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PAKISTAN'S NUCLEAR POSTURE: QUEST FOR ASSURED NUCLEAR DETERRENCE – A CONJECTURE

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CONTENTS

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Introduction

Just two years short of the new millenium, India's and Pakistan's rival nuclear weapon and ballistic missile tests in 1998 jeopardized economic reform and set the stage for the danger of nuclear war. Kashmir, disputed territory since the British transfer of power in 1947 and a chronic military flashpoint, returned to the front burner in the Kargil fighting over the boundary between Pakistan-held and Indian-held portions of Kashmir from May to July, 1999. The Kargil crisis undermined the Lahore Summit confidence-building efforts of Prime Ministers Nawaz Sharif and Atal Behari Vajpayee in February, just weeks earlier. Kargil illustrated how old South Asian quarrels are conditioned now by nuclear weapons, fueling Indo-Pakistani brinksmanship.

U.S. President Clinton's personal efforts with Sharif and Vajpayee to defuse the crisis signified increasing international interest in a resolution of the Kashmir dispute. But the knot of confrontation was tightened further by India's shooting down of an unarmed Pakistani naval reconnaissance aircraft on August 11 and India's release of an unofficial document described as its

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"nuclear doctrine" on August 17.[1] Two months later, Vajpayee's coalition government gained a stronger footing in national elections, while in Pakistan Nawaz Sharif's government was deposed by the Army, which returned once again to the nation's helm. Taken together, these developments suggest that in the absence of a solution to the Kashmir dispute, the prospects of reversing the Indo-Pakistani nuclear arms competition and lowering the risks of nuclear war in South Asia have become exceedingly dim.

With the latest nuclear events in mind, this article seeks to decipher -- as an analytical conjecture -- how Pakistan’s nuclear military aims, posture, doctrine and arms control positions may unfold early in the next millenium, if the nuclear weaponization of Indian military forces becomes definite.

Since Pakistan had not, as of this writing, openly deployed nuclear forces or set forth an explicit nuclear strategy, this must be an inferential exercise based on known factors of a political, geographic, economic and military nature. The inner nuclear thinking of the authorities in Pakistan is still unknown.[2] The article attempts to assess how Pakistani decision makers would craft deterrence and address military stability in light of their nuclear force structure, organizational, and deployment options, taking into account the geographic and resource asymmetries with India.[3]

Assessing these factors does not imply any endorsement of Pakistani or Indian nuclear weapons. Few outsiders doubt that the induction of these weapons radically increases the risks to the fundamental security and welfare of both countries, and this can only be regretted. The analysis could be a useful source of insights, however, into how the new dangers of Indian and Pakistani nuclear weapon acquisition and possible use can be anticipated, and headed off or curbed. It may also contribute to realistic appraisal of the political, diplomatic, non-proliferation and arms control measures that are being tried or that could be introduced. The conjecture includes arms control concepts that Pakistanis plausibly could originate to reflect their interests and conditions. The analysis also provides insights into how -- if diplomatic restraint, arms control and deterrence measures fail -- an Indo-Pakistani war might escalate to the nuclear level and what some of its consequences could be.

Impact of the Kargil Crisis

The chief surprise of the Kargil crisis from May to July, 1999, was Pakistan's apparent readiness to run a high risk of expanded war over Kashmir against the backdrop of a newly nuclearized South Asia. Outside observers concluded that Pakistani planners of the Kargil operation had been emboldened by Pakistan's demonstrated nuclear capability, viewing it as a "shield" against India expanding the conflict beyond the contested territory of Kashmir. If so, the Kargil initiative was a digression from the basic Pakistani approach of avoiding military actions that India could seize on as justification for military confrontation, a muted approach that Pakistan adopted over a quarter century ago with the Simla Agreement of 1972. Many Western observers of South Asia expected after the May 1998 Indian and Pakistani nuclear tests that India and Pakistan would adopt a pattern of self-restraint similar to that evolved by the superpowers following their Cuban missile crisis in 1962 – imposing limits on actions that could trigger nuclear confrontation. The Kargil episode, hardly a year after the Pokhran II and Chagai I series of nuclear tests, undermined this expectation.[4]

