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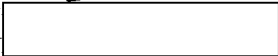
Communist China's Advanced Weapons Program

Submitted by the
DIRECTOR OF CENTRAL INTELLIGENCE
Concurred in by the
UNITED STATES INTELLIGENCE BOARD
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The following intelligence organizations participated in the preparation of this estimate:

The Central Intelligence Agency and the intelligence organizations of the Departments of State, Defense, AEC, and NSA.

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Director, Defense Intelligence Agency
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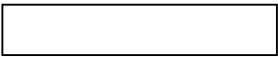
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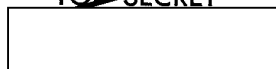


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1

COMMUNIST CHINA'S ADVANCED WEAPONS PROGRAM

THE PROBLEM

To assess the current state of Communist China's nuclear weapons and missile program and, insofar as possible, estimate the future course and size of that program.

NOTE

Although we have obtained a considerable amount of new information in the past year or so, there remain serious gaps in our information and we are therefore not able to judge the present state or to project the future development of the Chinese program with any high degree of confidence. The specific judgments in this paper should be read in the light of this general caution.

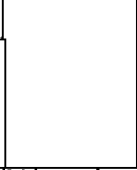

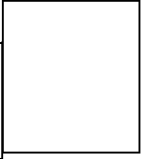
CONCLUSIONS


A. Communist China's first nuclear test on 16 October 1964 was of an implosion fission device with U-235 as the fissionable material and a probable yield of 19 kilotons (KT). We cannot estimate with confidence its weight or dimensions but believe it was relatively large and heavy. The most likely source of the U-235 was uranium first brought to partial enrichment in the gaseous diffusion facility at Lanchou and then further enriched by the electromagnetic process. We cannot, however, rule out the possibility that the U-235 was of Soviet or other non-Chinese origin though we believe this to be highly unlikely. (Paras. 3-11)

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B. The Chinese could now build bombs based on the results of their first test which could be carried by their two TU-16 medium jet bombers or their 12 or so TU-4s.   

 A weapon in bomb configuration could be available somewhat earlier and could be delivered by the Chinese air force's light jet IL-28 bombers of which they have about 290. (*Para. 20*)

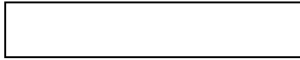
C. Although we have no good basis for estimating the current level of production of fissionable material, we believe that the Chinese will have enough material during the next two years to conduct a test program, with enough left over to stockpile at least a few bombs. We know of no facility under construction which would cause a significant jump in fissionable material production until what we believe to be a large reactor under construction at Yumen is completed. (*Paras. 12-16*)

D. The evidence leads us to estimate that the Chinese Communists are developing a medium-range ballistic missile (MRBM). We believe this system is essentially a Soviet design, probably the SS-4, perhaps with some Chinese modifications. It is possible that the Chinese could have a few MRBMs ready for deployment with compatible fission warheads in 1967 or 1968. (*Paras. 21-24*)

E. The Chinese have a submarine closely similar in outward appearance to the Soviet G-class submarine which is designed to launch 350 n.m. ballistic missiles while surfaced. We do not know whether the Chinese built this submarine or assembled components supplied by the USSR, or what missile they expect to put in it. We have no evidence that the Chinese are constructing any more of this type submarine and it would be at least several years before any units could be operational with Chinese-produced missiles. (*Para. 30*)

F. The Soviets provided the Chinese with some surface-to-air missiles (SAMs) by mid-1960. We have no evidence to confirm or deny that the Soviets have furnished any more since then and we do not know

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how many such missiles are now in China. The Chinese have a urgent requirement for SAMs and we believe are working hard on a production program. There are indications that the Chinese are now producing some kind of surface-to-air missile, either Soviet-type SAMs or prototypes of a Chinese version. The evidence is not sufficient to permit a firm judgment but we think it highly unlikely that either will be produced on a large scale for two or three years. (*Paras. 26-27*)

G. It is unlikely that the Chinese will develop a deliverable thermonuclear weapon for several years, and there is little chance of an intercontinental capability until after 1970. (*Paras. 18, 34*)





