4700	2300/4100 3100/5500	1700/3400 2300/4600	2100/4200 2850/5700	2550/5000 3450/6800	2800/5600 3800/7600	4100/8200 5600	4000/7800 5400
<u>Speed/Altitude (kn./ft.)</u>								
a. Max. speed at optimum alt.	350/30,000	360/30,000	545/12,500	550/12,500	535/18,800	540/19,000	495/21,400	510/21,400
b. Target speed/ Target alt.	310/30,000	340/35,000	475/41,000	470/43,000	475/41,500	475/44,500	435/40,000	440/42,900
<u>Combat Ceiling (ft.)</u>	36,500	37,500	45,000	46,000	43,800	46,500	40,700	45,400

^a Refueling estimates based upon use of compatible tankers which will provide approximately 35 percent increase in radius/range.^b Stripped and altered for longer range in a manner similar to the US B29B.^c Improvements include the replacement of the 18,000-lb. thrust engines with those having a thrust of 20,500 lbs.^d Based on installation of engines with improved altitude rating.

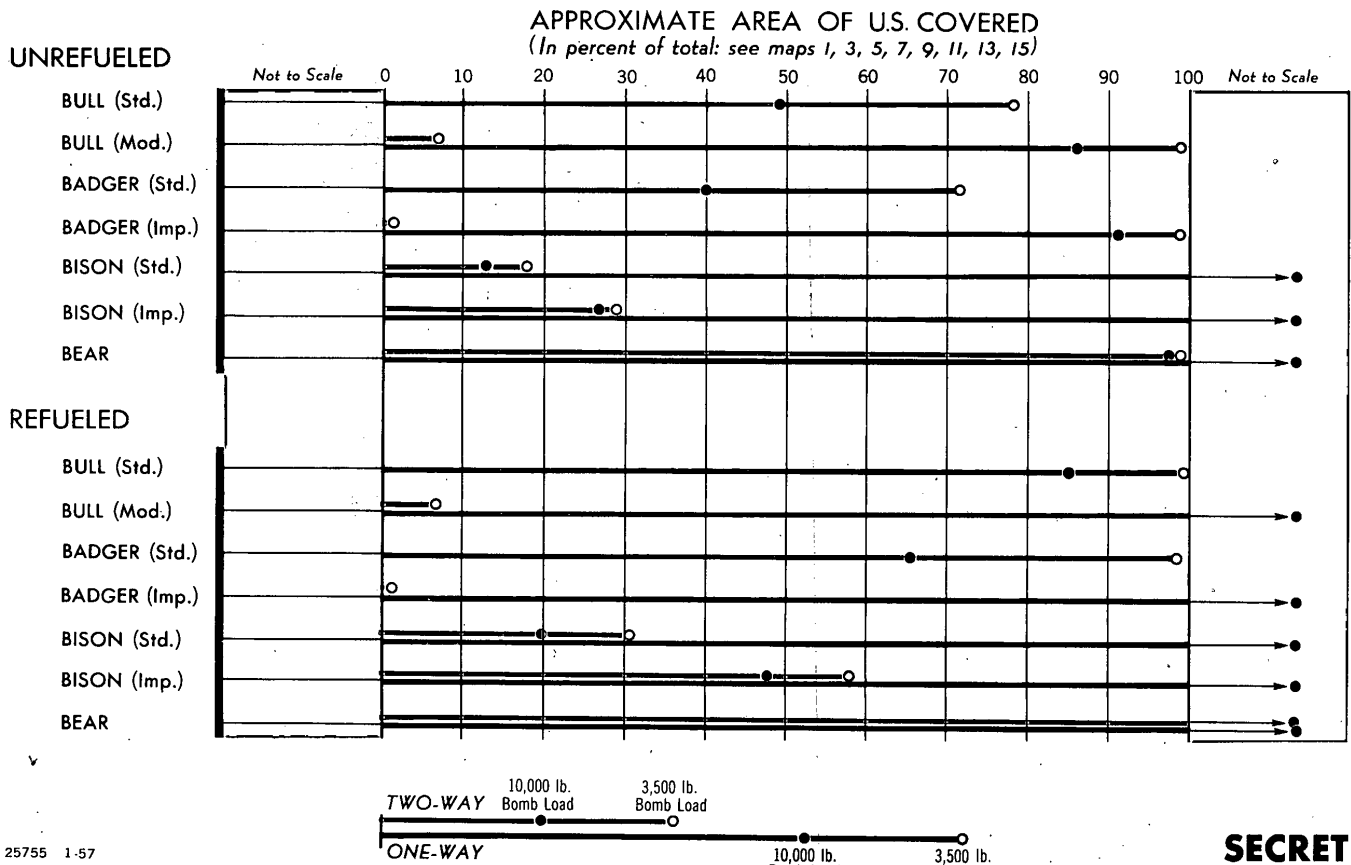
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CHART 1