India's nuclear weapons clearly did not deter preparation or execution of the Kargil venture. Indeed, India's nuclear weapons testing may have actually stimulated conception of the armed intrusion – ostensibly a guerrilla operation of up to a thousand *mujahiddeen* (Muslim freedom fighters) – as a safer means of putting pressure on India to pull its forces back from the Siachen Glacier and negotiate a resolution to the Kashmir dispute than a higher risk operation by regular Pakistani armed forces.[5] The guerrilla forces had crossed the "line of control" (LoC)[6] from Pakistan-held territory to dig in on high mountain ridges at altitudes of 16,000 to 18,000 feet as soon as the snow melted in April and May. From their lofty positions overlooking the towns of Kargil and Dras, they radioed targeting coordinates to artillery in their rear and used their own lines of direct fire to suppress vehicle movement on India's only paved road between Srinagar in the valley and Leh in Ladakh.

The speed, scale and coordinated nature of this armed intrusion caught Indian intelligence by surprise, requiring a massive, time-consuming and costly military effort to scale the steep slopes and begin dislodging the guerrillas from their bunkers. If the high-altitude road between Srinagar and Leh were closed in the Dras-Kargil sector through September, snow would return, fill the passes and cut off India's resupply of its brigade-strength force deployed to the northeast in the Siachen Glacier sector, a remote and at one time inaccessible no-man's land that India had seized by force, unilaterally, in 1984. The LoC drawn jointly by India and Pakistan in 1972 through the contested

region of Kashmir had never been delimited on maps nor, for obvious reasons, was it demarcated by physical markers on the ground across the difficult terrain of the Siachen Glacier.

The Kargil crisis subsided in mid-July with American involvement and back-channel communications between Islamabad and Delhi. By early July, India's focused military response had begun to show results, albeit at a high cost in lives, with a step-by-step assault against the most exposed guerrilla positions.[7] India prepared to expand the war to relieve the pressure in Kargil and presumably to attempt to punish Pakistan – but then held back from the options of attacking across the international border against Pakistan's concentrated defenses in Punjab, or across the Thar desert at the narrow waist of Pakistan between Punjab and Sind.[8] Except for India's use of fixed-wing fighter aircraft which apparently did cross over the Kashmir LoC (two were lost over Pakistan-held territory north of the LoC early in the conflict) and shelling of areas elsewhere across the LoC, India's military response was confined to its side of the LoC. This earned India international recognition of its self-restraint -- a significant public relations advantage. India acknowledged, as of July 16, that 407 of its troops had died in action in the eight-week Kargil conflict, and 584 others were wounded, an exceptionally high count for so localized a skirmish.[9]

President Clinton used his good offices in a hastily arranged White House meeting on July 4 with Nawaz Sharif, along with telephone calls to Vajpayee in Delhi, to reach an understanding on defusing the crisis. Clinton pledged in the Washington joint statement with Nawaz Sharif that once the "sanctity" of the LoC had been restored he "would take a personal interest" in negotiations on the Kashmir problem. Sharif in return was committed to induce the guerrillas to withdraw behind the LoC.[10] Despite charges of a sell-out of Pakistan's interests from Islamic and other opposition political groups, Sharif won the formal support of Pakistan's top military leadership on July 9 for the accord and went on TV to address the nation on July 12. Sharif explained that Kashmir had become a "nuclear flash point" and that it was necessary "to avoid nuclear war" which would be suicidal for both sides. While praising the valor of the insurgents, he urged them to withdraw. Sharif also appealed through his address to Vajpayee to meet him, as he reportedly put it, before the "volcano" in Kashmir erupted again.[11] The bulk of the guerrilla forces complied and withdrew. Indian spokesmen themselves announced on July 18 that intruders had vacated key positions across the LoC, and that Indian forces had reclaimed control of three out of four battle zones, with the fourth in Mushkoh Valley to be recovered soon.[12]

