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PROBABLE SOVIET POSITION ON
NUCLEAR WEAPONS TESTING

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Date 7/9/93

HRP 93-3

PROBABLE SOVIET POSITION ON NUCLEAR WEAPONS TESTING¹

THE PROBLEM

To assess the relative weight of weapons requirements and other considerations in determining the Soviet position on further nuclear testing, and to estimate the Soviet attitudes toward complete discontinuance of nuclear weapons testing and toward limited discontinuance.²

THE ESTIMATE

1. Broadly speaking, the considerations which lie behind the Soviet position on further nuclear testing are of three kinds: technical, strategic, and political. Technical considerations have to do with the stage of research and development in which the Soviets find themselves with respect to nuclear weapons—how urgent do they consider the necessity of further testing in order to round out their arsenal of nuclear weapons, to improve the economy or efficiency of those they have, or to realize the potential of new devices? Strategic considerations relate to the effect of further testing on the world balance of military power—how far do the Soviets believe they would derive advantage or disadvantage in this respect from either a resumption or a discontinuance of nuclear testing? Political considerations have to do with the advantages which the Soviets might see for themselves in

a continuance of their strong propagandistic stand against further testing, and with the longer-range benefits which they might hope for if an agreed discontinuance of nuclear testing could be established as the first step towards other agreements. We propose to discuss each of these considerations briefly, and to estimate how the Soviets weigh them against each other in arriving at their position.

2. The Soviets now have available a wide spectrum of fission and thermonuclear weapon types. Their test series have shown that they could obtain yields ranging from less than three KT from fission devices to eight MT from thermonuclear devices. They thus can produce weapons suitable for tactical ground force use and naval employment as well as for a wide range of aircraft and missile delivery systems. This capability probably included efficient use of nuclear materials in air defense warheads. Significant improvements in stockpiled weapons are certainly being made as a direct result of the tests completed in 1958.

3. An analysis of Soviet nuclear weapons progress does indicate that there are several areas in which the USSR might desire to conduct

¹ See NIE 11-6-58, "The Soviet Attitude Toward Disarmament," dated 24 June 1958 (Secret), for a fuller discussion of the arguments which are summarized in the present paper.

² Limited discontinuance would ban for an indefinite period any testing in the atmosphere and outer space, on the earth's surface, and underwater; only contained underground tests would be sanctioned.

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further tests. These areas include: (a) high altitude or space tests related to AICBM effects or proof tests; (b) tests of low-yield, light, tactical devices; (c) tests directed toward materially increasing fissionable material economy; (d) tests of "clean" devices; and (e) tests of thermonuclear weapons with yields above eight MT. In addition, refinement of existing designs would be desirable in any test series.

4. Almost certainly there are pressures in the Soviet Union, on both technical and military grounds, for continued nuclear testing in some or all of these fields. Over the long-run the Soviet nuclear weapon design and development capabilities could only be marginally improved without further tests. However, the available spectrum of nuclear weapons is probably adequate to meet their basic military requirements. On balance, we believe that the Soviets currently estimate that the technical potentialities for weapons improvement would make further testing desirable, but do not provide an overriding requirement for the resumption of tests at this time.³

5. From the strategic point of view, the Soviets probably believe that a continuation of nuclear testing by both sides would be unlikely to alter the relationship of military power between the US and the USSR in any decisive way. In any case, they are almost certainly unable to estimate with confidence that a continuance of nuclear testing would operate to their advantage rather than to that of the US. They may believe that, despite certain US superiorities in weapons technology, a stabilization of nuclear weapons technology at present levels of development would serve Soviet military interests better than would a continuance of testing by both sides. On these grounds, therefore, we think that the Soviets almost certainly are willing, though not necessarily anxious, to have both sides cease testing.

6. From a political point of view, total discontinuance of nuclear weapons testing would mark a major step in the Soviet effort to

³ For further discussion of the technical aspects see the Annex to this estimate.

single out nuclear weapons as different from and more repugnant than other weapons. It would crown with success the long public Soviet demand for a test ban and raise the prestige of the USSR. It would thus serve long-range strategic and political aims by providing a springboard for intensified agitation against further deployment of nuclear weapons abroad, against initiating the use of nuclear weapons in any situation, and even for a complete ban. Even though the Soviet leaders would probably see little prospect of involving the West in negotiations on these issues and still less prospect of getting agreement, they would calculate that by focusing renewed attention on them, they could generate political problems within the free world and inhibit Western defense activities. Any resulting relaxation of Western defense efforts, any divisions within NATO and any progress toward a climate inhibiting Western use of nuclear weapons would be viewed by the Soviets as important gains.

