TARAPUR

CLOSE TO SHUTDOWN?

"I have said that we will never take to nuclear weapons even if this country is going to be destroyed in the absence of (such weapons). I will not take to it, even if the whole world takes to it."

—Prime Minister Morarji Desai

These words were spoken soon after President Jimmy Carter's New Year visit to New Delhi in January. Carter's visit had been a resounding success. Indo-American relations had once again 'peaked'. Yet, there had been one major jarring note, one area of stubborn disagreement. Desai had refused to be convinced that India ought to sign the Nuclear Non-Proliferation Treaty. He had also turned down Carter's request that India allow all her nuclear installations to be inspected periodically by the UN-affiliated International Atomic Energy Agency (IAEA).

That was not all. Carter was told in unmistakable terms that "he had no right" to ask India not to make nuclear arms so long as his country continued to manufacture them. Soon after Carter left aboard Air Force One for Saudi Arabia, Desai told newsmen: "If there are safeguards which can be accepted, they will be. But if there are difficulties they will not be accepted."

The 'difficulties' Desai was referring to centered around the supplies of enriched uranium for the Tarapur Atomic Power Station near Bombay. The United States, which had been supplying enriched uranium for Tarapur ever since its operational inauguration in 1969, had made further supplies conditional on the acceptance by India of 'fullscope' safeguards—diplomatic shorthand for placing ***all*** nuclear facilities of non-weapon countries under international inspection, while weapon countries escaped such controls.

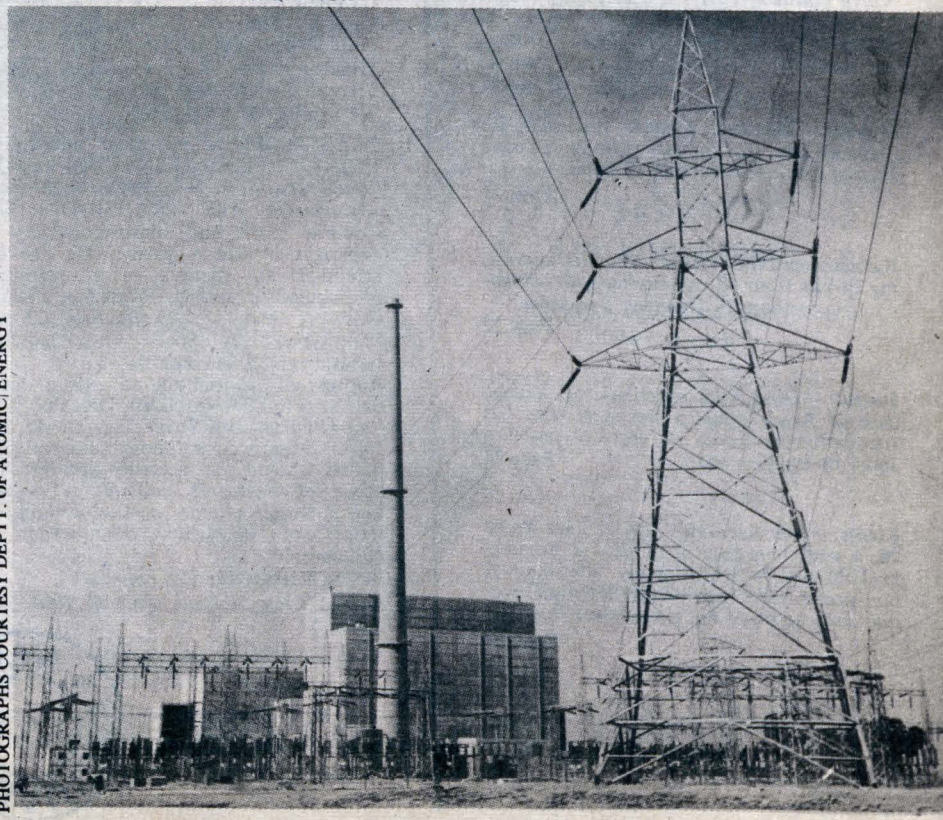
Tarapur had been set up with American assistance, and the prime contractor for the station had been the International General Electric Company of the US. In December 1963, the US Agency for International Development had granted a loan of $80 million for the project. And in September 1963, India and the United States had signed a Bilateral Agreement for cooperation relating specifically to the Tarapur project. It was agreed that only the Tarapur project would be subject to inspection by the United States, which promised to ensure supplies of enriched uranium during the life of the station.