SOVIET AIRCRAFT RADIUS/RANGE CAPABILITIES SUMMARY From the Chukotski Area

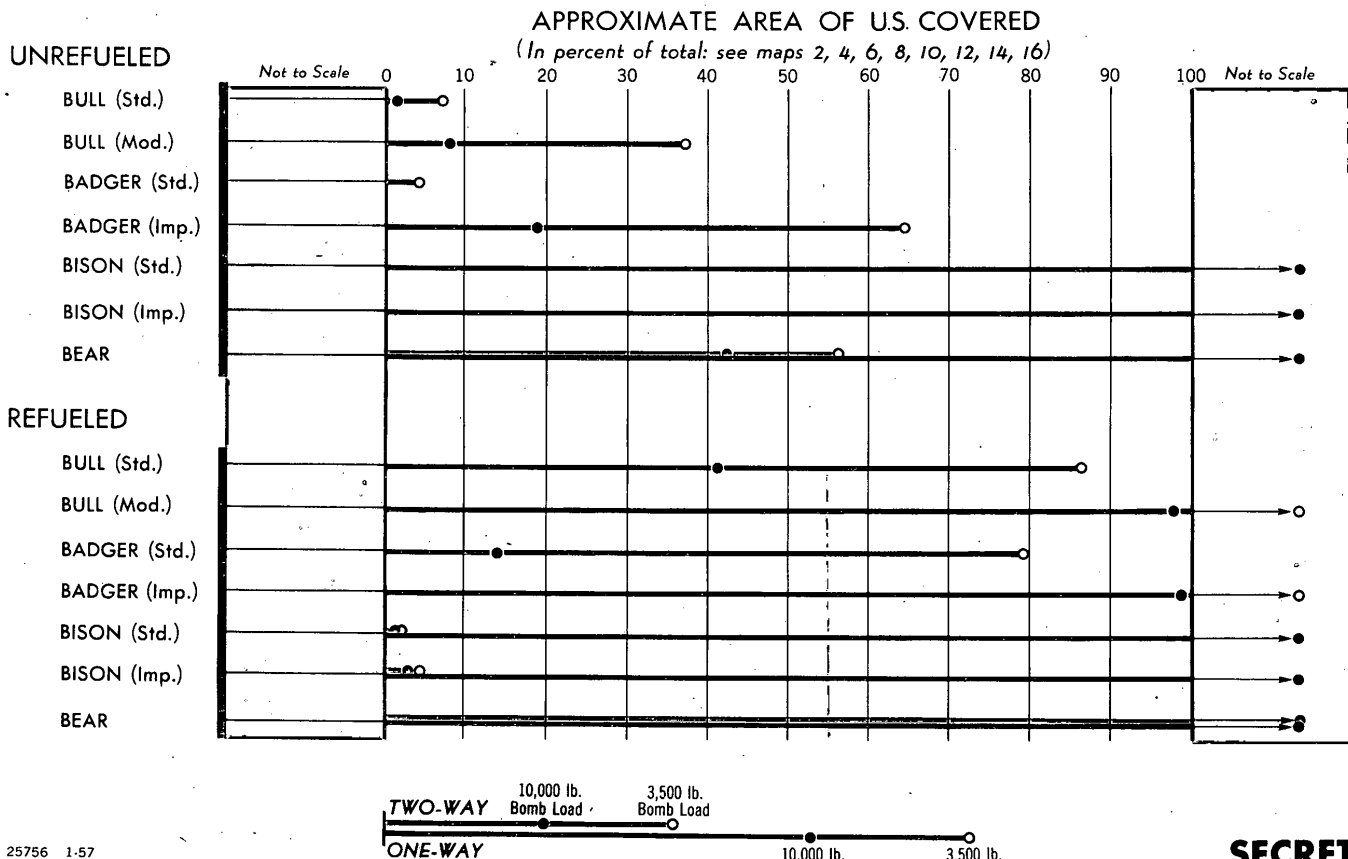


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CHART 2

SOVIET AIRCRAFT RADIUS/RANGE CAPABILITIES SUMMARY From the Kola Area

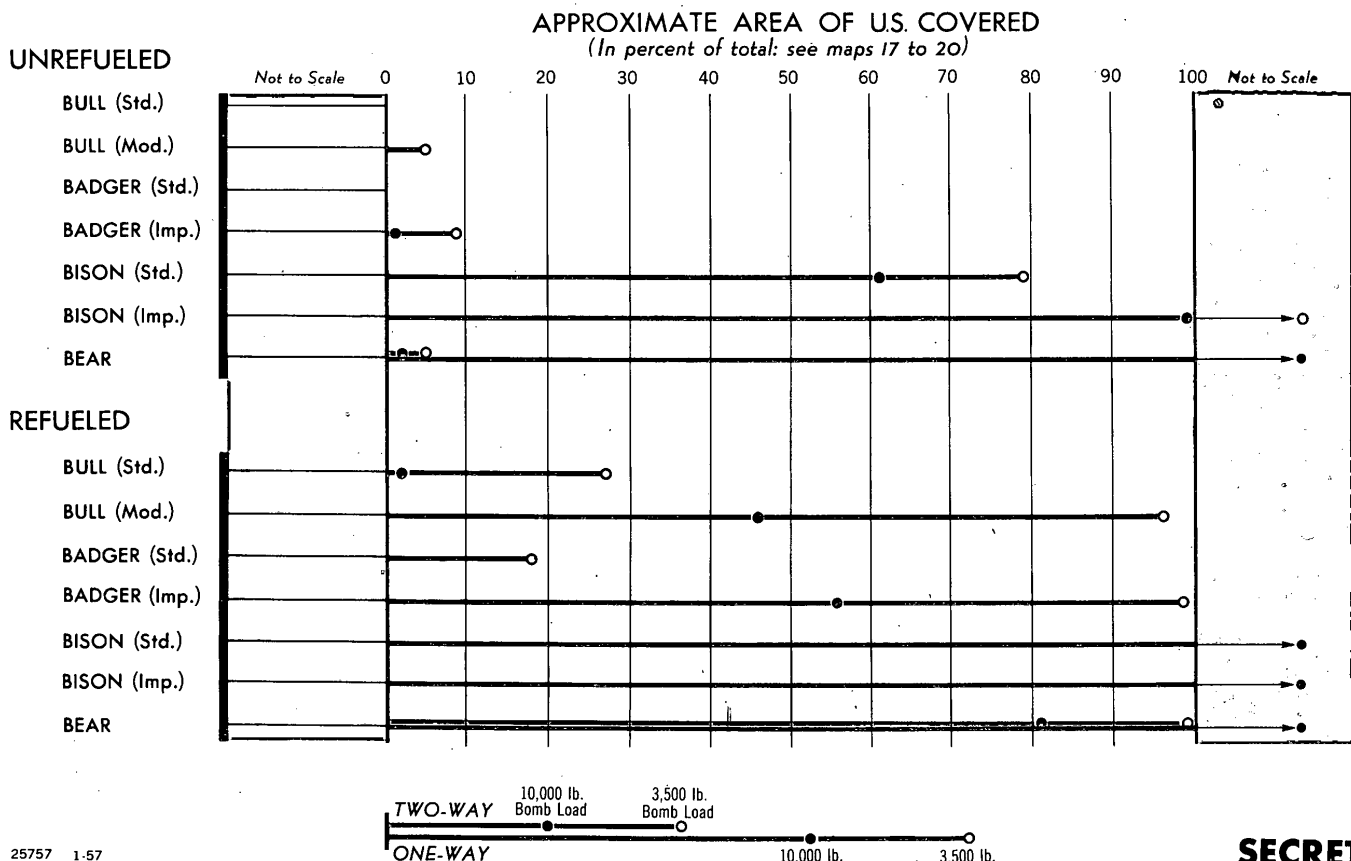


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CHART 3

SOVIET AIRCRAFT RADIUS/RANGE CAPABILITIES SUMMARY From the Moscow Area

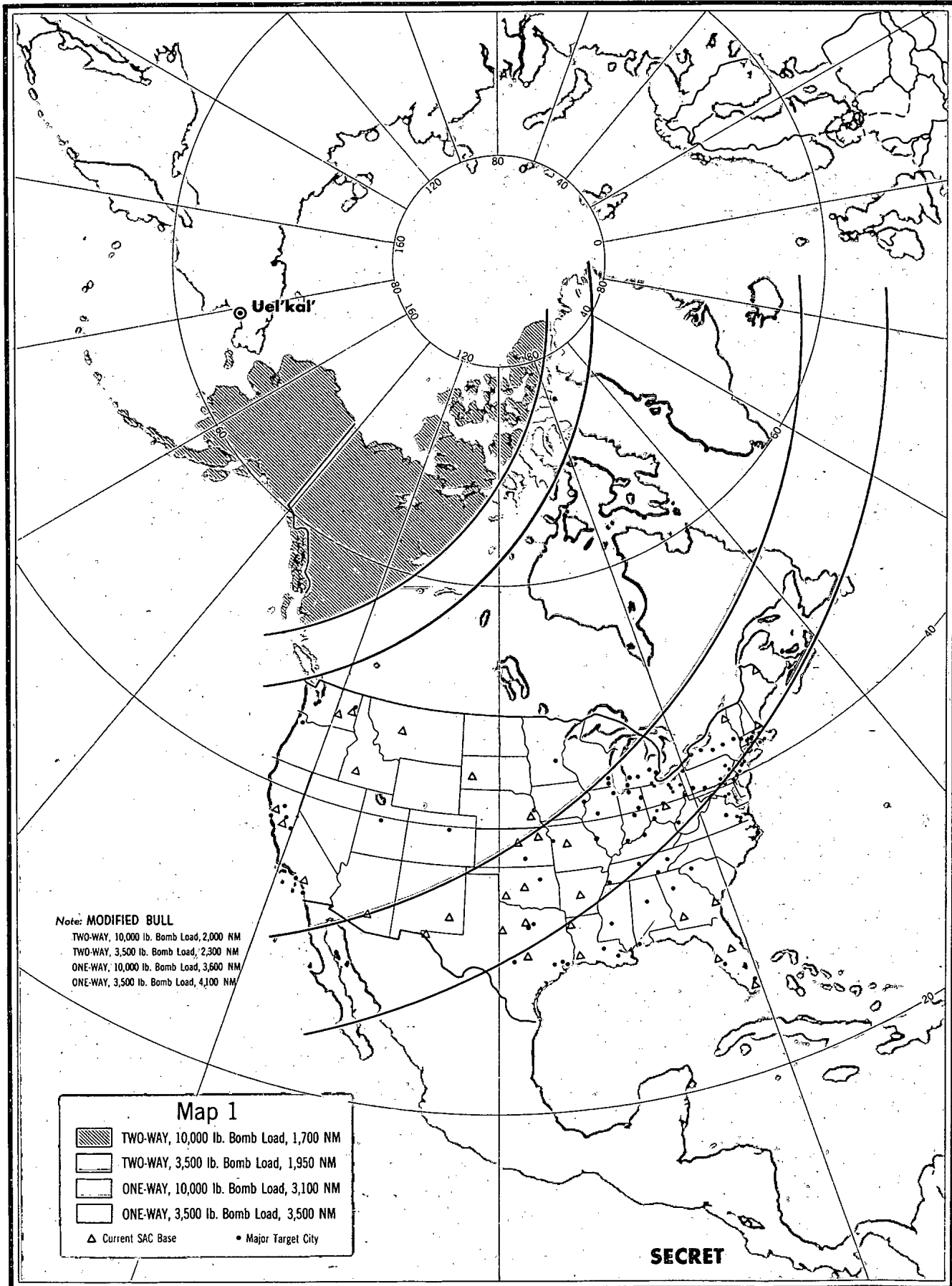


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CAPABILITY OF STANDARD BULL, UNREFUELED

From the Chukotski Area

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Note: MODIFIED BULL
 TWO-WAY, 10,000 lb. Bomb Load, 2,000 NM
 TWO-WAY, 3,500 lb. Bomb Load, 2,300 NM
 ONE-WAY, 10,000 lb. Bomb Load, 3,600 NM
 ONE-WAY, 3,500 lb. Bomb Load, 4,100 NM

Map 1

	TWO-WAY, 10,000 lb. Bomb Load, 1,700 NM
	TWO-WAY, 3,500 lb. Bomb Load, 1,950 NM
	ONE-WAY, 10,000 lb. Bomb Load, 3,100 NM
	ONE-WAY, 3,500 lb. Bomb Load, 3,500 NM
	Current SAC Base
	Major Target City

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TABLE II

ESTIMATED SOVIET LONG-RANGE AIRCRAFT PERFORMANCE UNDER AN OPTIMUM MISSION PROFILE

(Calculated in accordance with US Mil-C-5011A Spec except that fuel reserves are reduced to permit a maximum of 30 minutes loiter at sea level, and aircraft operate at altitudes permitting maximum radius/range)

CONDITIONS	BULL	Modified ^a BULL	BADGER	Improved ^d BADGER (1957)	BISON	Improved ^d BISON (1956)	BEAR	Improved ^a BEAR (1957)
<u>Combat Radius/Range (nm.)</u>								
a. 25,000-lb. bomb load one refuel ^a	-	-	-	-	2500/4800 3400/6500	2800/5300 3800/7200	3800/7200 5100	3800/7100 5100
b. 10,000-lb. bomb load one refuel ^a	1800/3300 2400/4500	2150/4000 2900/5400	1600/3100 2200/4200	2050/4000 2750/5400	2800/5400 3800/7300	3100/6100 4200/8200	4250/8300 5750	4300/8300 5800
c. 3,500-lb. bomb load one refuel ^a	2050/3700 2750/5000	2450/4600 3350/6200	1850/3700 2500/5000	2300/4500 3100/6100	2900/5700 3900/7700	3200/6400 4300/8600	4500/8900 6100	4500/8900 6050
<u>Speed/Altitude (kn./ft.)</u>								
a. Max. speed at optimum alt.	350/30,000	360/30,000	545/12,500	550/12,500	535/18,800	540/19,000	495/21,600	505/21,000
b. Target speed/Target alt.	310/30,000	340/35,000	475/41,500	470/43,500	475/42,400	475/45,500	410/42,100	430/44,900
Combat Ceiling (ft.)	36,500	37,500	45,500	46,500	44,600	47,500	41,300	46,000
<u>Terminal Target Altitude (ft.)^b</u>								
a. 25,000-lb. bomb load	-	-	-	-	52,600	55,200	48,200	50,100
b. 10,000-lb. bomb load	41,500	42,500	49,500	51,600	53,200	56,000	50,200	52,100
c. 3,500-lb. bomb load	42,000	43,000	51,000	53,000	54,600	57,000	51,200	53,100

^a Refueling estimates based upon use of compatible tankers which will provide approximately 35 percent increase in radius/range.

^b Service ceiling at maximum power with one hour fuel reserves plus bomb load aboard. No range figure is associated with this altitude.

^c Stripped and altered for longer range in a manner similar to the US B29B.

^d Improvements include the replacement of the 18,000-lb. thrust engines with those having a thrust of 20,500 lbs.

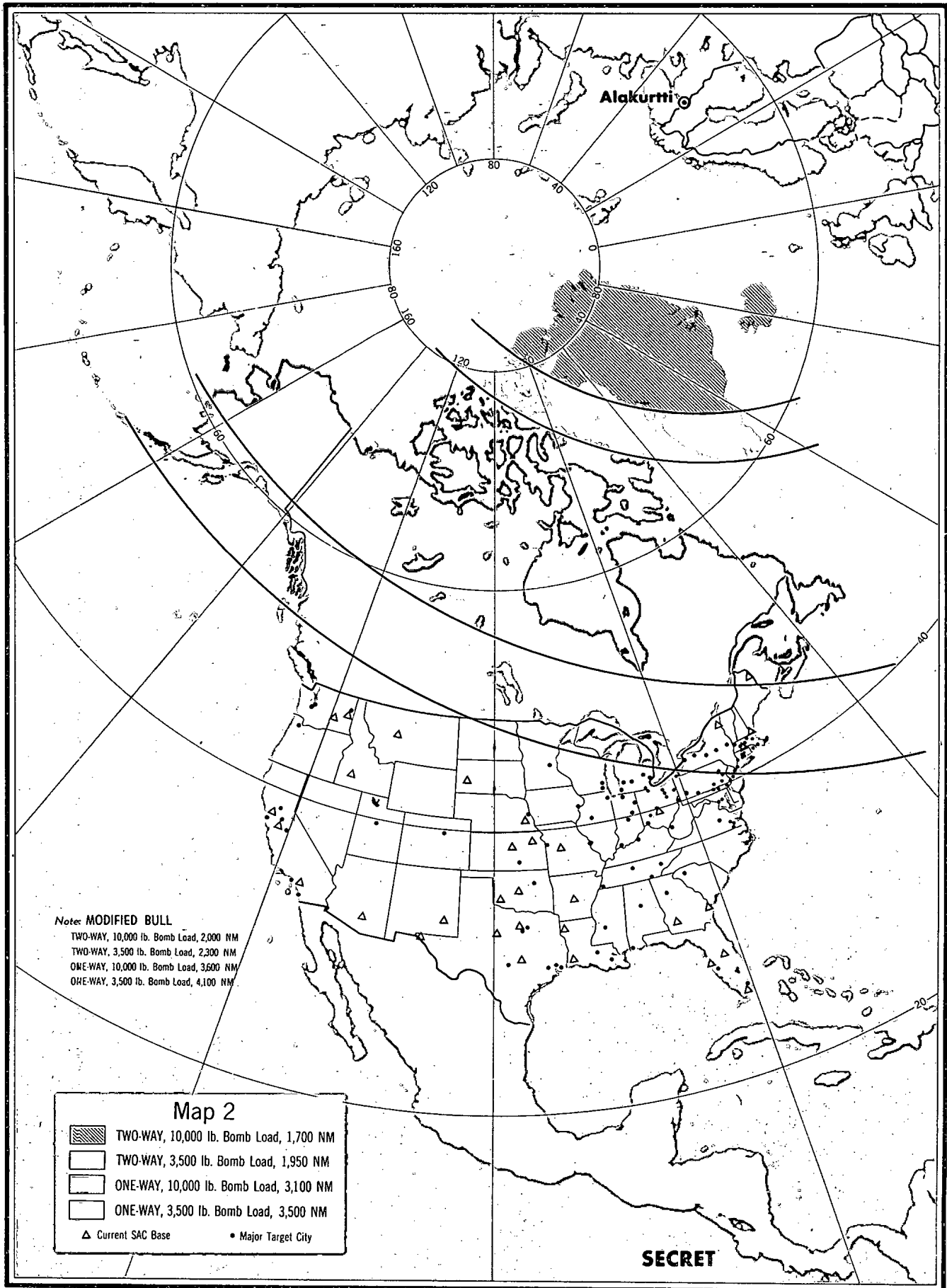
^e Based on installation of engines with improved altitude rating.

