CHAPTER VI

DEFENCE THROUGH DETERRENCE: ROLE OF BALLISTIC MISSILES IN INDIA'S NUCLEAR POSTURE

Working for a comprehensive missile disarmament treaty is no doubt a novel idea. But until then, India needs missiles for its national security as "there is no credible defence against ballistic missiles except to rely on defence through deterrence." Moreover, "powerful missiles serve as instruments of deterrence only when they carry weapons of mass destruction (WMD)." This realisation has led India to go nuclear and test-fire the IRBM Agni-II so as to attain a credible minimum nuclear deterrent. In the light of this background, this chapter is divided into three parts: (a) understanding nuclear deterrence, (b) Pokhran-II and India's newly acquired nuclear status, and (c) role of ballistic missile in India's nuclear posture.

I

UNDERSTANDING NUCLEAR DETERRENCE

Deterrence has been a fundamental part of military doctrine through the ages. It has relied essentially on two basic principles. One is through the threat of punishment. This is borne out of a belief that if another nation carries out a hostile act it will be visited by a sure and devastating response. Offensive forces held in reserve are meant to enforce this threat. The other is deterrence by denial. This implies that the action a hostile nation plans to take would be so difficult and certain to be defeated that it would not be worth the effort. This is achieved through fortifications and the deployment of adequate numbers of military forces in a defensive role.

The world has gone through various stages in the evolution of a nuclear strategy over the decades. This has produced an enormous amount of literature on nuclear deterrence. During the Cold War period, a stable
deterrence structure was formed between the USA and the former Soviet Union which was based on two simple assumptions:

* "First that if you strike first, I can not stop you, but my counterstrike will be incredibly punitive and you can not prevent it.

* Second, if I strike first, you can not stop me, but your counter strike will be incredibly punishing and I can not prevent it."^4

These statements contain within them the ingredients necessary for stable deterrence. Let us identify a few. First, is the ability to ensure an assured counter-strike. Therefore, under all circumstances and under every condition both sides must have the ability to strike back. This requires secure arsenals which should be dispersed, hidden, kept secure from decapitating first strikes often by underground storage. Delivery means need to be similarly protected. Also there has to be a command channel entrusted to pass the orders and an assured communication system to enable it to do so.

Second, this strike must be capable of inflicting punitive destruction. How should this be assessed and quantified? What constitutes punitive damage? The US plans estimated that destruction of approximately 25 per cent of the population and 40 per cent of the industry of the USSR would be essential for this. Some have argued at the other extreme that an assured capability to destroy a major population centre would constitute "unacceptable damage". But in reality, unacceptable damage is not easy to define.

Finally, it assumes a degree of rational decision-making at all levels and for people to react with calm deliberation, weighting carefully all the options, even as the world was either actually coming to an end around them, or there was every indication of utter and total devastation.
II

POKHRAI-I1 AND INDIA'S NEWLY ACQUIRED NUCLEAR STATUS

On May 11-13, 1998, India conducted five underground nuclear explosions at Pokhran and declared itself as a "Nuclear Weapons State". The tests conducted were with a fission device, a low yield device and a thermonuclear device. The measured yields were in line with expected values. Measurements have also confirmed that there was no release of radioactivity into the atmosphere. These were contained explosions like the experiment conducted in May, 1974. Mr. Brijesh Mishra, Principal Secretary to the Prime Minister, later elaborated that "these tests have established that India has a proven capability for a weaponised nuclear programme. They also provide a valuable data base which is useful in the design of nuclear weapons of different yields for different applications and for different delivery systems."

After declaring itself as a nuclear weapon state, India made a number of moves to be recognised as such by the international community. These include: a moratorium on testing, offer to convert this moratorium into a formal obligation through negotiations, to abide by some of the provisions of the CTBT, to tighten government control over export of sensitive materials and technologies and to participate seriously in the Fissile Material Cut-off Treaty (FMCT) negotiations.

These tests, as expected, unleashed a fury of events in India's neighbourhood and catapulted India into probably its worst confrontation with United States. On 13 May, the USA imposed a wide range of sanctions against India under the Glenn Amendment. Pakistan conducted a series of nuclear tests on 28 and 31 May and relations with China reached their lowest ebb since 1962. Beijing castigated New Delhi for what it turned its "outrageous contempt for the common will of the international community."
INDIA'S NUCLEAR DETERRENCE DOCTRINE

Till May 11, 1998, the Government of India's position was that the Indian nuclear programme was for peaceful purposes even though it gave the country a capacity to make nuclear weapons. The position was somewhat more refined by Foreign Minister I.K. Gujral in July, 1996, during negotiations for the CTBT. Mr. Gujral noted that "our nuclear policy .... is intimately linked with our national security concerns. We have never accepted the notion that it can be considered legitimate for some countries to rely on nuclear weapons for their security while denying this right to others." After the May nuclear tests, Indian leadership and officials have spoken about the minimal nature of the Indian action and the need for a "credible minimum deterrent". The question, however, is: what constitutes minimum deterrence? According to K. Subrahmanyam, "minimum deterrent is not a numerical but a strategic approach." Former Army Chief of Staff General K. Sundarji believed that India needs a minimum of 20 nuclear weapons of 20 kiloton each to deter a small country and about 50 such weapons to provide a credible nuclear deterrence against a large country. But it is next to impossible mathematically to state an accurate figure at any given time. The security threat perception and its intensity is ultimately a personal judgement of the ultimate decision maker based on his advisors, relative to an adversary at a given time. The number could very easily vary if an adversary raises the ante.

