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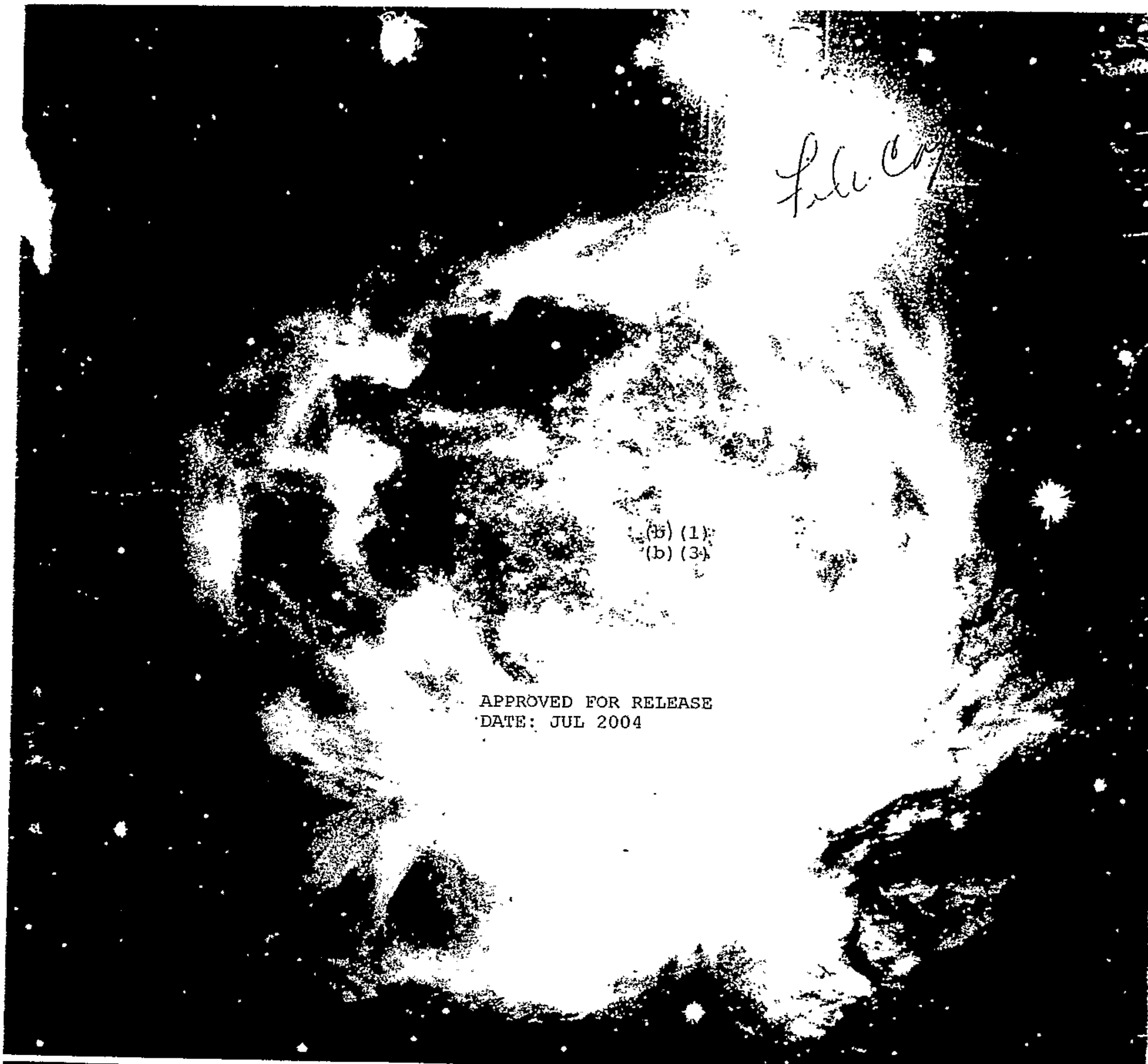