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CAPABILITY OF STANDARD BULL, UNREFUELED

From the Kola Area,

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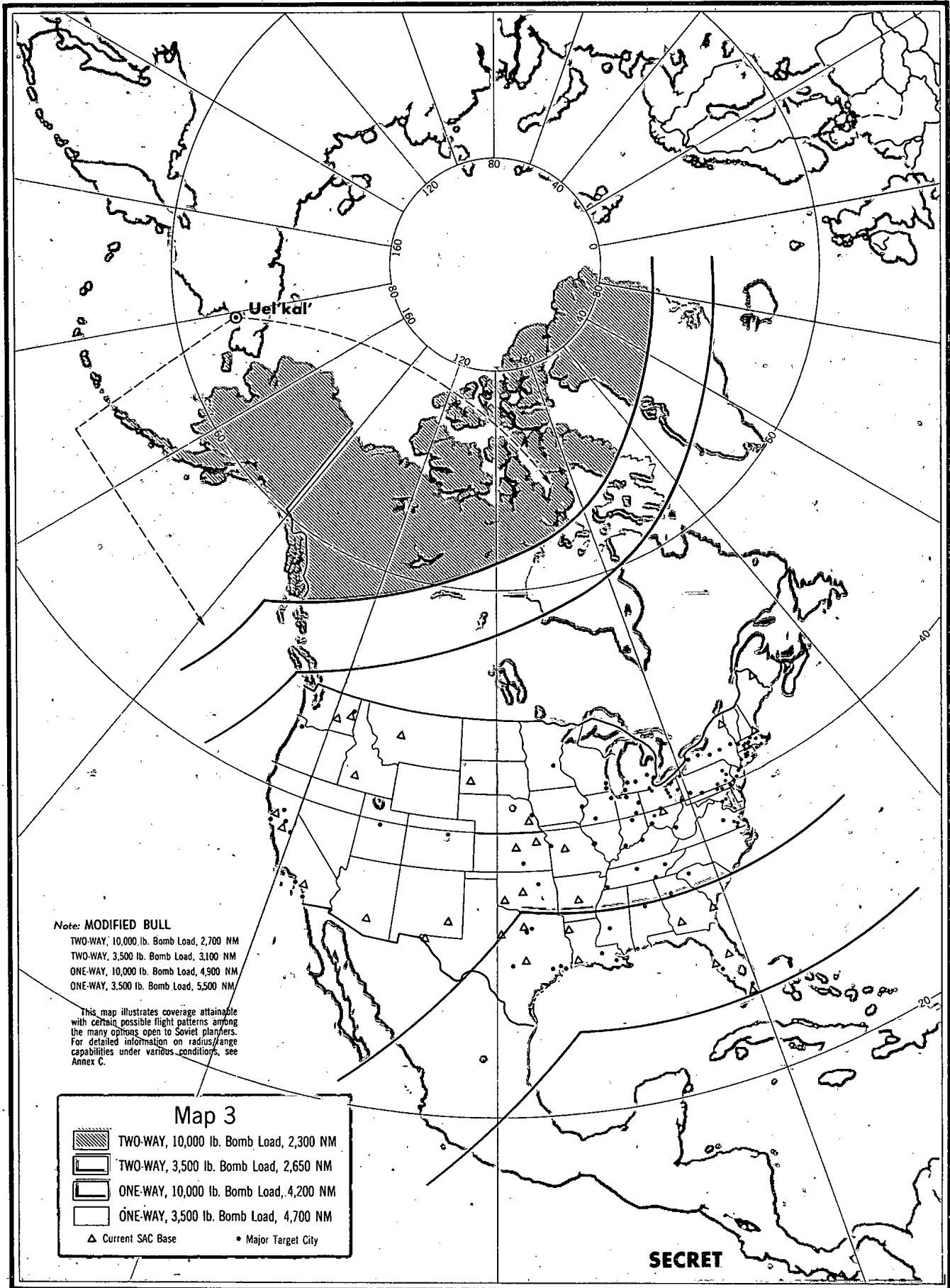
Note: MODIFIED BULL
 TWO-WAY, 10,000 lb. Bomb Load, 2,000 NM
 TWO-WAY, 3,500 lb. Bomb Load, 2,300 NM
 ONE-WAY, 10,000 lb. Bomb Load, 3,600 NM
 ONE-WAY, 3,500 lb. Bomb Load, 4,100 NM

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CAPABILITY OF STANDARD BULL, REFUELED

From the Chukotski Area

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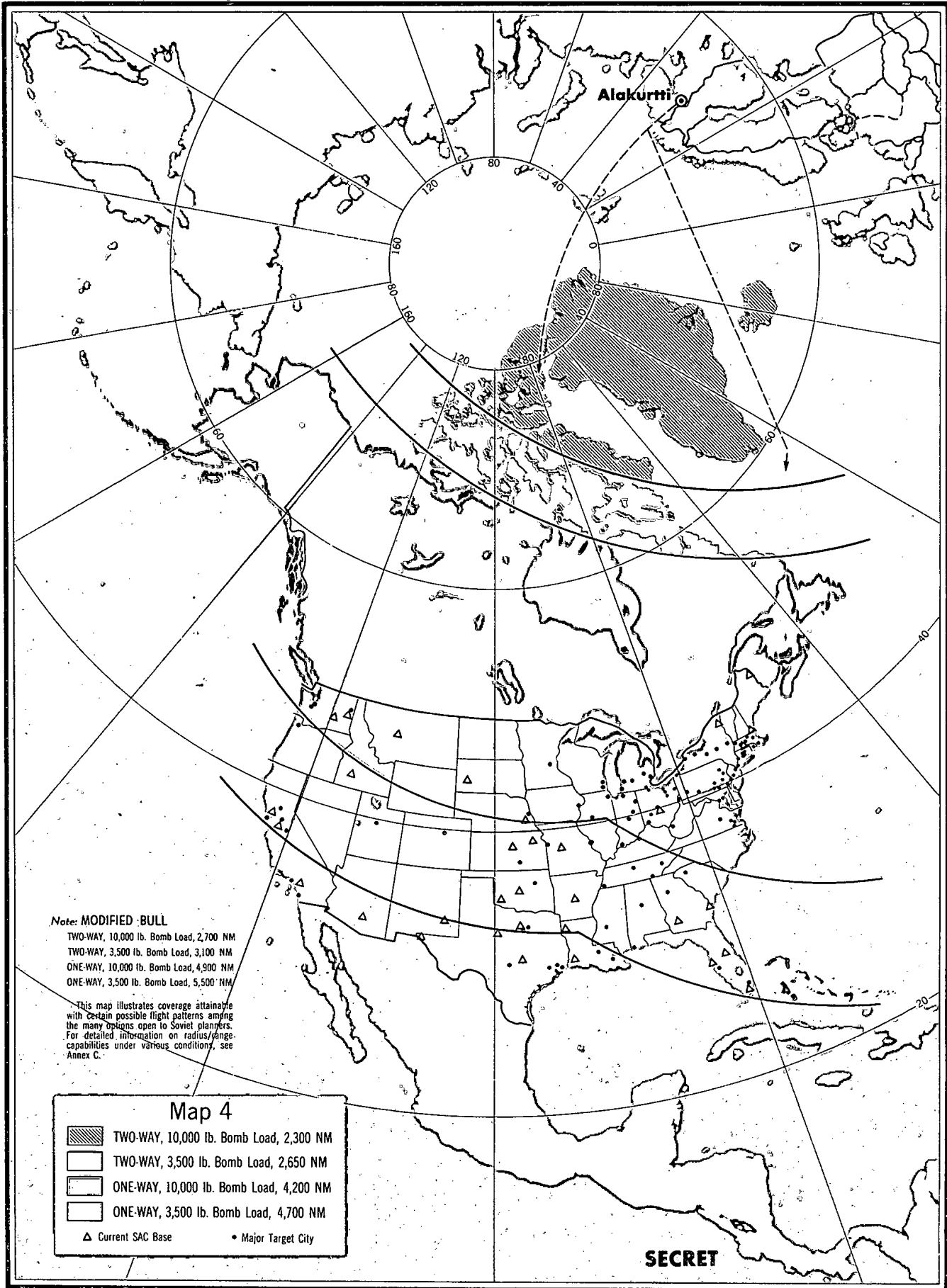
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CAPABILITY OF STANDARD BULL, REFUELED

From the Kola Area

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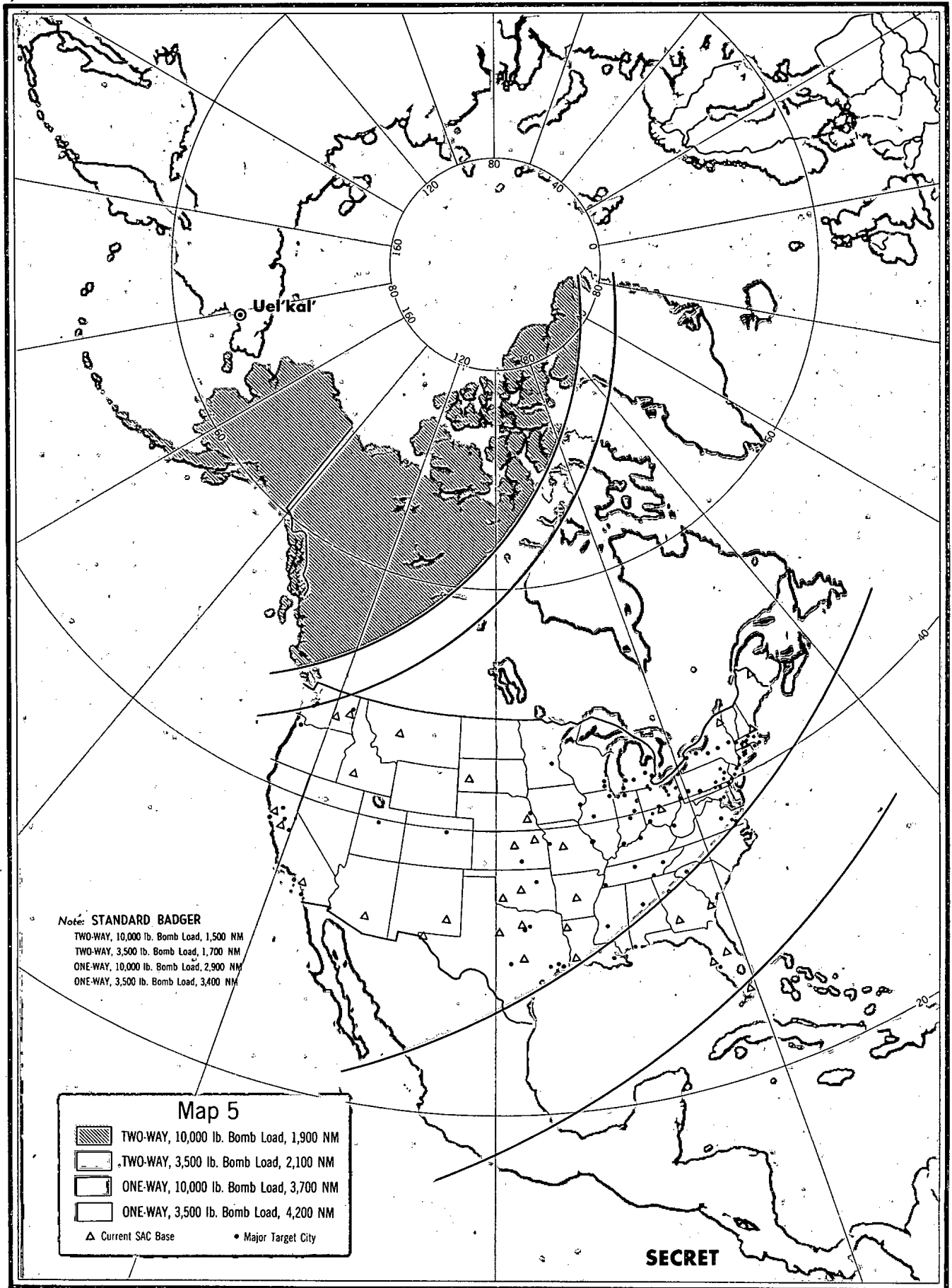
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CAPABILITY OF IMPROVED BADGER, UNREFUELED