Some important ingredients of India's nuclear doctrine can, however, be discussed here. First, despite its declaration of nuclear weapons status, India remains committed to the basic tenet that "global elimination of nuclear weapons will enhance its security as well as that of the rest of the world." In fact, India now sees that it can speak on nuclear disarmament more authoritatively, of course, from a position of strength. Second, while India is committed to the global elimination of nuclear weapons, now it has realised that this not will happen any time soon. For the present then, India's nuclear posture could be said to represent a "temporary" adherence to the deterrence
doctrine. As Prime Minister Vajpayee told the UN General Assembly in his address on September 24, 1998, "These tests were essential for ensuring a credible nuclear deterrent for India’s national security in the foreseeable future." 

Third, India’s deterrence will somehow be different from those of the established powers. Unlike the US, which till the end of the Cold War, believed that a limited nuclear war is thinkable and winnable, India looks at the nuclear weapons as the weapons of ultimate defence. Even after acquisition of nuclear weapons, Indian strategy is not based on the use of the nuclear weapons. As the Prime Minister stated in the Parliament that India shall not use these weapons to commit aggression or to mount threats against any country. These are weapons of self-defence and to ensure that in turn, India is not subjected to nuclear threats or coercion.

Fourth, India’s nuclear deterrence is minimal in nature. India will not build a huge arsenal or get involved in an arms race as other nuclear weapon states have done in the Cold War period. In other words, deterrence does not demand that India match every adversarial WMD System with a weapon of equivalent range and destructive power. India, for instance, can effectively deter aggression by China with a few dozen missile deliverable nuclear warheads despite the estimated 500 weapons in the later’s nuclear arsenal. Thus, deterrence does not necessitate qualitative or quantitative parity.

Finally, India’s deterrence is based on credibility. The potential aggressor must have no doubt that India could and would use nuclear weapons against population and and industrial centres if a nuclear strike is initiated against it.

ROLE OF BALLISTIC MISSILES IN INDIA’S NUCLEAR DETERRENCE

The recent five nuclear tests, however, by themselves have not given India its nuclear deterrent. By these tests we have only displayed our nuclear weapon capability at a much higher technological level than in 1974. We
have still a long way to go before acquiring a credible deterrence. Weapons will have to be fabricated, delivery systems will have to be perfected and coupled with nuclear warheads, a strategy for the use of the weapons will have to be defined and a command, control and intelligence system will have to be put in place. Finally, will come deployment.

A nuclear weapon in absence of an uninterceptible delivery system does not have a potent deterrent value. In other words, India can not be considered a credible nuclear weapon power until it has an operational medium range missile system. So the development of ballistic missiles and nuclear capability have to be meshed together. In fact, subscribers to deterrence believe that the addition of missiles which can carry nuclear weapons enhances the chances of peace because it makes war an unaffordable policy option. Since missiles, unlike aircraft, travel faster and are difficult to intercept, they make a "sure kill." Thus, their lethality makes a qualitative addition to deterrence.

It is in this context the military significance of ballistic missiles especially its potentiality as a weapon delivery system and credibility to deterrence is to be understood.

BALLISTIC MISSILES: THE MILITARY EFFECTIVENESS

Ballistic missiles possess certain characteristics that have traditionally accorded them special status as military instruments, including their speed in striking targets, their ability to penetrate defences and their perceived usefulness for non-conventional operations. But the characteristics that make missiles attractive to military planners also generate concerns about their effects on military stability.

Of the several ways to assess the effect of ballistic missiles on military capability, one way is to compare the performance characteristics of missiles with those of other weapon systems. According to Janne E. Nolan, the characteristics can be assessed at least approximately on the basis of range,
payload, speed of delivery and accuracy. Although these variables are highly interdependent, they are discussed separately for the purpose of analysis.

Range

Countries need missiles of sufficient range to target adversaries and to be able to deploy and launch them from secure sites. But the importance of range depends on geography, including the distance between adversaries, the size of the territory being defended or attacked and the proximity of population centres and key military targets to adversary forces.\footnote{23}

In the developing world, where many antagonists share a common border, traditional definition of short, intermediate and long range missiles developed in the Cold War context have limited utility. Given the proximity of many Third World targets to opposing military forces, even missile system classified as short-range (less than 300 miles) could reach deep into the territory of an adversary. Most Third World ballistic missiles, moreover, are mobile. For countries aiming to achieve longer range systems, even a system such as the Agni which has range of 200 miles, still well short of the ranges of missiles considered strategic in the US-Soviet context - could extend India's reach outside the region. Both Israel and India already have missiles that can reach targets within the Southern territory of Russia, for example.