The Tarapur site was chosen for India's first nuclear installation because of the economic importance of the region it serviced—it supplied electricity to the vital industrial grid of Maharashtra and Gujarat on the west coast. Annually, the station has been supplying roughly 2,000 million kwh of electricity to the grid (***see map on page 6***). One need not be an expert to realize that the effect of the station shutting down would be disastrous to the region's economy.

Why were the Americans making supplies of enriched uranium conditional on India's acceptance of safeguards? The seeds of this discord lie in the Bilateral Agreement of 1963. In 1976, when the US Nuclear Regulatory Commission was considering shipment of a uranium consignment to India, three American associations—the Natural Resources Defense Council Inc., the Sierra Club, and the Union of Concerned Scientists, had alleged that it was the US itself which "permitted and even encouraged India to develop an extensive and unsafeguarded nuclear establishment." The associations charged that in 1963, at the time of the signing of the Bilateral Agreement, the US Atomic Energy Commission (AEC) "was well aware of India's intentions to reprocess spent fuel from Tarapur in India as soon as she was in a position to do so." "Yet," the submission went on, "the US did nothing to dissuade India from its intentions."

Indeed, the submission went on, "the agreement for cooperation itself contemplates in Article ii(e) that reprocessing might take place in India itself." Besides, "the US was careful to assure India that safeguards would not be tied to the contemplated Tarapur reprocessing plant as a whole but only just some operations."

TARAPUR ATOMIC POWER STATION



PHOTOGRAPHS COURTESY DEPTT. OF ATOMIC ENERGY

DR. HOMI BHABHA, THE MAN WHO FIRST THOUGHT OF AN EXPLOSION

The three organizations warned that the Uranium-235 sought by India could be used to make atomic weapons. The Nuclear Regulatory Commission, however, felt that the safeguards were sufficient to ensure that the material would not be used to make atomic weapons, and approved the shipment in mid-1977. "Even if India explodes a weapon arguably constructed with entirely indigenous material utilizing technology not received from the US, the US government has announced its intention to terminate the supply of fuel to Tarapur," the NRC told the citizens' groups.

A plutonium reprocessing plant had been set up at Tarapur in 1964, and it was widely believed that it was plutonium from this plant that had been used by India in the 10-kiloton underground atomic blast at Pokharan on May 18 1974. That blast, that small black box, had been responsible later on for a rash of hysterical allegations by other countries that India was on the verge of building up a stockpile of nuclear weapons. India's protestations that the blast had been for "peaceful purposes" had been brushed aside by atomic experts, who had opined that there was no such thing as an atom bomb for "peaceful purposes".

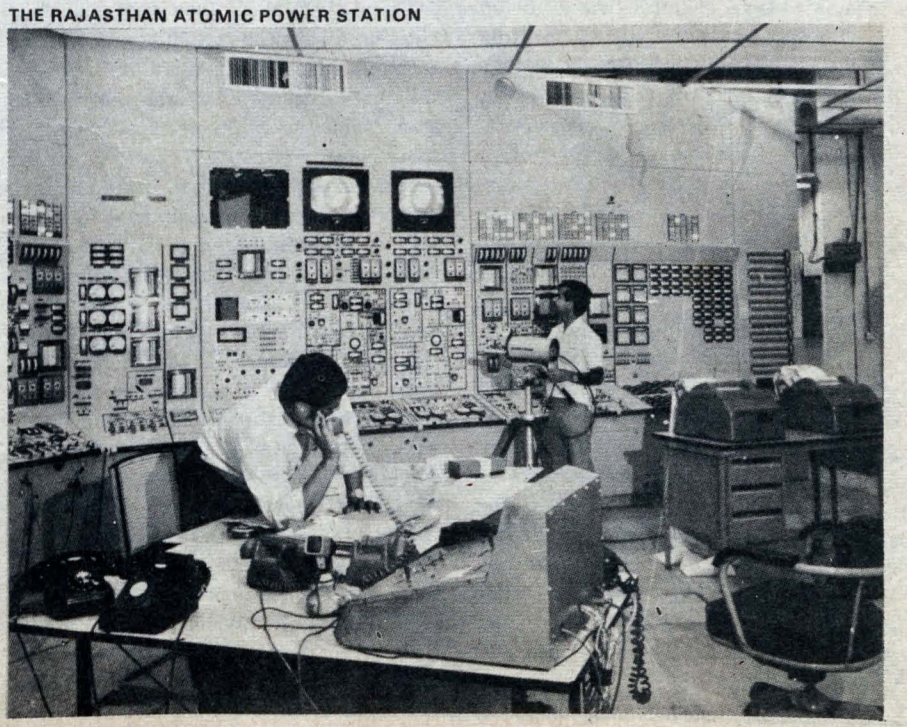
The Pokharan blast catapulted India into the companionship of five other countries that have detonated nuclear devices—the United States, the Soviet Union, China, Britain, and France. The very fact that a Third World country had dared to claim membership of the exclusive Bomb Club had angered Western governments. Today, in retrospect, the reasons for the Indian government's decision to go in for the blast seem hardly military—the move had been more a face-saving one. The then Prime Minister, Mrs. Indira Gandhi, had been steadily losing her base of support. The euphoria of the 1971 elections, and of the Bangladesh victory, had worn off. The crippling railway strike, drought in 1972 and 1973, the consequent rise in prices, runaway inflation—these had plagued Mrs. Gandhi. The Pokharan blast had resulted in a fresh upsurge of national pride. The hawks in the government had hailed this demonstration of India's potential. "India will no longer be treated as a second-rate nation," they had exulted