From the Chukotski Area

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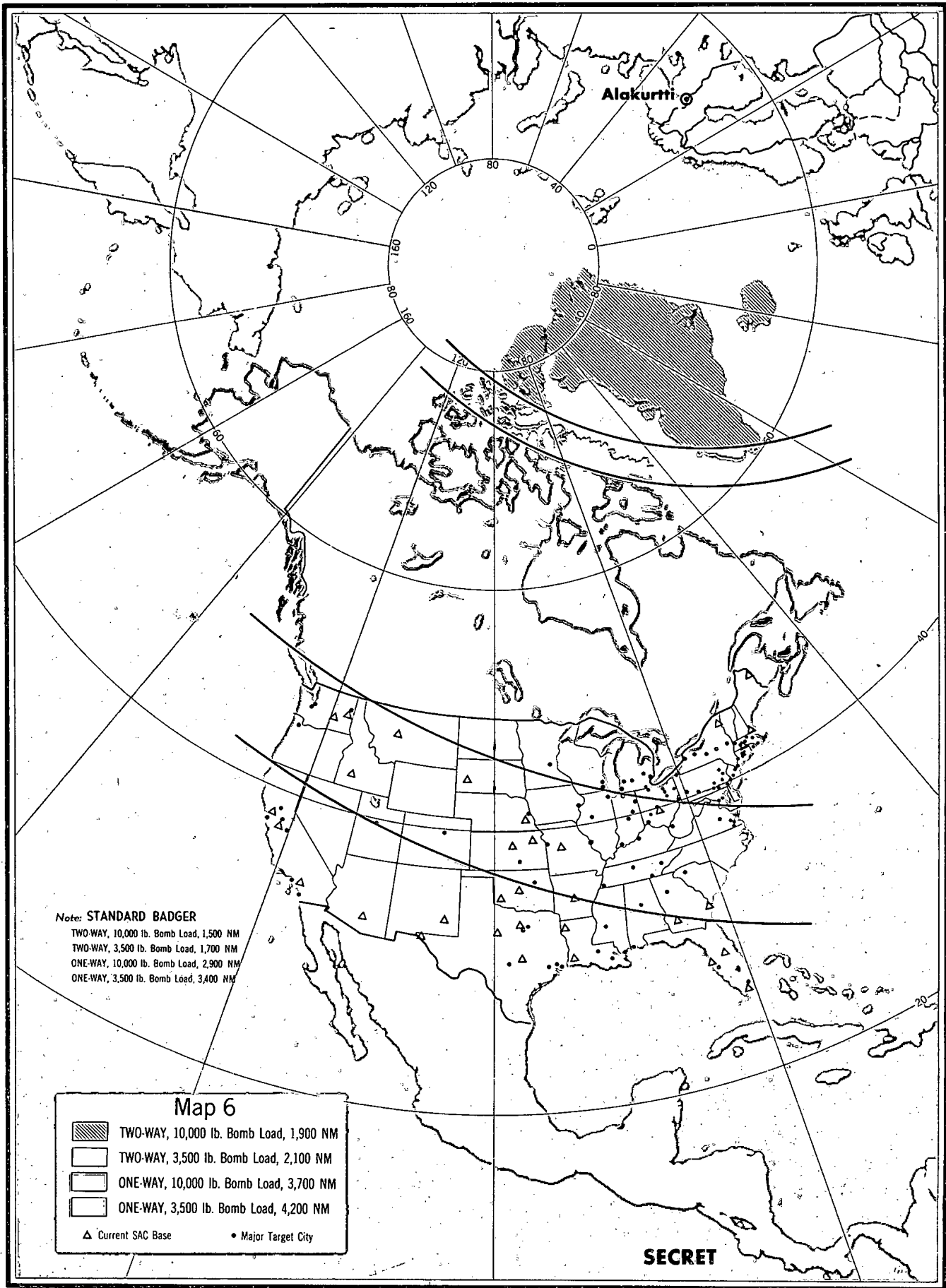
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CAPABILITY OF IMPROVED BADGER, UNREFUELED

From the Kola Area

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Note: STANDARD BADGER
 TWO-WAY, 10,000 lb. Bomb Load, 1,500 NM
 TWO-WAY, 3,500 lb. Bomb Load, 1,700 NM
 ONE-WAY, 10,000 lb. Bomb Load, 2,900 NM
 ONE-WAY, 3,500 lb. Bomb Load, 3,400 NM

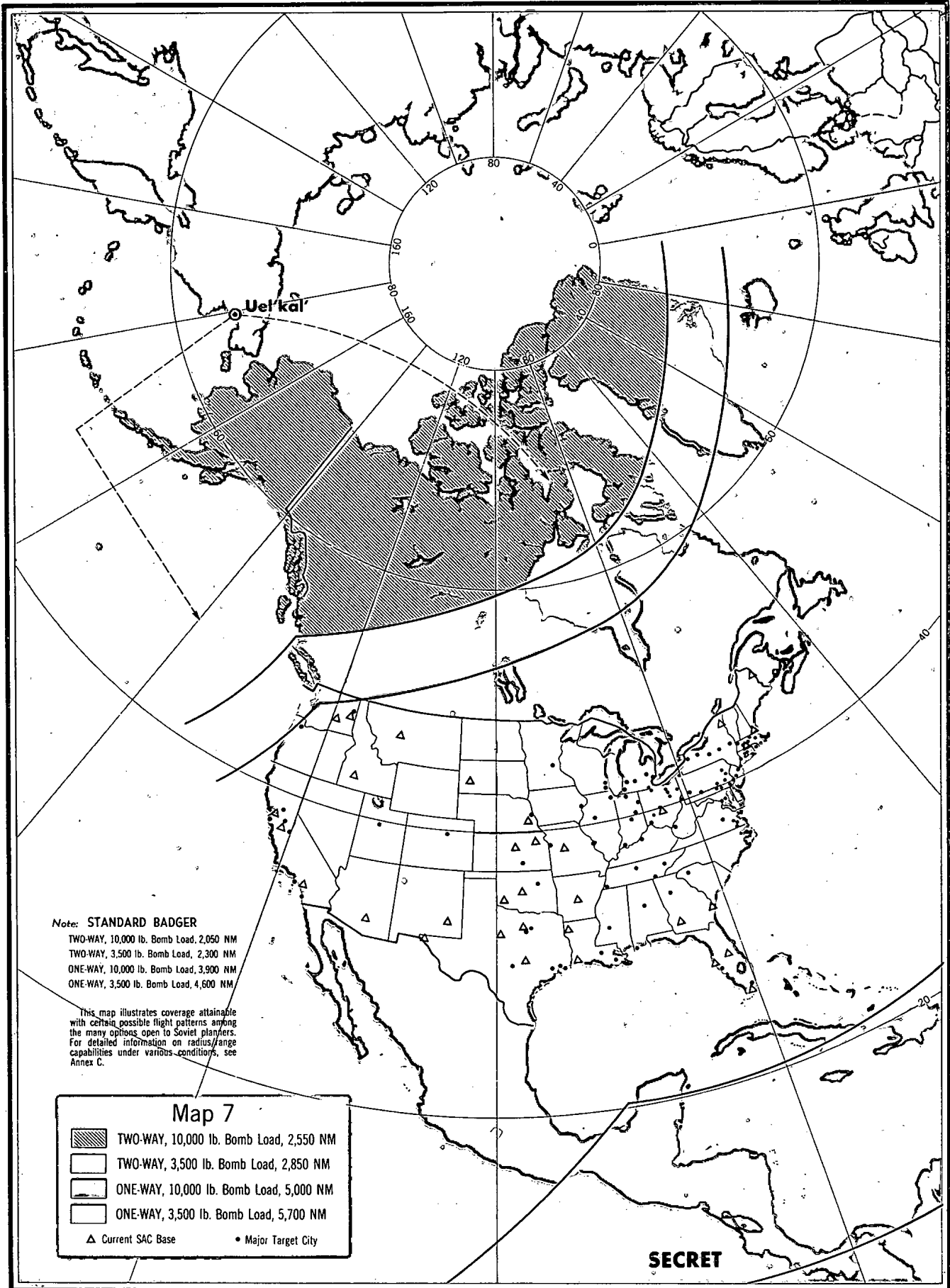
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CAPABILITY OF IMPROVED BADGER, REFUELED

From the Chukotski Area

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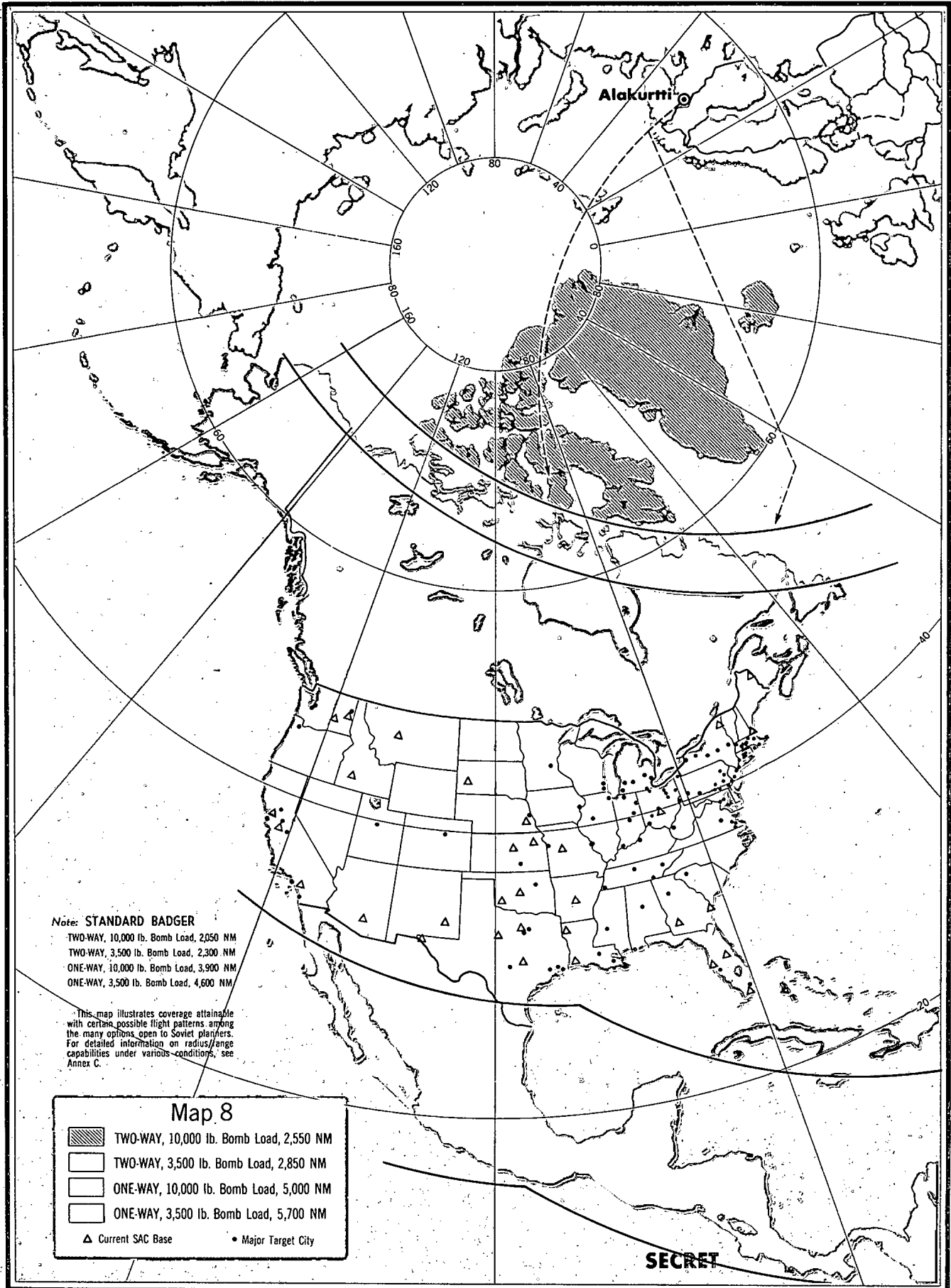
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CAPABILITY OF IMPROVED BADGER, REFUELED