DISCUSSION

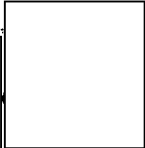
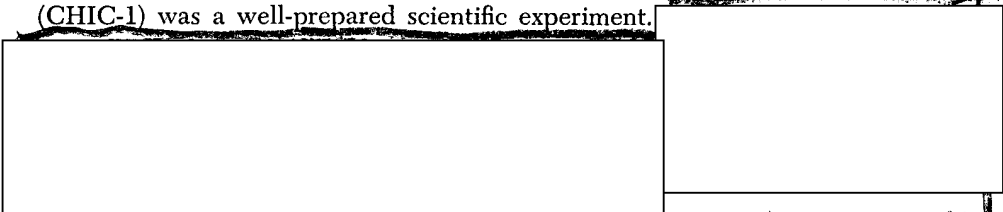
I. INTRODUCTION

1. The Chinese Communist detonation at Lop Nor on 16 October 1964, was a dramatic incident in Peiping's determined effort to become a modern nuclear power. During the past year or so there has been a substantial increase in our information on the Chinese advanced weapons programs. We believe that the Chinese had at least planned or begun construction on virtually all their major advanced weapons facilities by 1959, when they were still receiving a broad range of Soviet assistance. We do not know the precise extent of involvement of the Soviets in all these projects, but there is good evidence that they provided the Chinese with considerable technical and material assistance. We believe this included an experimental nuclear reactor, facilities for processing uranium, some equipment for a gaseous diffusion plant, assistance in constructing a missile test range, the equipment for a few surface-to-air missile sites, and probably a few surface-to-surface missiles. Although much of the progress we have observed to date results from earlier Soviet help, it is difficult to judge how much progress was achieved through Chinese efforts, aided by the considerable amount of information on Free World nuclear developments that is available in open literature.

2. Communist China is almost certainly committing a larger proportion of its scientific and technical resources to the development of advanced weapons than any other nation. Although such a resolute diversion of resources enhances the prospect for successes in some areas, a forced-draft effort resting on a very limited scientific, technological, and industrial base is susceptible to numerous difficulties. Thus the Chinese are likely to be forced to some expedients and make-shift adaptations for which US, Soviet, British, and French experience is no precedent, and which will accordingly be hard for us to detect or predict.

II. NUCLEAR PROGRAM

3. *Communist China's First Nuclear Test.* Our analysis of excellent samples of the test debris, indicate that the Chinese Communists' first nuclear detonation (CHIC-1) was a well-prepared scientific experiment.

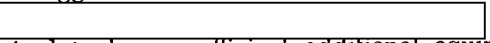


4. CHIC-1 was an implosion device.

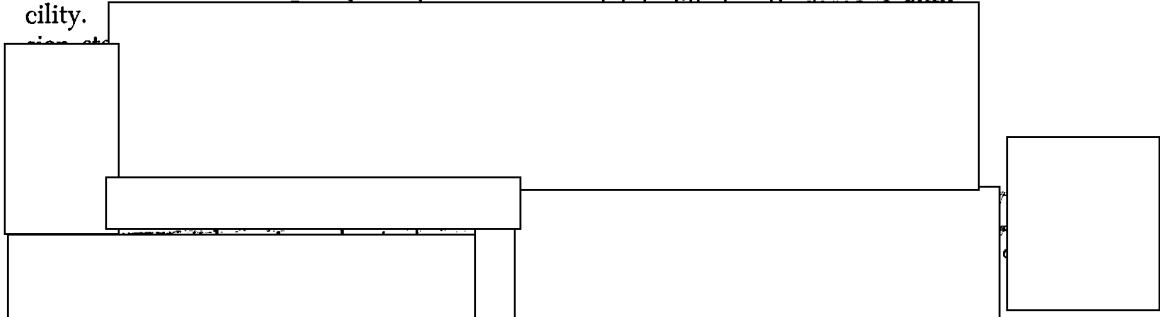




dispute. The Chinese have also charged in their polemics that the Soviets in 1959 refused to deliver a sample atomic weapon. In the light of all these considerations we believe that the Soviets did not provide the U-235 for CHIC-1.

7. There is a large facility in Communist China on the Yellow River near Lanchou. We have good quality overhead photography obtained over several years but there are major limitations on what can be learned from such photography. For instance, it does not, of course, show what is inside buildings. The facility has elaborate physical security protection including anti-aircraft defenses. We believe this facility includes gaseous diffusion equipment for the production of U-235. The equipment was probably supplied by the USSR between 1957 and 1959-1960. We believe this facility in its present state could produce U-235 of low enrichment by gaseous diffusion in a single-pass operation. Photographic evidence suggests that some production in the existing buildings could have started  Another large building would be required to house sufficient additional equipment to permit production of highly enriched U-235 by normal gaseous diffusion techniques.¹ The site layout indicates that plans originally included such a building but no construction has been started.