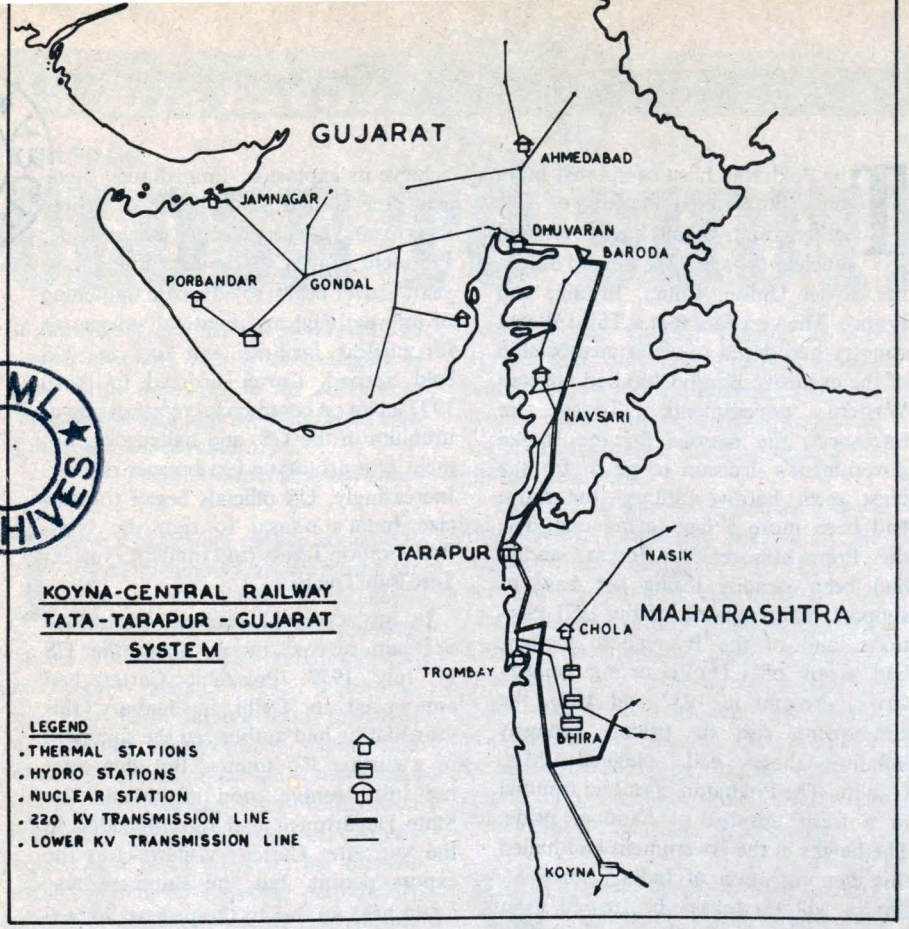
But the consequences of the Pokharan blast had been far-reaching. Canada, which had been collaborating with India in the setting up of the second atomic power station at Rana Pratap Sagar in Rajasthan, cut off all nuclear aid to India, accusing New Delhi of using Canadian equipment and expertise to achieve its explosion. Immediately thereafter, the United States began to tighten its grip, and matters reached a head under President Carter's administration. Last year, Carter began to advocate tightening of international and bilateral safeguards for nuclear facilities and fuel the US sold abroad. Carter ordered in April 1977 a ban on commercial reprocessing of uranium in the US, and halted development of a prototype fast-breeder reactor. Increasingly, US officials began to criticize India's refusal to sign the Non-Proliferation Treaty (NPT) and the Nuclear Test Ban Treaty.