7. A total discontinuance of nuclear weapons testing would inhibit other countries, including Communist China, from persisting in efforts to develop their own nuclear weapons. The Soviets would welcome the fact that the problem created within the Western Alliance by French desires to pursue a weapons development program would be intensified. While Communist China would probably press for acquisition of a nuclear capability, the Soviets presumably believe that they could meet this pressure by promising to provide appropriate nuclear support to China, and by arguing that as a next step they would work toward the withdrawal of US nuclear weapons from Eurasia.⁴

8. In sum, then, we believe that the Soviets see no overriding current technical requirement for continued nuclear weapons tests, and no assurance that they would improve their relative military position by such tests (assuming, of course, that tests were resumed by both sides). Accordingly, we believe

⁴ For further discussion of Chinese nuclear capabilities and Sino-Soviet nuclear arrangements, see NIE 13-59, "Communist China," paragraphs 74 and 83 through 86, dated 28 July (Secret).

that the major factor now determining the Soviet position on further nuclear testing is their evaluation of the political and propaganda gains to be expected from a discontinuance of tests. We believe that in their opinion these gains would be considerable, and in the long run would contribute substantially to their strategic objective of weakening the US both militarily and politically, outweighing any immediate technical and military advantages to be derived from a resumption of testing.

9. It follows from the above conclusion that the Soviets would prefer a total discontinuance and would be cool to a limited one. However, they could calculate that a surface, atmospheric and space test ban would still permit them to stigmatize nuclear weapons to a degree, and thus to gain some of the advantages of the complete ban. A limited restriction on nuclear testing which permitted underground tests would allow the USSR to realize some of the potentialities for further weapons development, though with greater expense and difficulty than under conditions of unrestricted testing. (Such an agreement would, of course, also permit the US and UK to improve their weapons, and in time would allow other nations to develop nuclear weapons.) While it is therefore possible that the Soviets would agree to a limited discontinuance with controls—especially if the alternative were a rupture in negotiations—we believe it highly unlikely. The chances are better that they would settle for a limited discontinuance without international controls.

10. We believe it most probable that the USSR will continue to press for a total discontinuance of nuclear weapons tests, capitalizing upon the approval which this course of action receives in many parts of the world. We think, moreover, that the Soviets will agree to a total ban on weapons tests, with international controls, provided that they succeed in holding inspection monitoring to what they regard as an acceptable limit in terms of their stringent requirements for state security. Pending such an agreement they will continue

their propaganda against tests. We do not believe that, for the time being, the Soviets will resume testing (in the absence of an agreed ban) unless and until the US does so; in effect, therefore, they would have a continued moratorium without controls.

11. With the alternatives open to them, we believe that the Soviets would prefer not to risk entering into an internationally controlled agreement with the prior intention to evade it by illicit weapons tests. If they regarded the need for testing as so great, they would instead probably defer an agreement or agree to a limited ban. If conditions changed subsequent to an agreement, so that they believed that significant gains could be realized from renewed testing, they would have to weigh these potential gains against the likelihood and consequences of detection. It is unlikely that the Soviets would risk what they regarded as an appreciable chance of detection and disclosure of illicit tests. However, if they came to believe that an overriding necessity for testing had arisen, they would probably renew testing, employing some gambit such as accusing a Western power of breaking the agreement, seeking to justify their renewed testing as retaliatory action to meet new and legitimate defensive requirements. If Communist China were not covered by the agreement, the Soviets might resort to testing on Chinese Communist territory.

12. If a considerable period elapses without an agreed nuclear test ban, the willingness of the Soviets to forego testing may change. The evolution of military requirements for new advanced weapons systems, or the recognized possibility of a technical breakthrough in the laboratories, might create in the USSR much stronger pressures for resumption of tests than we believe now exist there. These pressures could persuade the Soviet leaders that an agreed test ban was no longer to the advantage of the USSR, or possibly that a limited discontinuance of tests, rather than a total ban, was desirable.

