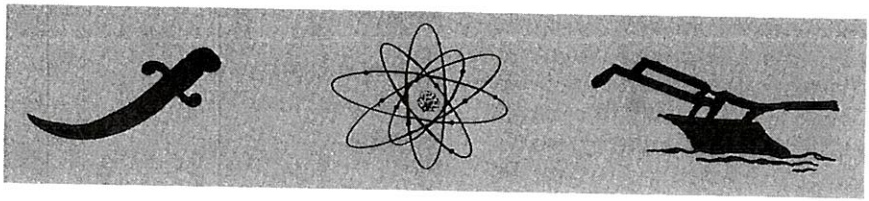
Military Review

Professional Journal of the US Army

FORTY-FOUR YEARS OF MILITARY SERVICE

VOL XLVII JAN 1967 NO 1

India on the Nuclear Path



Wing Commander Maharaj K. Chopra, *Indian Air Force, Retired*

FROM the nuclear point of view, the countries of the world may be placed in three categories: those which have few nuclear resources or no arrangements to tap them; those which, having them, are turning them to the development of nuclear energy; and those which are producing nuclear energy as well as nuclear weapons. Presently, India is in the second category, but she may also be in the third. This fact forms the central point of the nuclear debate now raging in the country.

The energy of an atom is released when a part of its nucleus vanishes. Theoretically, each of the 88 elements can yield nuclear energy, but, in practice, and so far, only the heaviest and lightest have been harnessed —uranium and hydrogen. Natural uranium contains uranium 235 which is easily fissionable. Human ingenuity and technique are concerned with the separation of uranium 235 from natural uranium.

Gaseous diffusion is the process used in producing U 235 by all the five countries which are presently capable of making nuclear weapons. The details of its technique are still a secret. Funds in the multibillion-dollar range are required. Industrial capacity of a high order is needed, supported by exceptionally large quantities of electric power. Because of its size and nature of construction, the great nuclear complex cannot be wholly hidden.

Countries which do not have resources of this order and yet would like to embark on a nuclear program could adopt comparatively cheaper methods. The method presently in use is to employ uranium as fuel in

reactors. Reactors generate enormous quantities of heat, and the heat can be converted into power which can be put to civil uses. Plutonium is produced as a side product which can be separated and preserved. The process of separation is difficult and expensive, but less so than the separations of U 235.

Indian Progress

For a country to go nuclear, the first problem is thus one of raw material. As far as uranium is concerned, substantial quantities of it have been found in the Indian state of Bihar. A uranium mill, capable of treating 1,000 tons of ore per day, is under construction and was expected to be completed by the end of 1966. Uranium has been found in at least three more places, including a sector of the Himalayas, and search is proceeding at other likely sites also. The present estimate, however, is that, once India embarks on a large-scale nuclear program, her own indigenous deposits of uranium may be inadequate.

India's nuclear effort may be traced back to 1945 when the Tata Institute of Fundamental Research was established, with nuclear physics as a prominent subject of study. This institute is now considered one of the foremost of its kind in the East, and has provided a sizable contribution to the main nuclear energy program.

The program was initiated in 1957 when the Atomic Energy Department was inaugurated. It has since been organized into many divisions of scientific disciplines, including physics, chemistry, biology, engineering, and metallurgy. Its area of activity has recently been extended to include rocketry and space programs.

The physics division presently is carrying out investigations in the fields of nuclear physics, fission physics, and reactor physics. The engineering division has built a reactor which helps to provide the radiation source in nuclear science. The electronics division produces electronic instruments in support of nuclear power stations and research effort. The department is now setting up a plant to produce heavy water. The most ambitious effort of the department, however, lies in the construction of nuclear power stations.

Three-Stage Program

Taking into account the availability of fissionable material and the progress made by the Atomic Energy Department, the late Prime Minister Lal Bahadur Shastri defined the process of implementing the nuclear power program in a statement made to Parliament in September 1964. The program would be implemented in three stages. In the first stage, reactors fueled by natural uranium would produce plutonium. Then the reactors would be fueled by plutonium, producing U 233 from thorium. In the third stage, reactors would be run on the thorium-uranium cycle.

The late Prime Minister did not say that India would produce U 235, but, in a subsequent statement, he revealed that Indian scientists were engaged in the study of the technique to separate this fissionable material from natural uranium by gaseous diffusion.