In any case, 12 tonnes of enriched uranium arrived by air from the US in July 1977. President Carter had announced in Delhi in January this year that he had authorized the shipment of a further 7.6 tonnes. But this offer ran into trouble soon afterward. The State Department had recommended to the NRC after Carter's visit to clear the export permit, but the shipment was again held up due to the protests lodged by environmentalist groups in the US.

Interestingly, the Pokharan blast does not seem to be a spontaneous decision. In a book titled ***India's Nuclear Option: Atomic Diplomacy and Decision-Making*** by Ashok Kapur (Praeger Publishers, 1977, New York), the author surmises that Dr. Homi Bhabha, the

CONTROL CONSOLE IN THE OPERATING GALLERY OF THE RAJASTHAN ATOMIC POWER STATION





father of India's atomic policy, was the one consistent nationalist who had his country's security interests constantly at heart. Bhabha resisted pressure from Canada and the US during Lal Bahadur Shastri's tenure as Prime Minister to sign the Non-Proliferation Treaty. Kapur claims that Bhabha put forward a note in November 1965 on the need for conducting a subterranean nuclear explosion project (SNEP).

Dr. Bhabha died in a plane crash in January 1966, and was succeeded as the Chairman of India's Atomic Energy Commission by Dr. Vikram Sarabhai, who, Kapur says, was against the SNEP. Dr. Sarabhai called off the SNEP and accepted tougher safeguards on the Rajasthan Atomic Power Project Phase II (RAPP II). The RAPP Phase I had included a provision for inspection, but only Canada could inspect it, and inspection was restricted to first-generation fissile material, tied to supply of Canadian uranium. IAEA inspectors, however, were allowed to inspect RAPP II. Senior officials like Jagat Mehta and Rikhi Jaipal in the External Affairs Ministry had pressed for signing the NPT, and Mrs. Gandhi had come close to it. But the Cabinet was opposed to the Treaty, with Morarji Desai and Y.B. Chavan leading the opposition. Indian public opinion polls had shown an Indian inclination toward manufacture of nuclear weapons.

It is ironical, if one looks back, to note that the US, in the '60s, had been eager to cooperate with India in nuclear energy in order to "enhance Indian prestige" as at least a "partial offset to the psychological impact of Chinese nuclear devices" and "as an influence in deterring

In Search Of An Indigenous Fuel

India's hopes of improvization of an indigenous nuclear fuel stem from the fact that she possesses the world's largest resources of ***thorium***, a naturally radioactive metal which can be extracted from monazite beach sands. India's southwestern state of Kerala alone possesses thorium resources that exceed 300,000 tonnes, over 70 per cent of the world total.

The Department of Atomic Energy (DAE) has been carrying out sustained research on replacing enriched uranium, which the Tarapur atomic power station depends on, with plutonium. Thorium can produce fissionable Uranium-233 in a fast-breeder reactor, presently under construction at Kalpakkam. DAE scientists estimate that a mixed fuel of plutonium and natural uranium may be used to run the Tarapur plant in the event of a stoppage of enriched uranium supplies from the US.

The US-supplied fuel contains 3% Uranium-235. The remaining 97% is Uranium-238, which is not easily fissionable, but turns into fissionable plutonium after being inside the reactor core for some time.