From the Kola Area

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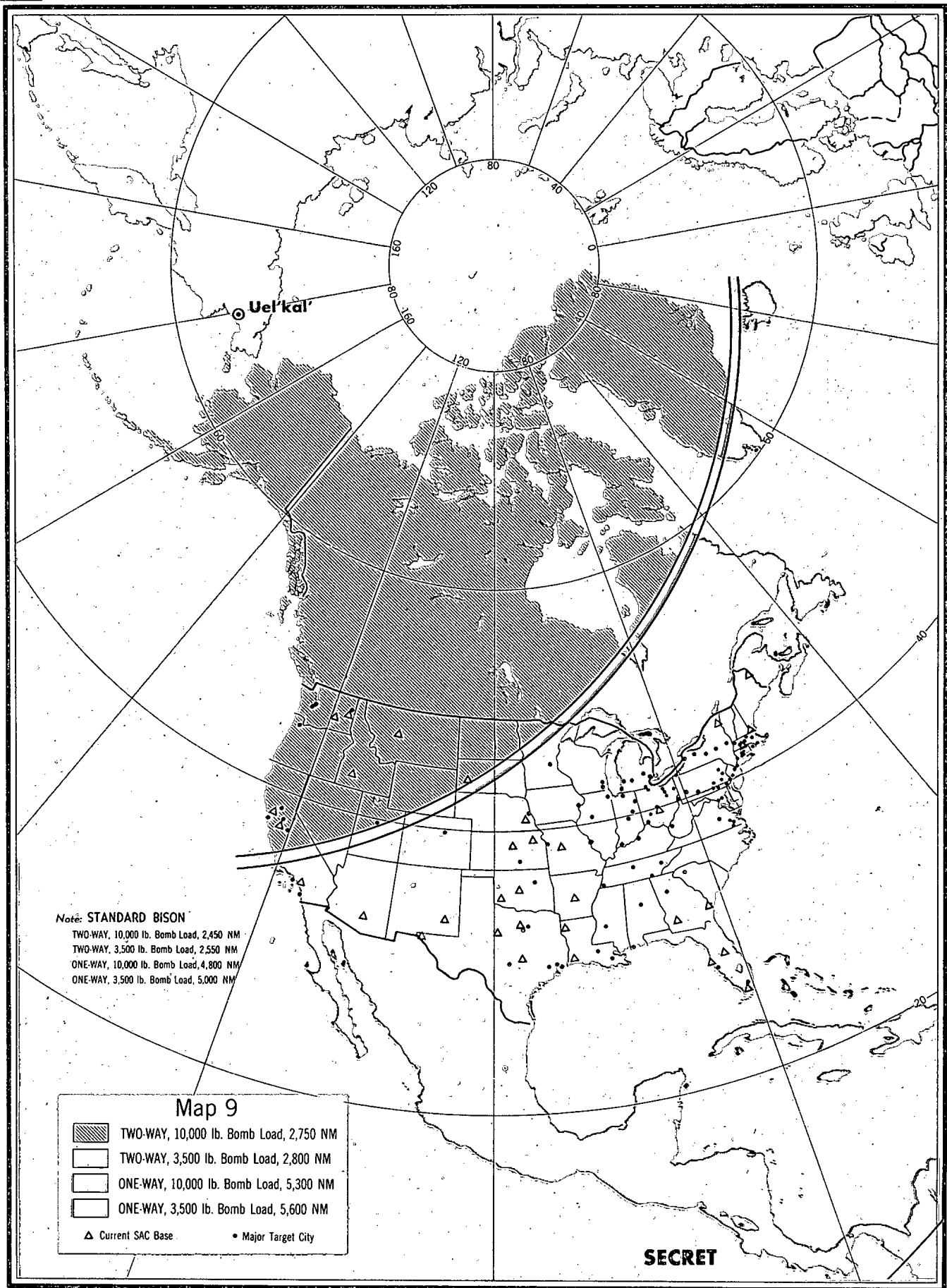
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CAPABILITY OF IMPROVED BISON, UNREFUELED

From the Chukotski Area

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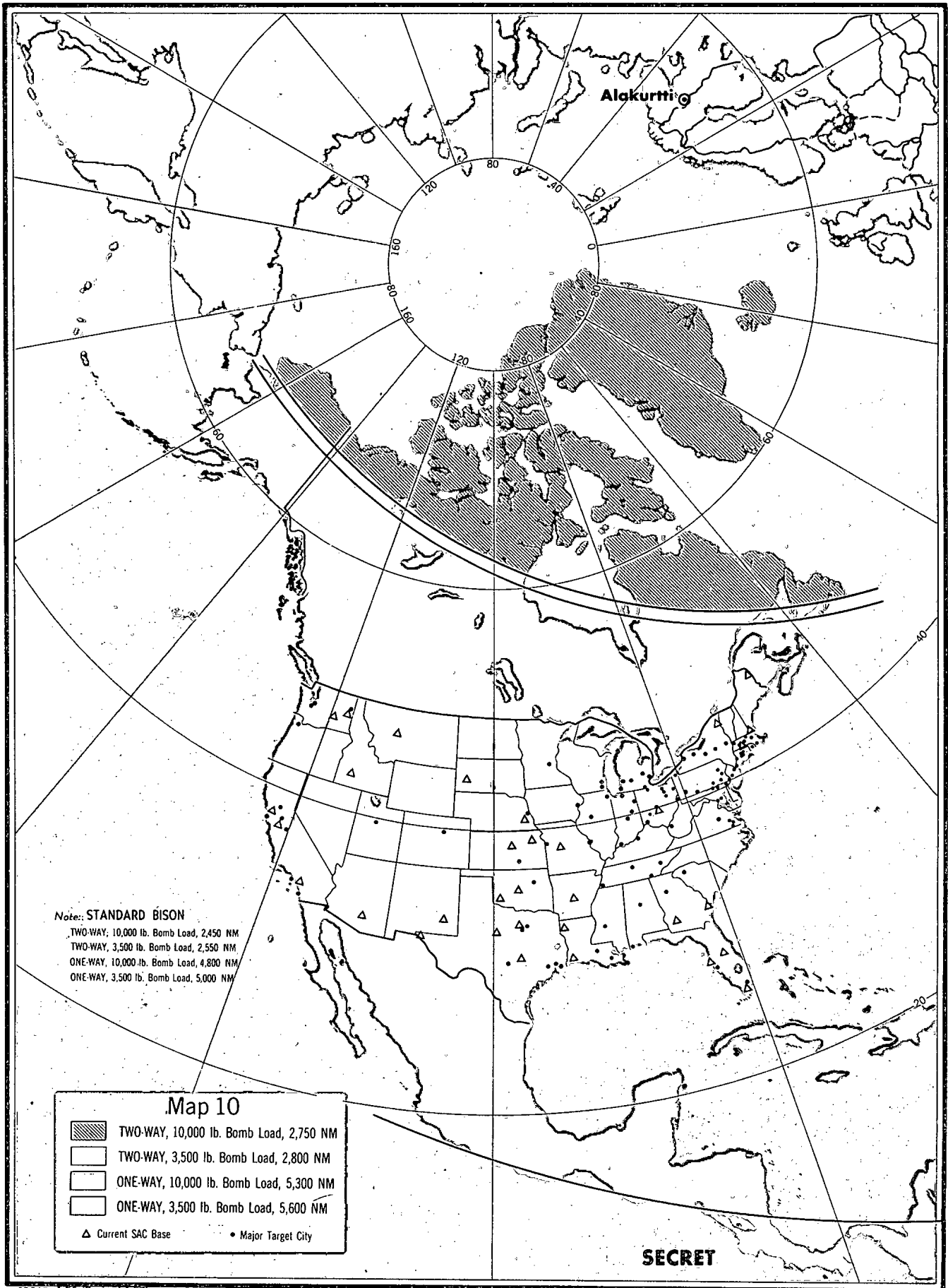
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CAPABILITY OF IMPROVED BISON, UNREFUELED

From the Kola Area

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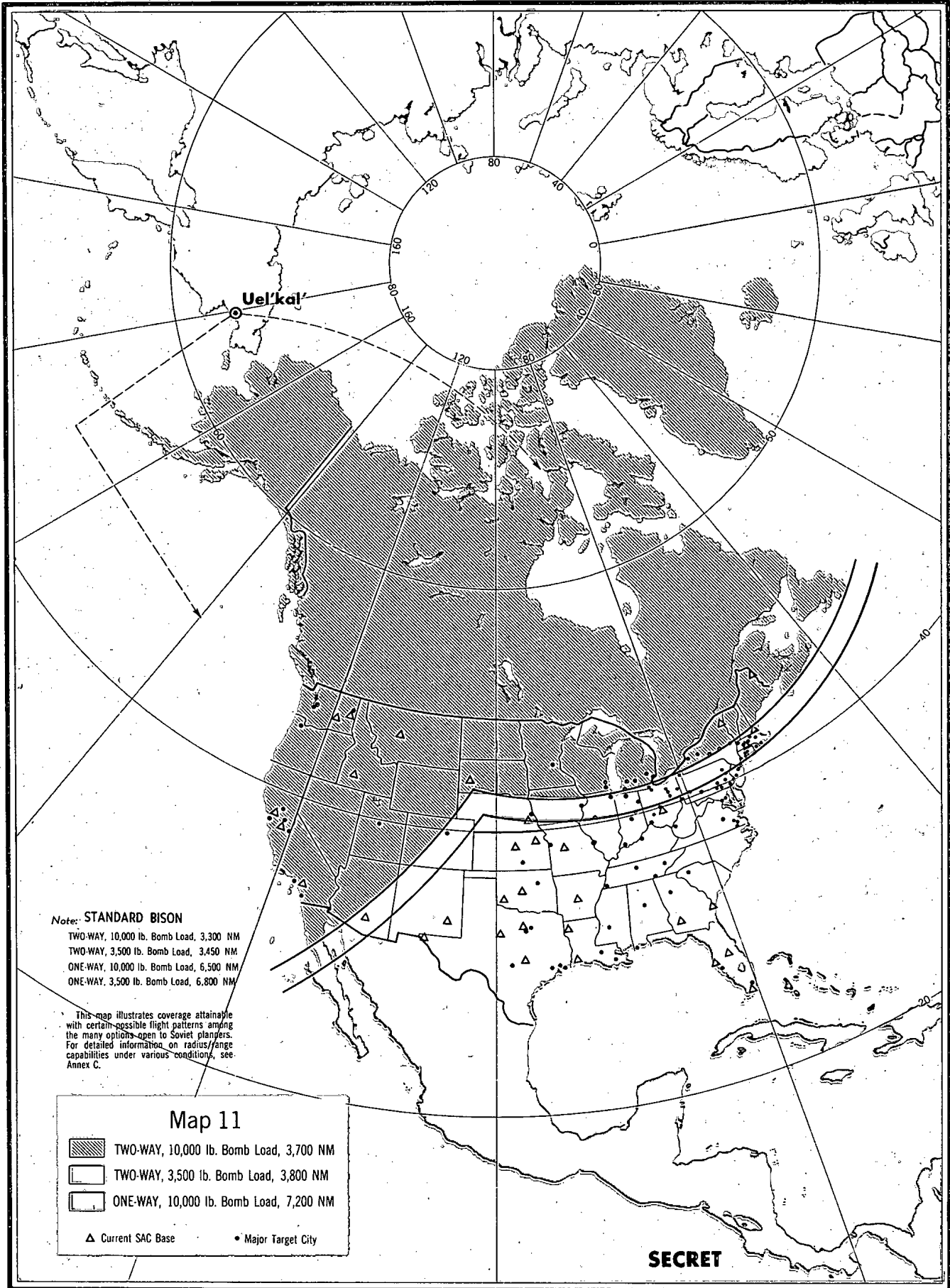
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CAPABILITY OF IMPROVED BISON, REFUELED

From the Chukotski Area

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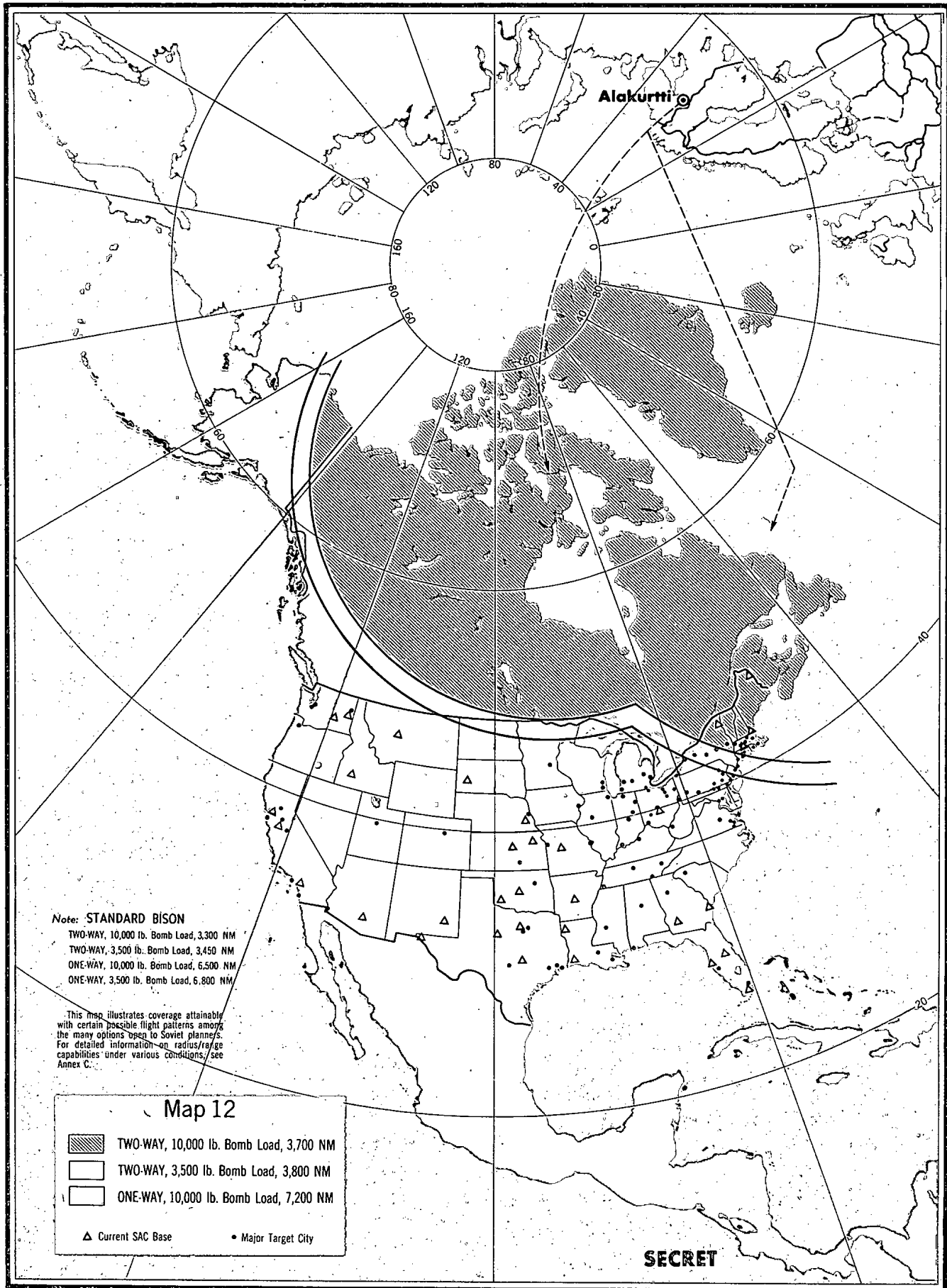
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CAPABILITY OF IMPROVED BISON, REFUELED