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ANNEX

SOVIET TECHNICAL MOTIVATIONS TO RESUME NUCLEAR WEAPONS TESTING

SUMMARY

1. With the completion of their 1958 test series, the Soviets have available to wide spectrum of fission and thermonuclear weapons which are probably adequate to meet their basic military requirements. This spectrum includes devices suitable for ground force and naval employment as well as for a wide range of aircraft and missile delivery systems. This capability also probably includes efficient air defense warheads and thermonuclear warheads yielding from 200 KT to 8 MT.
2. Based upon the nuclear weapon development and test capabilities evidenced by the Soviets to date, we estimate that with resumed unlimited testing they could increase their thermonuclear yields, improve yield-to-weight ratios and economy of fissionable materials in their weapons, and overcome any lack of knowledge of high altitude effects. They could also develop new weapons to satisfy future military requirements for advanced weapons systems.
3. Under an atmospheric and outer space test ban, the Soviets are capable of a major development effort but the advances would be somewhat slower and they would be unable to close any gap that might exist between the US and Soviet knowledge of high altitude effects. We have no evidence that the Soviets have conducted deep underground nuclear tests, and we estimate that they have not done so. However, the conduct of such tests to include the collection of adequate diagnostic information is fully within their technical capabilities.
4. If no further nuclear testing occurs, their over-all nuclear weapon development capabilities could only be marginally improved.
5. The Soviets are technically capable of conducting clandestine underground tests in violation of a complete nuclear test ban and at present have a unique missile capability for clandestine nuclear test attempts in outer space. Some significant design progress could be achieved if several limited test series were conducted, particularly in very low-yield weapons and in over-all fissionable material economy.
6. An analysis of Soviet nuclear weapons progress indicates that there are several areas in which reasonably adequate tests may not have been conducted to date and which probably create technical pressures within the USSR for the resumption of nuclear tests. These include: (a) high altitude or space tests related to AICBM effects or proof tests; (b) tests of low-yield, light, tactical devices; (c) tests directed toward materially increasing fissionable material economy; (d) tests of "clean" devices; and (e) tests of thermonuclear weapons with yields above eight MT. We estimate that at present these areas do not provide, either individually or collectively, an overriding technical motivation to resume testing. On the other hand, the evolution of military requirements for new advanced weapons systems or a possible technical breakthrough in the nuclear weapons laboratories could create in any or all of these technical areas much stronger pressures for the resumption of nuclear tests.
7. Resumption of nuclear testing by the US would intensify technical motivations for the Soviets to resume testing.

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DISCUSSION

INTRODUCTION

8. An assessment of Soviet technical motivations to resume nuclear testing, whether or not a test cessation agreement is negotiated, must consider the present state of Soviet weapon art, current and future Soviet requirements for improvement in their nuclear weapons, and likely Soviet assessment of the technical capabilities of existing and proposed test detection and identification systems. Soviet capabilities for undetected evasion of a test ban will be considered in this discussion in light of two assumptions: first, that only contained subsurface tests will be allowed—i.e., those in which no venting into the atmosphere occurs; and second, that a complete test ban with the necessary inspection components will be in effect.

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METHODS OF EVADING DETECTION

12. The effectiveness of all the detection systems given above are dependent upon Soviet knowledge of and ability to employ the technical means of decreasing the likelihood of detection. These means include such possible techniques as decoupling of subsurface explosions to reduce the seismic signal produced,

²Decoupling is a test technique for underground explosions which is designed to reduce the amount of energy going into the seismic signal. Decoupling may theoretically be accomplished by detonating the device in a large underground cavity or hole, the dimensions and shape of which are dependent upon the anticipated yield.

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shielding of space detonations to reduce the radiations emitted by the nuclear explosion, and positioning the explosion either at extremely large distances in outer space or behind planetary bodies for concealment. Such techniques have been made known to the Soviets, and it is within their capability to exploit them.

13. All of the methods above will increase the time and expenditure required for testing and decrease the amount, or at least make difficult the attainment, of diagnostic information desired from each test. Nevertheless, should the Soviets choose to risk detection and exposure, technical information could be gained by testing under these conditions permitting further progress in nuclear weapons development.

PRESENT STATE OF SOVIET NUCLEAR WEAPON DEVELOPMENT

14. Since the preparation of SNIE 11-7-57, "Feasibility and Likelihood of Soviet Evasion of a Nuclear Test Moratorium," dated 10 December 1957, the Soviets have conducted two extensive series of nuclear tests. These series include a total of 32 tests which were detected between 28 December 1957 and 3 November 1958.