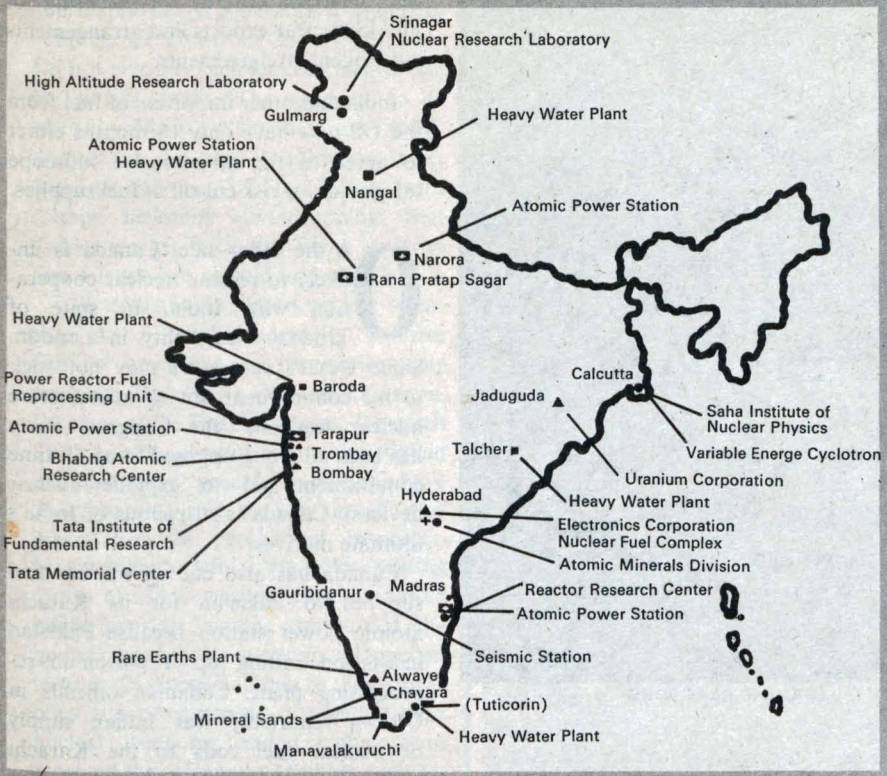
The Rajasthan and Kalpakkam reactors are heavy water-moderated, and can use natural uranium as fuel. The two Tarapur reactors use light (ordinary) water as coolant and moderator, and require a fuel containing enriched fissionable material like Uranium-235. The heavy-water CANDU reactor (which is in Rajasthan and Kalpakkam) can now be manufactured indigenously by India. It seems possible to achieve such a substantial thorium conversion rate in a CANDU reactor that this may well prove far more economical than a fast-breeder reactor. A thorium fast-breeder's conversion rate is 1.1—that is, it breeds 1.1 times as much fissile material as it consumes. In a CANDU reactor the thorium conversion rate would be around 0.9—not much of a difference.

If the Tarapur reactors can be run on a mixture of plutonium oxide and natural uranium oxide in place of Uranium-235, stoppage of US fuel supplies may not affect the plant too badly. Scientists point out that until 1970, the DAE had made over 200 design changes to improve the Tarapur reactors' performance.

The US supplied fuel bundles to Tarapur only till 1973. Since then, India has been receiving only raw enriched uranium hexafluoride powder, and its processing and fabrication into fuel bundles has been done at the Hyderabad Nuclear Fuel Complex (NFC).

Further, the plutonium reprocessing plant at Tarapur yields 100 tonnes after separating plutonium from the Tarapur reactors' spent fuel. The advantages of developing indigenous fuel supplies can be seen from the fact that uranium costs, at present, around $90 a kilogram.

India's Atomic Energy Establishments



There are four atomic power stations in India, either operational or under construction. The Tarapur Atomic Power Station became operational when its first reactor attained criticality on February 1, 1969. The second Tarapur unit became operational soon thereafter. Tarapur has a capacity of 400 megawatts.

The Rajasthan Atomic Power Station at Rana Pratap Sagar was second on India's nuclear map. Its first reactor (200 megawatts) has been feeding the northern power grid since December 1973. Its second unit, also of 200 megawatts capacity, was scheduled to attain criticality by end 1977 but seems to have been delayed. The two 235-megawatt units of the Madras plant, at Kalpakkam, are slated to go critical by end-1979 and mid-1981 respectively. And the fourth atomic power station at Narora in Uttar Pradesh will join this group with its two units of 235 megawatts each attaining criticality by the target dates of 1982 and 1983 respectively.

internal Indian pressures to embark on a nuclear weapons program".

But the ***atom angst*** (fear of atomic weapons) that the weapon-possessing countries appear to be in the grip of is not entirely their fault. Dr. Richard W. Mansbach, a noted US political scientist and author, had said in Bombay in May 1977 that Indian diplomats in Washington overtly claimed that India had acquired nuclear capability because "that was the only way to make her voice heard in the world".