Ballistic missiles can provide the means to deliver munitions to greater distances than is possible with artillery, which is designed for battlefield use at very short ranges. But most combat aircraft found in Third World arsenals, with average combat radiuses of 370 to 1,500 miles, can already achieve far greater ranges than most Third World ballistic missiles, because of the growing spread of in-air refuelling capabilities. Moreover, the range of aircraft could increase significantly. Still, missiles under development in India, Israel etc. eventually may achieve ranges of 3,000 miles or more and thus, exceed the reach of all but the most advanced aircraft available. Missiles of this range raise concerns that they will expand the scope of
conflict beyond the territories of the combatants and could even pose risks to the industrial powers.\textsuperscript{24}

Increasing the range of systems, however, does not automatically accord greater military capability. Longer missile ranges place higher demands on accuracy and make it more difficult to carry large warheads because missiles must then have either additional fuel. To compensate for reductions in accuracy, countries must either increase the number of missiles, target them less precisely or use unconventional warheads with greater destructive capability.\textsuperscript{25}

**Payload**

A missile's destructive capability depends in part on the size of warheads it can carry. Most observers believe that to serve as a delivery vehicle for a nuclear warhead, a missile has to be able to carry a minimum payload of 1,100 pounds. Conventional high explosive warheads typically weigh between 1,000 and 2,200 pounds. Smaller payloads are possible but most missiles found or under development can carry 1,100 to 2,200 pounds.\textsuperscript{26}

The payloads of missiles are much greater than those of artillery systems, most of which have capabilities well below 220 pounds but combat aircraft can carry significantly heavier loads and more diversified types of ordnance. Most combat aircraft can carry bomb loads ranging from 3,000 pounds to more than 20,000 pounds although usually they carry 1,100 to 1,200 pounds.\textsuperscript{27} However, whether or not missile delivery of non-conventional munitions is as efficient as air-delivery, missiles speed and ability to elude air defences could make them valued instruments for certain military operations, especially surprise attack.

However, the destructive capability of missiles is not just a function of the size of the payload but is affected by the speed at which they travel. Supersonic speeds impart considerable energy to ballistic missiles when they land. The Scud B travels at three times the speed of sound when it lands.\textsuperscript{28}
Similarly, India’s short range ballistic missile (SRBM) Prithvi has a range of 150 km but it can cover this distance in just five minutes.\textsuperscript{29}

To increase destructive capability (and compensate for inaccuracy), missiles can be equipped with non-conventional munitions such as nuclear weapons which is truly “weapons of mass destruction.” But the effectiveness of missiles in delivering nuclear weapons depends to a great degree on the sophistication of the missile system and the confidence a country has in its performance and reliability.\textsuperscript{30}

**Speed and Ability to Penetrate**

Two characteristics, particularly distinguish the performance of missiles from other delivery platforms: the speed at which they travel and their ability to elude air defences.\textsuperscript{31} Speed enhances a country’s ability to launch surprise attacks and aids the invulnerability of missiles to any air defences currently deployed. Combat aircraft can not execute surprise attacks against countries with competent air defences, although this may change as new aircraft technologies become available.

With the continued sophistication of air defences, the cost of conducting military operations with aircraft may increase to a point at which missiles become a competitive alternative. The disparity in cost between missiles and aircraft, an estimated US $ 1 million for the Scud, for instance, compared with more than US $ 20 million for even relatively non-advanced aircraft reinforces this point.\textsuperscript{32}

**Accuracy**

Compared with the current generation of missiles produced in the industrial world, some of which have accuracies of a few feet, most models in Third World arsenals are very inaccurate. For instance, an unmodified Scud-B has a CEP of 980 yards and the CSS-2 a CEP of 1.5 miles. By contrast, modern fighter aircraft can deliver high explosive munitions with CEP of 5 to 15 metres.\textsuperscript{33}
Most analysts believe that because of their relative inaccuracy, missiles in the developing world are suited only for non-conventional operations against airfields, troop formations and other unprotected military targets or for terror campaigns against civilian populations. Aaron Karp has argued, for example, that without nuclear weapons, inaccurate ballistic missiles are reduced to "appurtenances of the battlefield." In the absence of greater accuracy, it is difficult to identify other missions that are better carried out with missiles than with aircraft.

Coupled with advanced conventional warheads, such as fuel-air explosives or cluster munitions, however, ballistic missiles with high accuracy could be effective against a wide range of military targets. The implications of such highly accurate systems capable of precision strikes against military targets have been discussed in the US-Soviet context for many years. Analysts generally assume that the combination of low yield and high accuracy in a ballistic missile would raise incentives to use these systems, including use in pre-emptive operations.