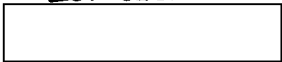
8. We believe, therefore, that the Lanchou facility was not responsible for producing the U-235 in CHIC-1 by the gaseous diffusion process alone but that another process was also involved, probably an electromagnetic separation facility.



We believe that had such production taken place, the Chinese would have fabricated their first device as soon as the requisite amount of fissionable material was at hand.

9. There are other processes for producing enriched U-235; only two of these, the gas centrifuge and the electromagnetic technique have been sufficiently developed to be considered as possibilities for the Chinese. It is highly unlikely that the Chinese have developed some third process. The gas centrifuge process has never been developed beyond the experimental stage in the Free World.

¹In this and other discussions of gaseous diffusion at Lanchou we assume a level of technology (barriers, compressors, etc.) comparable to what we have estimated the Soviets achieved in the mid-1950s.



[redacted]

There is no persuasive evidence that the Soviets have produced gas centrifuges in significant numbers and none that they have given any to the Chinese. We do not believe that the Chinese have attained the manufacturing capability and technology required for domestic production of the necessary large numbers of suitable centrifuges.

10. Electromagnetic technology, on the other hand, is well developed and almost certainly within the knowledge and competence of the Chinese. [redacted]

[redacted] We incline to the view, therefore, that the U-235 used in China's first nuclear detonation was produced through low enrichment by gaseous diffusion at Lanchou, with final enrichment by electromagnetic separation.

11. An analysis of the buildings, physical layout, and power available at Lanchou suggests that the Chinese could have both gaseous diffusion and electromagnetic equipment there. It is also possible that partial enrichment was done at Lanchou and the electromagnetic "topping-off" was done at some other location. No electromagnetic facility has been identified, but we estimate that such a plant could exist in the other known atomic energy sites. It is further possible that there is an electromagnetic facility in some other part of China.

12. *Current Production of Enriched U-235.* We have no good basis for estimating a probable level of China's production of highly enriched U-235. We can establish a minimum production capacity of highly enriched U-235 by assuming a minimum size of electromagnetic plant that could have "topped-off" just enough material in time for CHIC-1. These assumptions would give a daily output of U-235 of .05 kg, and a cumulative production total at the end of 1964 of 40 kg. The production capacity of combined gaseous diffusion and electromagnetic processes in the Lanchou facility could be greater than this minimum. Assuming that the Lanchou plant is entirely devoted to the gaseous diffusion process and that an electromagnetic plant large enough to process all of Lanchou's output of partially enriched product, the maximum daily output could be as great as 1 kg. If such production began as early as mid-1963, the cumulative total production would be 540 kgs as of the end of 1964.

13. *Plutonium Production Sites.* There is a small air-cooled reactor located at Pao-t'ou which we believe is now producing plutonium. Details of this reactor's progress, as seen in photography, indicate that it probably began operation in late 1963 or early 1964, although some evidence suggests that the reactor started up in early 1963. We estimate that the Pao-t'ou reactor has a

[Redacted]

thermal power rating of 30 megawatts which would give it an annual capacity of about 10 kgs of plutonium. Assuming a start up in early 1963 and that the reactor was operated in a manner to minimize the time necessary to obtain material for a test device, and assuming the Chinese encountered no serious setbacks, we estimate that the Chinese could have had by the end of 1964, 6-8 kgs of plutonium or more than enough for an all-plutonium test device.

[Redacted]

14. A large industrial complex was under construction in 1959 near Yumen in a remote area of Kansu Province, and was still under construction in 1964. We believe that among the projects under construction at this complex is a large nuclear reactor. In addition there is some evidence that a small production reactor (100 MW) was under construction in 1962 in West China.

[Redacted]

15. From the foregoing it is apparent that we have no good basis for estimating the current level of China's total production of fissionable material.

[Redacted]

[Redacted]

the Chinese capability to produce weapons would depend heavily on the level of technology and fabricating facilities available.

16. *Future Production.* The only identified facility which could produce a significant jump in China's fissionable material production is what we believe to be a large reactor under construction near Yumen. The failure of the Chinese to build the second cascade building at Lanchou indicates to us that the Chinese were unable to make all the highly intricate equipment needed to permit the production of highly enriched U-235 at Lanchou in a continuous diffusion process. Even if the Chinese began construction now on another cascade building there, it would probably be at least three years before the additional plant could begin production.