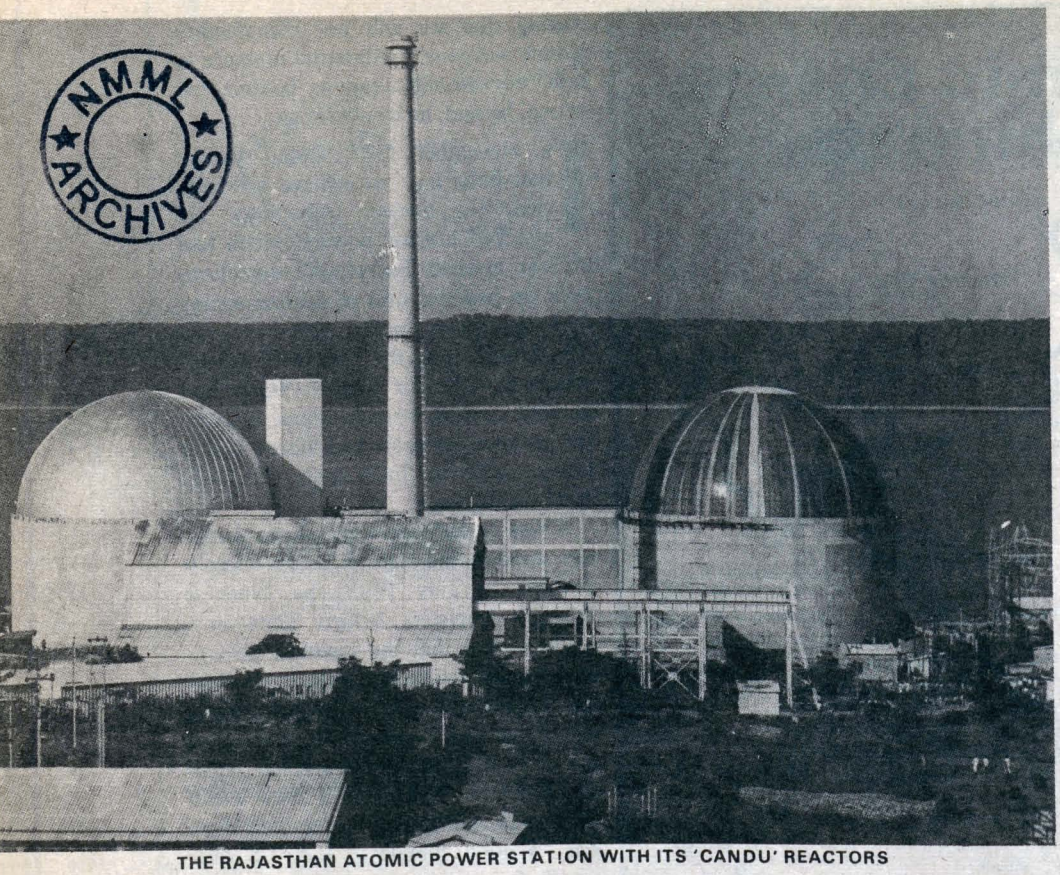
The Janata government that came in last March had initially had confused ideas on nuclear energy. In May 1977, Morarji Desai had told a news conference in Delhi that if a nuclear explosion was necessary for peaceful purposes "then we will do it". He went on to say that nuclear weapons were no good for defense; they were meant only for destruction. To defend itself the country needed conventional weaponry, he concluded. However, by the time the Commonwealth Conference came around in June in London, Desai's anti-blast stand had hardened, and there was even talk of renewed cooperation in the nuclear energy field with Canada after Desai had had cordial talks with Canadian Prime Minister Pierre Trudeau. Later that month, Desai told the Bonn daily ***Die Welt*** that "I will give it to you in writing that we will not manufacture atomic weapons." If internal pressure in India for atomic weapons became too strong, he said, he would resign.

In November 1977, Desai stressed that India has to achieve self-sufficiency in nuclear technology. He attacked nuclear powers, which had nuclear arsenals but placed restrictions even on peaceful uses of nuclear energy by other nations. Indian atomic scientists complained that the NPT had double standards—one for weapon States and another for non-weapon States. In 1976, for instance, Moscow had agreed to sell heavy water to India only on fairly strict conditions.

It was clear by now that India's anti-NPT stand would lead to further complications. In July 1977, the Japanese Foreign Minister, Iichiro Hatoyama, made it clear that the Japanese government's cooperation with India in developing the peaceful uses of nuclear energy would become "easier" if India signed the NPT. In August, US nuclear negotiator Joseph Nye said in New Delhi after talks with Indian leaders that there was "a good climate in Indo-US relations" for considering further supplies of enriched uranium to Tarapur. The opposition Congress party, however, had been vehemently critical of the Desai government's stand, charging it with jeopardizing the fast-breeder reactor program and the reprocessing program of the Department of Atomic Energy by "selling out" to Western interests.