Evidently, a key political goal of the planners of the Kargil intrusion was to put Kashmir back in the spotlight – to revive the issue urgently, so that foreign pressure would be applied to India to negotiate seriously on a solution.[13] In this, Pakistan had at least a partial gain, although at the cost of some damage to its image in the West. The episode reminded the world that Kashmir was an unresolved problem and the introduction of nuclear weapons there kindled a measure of new interest in achieving a solution. As the *Washington Post* editorialized:

> President Clinton personally led the American diplomatic effort to cool down Kashmir. He can fairly claim credit for seeing to it that Pakistan, the offending party, is backing off. But even if the crisis calms, the strategic situation in South Asia has been transformed. Before, the United States was politically on the outside of the Kashmir dispute. Now it is being drawn in. The simple reason is that with India and Pakistan both notching up their nuclear status, their failure to resolve their Kashmir differences could have consequences inimical to American interests.[14]

On the level of lessons for military stability, the Kargil venture made clear that the existence of India's newly declared nuclear weapons would not necessarily deter Pakistani support for intervention by surrogate forces, at least not within the territory of disputed Kashmir. Kargil suggested that nuclear weapons possession is insufficiently intimidating to assure maximum political and military restraint between contiguous enemies, confounding those who expected nuclear weaponization to breed extreme caution. Indeed, the Kargil case suggests that nuclear weapons -- at least in the absence of a solution to the Kashmir dispute -- may increase the propensity to risk-taking at non-nuclear levels, accentuating political and military instability in South Asia, despite the asymmetry in overall size and power between India and Pakistan.

The outcome of Kargil, it is safe to say, did not specify the future limits on how far leaders of each nuclear-armed neighbor may press the envelope in exploring nuclear-backed brinksmanship. On August 11, hardly three weeks after the Kargil fighting had subsided, Indian MiG-21 fighter aircraft destroyed an unarmed Pakistan Navy propeller-driven Berguet *Atlantique* reconnaissance aircraft with an air-to-air missile, killing all 16 aboard. India claimed the Pakistani aircraft had intruded across the border, and ignored the flight signals of the MiG interceptors (no radio contact was attempted) to fly

with them to an air base in India. Judging by the location of the crater where the wreckage fell -- 3 kilometers inside Pakistan, it is conceivable that the Indian aircraft themselves

crossed, or at least fired across, the border.[15] This armed attack violated one of the few substantive, pre-existing Indo-Pakistani military confidence-building measures, the 1991 agreement against violations of airspace.[16] India had moved ground forces into the Gujarat border area and put the air force and navy along the western coast on high alert during the Kargil episode, and further reinforced its forward deployed forces after August 11.[17] India's destruction of an unarmed plane and subsequent military movements illustrate how military overreaction could have ignited a larger war accidentally, or served as a pretext for escalation, with ominous implications for nuclear crisis stability.

Nuclear dangers may have helped curb Indian temptations to enlarge the Kargil war beyond Kashmir. However, India's sacrifice of lives lost to recover ground in the Kargil fighting focused professional military attention on gaps in defense capacity to deal with high-altitude, armed intrusions. It stirred an upsurge of patriotism in the populace, raised demands for tougher reactions to Pakistan, and generated wider support for defense budget increases. It also gave an election boost to Prime Minister Vajpayee and the BJP coalition. Kargil surely strengthened the hands of those who favor accelerating Indian development and deployment of nuclear weapons, including the search for a nuclear sword, or other offensive arms, to deflate the supposition that Pakistan had enhanced its safety behind a nuclear shield. Kargil damaged prospects for constraints on arms racing and an expanded regime of confidence-building measures.

Nuclear Weapon Inventories

As of this writing, no official announcements had based new Pakistani or Indian nuclear or missile activities directly on the Kargil outcome. But there was little to suggest that the effects of the crisis would restrain those programs. More likely, the damage Kargil did to confidence in the Lahore Summit dialogue process and the intensified nationalist feeling it inspired in India during the parliamentary election campaigns in September only strengthened the inclination in both countries not only to build up strategic capabilities but to make them operationally available.[18] This could mean efforts behind the curtains of secrecy to hasten production of nuclear weapons materials, refine warhead designs, accumulate delivery systems, assign command and control responsibilities, develop

regular and contingency plans for nuclear operations, train and organize nuclear weapon operators, and deploy and exercise nuclear-equipped units. While economic constraints are bound to limit the scope and rate of major new hardware acquisitions and facility construction, they will not necessarily stand in the way of military technical, conceptual and organizational developments.