From the Kola Area

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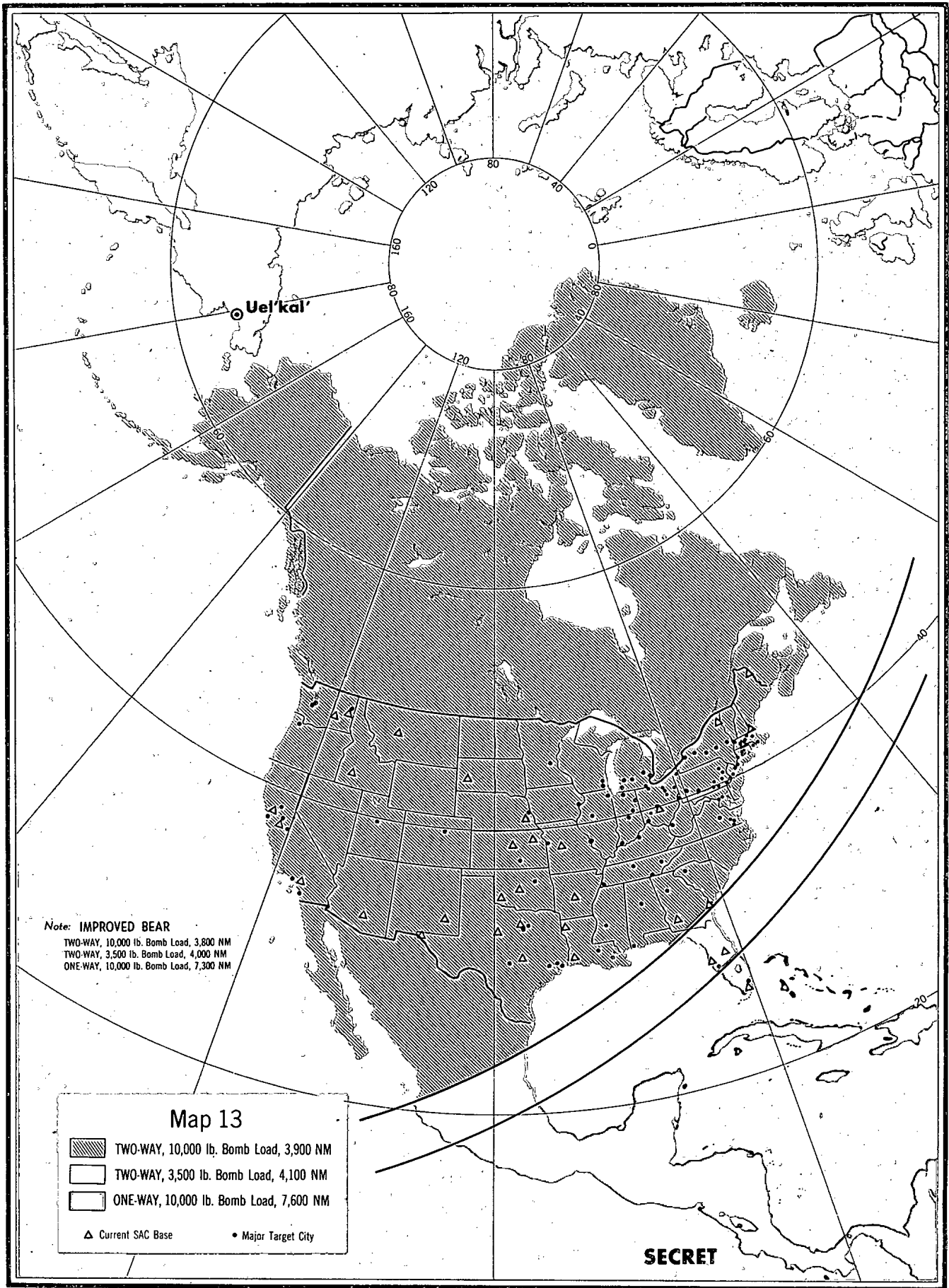
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CAPABILITY OF BEAR, UNREFUELED

From the Chukotski Area

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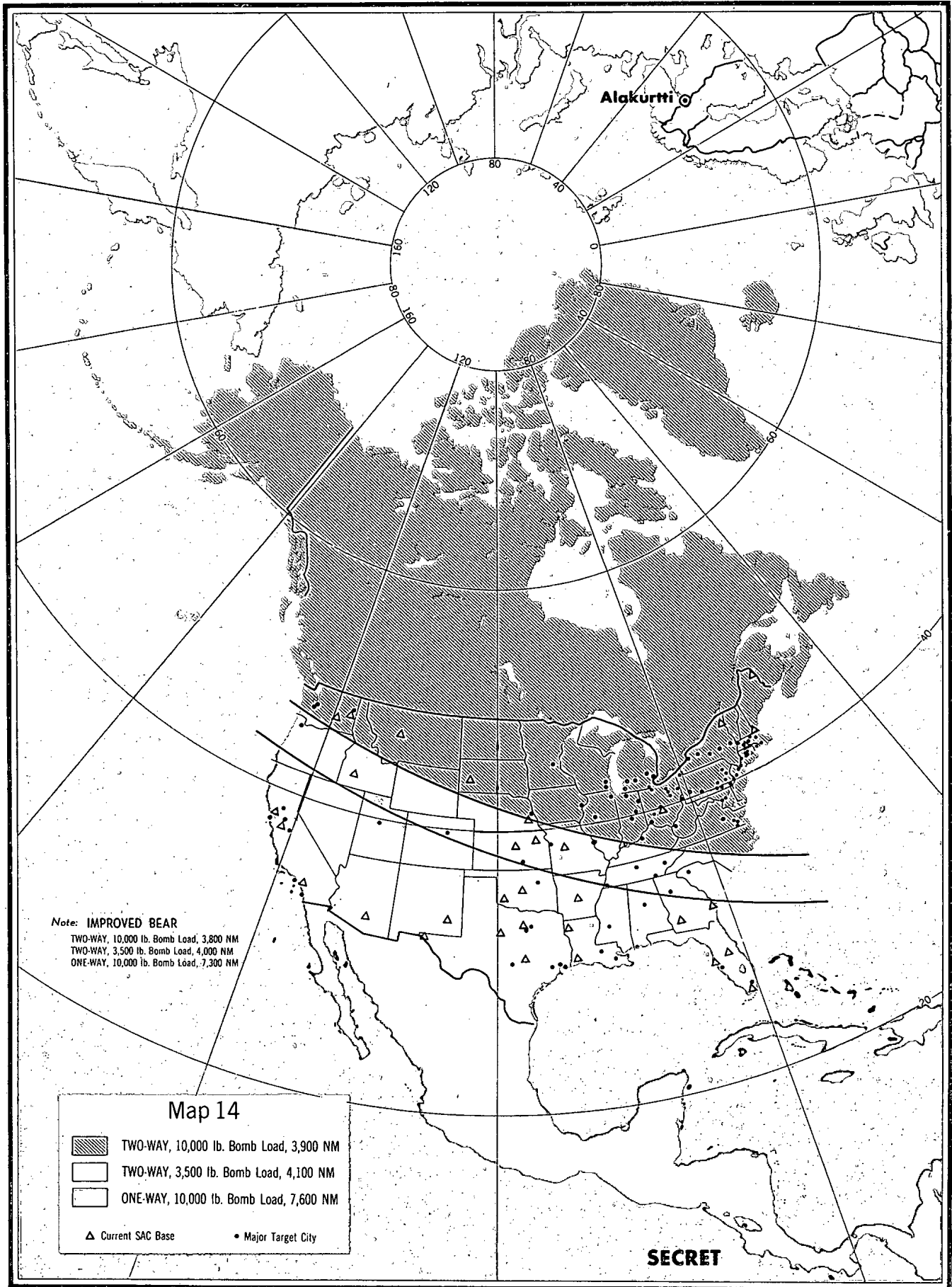
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CAPABILITY OF BEAR, UNREFUELED

From the Kola Area

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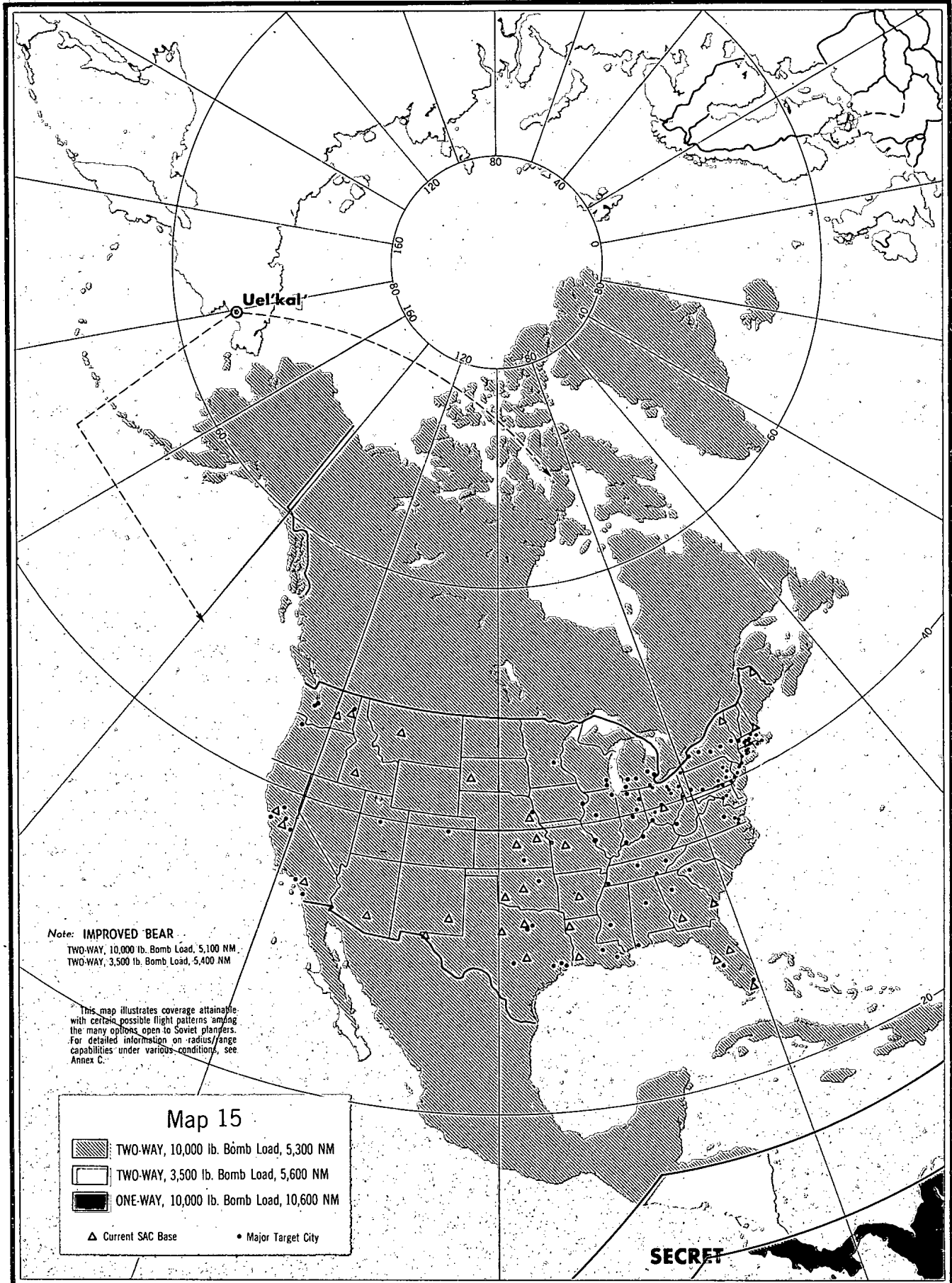
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CAPABILITY OF BEAR, REFUELED