The technical difficulties involved in developing or even acquire a high accurate system, however, suggest that developing countries will not have these capabilities for sometime. The challenge of producing such systems could be compounded by operational impediments. Accuracy is not only a function of the technical characteristics of the missile itself: it may be affected by the structure of the command and control system, the level of training of operators and the availability and reliability of targeting information. In actual conflict, accuracy is also likely to be affected by the "fog of war," the confusion, misinformation and mistakes endemic to combat that make it difficult to forecast effects on weapon performance very precisely. With the exception of Israel and India, most developing nations have only embryonic capabilities in such vital areas for missile performance as command, control, communication, intelligence, training and operational experience in modern tactics.
Other Considerations

So, prompt delivery, denial of warning, assured penetration and the capability to carry nuclear warheads make ballistic missiles valuable military assets. But what makes a ballistic missile even more important is its psychological and political impact value. The symbolic striking of the enemy’s populous heartland has psychological bearing and, thereby, undermines the enemy’s ability to protect its territory. Ballistic missiles strike can also have a very demoralising impact on the enemy. The suspense and strain of the missile attack make an individual helpless.

For example, even though the Iraqi missiles fired on Iran had only a small conventional warhead, life came to a complete halt in Tehran for five long months. This eventually forced Iran to accept a cease-fire. Similarly during the 1991 Gulf War, Iraq fired 86 Scud missiles — 46 on Saudi Arabia and 40 on Israel —.most of which had been ineffective. Yet the coalition forces flew 18,000 sorties - all in vain - to locate Scud launch sites.

Ballistic missiles can yield certain political/strategic payoffs too. Libya’s Gaddafi was able to restore his image battered by the US air strikes through launching Scud missiles at the US coast guard facility of Lompedusa off the coast of Italy. During the Gulf war, Saddam Hussain was able to proclaim to the Arab world that only Iraq had attacked Israel without Israel striking back. Similarly, China has recently used its ballistic missiles against a helpless Taiwan obviously for political ends. It showed that to make an adversary guiver, the missile do not have to be armed with live warheads. So effective were the Chinese missiles firing that three of Taiwan’s major ports were shot and the US naval fleet kept a safe distance from the scene of action.

A ballistic missile is also helpful economically. With the budget allocation shrinking and the need to protecting the country becoming more and more intense, states can not afford to spend a colossal amount on a standing army alone. An effective missile system can be an ideal force mutiplier.
Besides economic usefulness, ballistic missiles are also seen as symbols of prestige. For example, Indians regard their country’s nuclear and missile programmes as symbols of technical prowess and scientific competence by virtue of which India can be placed alongside the world’s leading developed nations. Similarly, the recent test firing of Ghauri missile has brought much smugness and jubilation among the Pakistanis who consider it as a major technological achievement.

CASE STUDY ASSESSMENT

Having discussed the importance of ballistic missiles now it is necessary to analyse the significance of Indian ballistic missiles, such as the SRBM Prithvi and the IRBM Agni which has been developed by India as a counter against Pakistan and China.

PRITHVI AND PAKISTAN

\[A\] bolt from the blue, sleek and deadly;

\[I\]t knows no friends, only enemies;

\[A\] weapon of today; it shall remain,

\[T\]he weapons of tomorrow.

(Avinash Singh on Prithvi)

Two aspects of the “Pakistani threat” contributed India to concentrate on the surface-to-surface short range ballistic missiles (SRBM) Prithvi. First Pakistan’s purchase of the F-16s and its acquisition of M-11 missiles from China added to India’s need for a counter. Secondly, although India has the ability to defeat Pakistan at every level of conventional military confrontation, the addition of battlefield missiles such as Prithvi further diversifies Indian strike force capabilities.

Now when India has demonstrated its nuclear capability, the Prithvi is meant to serve a twin purpose for the country: to be used in the battlefield
with conventional warheads and to serve as India’s main nuclear weapons delivery system against Pakistan.\textsuperscript{47} The Prithvi’s Army version with a range of 150 km and a 1000 kg warhead serves the first need. The 250 km Air Force version and the 350 km Naval version of Prithvi can provide a nuclear deterrence.

The Prithvi systems are one of the most advanced projectiles of the world. The Prithvi scores over all missiles of its class, be it the Russian Scuds or Israeli made Arrows or for that matter the US Patriots.\textsuperscript{48} The missile with its indigenously manufactured inertial guidance and double radar system — it uses two radars, one for guidance and the other for targetting — has a unique three-stage trajectory — the initial powered phase, the plain cruise and the steep descent phase of nearly 80° that makes it almost impossible for the radars to get time (it can cover 75 kms in just four minutes) to pick up a signal and counter it.