Four nuclear power projects have

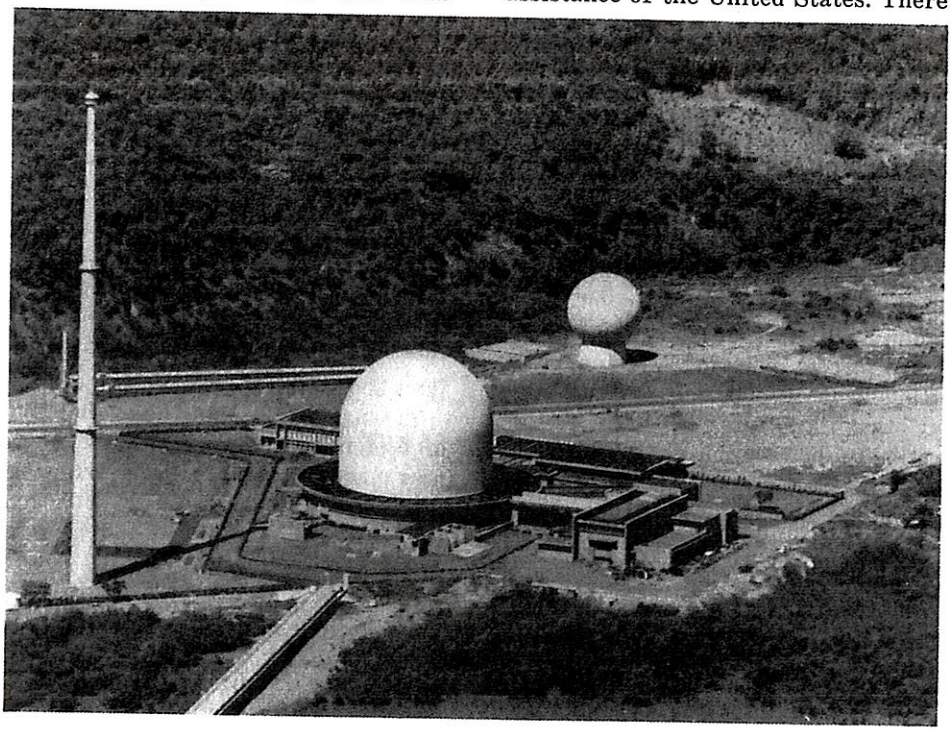
Wing Commander Maharaj K. Chopra, Indian Air Force, Retired, is military correspondent for the English-language Indian newspaper, The Indian Express. *A frequent contributor to the* MILITARY REVIEW, *he is the author of "Red China Colonizes Tibet" which appeared in the July 1966 issue.*

been undertaken in India, one of which is complete. The completed project relates to the construction and installation of an Indian-Canadian reactor near Bombay. This uses natural uranium originally supplied by Canada, but now also available from indigenous resources. A plant for the extraction of plutonium was completed last year, along with a unit to treat the highly radioactive waste. This places India in the category of half a dozen countries of the world possessing similar facilities.

Compared to the Bombay reactor of 40-megawatt capacity, the second reactor, which is under construction in the state of Rajasthan, will have an initial capacity of 200 megawatts, to be doubled subsequently. It will be fueled by natural uranium and employ heavy water as moderator. The Rajasthan project is being executed in cooperation with Canada although India's indigenous contribution is now considerable.

The third project is being executed in the state of Maharashtra with the assistance of the United States. There would be two reactors, each of 190-megawatt capacity. They would be almost as large as those in Rajasthan, but would differ from them by using enriched uranium for fuel rather than natural uranium.

Both the Rajasthan and Maharashtra projects are well on their way to completion, and the reactors are expected to begin functioning by 1968. The Madras project, the fourth of its



Press Information Bureau, Government of India

A nuclear reactor in India

kind, is in its preliminary stages. The construction has started, and the terms of cooperation with a foreign country are being settled. It is expected to be of the 400-megawatt class, fueled by natural uranium, with 1970 as the target date for completion.

Peaceful Purposes

This nuclear program is to generate power for peaceful purposes. Madras does not have coal, Rajasthan is deficient in hydroelectric power, while Maharashtra, an advanced state, needs more power than the customary sources can provide. The programs are a part and parcel of the five-year plan for development. Funds earmarked for them are openly stated, and, for the current year, the allocation is only 86 million dollars. Altogether, the three projects will generate 1.2 million kilowatts of power to light tens of thousands of homes and hundreds of schools, hospitals, and industries.

All four plants are located in areas which are easily vulnerable. The Bombay plant is on the coast. The Madras and Maharashtra plants are less than 100 miles from the coast, and the Rajasthan plant is close to the Indian-Pakistani border. Much more secure areas are available in the country, but were ruled out as unsuitable for the specific ends in view.

All the projects involve cooperation with one or another foreign country. Nearly 40 percent of the cost involved is met in terms of foreign exchange which is an important consideration. Besides, even with her advanced skills, India is not in a position to carry the projects to the point of completion alone. Because of international cooperation, India is also subject to one or another international safeguard governing the supply of nuclear material and expertise. For instance, the Indian-United States agreement provides for the application of the control provisions of the International Atomic Energy Agency. By provision of its statutes, the agency can satisfy itself that the nuclear facility is not so designed as to be used for military purposes, it can ask for progress reports, and it can demand inspections.

