

## India's Nuclear Program – From 1946 to 1998

**M. V. Ramana**  
**Center for Energy and Environmental Studies**  
**Princeton University**  
**Princeton NJ 08544 USA**  
**email: [ramana@princeton.edu](mailto:ramana@princeton.edu)**

On 26 June 1946, when addressing a public gathering in Bombay, Pandit Jawaharlal Nehru, soon to be India's first Prime Minister, said: "As long as the world is *constituted as it is* (emphasis added), every country will have to devise and use the latest scientific devices for its protection. I have no doubt India will develop her scientific researches and I hope Indian scientists will use the atomic force for constructive purposes. But if India is threatened, she will inevitable try to defend herself by all *means at her disposal* (emphasis added)."

After the nuclear tests of May 1998 the Indian Prime Minister Atal Behari Vajpayee triumphantly announced that India was now a Nuclear Weapon State. In his view, this was "India's due, the right of one-sixth of humankind..." and that "these are weapons of self-defence." Having supported the acquisition of nuclear weapons for forty years, he declared that India now had a "big bomb."

### ***The Early Beginnings***

The Indian nuclear program was started in the mid-forties, around the time it gained independence from British rule, and soon after the United States bombing of Hiroshima and Nagasaki. The legacy of colonial rule and the destruction of Hiroshima and Nagasaki had a powerful impact on Indian leaders. They saw India's technological backwardness and military inferiority as the main causes of colonization over two centuries ago. It was therefore natural that India would also follow the dominant power at the end of the Second World War, the United States, which relied on nuclear technology for energy as well as defense.

From the very beginning, the Indian nuclear program was ambitious and envisaged covering the entire nuclear fuel cycle. Over the years, apart from nuclear reactors, India also developed facilities for mining Uranium, fabricating fuel, manufacturing heavy water, reprocessing spent fuel to extract Plutonium and, more recently, enriching Uranium. Investment in this wide range of activities was often uneconomical. But it was justified on the grounds of self-sufficiency, a theme popular in post-colonial India.

At the same time, India under Nehru also tried to change the world so that it was no longer "constituted the way it was". As a champion of the non-aligned movement, Nehru had made several disarmament proposals. Prominent among them was the Comprehensive Test Ban Treaty (CTBT). In a proposal dated April 8, 1954, he requested the nuclear weapon states to negotiate: "Some sort of what may be called 'Standstill Agreement', in respect at least, of these explosions, even if arrangements about the discontinuance of production and stockpiling must await more substantial agreements among those principally concerned." The proposal, coupled with worldwide concern about the dangers of radioactive fallout, galvanized opposition to testing and resulted in the Partial Test Ban Treaty of 1963.

## ***The First Shift***

Three events mark the shift in India's nuclear program during the early sixties. The first was the completion of a reprocessing plant at Trombay and the CIRUS research reactor, which gave India the ability to extract plutonium and thus to make nuclear weapons. The second was the death of Jawaharlal Nehru. While encouraging the development of a militarily capable nuclear infrastructure, Nehru had always opposed explicit weaponization. The third event was the first Chinese nuclear test in 1964, barely two years after India lost the war with China.

In hindsight, the Chinese nuclear test was the most significant since the Chinese nuclear program allowed and has continued to allow the construction of a security rationale for the Indian nuclear program. With Nehru's death the most significant political opposition to an explicit nuclear weapons program had been removed. Following the Chinese test, several influential individuals among the bureaucracy, political parties and intellectuals started arguing for India developing nuclear bombs. The chief arguments for developing nuclear weapons were largely based on the rationales used by the U.S. and the Soviet Union during the cold war. The "bomb lobby" argued that nuclear weapons are required to counter nuclear weapons, they guarantee security, and that they are relatively cheaper than conventional weapons and provide more destructive power. The elite in India also identified having a nuclear bomb as a source of international prestige.

The first official policy decision shaped by this constellation of factors was at the negotiation of the Nuclear Non-Proliferation Treaty (NPT) in 1967. After initial attempts to seek security assurances from the nuclear weapon states, India decided to vote against the treaty and argued against its discriminatory aspects and pushed ahead with its nuclear program.

A little over a year after the NPT went into force, India and Pakistan fought their third war. During this war the US Seventh Fleet, led by the USS Enterprise, was sent into the Bay of Bengal. Henry Kissinger, Secretary of State at the time, claimed the move was designed not only to 'assist' Pakistan, but also to 'back up the Chinese'. For some Indian policy makers, however, the 1971 intrusion was a form of "gunboat diplomacy" – one that was possibly nuclear. This is regarded by some as a factor in the decision to conduct India's first nuclear test.

## ***The "Peaceful Nuclear Explosion" and After***

On May 24, 1974, at the height of a nation-wide railway strike (led by George Fernandes, who was then a trade union leader and is now the Defense Minister), India conducted its first nuclear test at Pokhran in the desert in Rajasthan. The device tested is believed to have been large and heavy with a yield of about 8-12 kilotons, a little less than the weapon that was dropped on Hiroshima. The test used plutonium from the CIRUS reactor reprocessed in the Trombay reprocessing plant.