The Prithvi is extremely accurate (its CEP is lower than most missiles of its class, i.e., 0.1 per cent\textsuperscript{49}) and four of them can devastate front of an attacking army effectively blunting an enemy attack on the ground. It can reach virtually all of Pakistan’s important industrial and population centres which are located along its eastern border with India. The Prithvi can carry both conventional and nuclear warheads. In the conventional category, warheads include high explosive, prefragmented, cluster munitions and fuel air explosives (FAE). The last mentioned can cause four times the damage done by an ordinary nuclear bomb.

Prithvi which is being projected as the biggest threat to Pakistan’s security and one that disturbed the armed balance in the Indian sub-continent according to the Americans, interestingly has most of its components locally made. Only 5 to 10 per cent of its parts like precision sensors, microprocessors and special alloy used for its silver-white exterior are imported.\textsuperscript{50}
Among the munitions developed for ‘Pritvhi’ are the deadly cluster bomblets, which are released when the missile is still in the air. Each of these bomblets is designed to piece armour or shower lethal mental fragments, a capacity that is proving to be Pakistan’s anathema. The 1.1 m diameter battlefield tactical missile has a maximum range of 350 km. The target shooting range can be increased or decreased by altering the angels. The only failure in 16 trials so far has been when the missile was commanded to do a 15 degree roll.\(^1\) Perfection has since been in this category too.

Pakistan sees India as a direct challenge to its sovereignty and security. The geography of Pakistan, including a concentration of population centres and major military installations near the Indian border and a lack of territorial depth, saddle it with intractable disadvantages.\(^2\) This has led Pakistan to step up its effort in the nuclear and missile fields so as to achieve some kind of parity with its eastern neighbour.

For Pakistan, the requirement has been to match India’s Prithvi battlefield missile for actual use and to have a few long range missiles for nuclear deterrence capable of hitting targets anywhere in India.\(^3\) The first need is fulfilled when Pakistan acquired the technology transfer of M-11 missiles from China sometime in 1997. Between 1992 and 1996, Prime Minister Benazir Bhutto repeatedly offered a zero-ballistic missile status to India as a confidence building measure and simultaneously coaxed the United States to apply pressure on India not to stabilise production of Prithvi missiles.

Pakistan’s fear about Prithvi was never that they would be deployed by India because mobile missiles of this class are never deployed but are made operational (a missile is operational once it becomes part of a military doctrine). The fear was that Pakistan without the technology know-how of M-11s would lag behind India if the later was allowed to stabilise production of the Prithvi.\(^4\)
By 1996, there were clear indications that Pakistan had either acquired M-11 technology or was close to doing so. The CBM offer on missiles to India by Pakistan suddenly stopped and the United States started exhorting India furtively about the virtues of abandoning the *Agni* programme. There was little lecturing from Washington about India’s *Prithvi*. Under such changed circumstances where Pakistan has managed to match an indigenous Prithvi capability, the Indian Army reviewed its position regarding the *Prithvi* missile. Now India’s focus has shifted to the other two *Prithvi* variants: the *Prithvi-II* with a warhead weight of 500-700 kg and a range of 250 km for the Indian Air Force and the *Prithvi-III* with a range of up to 350 km and a warhead weight of 500-750 kg.

Meanwhile, Pakistan has acquired some other ballistic missiles: the *Haft-III* which has a range of 800 km and a payload capacity of 500 kg, *Haft-V* (the *Ghauri*) which has a range of 1500 km and a payload capacity of 700 kg. Recently, it has test-fired the SRBM *Shaheen* which has a range of 600 km and a payload capacity of 1000 kg. These three missiles serve Pakistan’s need for a nuclear deterrence against India.

The deployment of *Haft-III* will seriously endanger Indian territory including the capital Delhi. Similarly, the 13 meter long missile weighing around 9 tons can target two major Indian cities — Delhi and Mumbai. The *Ghauri* is Pakistan’s most sophisticated IRBM till now which when deployed along India’s borders can strike at almost the whole of the Indian sub-continent except for perhaps some remote pockets of India’s North-Eastern region. In an interview, Dr. A.Q. Khan said, “our missile system is much better than India’s. It is more reliable and accurate than the *Agni* system and can be deployed very quickly because we have mobile launchers.”
Table 1. Pakistan's Missile Capabilities *(for a 500 kg payload)*