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THE INDIAN NUCLEAR WEAPONS PROGRAM AND DELIVERY CAPABILITIES

[redacted]
Nuclear Energy Division
OSI/CIA

[redacted]
Defensive Systems Division
OSI/CIA

and

[redacted]
[redacted]/CIA

SUMMARY AND CONCLUSIONS

On 16 November, Prime Minister Shastri told the Upper House of Parliament that, while India stood for nonproliferation of nuclear weapons, if China developed her nuclear power and perfected the delivery system, "then we will certainly have to consider as to what we have to do." He added that the integrity and sovereignty of the country and its preservation was utmost in his mind. In replying to questions on the Government's policy with respect to nuclear weapons, Shastri also said: "From the purely practical point it is more important that we build up our own conventional weapons and strengthen ourselves." Shastri subsequently stated (3 December 1965) that India has given up the idea of making an atomic bomb because it cannot afford it. He also said: "Once we produce a bomb we have to build for it the necessary carriers, rockets, etc. It starts a process of escalation which has no end in the swiftly developing military technology of our times. It would be quite impossible for us to meet the cost of this kind of enterprise."

India has established a fairly advanced nuclear energy program which has been publicly stated as being confined to nuclear research, the exploitation of nuclear raw materials, and the development of nuclear power. Facilities are now in operation for the production of modest quantities of plutonium metal. While these facilities would enable India to proceed into a nuclear weapon development program at any time, they have indicated an interest in use as fuel in future power reactors. There is no information on India's capabilities in non-nuclear component technology related to the development of nuclear weapons, but they

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are now apparently increasing their military research and development efforts. There is some evidence that they are interested in establishing a high explosives test site involving advanced instrumentation for research which could be related to nuclear weapons development.

Although they have put themselves in a position to do so, it is believed the Indian government has not yet decided to develop nuclear weapons. It is estimated that India could test its first nuclear device a year or so after such a decision is made. They could probably produce a weapon deliverable by the Canberra light bomber about two years after a first test. With an early decision to proceed with a weapons program, they could produce about a dozen weapons in the 20 KT range by 1970. India signed the 1963 partial test ban treaty but has areas where underground testing could be conducted.

DISCUSSION

Nuclear Energy Research

The principal facility of the Indian nuclear energy program is the Atomic Energy Establishment at Trombay (AEET) which is the site of three research reactors, a uranium metal plant, fuel fabrication facilities, a plutonium separation plant, and the usual research, administrative and support facilities. Of the three research reactors, one is a zero energy critical assembly, another is a 1 megawatt (MW) swimming pool reactor; neither of these has any significant plutonium production capability. The third reactor, the 40 MW Canadian-Indian Reactor (CIR), is the only one that can produce enough plutonium for weapons use. The agreement between Canada and India for the construction of the CIR stated that the reactor would be used for peaceful purposes. However, only the uranium supplied by Canada for half of the first fuel load has stringent safeguard controls. The Canadian uranium was replaced with Indian fuel at an early date, and there are no safeguards on either the uranium or heavy water now used in this reactor.

Information on the mode of operation of the CIR available through mid-1965 indicates that the reactor has been operated at rather low irradiation levels for a research reactor of this type. Irradiated fuel containing 9 to 12 kg of plutonium has been removed from the CIR. It is possible that the irradiation time has been kept short because of fear of fuel element failures at higher irradiation levels. The Indians have expressed interest in uses of plutonium other than for weapons. They have indicated a desire to use plutonium for experimentation and as a reactor fuel. They have stated that plutonium alloy fuel elements are to be used in the CIR to provide the neutron flux enhancement needed for future reactor research programs. The Indians also are considering the construction of another research reactor at AEET which would be fueled with natural uranium en-

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riched with 0.2% plutonium oxide. (Plutonium oxide would be used in place of enriched U-235 which the Indians have no present capability to produce.) The Indians have announced a long range plan to use the plutonium produced in the first nuclear power reactors to fuel more advanced types of future power reactors.

India presently plans to have three nuclear power stations in operation within the next decade. The first nuclear power station, at Tarapur about 60 miles north of Bombay, is now under construction and is expected to be in operation by 1968 with an installed electric power capacity of 380 MW. The Tarapur station will consist of two U.S.-supplied boiling-water reactors using slightly enriched uranium provided by the United States. The second nuclear power station is being constructed at Rana Pratap Sagar, Rajasthan, with Canadian assistance. This station will have two natural-uranium-fueled, heavy-water-moderated reactors identical to the 200 MWe Canadian CANDU reactor. The first 200 MWe reactor is expected to be in operation in the period 1969-70. Originally, the Indians planned to construct -- without foreign assistance -- the second 200 MWe reactor at the Rajasthan site and the third nuclear power station which is expected to go into operation at Kalpakkam, Madras, about 1972. Sweden assisted India in conducting a feasibility study for the Kalpakkam nuclear power station, but it was announced recently that Canada will assist India in the construction of the second Rajasthan reactor and the two reactors to be built Kalpakkam. Both the Tarapur nuclear power station and the first reactor of the Rajasthan nuclear power station are subject to the safeguard controls required by the United States and Canada respectively. It is expected that the other nuclear power reactors to be constructed with Canadian assistance will have similar safeguard controls. In any case, none of these reactors could be in operation prior to 1968, and, therefore, could not contribute to the production of plutonium prior to 1970.

