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Dick

To : CIA - Mr. Helms

Subject: Prospects of an Indian Nuclear Test

At the request of Under Secretary Irwin, we recently took another look at the India nuclear situation. Attached is the report which we prepared on the subject and submitted to Mr. Irwin.

In view of the importance of this topic, I would appreciate any comments which you or your staff may have on our paper.

Ray

Ray S. Cline

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Possibility of an Indian Nuclear Test

Summary

India probably has undertaken research directly related to the development of nuclear weapons, and may well have fabricated one or more nuclear devices. In this connection, the following points are particularly significant in the short term (i.e., the next several years):

1. The fissionable material employed would almost certainly be plutonium produced in the CIRUS reactor at Trombay. India probably has 50-60 kilograms available at present.

2. The Indian government would probably identify the devices, if tested, as peaceful nuclear explosives (PNEs).

3. Agreements with both the US and Canada limit the use of the CIRUS reactor to peaceful purposes, but:

a. neither agreement provides for inspection or verification procedures to determine the uses to which CIRUS-produced plutonium is put;

b. the language of the agreements does not specifically preclude "peaceful" nuclear explosions; and

c. India has not accepted US and Canadian interpretations of these agreements as precluding all nuclear explosions on the grounds that any such explosion is tantamount to a nuclear weapons test.

Regarding the prospects of an Indian decision to proceed with a nuclear test, it is our judgment that such a decision is unlikely during the next few months and may well be deferred for several years. The political and economic restraints would appear -- in the near term -- to outweigh the international political or military benefits which could flow from becoming the world's sixth "nuclear power." Indian leaders and their country's potential adversaries realize that a nuclear test conducted several years before a viable delivery system can be acquired is of very limited military value. It is true that India might anticipate achieving

new status as the result of a nuclear test, and the immediate reaction of the Indian populace could be quite favorable. On the other hand, the long-term costs -- in terms of both the diversion of resources from critical domestic programs and the prospective loss of foreign technical assistance -- could be very high.

Fissionable Materials

General. Of the three fissionable materials -- plutonium-239, uranium-235, and uranium-233 -- which can be used in making nuclear weapons, India almost certainly would base a nuclear weapons program on plutonium, at least for the next several years. Facilities for producing uranium-235 probably will not be available during the 1970s. Uranium-233 could be produced in significant quantities in Indian power reactors now in operation and those under construction, but it could be produced much more efficiently in a future generation of reactors -- the so-called "fast breeder" reactors -- planned for the 1980s. Plutonium, on the other hand, will be readily available during the 1970s and would be the natural choice for weapons use.

Plutonium. India has in operation or under construction seven nuclear reactors capable of producing kilogram quantities of plutonium: the CIRUS research reactor at Trombay; two US-type power reactors at Tarapur; two Canadian-type power reactors at Rana Pratap Sagar, Rajasthan; and two other Canadian-type power reactors at Kalpakkam, near Madras. Significant factors relating to each of these power stations are outlined below:

1. CIRUS. This is a 40-megawatt research reactor at the Bhabha Atomic Research Center, Trombay. Fueled with natural uranium and moderated with heavy water, this reactor can produce plutonium suitable for use in nuclear weapons. In operation since 1963, the CIRUS reactor may have produced as much as 70 kilograms of plutonium, and 50-60 kilograms of this could already have been extracted at the nearby chemical separation plant and available for use in nuclear devices.

Agreements with Canada, in connection with supply of the reactor components, and with the US, in connection with supply of the heavy water, preclude use of the reactor for other than peaceful purposes: "The heavy water sold hereunder shall be for use only ... in connection with

research into and the use of atomic energy for peaceful purposes" However, lacking provisions for inspection, these agreements cannot prevent the Indians from using CIRUS-produced plutonium for experiments related to nuclear explosives, provided secrecy is maintained.