The test led to the withdrawal of practically all cooperation in nuclear technology with the US and Canada. To avoid such problems in the future, India subsequently built a similar, but larger, research reactor called Dhruva. Dhruva started functioning in 1985. It has been estimated that India could have accumulated about 300-500 kgs of Plutonium from these two reactors. Assuming that Indian designs use less than 5 kg of Plutonium for each nuclear bomb, India may have sufficient stocks of fissile material for over 60 to 100 bombs. India has also built a uranium enrichment facility, ostensibly for the nuclear submarine program that was started in the late 1970s.

## **The Missile Program**

The quest for nuclear capability also extended to developing vehicles for delivering nuclear weapons. As with the other nuclear weapon states, it was argued that having airplanes alone did not suffice. Consequently, in 1983, the Integrated Guided Missile Development Program (IGMDP) was set up. The program started with the development of five missile systems - the short range Prithvi (Earth), the intermediate range Agni (Fire), the surface to air missiles Akash (Sky) and Trishul (Trident), and the guided anti-tank Nag (Snake). By 1988, the results of the new program were visible - the first test of Prithvi was conducted on 25 February 1988. This was followed the next year with a test of Agni. Other missile systems are also reportedly under development – the Pinaka, the Sagarika and the Astra.

## **The Indefinite Extension of the NPT and the CTBT**

In 1995, the NPT reached the end of its 25-year life and came up for review. A decision about extending it had to be made. Despite opposition by the Non Nuclear Weapon-States, the Nuclear Weapon-States, led by the US, forced through an indefinite extension of the NPT. The indefinite extension of the NPT provided grounds for a renewed campaign for nuclear weapons [For more on this see: *The Hawks Take Flight...*]. In the domestic debate, the Indian bomb lobby argued that nuclear weapons were going to be around forever and India should either develop nuclear weapons or settle for permanent second-class status. To develop militarily useable nuclear weapons India had to test. Therefore it had to reject the Comprehensive Test Ban Treaty (CTBT). In 1996, India voted against the CTBT.

## **The May 1998 Tests**

The two Indian Prime Ministers (belonging to the center-left United Front party) who held office since 1996, despite voting against the CTBT, did not authorize any nuclear tests. This was left to the Hindu Nationalist Bharatiya Janata Party (BJP) under Prime Minister Atal Behari Vajpayee, who also declared that he has wanted India to have nuclear weapons for 40 years and that such weapons were the "due" of one-sixth of humanity.

Speaking at a press conference following the tests of 11 May 1998, the Prime Minister said that there had been three tests. One was a fission device with a yield of "about 12 kilotons," a thermonuclear device with a yield of "about 43 kilotons," and a sub-kiloton device. This was followed by two more tests on 13 May 1998, whose yields are claimed to be "in the range of 0.2 to 0.6 kilotons." There has been much debate over these yields. Based on seismic data, several analysts have claimed that the Indian claims are exaggerated and the real yield is much lower [See B. Barker *et al*, *Science*, 25 September 1998 and T. Wallace, <http://www.geo.arizona.edu/geophysics/faculty/wallace/indo.pak/>]. In particular, no seismic signals from the May 13 tests have been detected. The uncertainty in the yield leads to grounds for skepticism over the claim that one of the devices tested is a thermonuclear fusion device (i.e. a hydrogen bomb).

These doubts notwithstanding, it is clear that unlike the 1974 test, these tests are clearly intended as steps towards weaponizing India's nuclear capability. In the words of Abdul Kalam, the head of the Indian Defence and Research Development Organization (DRDO) and the architect of the Indian missile program, "Weaponization is now complete. We have tested the size, weight, performance, and vibrations" for nuclear warheads designed to go on Prithvi and Agni missiles. The DRDO has claimed responsibility for "weaponizing proven designs," being involved in the "design, testing and production of advanced detonators, ruggedized high volt trigger systems, interface engineering, systems engineering and systems integration to military specifications" as well as "contributions in aerodynamics, arming, fusing, safety interlocks,

flight trials... " There have also been statements that the tests have provided "critical data for the validation of our capability in the design of nuclear weapons of different yields for different applications and different delivery systems" and "significantly enhanced our capability in computer simulations of new designs and taken us to the stage of sub-critical experiments in the future, if considered necessary." The Indian Prime Minister also stated that a Command and Control system was in place, thus making it clear that it is possible to deploy these weapons.

All these statements imply that India may be on the verge of fielding a full-fledged arsenal. Just as with the arsenals at the hands of the nuclear weapon states, these pose an immense danger to the people of South Asia and the World. The task of nuclear disarmament is urgent and important.

-----

M. V. Ramana's work is supported by a SSRC-MacArthur Postdoctoral fellowship on International Peace and Security in a Changing World.