India has more than adequate fuel supplies for the production of plutonium. India has been processing its monazite deposits to extract uranium for a number of years and has purchased uranium concentrate from France [redacted] Belgium [redacted] and Spain [redacted] without safeguards. In addition, the domestic production of uranium is being increased. Mining has begun in the state of Bihar where large deposits of uranium ore have been found, and a concentration plant to process 1,000 tons of ore per day, with an annual production of concentrate containing about 200 to 300 tons of uranium metal equivalent, is expected to be in operation by mid-1966. The capacity of the uranium metal plant and fuel fabrication facilities at AEET can be expanded to handle most of this uranium concentrate. A plant is being constructed at AEET for producing about 50 tons of uranium per year as uranium oxide pellets canned in domestically produced zircaloy. This plant is expected to be completed within two years and is being designed so that it can be expanded. India has a heavy water plant in operation at Nangal which has been in operation since August 1962. This plant

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has a capacity of about 15 tons of heavy water per year. Consideration is being given to the construction of a heavy water plant having an annual production of 200 tons of heavy water, but the site has not yet been selected and completion of the plant is not expected in less than four or five years.

A plutonium separation plant went into initial operation at AEET in March 1964 using unirradiated uranium to test the facility. By October 1964, the separation plant had processed the first run using irradiated fuel from the CIR. Although the Indians announced that the plant has a "nominal" capacity of 30 tons of uranium per year, we believe it could process several times this amount. The end product of the separation plant is a plutonium nitrate solution. A small facility to convert the plutonium nitrate solution to plutonium metal was completed in January 1965 and 50 grams of plutonium had been processed to the step prior to plutonium metal reduction. The reduction furnace was ready, and it was expected that actual reduction would be carried out by late January-early February 1965. While small, the facility has all the necessary equipment to produce plutonium metal at the rate of between 250 to 500 grams per week or more, which is sufficient for about two weapons per year. This is more than enough capacity to process the irradiated fuel from the CIR.

Delivery Systems

The Indian Air Force (IAF) has only a limited nuclear delivery capability at the present time. Assuming weapons of size and weight compatible with existing aircraft were made available, the IAF could use any of its fighters -- the MIG-21, Mystere IVa, Hunter F. Mk56, or the Gnat I -- for tactical delivery. The IAF Canberra and B-24 bombers could deliver weapons from medium altitudes against Asian targets within a 1000 n.m. radius. Nevertheless, because of age and vulnerability, it is unlikely that the B-24s would be used for nuclear delivery. The IAF also has some U.S. C-130 and Soviet AN-12 cargo aircraft that could be used to deliver a weapon.

With the limited capability of the Indian aircraft industry, it is unlikely that India could develop a modern strategic delivery aircraft by the 1980 time period. The Indians have designed and are currently producing the HF-24 fighter aircraft with a tactical delivery capability. It is probable that the Indians will continue to design and produce their own tactical fighter aircraft. If India decided to acquire nuclear weapons within the next 10 years they would probably seek medium bombers with combat radii of about 1500 n.m. from the major powers. However, at the present time, the Indians are building a factory to produce the Soviet-designed MIG-21 which is capable of tactical nuclear delivery.

India has limited research development and test facilities to develop a short range ballistic missile system. Such a system could reach an initial operational capability in some five to seven years. India's missile propulsion capability would stem either from the Soviet-supplied solid propellant facility at Nasik, India, or the French-provided

CENTAURE. Neither of these programs is much beyond the planning stage at present. The Nasik facility is to produce the Soviet K-13 ATOLL air-to-air missile, while the CENTAURE is a relatively small two-stage solid propellant sounding rocket. While these might provide a basis for India to eventually produce a longer range ballistic missile, considerable outside technical assistance and foreign components would be required. [redacted]

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