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ESTIMATED CHINESE NUCLEAR WEAPONS STOCKPILE - 1970

BY

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OTTAWA, CANADA
APRIL 1966

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ESTIMATED CHINESE NUCLEAR WEAPONS STOCKPILE - 1970

OBJECT

1. To estimate the possible nuclear weapons stockpile that might be achieved by Communist China by 1970. (U)

SUMMARY AND CONCLUSIONS

2. It is estimated that by 1970 Communist China could have produced enough fissile material to enable her to engage in a reasonable nuclear test program and in addition accumulate some 2,000 kg of uranium-235 and some 200 kg of plutonium for the construction of nuclear weapons to be stockpiled and supplied to the armed forces. (S)

3. Three possible nuclear weapons stockpiles might be:

(a) 100-150 low-yield warheads or bombs; or

(b) 50-75 higher-yield warheads or bombs; or

(c) 50-75 low-yield plus 25-40 higher-yield warheads or bombs. (S)

DISCUSSION

Introduction

4. An attempt is made in this memorandum to estimate the probable size of the Chinese nuclear weapons stockpile in 1970 based on the estimated production of fissile material by China during the period 1965-1970. Because of the major uncertainties associated with projections of this type, the results must be considered to have qualitative value only. Nevertheless the conclusions based on these results are considered valid. (S)

General Considerations

5. The analysis of radioactive debris from the first two Chinese nuclear tests indicated that both devices contained uranium-235 (U-235) as fissile material and achieved a probable "burnup" efficiency of 5% and 6% respectively. From the estimated "best-value" yields of about 19 KT and 40 KT, it follows that the U-235 content of the two devices must have been about 20 kg and 35 kg respectively. (S)

6. The yield of a nuclear warhead is not in direct proportion to the amount of contained fissile material but rather is a complex function of the design efficiency, the geometry of the warhead, and the amount and nature of fissile material. We expect that plutonium will soon make its appearance in Chinese nuclear weapons, resulting in significant improvements in "burnup" efficiency and hence greater economy in the use of fissile material. Our analysis of all of the factors involved lead us to conclude that on the average the fissile material content of Chinese nuclear weapons developed over the next 4-5 years will probably be as follows:

(1) 15-20 kg in low-yield weapons (up to 40 or 50 KT).

(2) 30-40 kg in higher-yield weapons (up to several hundred KT). (S)

Fissile Material Production

7. At least two and possibly three fissile material production facilities have been identified to date in China. These are located in the vicinity of PAOTOU in Inner Mongolia, LANCHOU in north-central China, and YUMEN in northwest China. (S)

8. A uranium isotope separation facility consisting of a gaseous diffusion plant and possibly one or more electromagnetic separation units, is located at LANCHOU. In order to provide enough highly-enriched uranium for the first Chinese device, this plant must have been in operation since late 1963. From a consideration of all available evidence, it is estimated that the present rate of production could be as low as 100 kg of U-235 per year or as high as 400 kg per year, with a most probable value of about 200 kg per year. We believe that the Chinese almost certainly intend to increase their U-235 production capacity as soon as possible. This could be accomplished by providing additional floor space for gaseous diffusion equipment or by constructing additional electromagnetic separation units in order to accommodate the maximum possible output from the existing low-separation gaseous diffusion plant. Either of these measures, if undertaken shortly could increase the rate of U-235 production to 1,000-2,000 kg per year by 1970 and hence we predict that cumulative U-235 production by 1970 could attain 3,000 kg. Of this total, probably less than one-third will be used in tested devices or weapons during this period. Thus by 1970, at least 2,000 kg of U-235 could be available for China's nuclear weapons stockpile. (S)

9. A large and expanding nuclear energy-associated facility near PAOTOU is believed to include a relatively small reactor (not more than 30 megawatts thermal output) and a plutonium separation plant, both of which could have been in operation since 1964. Assuming an annual production of about 10 kg of weapons-grade plutonium, this facility could have produced about 50-60 kg of plutonium by 1970. The absence of plutonium in the two devices tested to date indicates however, that the Chinese may have encountered difficulties with the reactor or the separation plant. (S)

10. A major plutonium production complex is reported to be under construction near YUMEN. Unconfirmed reports have indicated that a reactor of moderate size (i.e. about 50-100 megawatts thermal output) may already be in operation somewhere in northwest China, possibly at this location. We are inclined to doubt this. However, we do estimate that a larger reactor (possibly 500-600 megawatts thermal output) may be in operation at YUMEN by the end of 1967, with an annual production capacity of 150-180 kg weapons-grade plutonium. Thus by 1970 a cumulative total of about 350 kg of plutonium could have been produced at YUMEN and PAOTOU, of which about 200 kg might be available for China's nuclear weapons stockpile. (S)

Conclusion

11. We conclude therefore that by 1970 China could have produced enough fissile material to enable her to engage in a reasonable test program and in addition accumulate some 2,000 kg of U-235 and some 200 kg of plutonium for the construction of nuclear weapons to be stockpiled and supplied to the armed forces. Using the average fissile material values postulated in para 6 above, we can calculate a variety of possible weapons stockpiles which China might achieve by 1970. Three of these might be as follows:

(a) 100-150 low-yield warheads or bombs; or

(b) 50-75 higher-yield warheads or bombs; or

(c) 50-75 low-yield plus 25-40 higher-yield warheads or bombs. (S)

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