<table>
<thead>
<tr>
<th>Missile</th>
<th>Origin</th>
<th>Lift-off weight</th>
<th>Length</th>
<th>Diameter</th>
<th>Fuel</th>
<th>Stages</th>
<th>Range</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatf-1</td>
<td>French</td>
<td>1,500 kg</td>
<td>6 m</td>
<td>0.55 m</td>
<td>Solid</td>
<td>1</td>
<td>60 km</td>
<td>Deployed</td>
</tr>
<tr>
<td>Hatf-2</td>
<td>French</td>
<td>2,520 kg</td>
<td>9.75 m</td>
<td>0.55 m</td>
<td>Solid</td>
<td>2</td>
<td>280 km</td>
<td>Deployed</td>
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<tr>
<td>Shaheen</td>
<td>Chinese</td>
<td>6,200 kg</td>
<td>9.1 m</td>
<td>1.0 m</td>
<td>Solid</td>
<td>2</td>
<td>600 km</td>
<td>In developmental stage</td>
</tr>
<tr>
<td>(Hatf-3?)</td>
<td>(M-9?)</td>
<td></td>
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<tr>
<td>Ghauri-1</td>
<td>North Korea</td>
<td>16 tons</td>
<td>12.4 m</td>
<td>1.3 m</td>
<td>Liquid</td>
<td>1</td>
<td>800 km</td>
<td>In developmental stage</td>
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<tr>
<td>(Hatf-5)</td>
<td>(No Dong-1)</td>
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<tr>
<td>Ghauri-2</td>
<td>North Korea</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Liquid</td>
<td>1</td>
<td>1000 km</td>
<td>In developmental stage</td>
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<tr>
<td>(Hatf-5)</td>
<td>(No Dong-1?)</td>
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<tr>
<td>Ghaznavi</td>
<td>North Korea?</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Liquid</td>
<td>2</td>
<td>2000 km?</td>
<td>N.A.</td>
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<tr>
<td></td>
<td>(Taepto Dong-1)</td>
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<tr>
<td>Abdali</td>
<td>North Korea?</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Liquid</td>
<td>2</td>
<td>3500 km?</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>(Taepto Dong-2?)</td>
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</table>

*Source: R. Ramachandran, "Pakistan's Ballistic Response", Frontline, May 7, 1999 p.30*
Thus, these wide ranging missile delivery systems irrespective of whether these are indigenous or Chinese in origin, constitute a reality India must build into its threat matrix. The recent Pakistani nuclear tests and for that matter India's have clearly transformed the ambiguous nuclear posture into a more transparent deterrence in which missiles may be the primary delivery options. One negative implication of this transparent deterrence is that the nuclear and missile tests have provided Pakistan an opportunity to think that it can take Kashmir either through force or through international interventions. The recent Kargil conflict bears a clear testimony of this. However, even though it remains 'ugly', in the near future, the overt nuclear and ballistic missile status by India and Pakistan may eventually promote stability in the long run.

AGNI AND CHINA

India has developed the Intermediate Range Ballistic Missile Agni keeping in view of its severe disadvantage of geography in relation to China. While Beijing can strike India's Gangetic heartland from occupied Tibet with short range ballistic missiles, India requires deep penetration IRBMs to strike key Chinese strategic targets.

The Agni has two versions: Agni-I and Agni-II. Agni-I is a two-stage IRBM with a length of 18.4 metres and a body diameter of 1.3 metres. It has a range of 1000 km and a payload capacity of 1000 kg. The missile has remarkable circular error probable (CEP) figures (which determines a missile's strike accuracy) and excels in crucial operational areas such as re-entry, long range maneuvering etc.

Agni-I as a missile provides many battlefield advantages such as better interception rate, speed, night operation capability, pre-launch survival ratio and so on. With a range of 1000 km, it can easily target Tibet (where Chinese nuclear missiles are deployed against India). A Western commentator remarks that the Chinese industrial centres of Chengdu, Lanzhu and Xian as well as space launch facilities at Xichang in Siquan province can be hit
Moreover, India can use this missile to target military concentrations, installations and bases. This can also be a suitable weapon for frontline attack.

Agni-II, the extended version of Agni-I, has a range of 2000 km which it can cover only in 11 minutes and a payload capacity of 1000 kg. The range variant is proportionate to the weight of the warhead fitted for delivery. If the range is to be increased to 3000 km, then the payload has to be halved.

The 20-metre long missile with a weight of 16 tonnes, has a solid propulsion system. The use of solid fuel is of crucial significance because of its operational advantages. Solid fuel is non-corrosive and easy to handle. Its user friendly characteristics cut the down pre-launch preparation time and enable faster sequential firings. Besides solid fuel is compact and easy to store, the resulting storage advantages can help in beefing up the size of the ready-for-battle missile stocks and thus increase the overall missile punch.

Agni-II can be fired from a mobile launcher, signifying that the enemy can not easily detect firing sites in operational environs. It can easily be shifted from one site to another few km away in the event of actual hostilities. Mobile launchers are also the harbingers of developing submarine fired version of Agni-II which could sharpen the teeth of the sea-borne forces.

Another advantage of Agni-II is that it has been test-fired in operationalised-configuration which

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**WHAT’S NEW**

*The major changes since Agni’s last launch in 1994*

- Nuclear bombs have been mated to warhead platform.
- New second-stage solid fuel motor. Agni-II can now go upto 2,000 km.
- Accuracy is improved by a factor of three using advanced guidance systems, including realtime course corrections.
- Wiring of missile made simple and is ruggedised to any weather condition.
- Mobile platform for rail or road makes it ready to fire from anywhere.
implies that it is virtually battle ready. In layman's language, it means conventional warhead was used and dropped on the pre-determined target with pin-point accuracy and thus no further tests are needed for this type of missile for mass production and deployment.

