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CENTRAL INTELLIGENCE AGENCY

3 April 1957

MEMORANDUM FOR THE DISARMAMENT STAFF

SUBJECT: Questions on Nuclear Weapons Tests and Fourth Countries
(dated 26 March 1957)

I. Is testing necessary to the development of atomic or hydrogen weapons by fourth countries?

1. The question posed requires a distinction between the desirability for testing atomic or fission weapons on the one hand and the necessity for testing hydrogen and advanced types of fission weapons on the other. A country possessing kilogram quantities of weapon-grade fissionable material, technical know-how and the motivation could produce and stockpile, without testing, limited numbers of low-yield, inefficient atomic weapons (i.e. weapons comparable to the Heroshima bomb). Such a procedure would result in extremely inefficient use of fissionable materials and would be achieved at considerable cost to the potential of the weapon stockpile. Testing in any event would be considered highly desirable by both scientific and military components of the government. For the development of hydrogen weapons and atomic weapons of advanced design testing is a necessity.

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II. Given the scientific capability, industrial capability, and the nuclear knowledge now available to the world, can any fourth country clandestinely develop a nuclear weapon? How sophisticated would the weapon be?

2. A nation could clandestinely develop a fission weapon. Without testing this would be inefficient and of low yield. Thermo-nuclear weapons would require more elaborate and extensive experimentation and therefore could not be developed clandestinely. Note: The assumed capabilities would have to include the possession of quantities of fissionable materials above and beyond that which must be accounted for under bilateral agreements requiring strict accountability of materials.

III. Would it be possible for fourth countries to produce and stockpile weapons as the result of design and weapons specifications passed to them by a country currently possessing nuclear know-how? If technical assistance were provided?

3. (a) The fourth country could produce and stockpile advanced atomic or hydrogen weapons under the first assumption if the country had a supply of weapons-grade critical material and the scientific and technical capacity to utilize the information given.

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3. (b) There are two possible definitions of "technical assistance":

(1) Technical assistance meaning completely equipping the fourth country with plants for fabrication as well as supervisory and technical personnel, in which case the fourth country could produce and stockpile weapons, assuming the availability of weapons-grade critical material.

(2) Technical assistance meaning the provision of knowledgeable technical and scientific personnel only, in which case the fourth country could only accomplish weapons production and stockpiling if it had a supply of weapons-grade critical material and the scientific and technical capacity to utilize the assistance given.

IV. What countries, other than the USSR, UK and US have the capabilities and motivation to develop nuclear weapons program and the stockpiles within the next decade.

4. With respect to capabilities, a country should possess adequate quantities of fissionable materials under its own control, competent

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scientific and technical personnel, an advanced industrial establishment, and substantial public financial resources, in order to develop a nuclear weapons program and stockpile of sufficient size to be militarily effective. No fourth country except Canada possesses all of these. There are countries, however, which possess one or more of these ingredients and which could, if they were prepared to make the necessary adjustments in their economy or in their relations with other countries, engage in a nuclear weapons program.

5. With respect to motivation, there are government leaders, public officials, or private citizens almost everywhere who see advantages in the possession of nuclear weapons. There are also people almost everywhere who oppose inauguration of a nuclear weapons program. In some countries the leaders would almost certainly initiate a program if they possessed the capability; in other countries considerable capability exists, but there is no agreement that the sacrifices and risks should be undertaken. In all cases, the motivation to initiate a nuclear weapons program would be greatly reduced -- if not eliminated -- by an effective system of international control.

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6. The fourth country possessing the greatest capability is France. The only substantial limitation on French capability is the lack of the public financial resources necessary to undertake a major weapons program without further endangering an already strained economy. The French reactor program is already in operation; there are strong pressures in France for undertaking a weapons program; some weapons research may already have been accomplished. It is argued that defense costs in the longer run would even be reduced by shifting from conventional to nuclear arms. These pressures will probably lead France to adopt some kind of a weapons program over the next decade unless it receives an adequate supply of weapons from other countries (i.e., the US or UK).

7. West Germany presents a special case. Its uranium resources are inadequate, but it possesses all the other ingredients necessary to the development of a major nuclear weapons program. It is currently barred by treaty from producing nuclear weapons. The West German Chancellor is now in the forefront of those in West Germany and NATO who favor a comprehensive review of NATO strategy, weapons, and forces. He evidently feels that a shift toward greater reliance on nuclear weapons as against

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conventional armaments is taking place without being planned or coordinated on a NATO-wide basis. He appears to oppose this trend, particularly if it would leave no alternative to nuclear warfare, but he and his countrymen also appear to recognize that some nuclear forces are necessary. Judging by the West German desire for a review and judging by their views on the need for some atomic weapons in any defensive system, it appears likely that the West Germans will press strongly for some change in the present restrictions upon them especially if it is affirmed that NATO strategy will involve extensive reliance upon nuclear weapons. It seems most unlikely that the present situation can continue, and West Germany must be counted as a fourth country likely to have some form of atomic weapons program within the next decade. If Germany should be reunified, it would, of course, possess adequate uranium resources; presumably the use of these resources would be a major question in any final peace treaty.