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SOVIET REQUIREMENTS FOR FUTURE TESTS

17. Future Soviet requirements for nuclear tests are dependent upon military requirements on which adequate intelligence does not exist. However, the characteristics of the varied nuclear test devices that have been detected clearly indicate that the Soviet military planners have a wide spectrum of modern nuclear weapon designs available to them for all of the weapons systems we estimate that they possess. Furthermore, we estimate that there is virtually no major principle of weapon design which the US exclusively holds. However, members of the Soviet Delegation to the current Geneva Conference on the Discontinuation of Nuclear Weapons Tests have admitted informally that there is military pressure within the USSR for the resumption of nuclear tests.

18. There are five discernible areas wherein adequate tests may not have been conducted to date which must be evaluated both collectively and singly:

a. *Tests related to AICBM effects or proof tests at altitudes well above the tropopause (higher than approximately 30,000 feet) or in space.* ┌

┐ a large volume of information has been published on US high altitude tests, which may reduce Soviet requirements for high altitude effects data.

b. *Tests of low-yield, light, tactical devices.* ┌

┐ However, we believe that they seriously lag behind US capabilities, particularly in fractional KT weapons.

c. *Tests directed toward materially increasing the economy of fissile materials, particularly in the larger TN devices.* Soviet nuclear weapons in the higher yield ranges consume large amounts of fissionable materials, and it is well within Soviet capability to achieve substantial economies by further testing.

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d. *Clean devices.* [

] Additional tests will be required if the Soviets desire clean weapons in any yield range.

e. *Thermonuclear weapons with yields above eight MT.* [

] Any requirement for such very high-yield devices would probably necessitate testing in the 10-20 MT yield range.

19. In addition, the refinement of existing designs should be included as a desirable requirement in any test series.

POSSIBLE TEST PROGRAMS

20. Table I presents our estimate of Soviet technical potentialities for nuclear weapons development under three conditions: (a) continued unlimited testing; (b) a partial test ban; and (c) a complete test ban. (Detailed related cost estimates are impracticable in light of the scant knowledge available on the expense of evasion techniques, thus we have only attempted to indicate relative magnitudes.)

POSSIBLE GAINS WITHOUT TESTING

21. One should not conclude that the Soviet nuclear weapons program will be immobilized if no tests are conducted. Significant improvements in stockpiled weapons are certainly being made as a direct result of the test series completed in 1958. Future laboratory studies of nuclear materials in contained environments and in amounts not sufficient to produce a significant nuclear yield can also contribute to some advancement of the weapon art, particularly for small, low-yield devices. Improvement in delivery hardware and techniques can materially increase the military effectiveness of the present Soviet nuclear stockpile. Redesign based on theoretical studies may be made to a limited extent, but we believe the Soviets would hesi-

tate to stockpile new designs without proof-testing them. Successful espionage against the West might permit isolated advances in the Soviet program.

TECHNICAL MOTIVATIONS TO RESUME TESTING

22. We believe that the five areas requiring further tests, as listed in paragraph 11, create technical pressures within the USSR for the resumption of nuclear tests. However, we do not believe these areas currently provide an overriding technical motivation to resume testing. Under a nuclear test ban the Soviets will continue to pursue the development of improved weapons systems and the study of improved nuclear weapons technology. Over a period of a few years the evolution of military requirements for new advanced weapons systems and improved nuclear devices could create in any or all of these technical areas much stronger pressures for the resumption of nuclear tests.

23. There is always a possibility that as a result of laboratory research which is beyond our capacity to predict, the Soviets may foresee a technical breakthrough leading to a major improvement in nuclear weapons design. This possibility appears remote; however, should it occur, it could produce with the passage of time a very strong technical motivation for the Soviets to resume testing.

24. Resumption of nuclear testing by the US would intensify technical motivations for the Soviets to resume testing.

25. If the US resumes underground nuclear tests for the specific purpose of acquiring further technical information on seismic effects pertinent to the control of a complete test ban, this probably will also promote demands within the Soviet Union for resumption of testing. However, the Soviets would probably refrain from testing until they have made capital of any potential propaganda advantage. If the Soviets, in time, conduct similar tests, we believe they would certainly exploit them for weapons development information.

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