From the Chukotski Area

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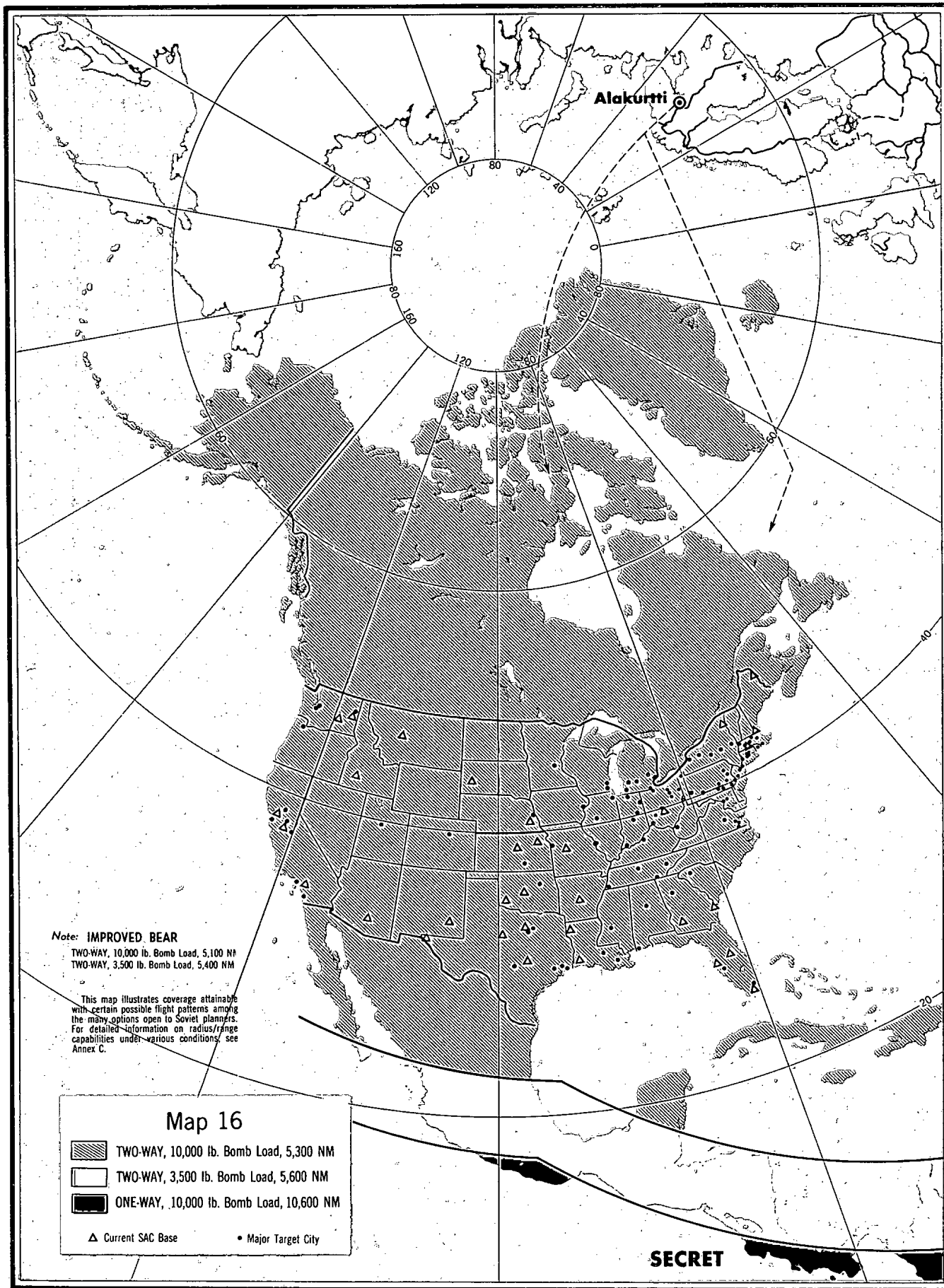
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CAPABILITY OF BEAR, REFUELED

From the Kola Area

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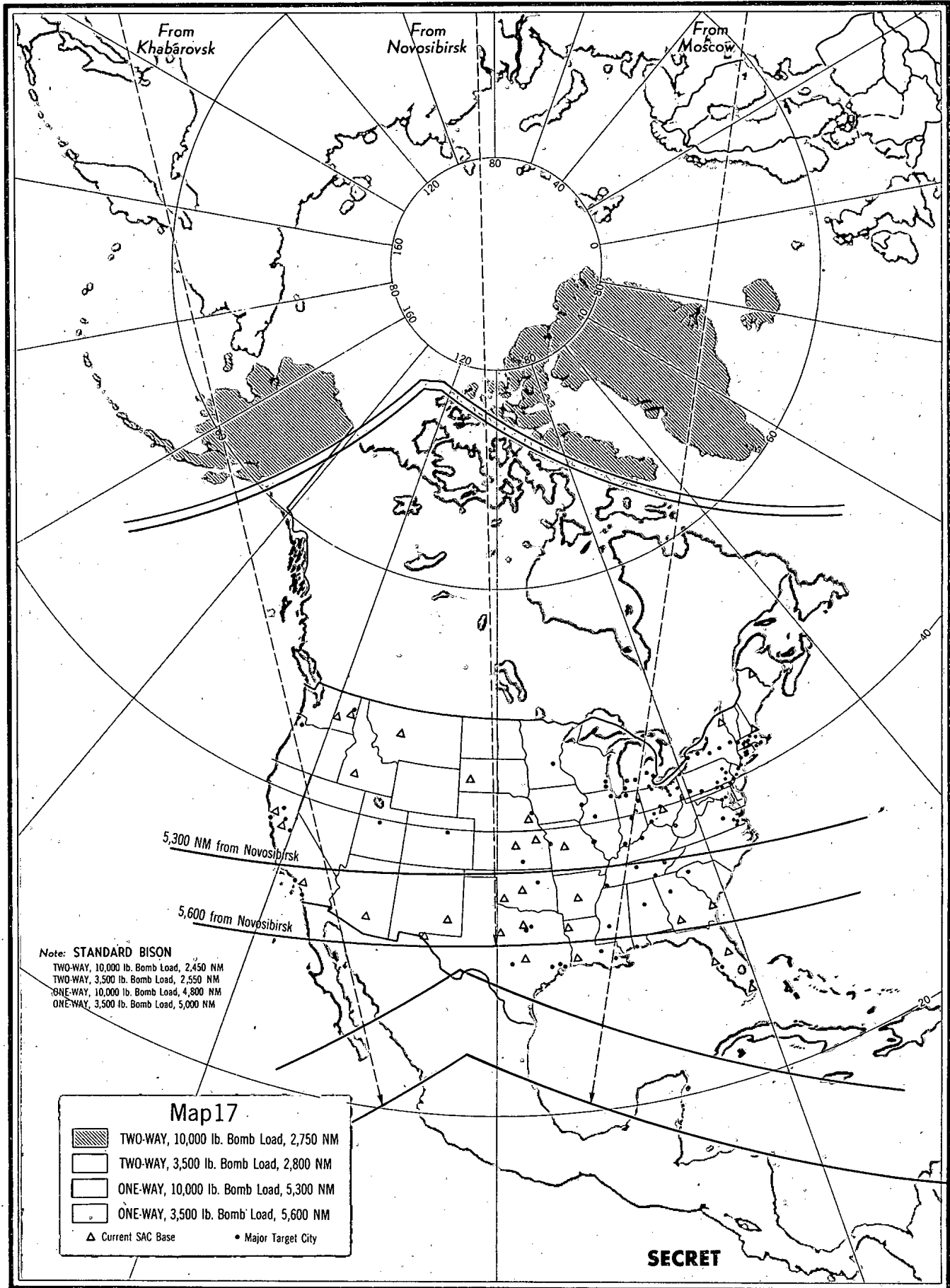
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CAPABILITY OF IMPROVED BISON, UNREFUELED

From Selected Interior Bases

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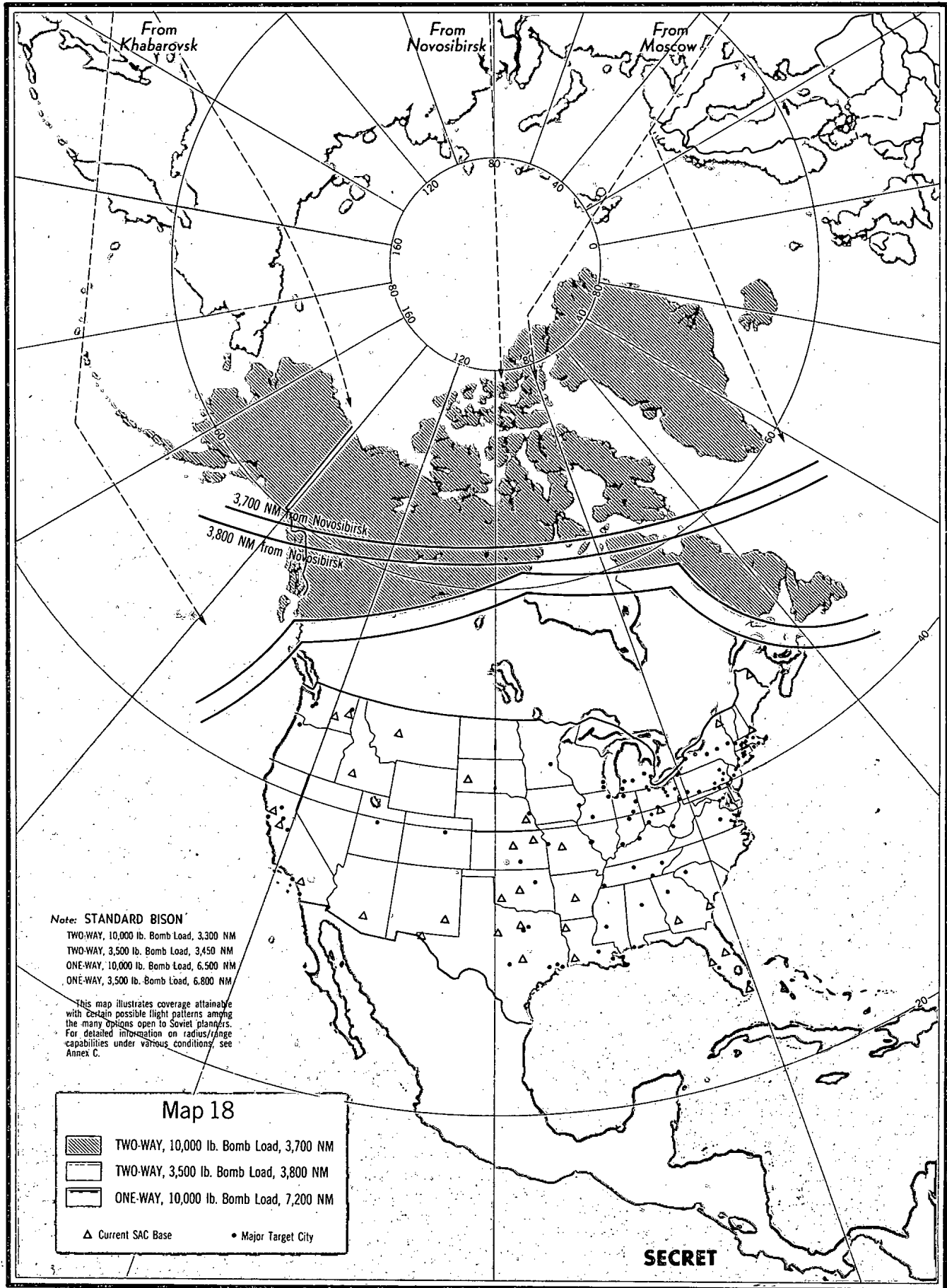
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CAPABILITY OF IMPROVED BISON, REFUELED

