

to South Africa. South African Health Minister Manto Tshabalala-Msimang, who took the battle to the multinationals, is scheduled to visit India soon to begin talks with CIPLA. Similar visits to Brazil and Thailand would open up more sources that can ensure a steady supply of cheaper drugs to treat AIDS patients. In India, the Hyderabad-based Hetero Ltd. is another drug company which manufactures generic AIDS drugs and is willing to sell them to South Africa at a low price.

Simultaneously, South Africa must exploit all possible openings that exist in the Trade-Related Intellectual Property (TRIPs) rights agreements, imposed on all trading nations through the World Trade Organization (WTO). TRIPs allows production of generic drugs. However, the nation concerned is allowed to manufacture generic drugs only in case of national emergencies. The Nelson Mandela Administration, which enacted the law to import cheap generic drugs, had, however, conceded to every demand of the free traders.

South Africa must now seize the moment and challenge the WTO clause, with the cooperation of such nations as Brazil, India, Thailand, and other African nations. China, which is expected to join the WTO this year, must also be brought in to join the fight. South Africa must lay down a clear formulation that will enable the nations to protect their citizens from the burden of importing expensive patented drugs.

One such formulation, floated in India, suggests that the generic drug manufacturers will be asked to pay an annual royalty to the patent-holders based upon the sale of the generic drug. Such royalty payments could be 4-5% of the annual generic drug sales in the country. The patent owners, of course, would be allowed to sell their high-price drugs at any price they like.

The second part of the plan will be to set up a global fund for treating AIDS victims. This cannot be done through the World Health Organization or such other United Nations outfits, because all of them are heavily courted by public relations officials representing the multinationals. The proposed global fund should be developed in the form of a common fund generated by countries severely affected by AIDS, or those expected to be so affected in near future.

The fund could also be used for adopting preventive measures. What these preventive measures would be, will depend upon the society in which the measures are implemented. For example, there is little doubt that the population, who are victims of generational malnutrition problems, are more vulnerable to the ravages of AIDS than those who are well fed. This means developing a program to increase the nutritional content of the diet of the people in those countries. It is a long-term preventive measure, but it is worth every penny that the country sinks into it.

The third part will be to put in place a distribution system which will give AIDS patients access to generic drugs. Brazil, among all the developing nations, has done a remarkable job in developing a distribution system whereby it has the ability to reach a vast number of AIDS victims in time to arrest the

deadly progression of the disease. India lags far behind, and so does Thailand. It seems that China does not have the infrastructure either, to respond to its needs quickly. South Africa, on the other hand, has a much better physical infrastructure than most other developing nations. There should not be any reason why every AIDS victim in South Africa cannot be reached and treated.

It is evident that no matter how satisfying it was to defeat the multinationals, that will not suffice. The cheapest generic drugs, even if they are made available in sufficient quantity and in time, will still remain unaffordable to more than 90% of AIDS victims. Most of the governments fighting this deadly disease, are those of very poor nations.

India Is Ready To Exploit Outer Space

by Ramtanu Maitra

On April 18, India's first developmental flight of the Geosynchronous Satellite Launch Vehicle (GSLV-D1) took off smoothly, carrying an experimental communications satellite, G-SAT-1. The takeoff was perfect, bringing India into an elite club of nations which have the technology to exploit outer space.

Although India needs to carry out yet another successful launch before the reliability of the GSLV is fully established, the success of the April 18 launch has opened up new possibilities for India, and discussion to that effect is heard in Delhi. The Indian Space Research Organization (ISRO), the authority in charge of India's space program, has already indicated that it is interested in "seeding" future technologies for building re-usable launch vehicles which could take off and land like aircraft. Such vehicles can be manned or controlled by automatic pilot. Russia, which has helped India in developing the supercooled fuel (or cryogenic) engine used in the GSLV, reportedly has the technology for auto-controlled re-usable launch vehicles, and is being seriously courted by Delhi on various areas of space technology cooperation.

Moon Mission

The ISRO is also lobbying for drawing up plans for a lunar probe, or an orbiter, to be followed by a Moon mission. Delhi has not cleared the plan yet.