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8. Sweden has a sufficiently developed reactor program to enable it to produce some nuclear weapons within the next five years. It possesses the required raw materials and the qualified personnel. However, to carry out the necessary research, development, and production program would impose a severe strain on the Swedish economy. There is strong military pressure in Sweden to acquire a nuclear capability, either by developing a program in Sweden or by acquiring the weapons from other countries. There is also strong opposition, and the government has not reached a decision. We believe that discussion and agitation will probably continue for some time, and there is a good chance that at some point in the next decade Sweden will initiate a limited program.

9. Because of its concern over North American defense, Canada must also be considered as one which might engage in an atomic weapons program if it does not receive weapons from the US or UK which it can use in an emergency situation. Canada has the capability to develop such a program, and we believe it will do so, probably with British assistance, unless it receives defensive atomic weapons from the US.

10. There are states which, if they were now prepared to make the necessary sacrifices, could have a small number of low-yield weapons within the next ten years. We do not know of any which are

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now attempting this or appear likely to do so within the next few years. Such a limited program almost certainly would not permit the development of a nuclear weapons capability which would be militarily effective in a major war either for offensive or defensive purposes. Possession of atomic weapons by a substantial number of countries based on domestic production seems likely to occur, if at all, in some period of time beyond ten years.

11. Within the Soviet Bloc, the only country which appears likely to develop a capability to produce atomic weapons is Communist China. It does not now possess a sufficient number of qualified personnel or the capacity to produce the needed equipment for development. A research reactor, built with Soviet assistance, is scheduled for completion in 1958. The USSR is assisting in the training of Chinese scientists in basic nuclear physics and in the adaptation of atomic energy to peaceful purposes. Chinese uranium resources would be sufficient to support a weapons program. We believe that, in view of the extremely limited progress so far made, Communist China will be unable independently to develop an atomic weapons program within the next five years. In the course of the next decade, however, they may get enough technical and material assistance from the USSR to make possible a substantial nuclear weapons production and stockpiling program.

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V. In the absence of test agreement, in what time period would they be expected to develop nuclear weapons? Commencing when?

12. It is possible to give a specific estimate only for those countries -- France and Sweden -- which have reactor programs under way.

a. France: If the French have been carrying out theoretical weapons research for the last three years, France could test a low-to medium-yield weapon in early 1958. Assuming no theoretical studies have been conducted by the military as of this date, 1960-61 could be forecast for development and proof of the first French nuclear weapon. If the French reactor program is carried out as now outlined, and all the attendant plutonium produced were allocated for a weapons program, France could produce about 45 medium-yield or 75 small-yield nuclear weapons by 1960, and a cumulative total of 350 medium-yield or 600 small-yield nuclear weapons by 1965.

b. Sweden: Sweden will begin to have the minimum quantity of plutonium required for one low-yield weapon per year by 1960. This one low-yield weapon per year figure could be doubled in 1963 and a total of 12 low-yield weapons could be produced commencing in 1964 if Sweden's present reactor construction plans are carried through as now scheduled.

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VI. What inducements would dissuade potential fourth countries from developing a nuclear weapons program?

13. The most obvious, and probably the only effective, inducements would be either (a) implementation of an effective international control system, or (b) provision of nuclear weapons to fourth countries under conditions permitting their emergency use. It should be noted, with respect to (b), that the condition which most nations would seek would so limit the control exercised by the supplier as to increase the opportunities for uncontrolled and irresponsible use of these weapons, with its attendant danger for world peace.

VII. What effect would the following possible US-UK-USSR agreements have on fourth country weapons development:

- a. test limitation on allowable contribution to world-wide fall-out;
- b. test limitation on number of tests;
- c. test limitation on total yield;
- d. test limitation on yield of individual detonations; and
- e. test limitation combining some or all of the above?

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14. We assume that fourth countries would abide by the conditions of such a trilateral agreement. However, test limitations of the type described would have little effect upon the fourth country problem. Presumably the testing requirements of many of these countries would not be substantial, since they would not be involved in the development of advanced atomic and thermonuclear weapons. Unless the maximum allowable yield were extremely low, most countries would be permitted to make such tests as were within their capability to attempt.

VIII. What would be the effect on fourth countries of an agreement to cease testing entirely?

14. See paragraph 1.

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