Experts believe that India can now target major Chinese cities and defence establishments which had been outside the range of Agni-I. This obviously neutralises the Chinese missiles positioned on our north-eastern borders fitted with nuclear warheads which target Indian cities and strategic installations. Moreover, a missile with a range of 2000 km will give India more confidence in dealing with the Chinese.

According to reported sources, China has recently declared two new missiles, operational and both can hit India from Chinese mainland. There is even a third programme underway with a mobile launched missile, which can fly all the way to United States.

Besides, China has several missile bases, out of which two are of particular interests to India. One at Xining at Qinghai province which has three brigades with DF-3 and DF-4 missiles. This is a major missile base targeting earlier the Soviet Union. But, it is also only about 1,000 km from India's north-east borders and 2,000 km from Delhi. Both are well within range of these missiles.

The other base is at Yunan province with upto two missile brigades. Again, probably deployed to target South-East Asia, it also includes India within its range. Depending upon the exact deployment locations, North-East India is about 600 and Delhi about 4,500 kms away. While the solid fuel DF-21 will only have North-East India in range, Delhi will be covered by the DF-4. Of course, DF-4 and DF-5 missiles, whose total number with the PLA. may only be about 17, will have whole of India in its range no matter where they are located. The DF-21 and 25 missiles are solid fuel and mobile and could be moved with comparative easy should this be required. China's bomber delivery capability is suspect though it has now some 72
SU-27 aircraft. It also has only one Xia Class SSBN with 12 JL-1 missiles which are not often deployed. Still China has currently a comprehensive nuclear weapon equability against India.

Table 2. China's Missile Capabilities

<table>
<thead>
<tr>
<th>Chinese Designator</th>
<th>International Designator</th>
<th>Classification</th>
<th>Range</th>
<th>Location (Province)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF-3</td>
<td>CSS-2</td>
<td>MRBM</td>
<td>2,800 KM</td>
<td>Qinghai, Jilin</td>
<td></td>
</tr>
<tr>
<td>DF-4</td>
<td>CSS-3</td>
<td>ICBM</td>
<td>5,500 KM</td>
<td>Qinghai, Yunnan, Henan, Hunan</td>
<td></td>
</tr>
<tr>
<td>DF-5</td>
<td>CSS-4</td>
<td>ICBM</td>
<td>13,000 KM</td>
<td>Henan</td>
<td></td>
</tr>
<tr>
<td>DF-21</td>
<td>CSS-5</td>
<td>MRBM</td>
<td>1,800 KM</td>
<td>Yunnan, Jilin</td>
<td></td>
</tr>
<tr>
<td>DF-15/M-9</td>
<td>CSS-6</td>
<td>SRBM</td>
<td>600 KM</td>
<td>Anhui</td>
<td></td>
</tr>
<tr>
<td>DF-25</td>
<td>-</td>
<td>MRBM</td>
<td>1,700 KM</td>
<td></td>
<td>Under developments some reports indicate given up</td>
</tr>
<tr>
<td>DF-31</td>
<td>-</td>
<td>ICBM</td>
<td>8,000 KM</td>
<td></td>
<td>Under development (2001?)</td>
</tr>
<tr>
<td>DF-41</td>
<td>-</td>
<td>ICBM</td>
<td>12,000 KM</td>
<td></td>
<td>Under development (2005?)</td>
</tr>
<tr>
<td>JL-1</td>
<td>-</td>
<td>SLBM</td>
<td>1,700 KM</td>
<td></td>
<td>With one xia SSBN</td>
</tr>
<tr>
<td>JL-2</td>
<td>-</td>
<td>SLBM</td>
<td>8,000 KM</td>
<td></td>
<td>Under development (2005?)</td>
</tr>
</tbody>
</table>

Table 3. China's Ballistic Missile Bases

<table>
<thead>
<tr>
<th>Base</th>
<th>Location</th>
<th>Brigades</th>
<th>Missiles</th>
<th>Probable Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>51.</td>
<td>Shenyang, Jilin Province</td>
<td>3</td>
<td>DF-3/DF-21</td>
<td>Northeast Asia</td>
</tr>
<tr>
<td>52.</td>
<td>Huangshan, Anhui Province</td>
<td>2-3</td>
<td>DF-15</td>
<td>Taiwan</td>
</tr>
<tr>
<td>53.</td>
<td>Kunming, Yunnan Province</td>
<td>2</td>
<td>DF-3/DF-21</td>
<td>Southeast Asia, India</td>
</tr>
<tr>
<td>54.</td>
<td>Luoyang, Henan Province</td>
<td>3</td>
<td>DF-4/DF-5</td>
<td>Russia, United States</td>
</tr>
<tr>
<td>55.</td>
<td>Huaihua, Hunan Province</td>
<td>2</td>
<td>DF-4</td>
<td>Russia</td>
</tr>
<tr>
<td>56.</td>
<td>Xining, Qinghai Province</td>
<td>3</td>
<td>DF-3/DF-4</td>
<td>Russia, India</td>
</tr>
</tbody>
</table>