More ominous was the Nuclear Non-Proliferation Bill being piloted then

DR. H. N. SETHNA, THE CHAIRMAN OF THE ATOMIC ENERGY COMMISSION



THE RAJASTHAN ATOMIC POWER STATION WITH ITS 'CANDU' REACTORS

through the United States Congress. This Bill had been supported actively by the Nuclear Suppliers Group, whose declared policy is to see that non-weapon States like India will not attempt to set off an explosion "even for peaceful purposes".

The Nuclear Non-Proliferation Bill has since been passed by both houses of the US Congress, and now awaits President Carter's signature. If it comes on to the American statute book, it will bring in provisions so tight that any country refusing to sign it would cut itself off from nuclear fuel, technology and heavy water supplies. Title III of the legislation pledges the best efforts of the US to insure its liability as a supplier of enriching services for light-water reactor fuel to nations which adhere to the US anti-proliferation guidelines.

Title IV establishes guidelines for the negotiation of new agreements for co-operation, and revises procedures for congressional consideration of those agreements. Title V establishes consistent and effective criteria for licensing of all US nuclear exports and arrangements subsequent to agreements.

India and other importers of fuel from the US now have only 18 months either to agree to the all-pervasive fullscope safeguards, or risk cut-off of fuel supplies.

On the other side, Canada is unlikely to resume nuclear cooperation with India, in spite of Trudeau's cordiality in London. Since Desai's successors may not stick to his commitment not to manufacture nuclear weapons (the Congress Party has been all along opposed to an all-time commitment not to explode nuclear devices), Canada is suspicious of India's ultimate motives.

Canada has also cut off nuclear fuel supplies to Pakistan for its Karachi atomic power station because Pakistan insists on setting up a plutonium-reprocessing plant. Canadian officials in Ottawa reportedly fear Indian supply of nuclear fuel rods to the Karachi station, which uses a CANDU reactor similar to that in the Rajasthan project.

By end December 1977, India had firmly decided not to accept fullscope safeguards on which US fuel supply is conditional, as being against the country's self-respect and basic industrial interests. If the safeguards are accepted, India would have to obtain approval from the IAEA even to set up a new nuclear power station. Even designs and

Can India Build Up A Secret Arsenal Of A-Bombs?

India's 1974 "peaceful" nuclear explosion, insist critics, proves that the dividing line between peaceful and military uses of nuclear energy is very, very blurred. All it takes, they point out, is around 10 kilograms of plutonium or 20 kilograms of highly enriched uranium to make atom bomb. The former US Energy Research and Development Administration (ERDA). —recently made a part of the new Department of Energy—conducted a study of the potential possessed by certain less developed countries to produce nuclear bombs by 1990. This study says that India's annual potential in 1990 for making small A-bombs could be as high as 544—an estimate that tops the ERDA's list. This surmisal, one must note, is the worst case, assuming that ***all*** available plutonium is turned into bombs.

But experts point out that it would be necessary to divert only 2%-5% of the plutonium produced each year to make a single bomb—a range that falls within the IAEA's limits of error for nuclear materials accounting. Even if a country like India were to agree to inspection of all its nuclear installations by the IAEA, that agency, with a staff of just over 80 inspectors, is just not equipped to check facilities in more than 70 countries, leave alone India. And, even if a diversion of fuel toward military purposes is detected, the IAEA can, at the most, report its finding to the UN Security Council. Which underlines the fact that if a country is secretly determined to manufacture nuclear weapons, there is no safeguard system that can prevent it from doing so.

drawings would have to be submitted to the IAEA.

The only gleam of hope lies in the fact that the new US law is likely to empower the US President to exercise his discretion in not applying its provisions to countries of his choice. However, Carter apparently did not give any such assurances in Delhi in January. Instead, he appeared to be irked by Desai's "adamant and cold" attitude on the Non-Proliferation issue, and told Secretary of State Vance, with snoopy newsmen eavesdropping, that "when we get back we ought to write him a letter just as cold and blunt".

It is evident that Indian nuclear scientists do not wholeheartedly endorse Desai's unequivocal pronouncements against nuclear blasts. Dr. Raja Ramanna, Director of the Bhabha Atomic Research Centre, told a symposium in Ahmedabad in January that peaceful explosions have an important role to play in effective exploitation of geothermal resources. Meanwhile, in Delhi, Desai told a visiting group of US correspondents that India might consider signing the NPT if the nuclear powers (1) gave up all nuclear testing; (2) stopped adding to their stockpiles and progressively dismantled their nuclear weapons, and (3) themselves accepted the safeguards they are suggesting. That seems to be an impossible dream, however.