17. *Future Tests.* We believe that the Chinese are preparing for another test at Lop Nor, probably within the next few months. We believe that this test will be another fission device.

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

It is

also possible that they will test an all-plutonium device.

18. We believe that political considerations would impel the Chinese to detonate a thermonuclear device as soon as they can. The Chinese might be able to base a crude, single-stage thermonuclear device on their present tested design.

[Redacted]

[Redacted]

19. *Weapons Development.* We have identified a large complex under construction near Koko Nor in Tsinghai Province that we believe is a nuclear weapons research, development, and production facility. Construction here has obviously had a high priority, elaborate security precautions have been taken and some of the installations in the complex bear a resemblance to Soviet weapon sites. The facility is apparently nearly completed, and some portions of it may already be in operation.

20. If they so chose, the Chinese could now build bombs based on the results of their first test which could be carried by their two TU-16 (Badger) medium jet bombers or by their 12 or so TU-4s (Bull). The Chinese will almost certainly give first claim on their supply of fissionable material to the development of more sophisticated designs, but we do not rule out the possibility that the Chinese are even now attempting to fashion a few weapons based on the test device.

[Redacted] We believe that, assuming a consistently successful program, the Chinese could develop a missile warhead [Redacted]

[Redacted] This warhead in a bomb configuration [Redacted] could be available somewhat earlier [Redacted]

Such a bomb could be delivered by the Chinese air force's IL-28 light jet bombers of which they have about 290.


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III. MISSILE PROGRAM

21. *Medium-Range Surface-to-Surface Ballistic Missiles.* We believe the Chinese Communists are developing a medium-range ballistic missile. The Shuang-ch'eng-tzu missile test range (SCTMTR) is designed to permit the testing of surface-to-surface missiles up to a range of about 1,000 nautical miles. There is good evidence that the Soviets helped develop SCTMTR, and they probably were involved in early testing activity there. We believe that by mid-1960, when the major withdrawal of Soviet technicians had been accomplished, the USSR had provided the Chinese with some Soviet SSMs—possibly up to SS-4s (1,000 n.m.). We believe that operations at the range began in 1961 with some kind of SSM tests and that there were further firings in 1962, 1963, and 1964; but we believe the rate of firing was sporadic and limited.

22. Communist China's missile research and development center is located at Chang-hsin-tien, a suburb of Peiping. We believe that this facility began static testing of missiles by 1963. Judging from the layout and the size of the rocket engine test stands, this complex appears suitable for developing surface-to-surface ballistic missiles to at least the MRBM size. It appears large enough to permit limited series production of missiles.

23.  the Chinese extended one of the two surface-to-surface launch pads and modified some of the support facilities at SCTMTR. Thus the available data—the geographic limitations on the length of SCTMTR, the substantial missile development center at Chang-hsin-tien, the launch facility modification, and the gradually quickening pace of activity strongly suggest that flight testing began on a Chinese-produced medium-range missile system in the latter part of 1963.

24. The evidence suggests that the Chinese are working on a missile based on the design of the Soviet SS-4. Such a missile would be capable, when fully developed, of delivering a payload of over 3,000 pounds to the maximum operational range of 1,000 nautical miles. It is possible that the Chinese could have a few medium-range missiles ready for deployment in 1967 or 1968, although the system might still have problems of reliability and accuracy. Also, assuming consistent success in their nuclear program (see especially paragraphs 4 and 21 above), we estimate that the Chinese could possibly have fission warheads compatible with these missiles in 1967 or 1968.

25. *Short-Range Ballistic Missiles.* There is a reliable report that the Chinese received some Soviet 150-mile range vehicular mounted missiles prior to mid-1960, and we have other evidence that there may have been testing or training exercises with this type missile during 1960. However, we believe it unlikely that the Chinese would at this stage divert much of their scarce scientific talent and fissionable material to the development and manufacture of nuclear warheads for this type of missile.

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26. *Surface-to-Air Missiles.* The Chinese Communists were provided by the Soviets with a limited amount of SA-2 surface-to-air missile equipment and probably a start on the technological base for future domestic development before the withdrawal of Soviet technicians in mid-1960. We have no evidence to confirm or deny that the Soviets have furnished any SAMs since then. We do not know how many such missiles there are in China but the Chinese appear to have had to ration carefully the equipment they have. At least 20 SAM sites have been identified in China. Some have been completely abandoned, and at any given time only a few are actually occupied with equipment. Our evidence suggests that the number of units is considerably smaller than the number of sites and that the Chinese move the units from one place to another in an effort to intercept Chinese Nationalist photo-reconnaissance flights.