Nuclear Threat

If this is the position in regard to India's nuclear program, how, then, does the question arise of India building nuclear weapons? The key to the answer does not lie so much in India as outside India. In fact, so far as the present position is concerned, it lies almost wholly in the developments in mainland China.

Among Red China's recent significant developments is her capability to build a nuclear device. It was known in the midfifties that she had acquired from the Soviet Union a nuclear reactor, as well as designs, to manufacture a nuclear device; that her nuclear scientists were being trained at the Soviet Institute of Nuclear Research at Dubno; and that large uranium deposits had been found in Sinkiang.

Also, for years there were numerous reports concerning secret activities at the junction of the Provinces of Sinkiang, Kansu, and Tsinghai. It has since been confirmed that China's main nuclear activity is located in this region. The four nuclear explosions since October 1964 may have caused surprise, but they should have been expected.

Sino-Indian confrontation lends great piquancy to this development. This confrontation dates not from October 1962, when the Red Chinese Army invaded India, but from 1954

when China almost forced India into signing the Sino-Indian Agreement on Tibet which meant, in effect, India's expulsion from a strategic area. For over a decade, Tibet has been developed as a military base where up to 15 divisions of the People's Liberation Army are permanently stationed.

The militarization of Tibet brings dangers from central Asia to the doors of India in a manner unprecedented in history, for invaders have in the past descended only through northwestern routes which lie beyond Tibet. Airpower has added to the danger.

The North Indian Plain, containing the country's densest population areas, as well as a large number of vital points, comes within striking distance of conventional bombers which Red China possesses. There is ample evidence to suggest that the strike capability of Red China is improving. This will eventually include better bombers and a sizable stock of missiles capable of reaching areas beyond the northern plain.

Impact of Weapons

Until the Chinese attack in 1962, India had hardly felt the impact of nuclear weapons. Since then, the impact has been widespread and profound. The impression has grown that the only deterrent to the developing threat is for India to possess nuclear weapons of her own. The question then arises whether India can build them. The answer has been given both by scientists and political leaders to the effect that she can if she wants.

No further elaboration of this position has been made officially; however, unofficial estimates have been forthcoming and published in India and abroad by knowledgeable people. Nuclear bomb-making technology is highly complicated and largely secret. Broadly speaking, it requires fissionable material, the facility to render it critical, and a device to control explosion. The latter two elements are purely technical, and it is considered that, with her nuclear experience of many years and with her present team of over 2,000 nuclear scientists, India is capable of generating them.

Material Availability

The question then revolves around the availability of fissionable material —U 235 and plutonium. India is not extracting her own U 235, but stockpiles of plutonium could now be built. So far as the US-supplied reactors are concerned, they would not yield plutonium, fueled as they are with enriched uranium. All other reactors have a plutonium-producing capacity.

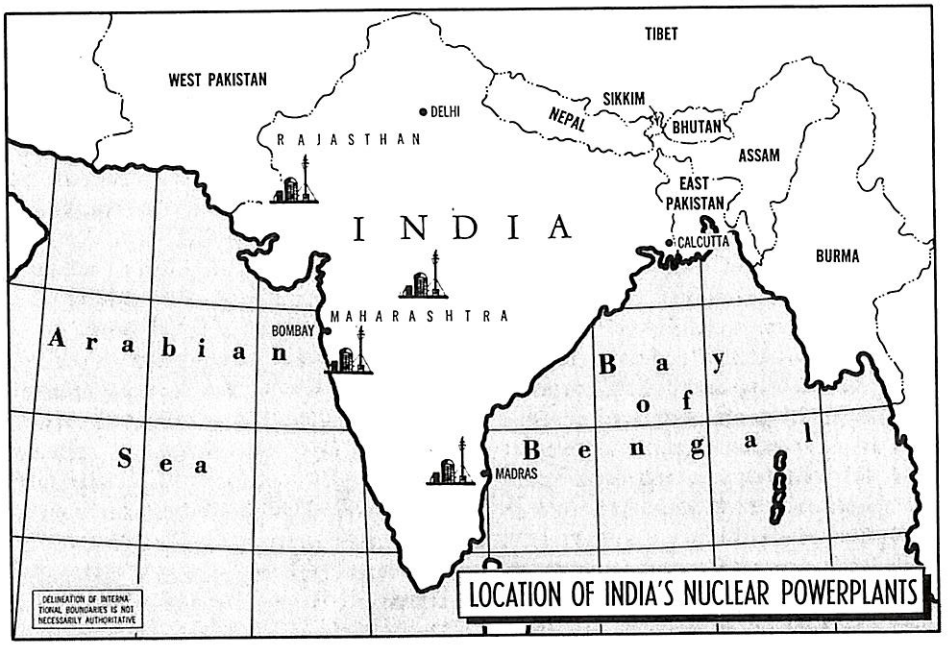
One estimate, based on the planned yield of power, suggests that the present nuclear projects could supply enough plutonium per year to make 100 small-sized bombs. Reactors operated with India's own resources, particularly fuel, would not be subject to rigid international safeguards.