In the face of a likely stoppage of fuel supplies from the US, India is now actively thinking of indigenous substitution. (***See box***). Desai told a visiting team of US Senators in January that India would "improvize" to fill in the gap if the US refused it enriched uranium. Later, British Prime Minister James Callaghan suggested, during his State visit, that India could accept the fullscope safeguards while not signing the NPT. Desai soon thereafter clarified that India's stand remained unchanged in regard to fullscope safeguards.

So that is the position, as of today. Even if the shipment of 7.6 tonnes of enriched uranium promised by Carter were to arrive, it would keep the Tarapur Atomic Power Station operational only until early 1979. If improvisation does not come through then, the plant may have to be shut down indefinitely, leading to crippling shortages in supply of electricity to the Maharashtra-Gujarat belt. But at least India will have had the satisfaction of proving that the haves cannot always pressurize the have-nots into accepting unrealistic terms and conditions.

Chaitanya Kalbag

KEYHOLE

The Kidney That Nobody Wanted

Once upon a time, or barely a month ago, in New Delhi, there was a man with something to give, his kidney. His story was out in the papers because this man with a kidney to give found no takers. There was nothing wrong with his kidney. It was probably as sturdy a bean as ever pumped the water of life. The problem lay in the hospitals, which seemed to think it a bit of a joke, especially at the receptionist's level.

The man, much burdened by the giveaway no one wanted, apparently shuttled around from ward to ward, and was met with light laughs and odd looks. So much for social attitudes toward altruism.

All over India, around 180,000 people are giving away blood for a living, for around Rs. 50 a go. Enough takers. And also enough casualties later when the poor-grade blood is transfused. The moral is, if you have a kidney to spare, keep it. Discrimination is alive....

And kicking. The matrimonial columns of Indian newspapers bulge with them. "Only non-Koundinyas need apply". "Slim, pretty, Moolam girl". "Match for four-figure Saraswat Gaur foreign-returned engineer". You could walk about Bombay and never be reminded of castes and subsects, but a brief trip just about anywhere that isn't urban is eye-opening. In almost any village you remain an enigma until your caste is known.

In most cases, knowing your caste seems not to matter, rather like knowing someone's astrological sun-sign. Done for its nothing value. But if perchance you are a Harijan, maybe things would start looking grim. Things are not helped any when Ministers of the nation exhort one caste to discriminate against another. None other than the downtrodden masses' own representative in the Lok Sabha, Jagjivan Ram, did just this. Talking to a gathering of Harijans, he urged them to put Brahmins in their place by not inviting them to their parties. (Or religious functions, as the case was). The Brahmins, none too miffed, said they wouldn't have gone, anyway. What came out was that Brahmins feel as Brahmin today as way back when, and Harijans, thanks to J. Ram, are being made to feel as Harijan as ever. Thank you, Mr. Minister, for a splendid job.

What about "the atmosphere of fear in the north" (sic)? The statement came from none other than Mrs. Indira Gandhi herself, who, after a canvassing tour of some states, announced that the countryside was living in abject fear. (Incidentally, of what?) Later, after a tour of other Indian parts, she announced that "a reign of terror had been unleashed in the south" (or west or whatever). Up and down the nation Mrs. G. zips and zooms pointing out the menaces at our doorsteps that we have not seen. Two years back, or just before June 26, 1975, there was, if you recall, "a deep-rooted conspiracy" and the country was on the brink of disaster.

Recently, the Janata government took tha big money notes away, and some people said it was a death blow to the Congress treasuries. Now it is clear that the Congress (or Congress) have got things rather neatly stashed. If mismanagement of funds was there, neither the Shah Commission nor the demonetizers seem likely to be the ones to find out.

Summer approaches on the Indian subcontinent, and soon monsoon, and with it, in places like Karnataka, people are wondering if a procession of frogs will have to be organized to make the rain come, as happened last year. For drought and famine haters, good news from Mt. Abu, where a secret agricultural scientist has experimented and proved that peppermint missiles hurled at the lowering storm clouds will make the rain fall in sheets. The two questions are: is our peppermint industry geared to cater to the new demand to come? And what possibly will be the effect of peppermint on the rabi paddy crop? Will we be having mint-flavored *biryani* then?

Gammon