27. We believe that Peiping has assigned a high priority to developing a domestic capability involving either a copy of the Soviet SA-2 missile or a Chinese modification. We have not firmly identified a factory for the production of surface-to-air missiles. However, there is at Taiyuan in North China a large facility which we believe is for the production of solid propellants which could be used in SAMs. There are also some indications that other plants in this area are producing missile components, and they may be producing some kind of surface-to-air missile, either replacements for the Soviet SAMs or prototypes of a Chinese version or both. The evidence is not sufficient to permit a firm judgment; however, we think it highly unlikely that either version is being produced on a substantial scale. We believe it will be two or three years before production on a large scale is within their capability.

28. *Air-to-Surface Missiles.* We believe the Chinese Communists have no air-to-surface missile (ASM) capability at this time. While some of the original facilities at SCTMTR airfield suggest that an ASM program was at one time contemplated, no more recent indications of such a program have been identified and we believe that other higher priority weapons programs make such an effort unlikely.

29. *Air-to-Air Missiles.* The Chinese Communists may have a limited number of air-to-air guided missiles (AAM) for their fighter aircraft. While we have no direct evidence that the Soviets supplied any, aircraft have been observed with equipment suitable for carrying such missiles. We have no persuasive evidence that the Chinese are producing AAMs, but we believe it within their capabilities to produce copies of Soviet missiles or US infrared Sidewinders. Such US missiles were captured by the Chinese at the time of the Taiwan Strait crisis in 1958.

30. *Missile Submarine.* [REDACTED] revealed that the Chinese have launched a submarine closely similar in outward appearance to the Soviet G-class submarine which is designed to launch SS-N-4

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350 n.m. ballistic missiles while surfaced.² Photography indicates that the hull assembly began in about mid-1962. The Soviets may have helped build this vessel, and may have supplied components for the submarine and the missile system. We have no evidence as to what missile the Chinese may be planning to put in this submarine or as to whether the Soviets gave them assistance in this respect. Presumably the Chinese are aiming at the SS-N-4. We have no evidence that the Chinese are now constructing any more of this type submarine, and it would be at least several years before any units could be operational with Chinese-produced missiles. The Chinese Communists might be greatly attracted to the development of a missile submarine force which could pose at least a limited nuclear threat to targets in the US.

31. *Coastal Defense Missiles and Guided Missile Patrol Boats.* We have fairly good evidence that the Soviets in about 1959 provided the Chinese with some cruise missiles with a range of 35 n.m. and which carry a high explosive warhead. Since that time the Chinese have maintained an apparently active test range and development center for coastal defense cruise-type missiles at Lien-shan on the Gulf of Liaotung. The only other cruise missile site we have identified in China is near Dairen. We cannot be certain however that it is operational. Although we have no evidence of Chinese production of cruise missiles, the Lien-shan facility indicates the Chinese are interested. They probably could produce such a weapon system without much difficulty.

32. At least one and probably two each of the Soviet OSA-class and KOMAR-class motor boats have been sighted in China since 1963. In the Soviet Union, this type of craft carries SS-N-2 aerodynamic missiles with a high explosive warhead and with a range of 15-20 miles. Although there is some indication that the Soviets may have supplied or helped build these craft, we believe that construction of both the boats and the missiles is within Chinese capabilities.

IV. PROJECTIONS FOR THE LONGER TERM

33. With our knowledge of Communist China's advanced weapons program being as sketchy and inadequate as it is, any longer term estimates must be even more tentative than those made above. The next decade could bring important, even radical, changes to China and to the state of international relations. It is likely that many of the top leaders will have passed from the scene, and what this might mean for Peiping's foreign, military, and domestic policies is unpredictable. There remains the profound question of the outcome of the race between population growth and food supply in China, and, indeed, the proportion of China's scientific, technical, and industrial resources and energies that the regime sees fit to devote to advanced weapons and other military programs will have an important bearing on this question.

² The Soviet G-class submarine is estimated to have a maximum patrol operating radius (one day on station) of 4,850 n.m. without refueling.

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34. The Chinese probably will be able to proceed with experimentation on various types of nuclear warheads and missile systems. However, there will be limitations in the supply of fissionable material, a myriad of technological problems, and an enormous economic burden. An intermediate range missile system (2,000 miles) would not bring within range many additional targets (except possibly in the USSR) likely to be of interest to Peiping and the Chinese may try to jump to an intercontinental capability. Even if development has already been started, we do not believe they could have an operational ICBM system until after 1970.