2. Tarapur. At Tarapur the Indians have a nuclear power station with two boiling-water type reactors, each generating 190 electrical megawatts (MWe). In operation since 1969, these reactors are fueled with enriched uranium supplied by the US. They cannot be refueled while in operation and are not suitable for producing plutonium for use in Indian nuclear weapons.

In connection with US aid in building the Tarapur reactors, India entered into safeguards arrangements with the US: "The Parties to this agreement emphasize their common interest in assuring that any material, equipment or device made available ... for use in the Tarapur Atomic Power Station ... shall be used solely for peaceful purposes" (Article VI) "No material, equipment or device ... will be used for atomic weapons or for any other military purpose ...!" (Article VII)

While the Tarapur safeguards -- unlike the CIRUS agreements -- do provide for inspection rights, they still do not explicitly preclude nuclear explosions for peaceful purposes. The US position on PNEs (that any nuclear explosion constitutes a nuclear weapon test) was presented to India at a later date.

3. Rajasthan. In this area the Indians have a nuclear power station with two Canadian (CANDU) type power reactors, one scheduled to begin operation a few weeks from now and the other expected to be completed in 1976. Designated RAPP-1 and RAPP-2, each of these reactors will generate 200 MWe. They will use some Canadian uranium initially, but over the long term these reactors presumably will be fueled with indigenously-produced natural uranium from India's substantial deposits of this nuclear raw material. RAPP-1 will use heavy water supplied by the US.

Capable of being refueled while in operation, these reactors would be excellent producers of "clean" plutonium for weapons use. Each reactor could produce some 160 kilograms of plutonium annually.

However, both RAPP reactors are under a Canada-India-IAEA Trilateral Safeguards Agreement which provides for control and inspection rights: "The Government of India agrees that the nuclear material used or produced in the Rajasthan Atomic Power Station will be used only for peaceful purposes." (Article 2)

It should be noted that the Indians probably would have no pressing need in any case to use plutonium from the RAPP reactors in nuclear explosives. Plutonium from the CIRUS reactor could support a modest test program until such time as unsafeguarded plutonium became available from the Kalpakkam reactors (see below). It appears unlikely, therefore, that India would see a need to confront the issue of safeguards on the RAPP reactors by involving material from those reactors in a nuclear explosives program, "peaceful" or otherwise.

4. Kalpakkam. The two CANDU-type reactors being built at this site differ from those at the Rajasthan plant in only one major respect: they are being built without foreign assistance and without safeguards. Like the Rajasthan reactors, they are fueled with natural uranium and can be refueled while in operation; as a result, they would be virtually ideal producers of weapons-grade plutonium.

Expected to be operational by 1977-78, each reactor will have a plutonium production capacity of about 160 kilograms annually, or 320 kilograms for both reactors. It should be noted, however, that production of "clean" plutonium at this rate would require substantial supplies of uranium, since each reactor would have to be refueled completely about every 60 days. As a result, we would not expect the Indians to utilize the full capability of these reactors for the production of weapons-grade plutonium unless there is a definite requirement for it in the late 1970s. (Note: These CANDU reactors should not be mistaken for the experimental "fast breeder" reactor project, also at Kalpakkam, which India is undertaking with French assistance.)

Uranium-235. India has no capability at present to produce enriched uranium, either to fuel the Tarapur power reactors or for weapons use. The decision may be made to acquire uranium enrichment facilities to produce fuel for the Tarapur reactors, probably by importing the technology.

It is too early to predict whether or when India might have a production-scale uranium enrichment capability, particularly in view of the uncertainties associated with the future spread of gas centrifuge technology, but it is unlikely that India would be in a position to produce kilogram quantities of highly enriched uranium for weapons use before about 1980.

Uranium-233. India has enormous reserves of thorium in its monazite sands, and has shown interest for years in utilizing the thorium in "fast breeder" reactors (FBRs) planned for the 1980s, fueled with plutonium and producing U-233. The U-233 would then be used to fuel the next generation of FBRs.