Before May, 1998, India had some tested deployable missiles but no tested, deployable warheads. That serious anomaly has been corrected by Dr. R. Chidambaram and his team by demonstrating a full range of nuclear weapons capabilities. In April this year, India has test-fired the IRBM Agni-II ending a five year moratorium on such tests and bridging a key gap in its minimum nuclear deterrent profile. A credible missile-based nuclear deterrence will provide India a counter-strike capability in the face of Chinese nuclear threats and convince the Chinese that assistance to Pakistan during a conflict with India would not be without costs.71

However, the Rand Corporation in its Report which was prepared soon after the Indo-Pakistani nuclear tests in May, 1998 states that even with an extended range of 2,500 km India’s IRBM Agni can not hit Beijing even if it is fired from the North Eastern states. A range of 5,000 km would be ideal since such a missile could be based almost anywhere in India and still hit Beijing.72 However, no upgrade of Agni is likely to be able to produce a missile with a 35-5000 km range. Thus, India would have to produce a whole new missile as this can not be derived from India’s PSLV as this would be too big to be a missile. Even if India builds such a missile capability it does not have a hardened silos to launch them from or a reliable mobile launch system.

The Report also states that while India is capable of striking any part of Pakistan, both with strike aircraft and missiles, Indian strike aircraft and the present range of missiles can at best reach a limited range of targets located only in South-Western China and that too from a geographical restricted region of the North-East.73 However, operating such a geographically restricted area would increase the missiles vulnerability to a Chinese first strike and that India is incapable of withstanding a Chinese first strike. Painting a grim scenario, the study says that China could easily strike Indian military facilities and nuclear weapon production sites with 20 or so nuclear armed ballistic missiles and still have over 100 nuclear missiles
or so nuclear armed ballistic missiles and still have over 100 nuclear missiles in reserve. Keeping in view that India has no way of detecting ballistic missiles in flight, not have a command, control and intelligence structure that is resistant to an attack, China could then “mob up” with bomber-delivered nuclear attack against India.

Although it is difficult to entirely agree with this Report, it can not be denied that “the Agni-II still does not give India 100 per cent credibility as it is unable to reach vast parts of China including Beijing which is over 3,000 km away.” So there is an urgent need to develop a longer range Agni to act as a deterrent against China. According to Dr. Kalam, the father of Indian missile programme, India Government has recently approved the long range Agni missile system, what is being christened as Agni-III for launch as well as deployment.

However, to be sure, there are many in China who see India as an emerging threat that must be countered. There is some concern in Beijing that the renewed anti-China rhetoric in India might be a precursor to an alliance with the US to contain China. But there are many others who see that prolonged hostility with New Delhi will not be in Beijing’s interests and that cooperative relations are essential for the larger political goals.

The nature of China’s eventual India policy will inevitably be shaped by the signals that are likely to emerge from New Delhi. As it expands its missile capabilities vis-a-vis China, it is essential that India develop a positive approach towards China. Such a policy must be built around three premises.

One, India has no interest in entering into a nuclear and missile arms race with China. Parity with Beijing does not involve matching numbers of nuclear weapons and missiles, but the creation of the ability to retaliate against a nuclear attack from China. Mr. Brajesh Misra, Principal Secretary to the Prime Minister, declared late last year that India had no desire to
enter into an arms race with China. This sentiment needs to be reiterated.

Two, India has few gains to make by seeking a new Cold War confrontation between the US and China and hoping for an alliance with one against the other. Whatever the nature of the future strategic balance in Asia, New Delhi needs to pursue cooperative relations with both the US, sole superpower, and China, India’s largest neighbour.

Three, as it gains the ability to deter China with the Agni missiles, India is now in a position to engage that country with self-confidence and without the burdensome political baggage of 1962. The time has come to shed the prickliness underlining India’s interaction with China. Just as the nuclear weapons have provided a new basis for dealing with Pakistan, they also open the door for a realistic policy towards China.
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15. Ibid.


22. One type of comparison can be with the advanced strike aircraft. For details see John R. Harvey", Regional Ballistic Missiles and Advanced Strike Aircraft", *International Security*, Fall, 1992. pp.41-83.


29. For details about Prithvi's range, see Avinash Singh, "Its Sleek, But Punch is Deadly", *The Hindustan Times*, June 5, 1994.


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44. Singh, "Its Sleek But Punch is Deadly", *op. cit.*


50. Singh, "Its Sleek But Punch is Deadly", *op. cit.*


54. Ibid.

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60. Ibid.


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65. The Hindu, April 12, 1999.


68. The Hindustan Times, April 14, 1999.


70. Ibid.


73. Ibid.
74. Ibid.
75. The Hindustan Times, April 27, 1999.
76. The Times of India, April 14, 1999.
78. Ibid.