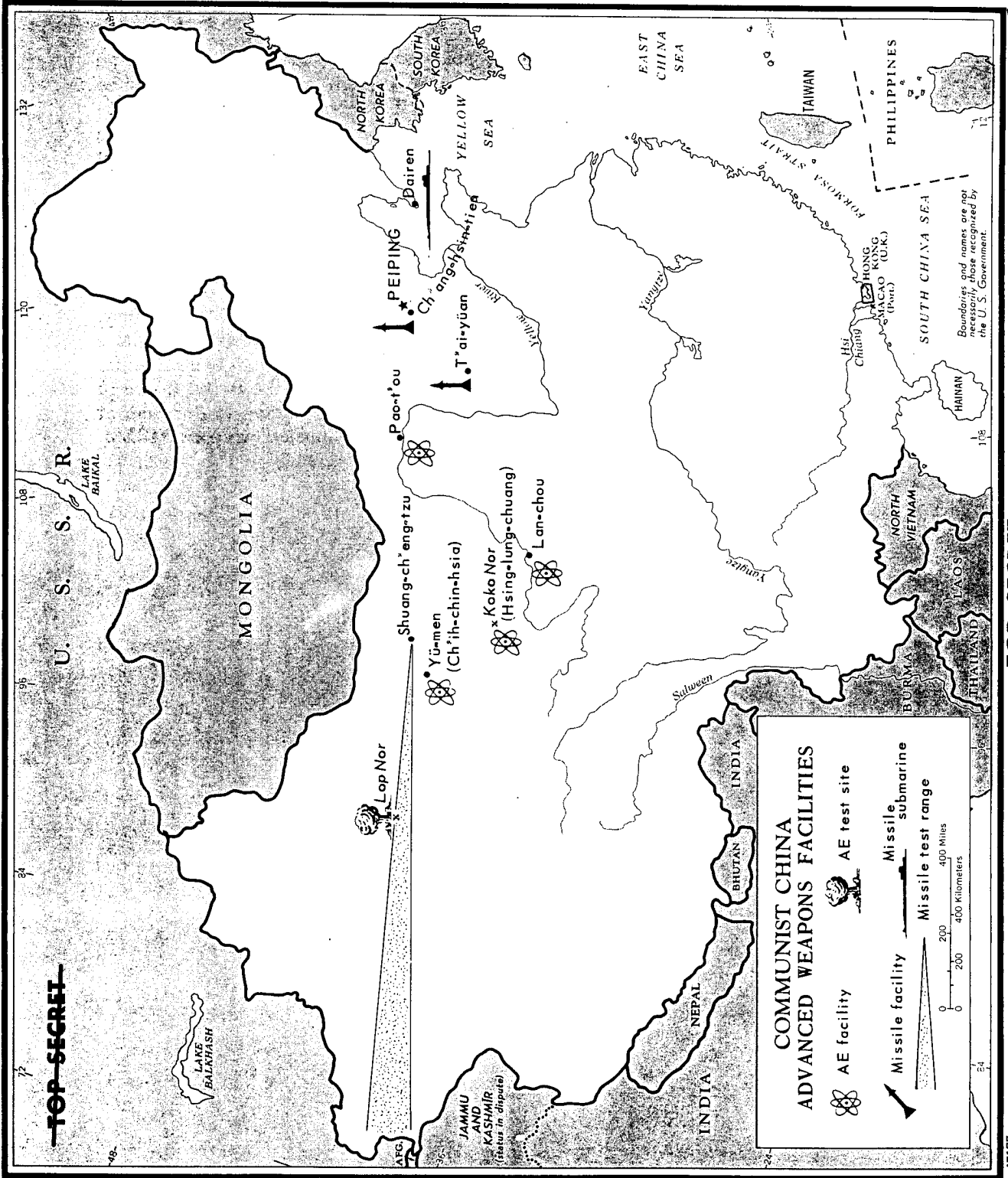
35. If the Chinese Communists decide to devote a massive effort to advanced weapons programs, irrespective of the cost to other parts of the economy, they probably will be able to carry forward many of the weapons programs considered in this estimate. However, pressing all these programs to a successful conclusion will be a formidable task and the Chinese may be forced to accept changes and delays. It is probably within Chinese capabilities to carry out at least those programs with the highest priority, e.g., the nuclear weapons, MRBM, and SAM programs.

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