According to ISRO scientist Dr. P.S. Goel, what is required at this point is "a green light from the government." "An unmanned lunar probe mission can be launched by 2008 if we get a go-ahead now," Dr. Goel said. ISRO chief Dr. Kasturirangan is also high on such lunar missions. "It is not a question whether we can afford it, it is whether we can afford



India's Polar Satellite Launch Vehicle, the forerunner to its more advanced Geosynchronous SLV.

to ignore it," he pointed out to newsmen recently.

India already possesses a proven launch vehicle, the Polar Satellite Launch Vehicle, which can be used to send an orbiter to study the Moon more closely. Alternatively, the GSLV can do the job, sending an 850-900 kilogram spacecraft as a flyby mission to the Moon, or a 600 kg orbiter to investigate the Moon from close quarters.

The Indian space scientists have been discussing the possibility of a Moon voyage project since 1997. But only in 1999 did they hold the first public discussion on it. The success of the GSLV launch will surely give the Moon voyage project momentum; the ISRO has lobbed the ball back to Delhi's court.

The GSLV: New Potentials

The GSLV, launched from India's southeastern coastal town of Sriharikota, is a three-stage vehicle. The first stage, GS-1, comprises a solid propellant motor, S-125, and four liquid propellant strap-on boosters, L40. A single liquid propellant engine, L37.5, powers the second stage, GS-2. The third stage, GS-3, is a cryogenic stage with a C-12, re-chargeable engine. The third stage uses supercooled liquid hydrogen and liquid oxygen in two separate aluminum tanks connected by an interstice structure.

The launching of the 49.1 meter tall and 401 ton vehicle, carrying the 1,540 kg experimental satellite, has put India in the same league with the United States, Russia, the European Space Agency (ESA), Japan, and China, which have similar capabilities. The launching of the GSLV is also important because it not only provides India the capability to launch its own communications satellites, but also to enter the lucrative \$3 billion commercial market for satellite launch. India had used international assistance earlier to launch the remote sens-

ing satellites in the geosynchronous orbit. However, these satellites were used to meet civilian requirements. With the success of the GSLV, India now can launch satellites dedicated for surveillance and other purposes for the armed forces, into low Earth orbit.

The first attempt to launch the GSLV-D1, on March 28, was aborted when the strap-ons caught fire. That the ISRO could identify and rectify the problem, and launch the vehicle within the span of three weeks, shows the determination and capability of the outfit.

Strategic Issues

In addition to the commercial issue, the launching of the GSLV shows that India can now develop long-range missiles, capable of carrying nuclear weapons. India's missile program, which developed the short-range Agni-I missile and is testing out the medium-range Agni-II missile, is now ready for the long-range intercontinental missile, the Agni-III.

Western defense experts say the GSLV, like much of India's indigenous space program, could also serve as a platform to test a wide range of military technologies. The United States, which, along with the European nations, slapped sanction after sanction on India, opposed India's receiving cryogenic engines from Russia. Washington said that the deal violated the Missile Technology Control Regime, an informal, non-treaty association of countries meant to limit the spread of missiles and missile technology. Under pressure from Washington in particular, Russia supplied India with seven cryogenic engines, but did not transfer the critical technology required to handle the liquid oxygen and liquid hydrogen fuels.

Indian scientists, despite sanctions against technology-transfer from the West, have developed the entire nuclear fuel cycle, space vehicles, and super-computing capabilities indigenously. In fact, according to Dr. Raja Ramanna, now the doyen of the Indian nuclear scientists, the Indian nuclear weapons program was put in place because of the Western opposition.

What has not been brought into focus following the GSLV launch, is that India has also developed an indigenous supercomputer, PARAM, which has a range of 100 gigaflops (100 billion floating-point operations). Only two other nations, the United States and Japan, have supercomputers with a greater range. According to the Indian scientists working on PARAM, the supercomputer can be scaled up to perform a trillion floating-point operations, which would make it perhaps one of the most powerful supercomputers in the world.

When one puts India's nuclear, space, and computer capabilities together in the proper light, it is evident that India has the potential to become more than a nuclear weapons nation. While India is keen to bridge the military gap with other major nations, Delhi has indicated flexibility to Washington's probes on the development of ballistic missile defense. It is evident that India is preparing for it.