There is, of course, a long road to travel from the point of making plutonium to the point of making a weapon. Plutonium by itself is not enough for the necessary range of weapons; U 235 is also required in conjunction with it. To convert a nuclear explosion into a proper weapon needs a prolonged period of testing. Besides, from a military point of view, the logical target of the effort would be a full-fledged weapon system which should include bombers and missiles as well as bombs. India does not presently have the answer to all the problems of military nuclearism, but could find it if the situation became desperate.

What should be the national policy in the face of this dilemma? So far the policy has been clear and categorical. India has been emphatically opposed to the use of nuclear energy for military purposes and declared that she would not build nuclear weapons.

There are many reasons for this, some, perhaps, not easily defined. Among the latter would be the Indian chain of sages, practiced on a limited scale in India, have now acquired a validity for all mankind. These precepts, therefore, should be kept at the forefront of all Indian endeavor.

More tangible reasons are also given. The energy of the atom opens vast possibilities for the material benefit of mankind. Some of its characteristics are unique. These include its



traditions of nonviolence and peace so powerfully expounded and preached by Mahatma Gandhi. Gandhi could not carry the nation fully with him, but inspired millions of people in their ancient faith.

Some of these people dominate the Indian scene and are in positions of influence and authority. They maintain that violence, never justifiable in human relations, has no place whatever in this nuclear age. They say that the precepts of Gandhi or, for that matter, of the Buddha and a whole lack of need for oxygen, its capability of producing from milliwatts to megawatts of power, its ability to operate unattended for extended periods, and its availability in inexhaustible quantities.

Thus, nuclear energy can be used not only on the earth's surface, where man lives, but also underneath the oceans and in space. It has already been used for propulsion and for generation of electric power. Desalinization plants run by nuclear energy are well on the way. Radioisotopes are be-

coming almost commonplace in hospitals, factories, and laboratories. Oceanographic explorations are increasingly demanding nuclear gadgets.

Indeed, the atom has limitless potential for producing wealth. Plausibly enough, its peaceful exploitation may contribute, in the long run, to the abolition of the biggest cause of war among nations—shortage of wealth.

Another highly practical reason for not producing nuclear energy for military purposes bears on the nation's economy. The building of nuclear weapons would be a tremendously expensive project. The question is whether India could or should undertake it in her present phase of economic development which is so heavily committed to providing ordinary necessities of life to millions of people.

For a democratic country like India, this is a long and difficult process, dependent on persuasion and consent. It is also dependent upon outside countries for assistance which includes vital technical know-how and foreign exchange. It would be neither morally justifiable nor politically wise to divert national effort to a program of such massive dimensions as the manufacture of nuclear arms.

These and other good reasons are given in support of the stand to keep out of the race for nuclear arms. But one must also contend with reality.

The younger generation, and students, in particular, the intellectuals, the strategists, the writers and thinkers on power politics, and the ultra nationalists, all point vigorously to the dangers of military backwardness and inferiority in relation to an avowed enemy. Even the more sober among them admit that to keep the field so patently clear for a totalitarian and imperialist Communist China is portent of danger to India as well as this entire part of the world.

Three lines of thought seem to be current against the above background. The first is concerned with a "nuclear umbrella" which is an alliance with a nuclear power against a nuclear threat from Communist China. For a nonaligned country like India, such an alliance is difficult; besides, its credibility is in doubt. It has been cynically stated that India would be finished before the umbrella opened. Allied with it would be the proposal to establish nonnuclear zones in this part of the world. This is ruled out because it would require the consent of Communist China. Held only in nonofficial circles, and never officially sponsored, this line of thinking does not seem to have much future.

On a second front, India is making efforts in the 18-nation disarmament conference to bring about a treaty on the nonproliferation of nuclear arms. This again would require participation of Communist China. Even otherwise there are difficulties. India would not like to accept a treaty which heaps all the controls, all the limitations, and all the prohibitions on nonnuclear countries, and would like to have a treaty which embodies an acceptable balance of mutual responsibilities and obligations of nuclear and nonnuclear powers.

Meanwhile, Indian leaders, from the Prime Minister down, are assuring the public through statements made in and outside the Parliament that they are seized with the dilemma, that the technical know-how is being developed to the maximum extent, that the nuclear threat is constantly assessed, and that nuclear policy is liable to change if conditions warrant.