Less than 1 kilogram of U-233 is presently being produced in Indian research reactors each year, and 4 or 5 kilograms of this material may now exist in India. It should be noted also the U-233 presently on hand was produced principally in the CIRUS reactor, and any larger amounts available during the next few years would be produced in nuclear power reactors now in operation or under construction. In all cases, whatever safeguards apply to plutonium produced in those reactors would apply equally to the U-233.

As a result, while India probably will begin during the 1980s to produce large quantities of U-233 to fuel future power reactors, this would not be a significant factor in relation to a nuclear weapons program during the 1970s. Ample quantities of plutonium will become available at an earlier date.

Delivery Systems. India presently possesses aircraft which could be adapted to deliver nuclear weapons -- Canberra light jet bombers, and Mystere IV, Hunter, SU-7 FITTER, and MIG-21 FISHBED fighters. In the early stage of a nuclear program, the Indians would have some difficulty developing a nuclear weapon suitable for delivery by the fighter aircraft. While the Canberra, with a 4,000 pound payload, could carry a nuclear bomb, neither it nor any other aircraft currently available to India possesses sufficient range capabilities to constitute a strategic threat to China. A longer range bomber would appear to be the minimum requirement. Indigenous production of such an aircraft is beyond India's capabilities in the next few years, and it is doubtful whether a suitable bomber could be imported.

It appears more likely, therefore, that the Indian objective would be to acquire a strategic missile system -- an IRBM with a range of some 2,000 miles. India's space effort could provide the technological and industrial base for supporting a ballistic missile R&D effort, but in view of the relatively early stage of development of the space program, it is highly unlikely that India could deploy effective IRBMs before 1980.

The Political Decision

For several years it has been apparent that -- in the absence of a major breakthrough in nuclear disarmament -- India would sooner or later elect to develop nuclear weapons. We believe that activities specifically related to nuclear weapons development probably have been undertaken. Indeed, if the Indian government has even considered the possibility of embarking on a nuclear weapons program -- and we know that it has -- it would be surprising if research basic to weapons development had not been authorized. The real uncertainty arises in estimating how far these efforts may have proceeded.

While we have no direct evidence to support a judgment on this point, we consider it entirely possible that one or more nuclear devices have actually been fabricated and assembled. If this is the case, a test could be conducted on short notice. We believe that India would abide by the terms of the Limited Test Ban Treaty, which requires that any nuclear tests be underground. Several months would be required to prepare a suitable test site, but we cannot exclude the possibility that such a site is being or has already been prepared without our knowledge.

It is our judgment that a decision to authorize a test is unlikely in the next few months and may well be deferred for several years. The principal arguments against such a decision are: the high cost of a nuclear weapons program, which would be competing with critical domestic programs, and India's full awareness that assistance from the US and other countries (possibly including the USSR) would be jeopardized. It is recognized that there are continuing pro-nuclear pressures, and in the near term the strongest incentive may well be the desire for the increased status of a nuclear power. A decision to proceed with a nuclear weapons program might be viewed as offering short-term domestic political benefits. On balance, however, the factors against testing

would seem to outweigh the increased status and the possible international political and military gains which India might hope to achieve by demonstrating a nuclear weapons capability with no delivery system in sight.

The restraints outlined above could be over-ridden, of course, by other developments (e.g., a resumption of Sino-Indian tensions coupled with a thaw in Sino-Soviet relations). Barring such developments, we feel that Mrs. Gandhi will resist the pro-nuclear pressures and will not authorize nuclear testing. She will make national decisions according to her own priorities and her own sense of national requirements, and is unlikely to see her own or her country's interests as being served by a nuclear test. On balance, therefore, we believe an Indian nuclear test during the next few months is unlikely, and the decision to test may be deferred for several years.

Nonetheless, in view of reports about the possibility of a test and of Indian nuclear capabilities, we cannot completely rule out such a nuclear test. It would thus be prudent to develop contingency plans in the event of such a possibility.

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