From Selected Interior Bases

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Note: STANDARD BISON

- TWO-WAY, 10,000 lb. Bomb Load, 3,300 NM
- TWO-WAY, 3,500 lb. Bomb Load, 3,450 NM
- ONE-WAY, 10,000 lb. Bomb Load, 6,500 NM
- ONE-WAY, 3,500 lb. Bomb Load, 6,800 NM

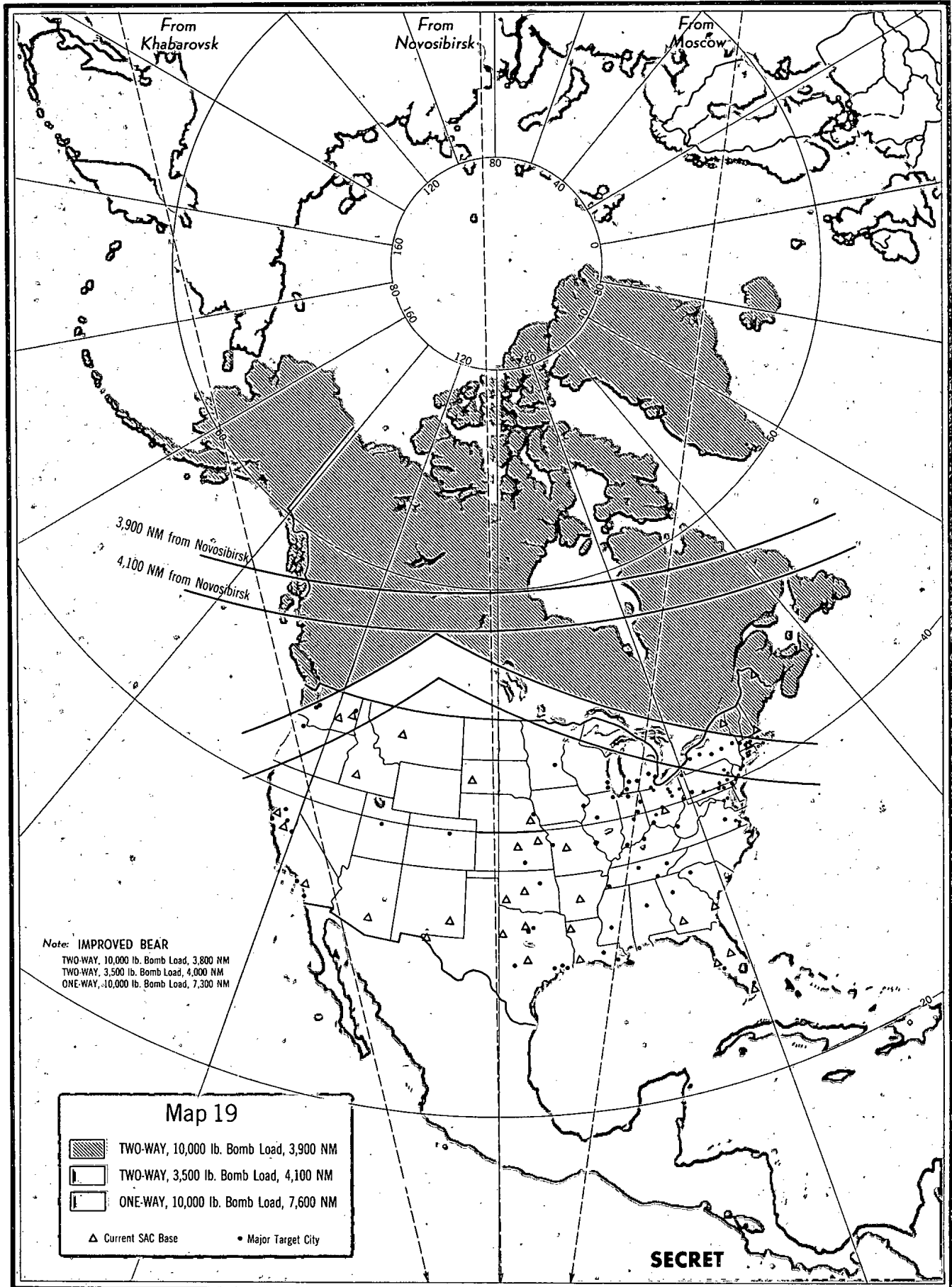
This map illustrates coverage attainable with certain possible flight patterns among the many options open to Soviet planners. For detailed information on radius/range capabilities under various conditions, see Annex C.

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CAPABILITY OF BEAR, UNREFUELED

From Selected Interior Bases

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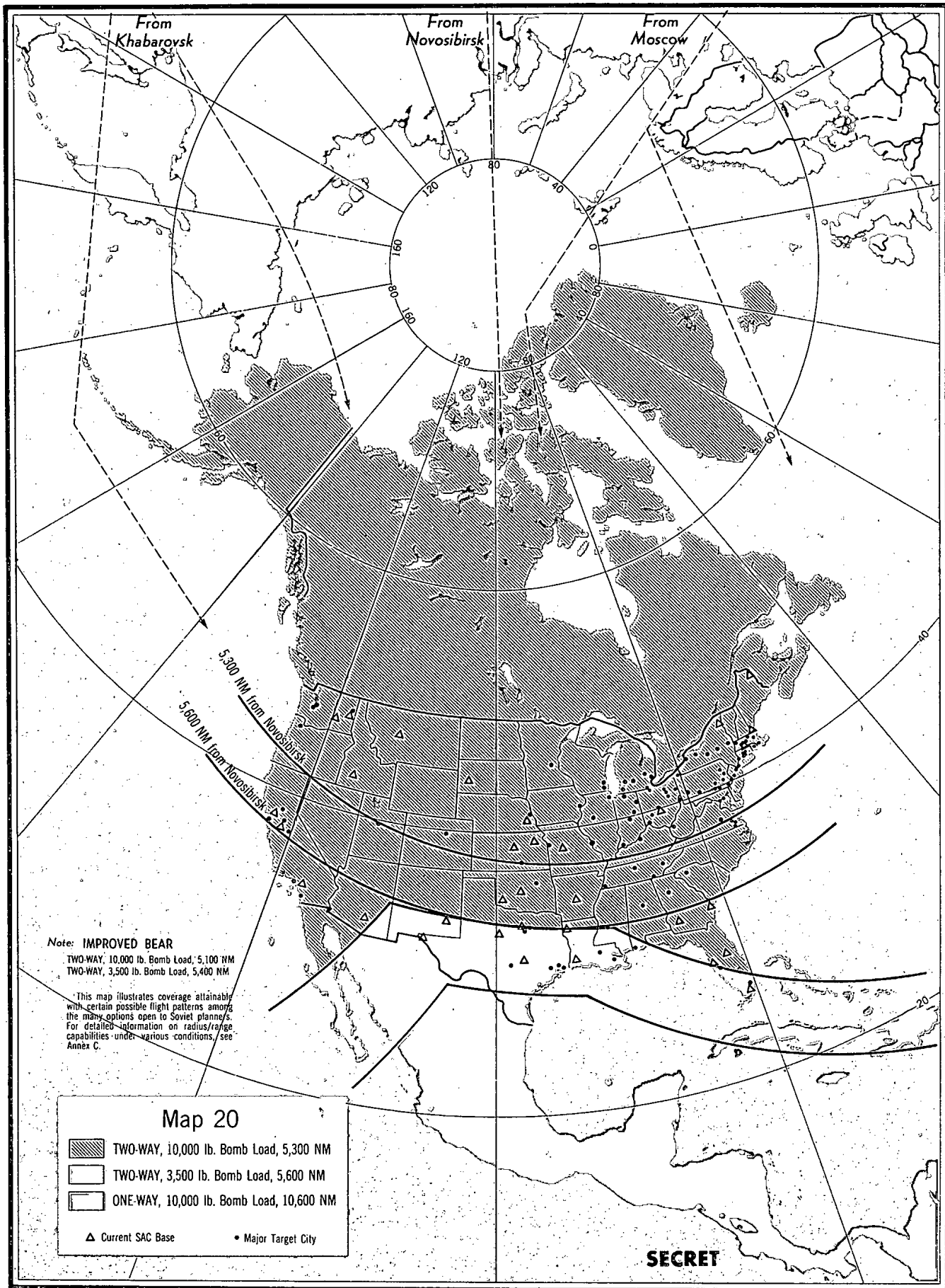
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CAPABILITY OF BEAR, RETOLLED

From Selected Interior Bases

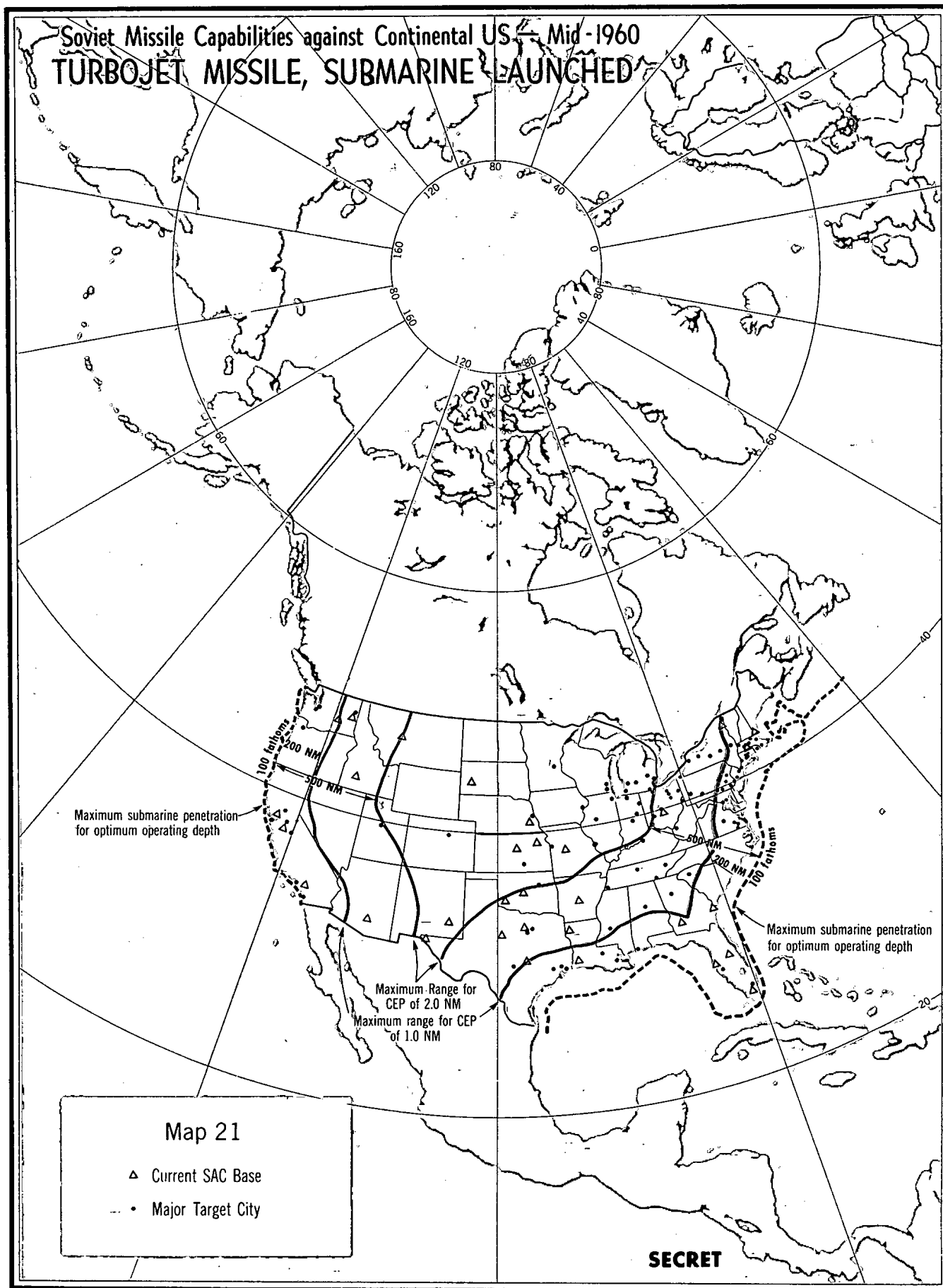
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