Pakistan's success in conducting nuclear weapon detonations within weeks of the Indian nuclear test series in May 1998 laid to rest residual uncertainties regarding Pakistan's mastery of the separation of weapons-grade uranium and the fundamentals of fabricating an implosion device around a uranium core.[19] Pakistan's nuclear tests presumably validated a device suitable for aircraft delivery and possibly a design compact enough for installation in ballistic missile front sections. The tests were bound to yield data useful to weapon designers in refining weapon assemblies and certifying them for military purposes. A Pakistani discussion of the tests claims that the data derived from Pakistan's fission tests are sufficient to support Pakistani progress on thermonuclear weapons.[20] India's testing achievements in 1998 may have been greater, in validating so-called 'boosted weapons' of higher yield, steps toward thermonuclear capability, and perhaps miniaturization of plutonium warheads for a greater variety of potential military applications.[21] But in Pakistan's case, crossing the fission threshold itself was fundamental, proving to skeptics that Pakistan had acquired the basic materials and workable designs.[22]

Limits on the size of Pakistan's existing highly-enriched uranium (HEU) stockpile for manufacturing nuclear weapons and on the growth capacity of its uranium processing activities probably restrict the number of deployable nuclear weapons over the next few years. This may in turn constrain Pakistan's force structure options, and thus would have a bearing what the defense establishment could consider as a viable nuclear defense strategy for Pakistan's circumstances in the near term. Presumably, the chief constraint of a small nuclear force on strategic options would be uncertainty about the survivability of that force under preemptive attack. As a result, Pakistani planners probably would judge that they could not safely fall back on a retaliatory ("second-strike") deterrent posture for the near future.

By conservative outside estimates, Pakistan would have had sufficient HEU to be able to deploy from "a few" to about 10 nuclear weapons by 1995. Other outside estimates suggest a somewhat larger HEU stockpile in 1995 could have supported as many as 15 to 25 nuclear weapons.

Researchers believed that Pakistan's enrichment facility at Kahuta had the capacity in 1995 to produce enough new HEU for several (two or three) bombs a year.[23] If today we were to assume 10 as a relatively conservative HEU stockpile number for 1995, three years later even this low-side

number would in all likelihood have grown to between 15 and 16. Material consumed by the nuclear explosive tests could have reduced the number, perhaps by two or three, leaving between 12 and 14. Following the nuclear tests of May 1998, Pakistan almost certainly would have invested in increasing the enrichment facility's throughput to produce at a maximum rate, perhaps 3 to 4 weapons quantities of HEU a year, or higher -- from already partially enriched uranium source material, bringing the estimate of possible warheads back up to at least 18 to 22 in 1999.[24] Based on this reckoning, Pakistan probably could derive a HEU stockpile from its own facilities, conservatively speaking, sufficient for about two dozen nuclear weapons by the year 2000.[25]

Assuming the nuclear weapons and delivery systems are mobile and will be dispersed and hard to detect at times of crisis, two dozen deliverable warheads might be considered sufficient for a minimum credible deterrent against a large-scale conventional attack by India. This is not to say that Pakistan would consider a low two-digit number as an adequate safety margin and cease producing nuclear weapons-grade material. Nevertheless, for analytical purposes we may assume a Pakistani nuclear force size of 24-25 deliverable uranium weapons provides a benchmark of Pakistan's near-term strategic deterrence options. An objective of preemptive (disarming) strikes against Indian nuclear weapons inventories would not be plausible for Pakistan with a force this size, or even a significantly larger one. That is because the Indian stockpile would be much larger, more dispersed and harder to reach. This is not to say that India's previously known nuclear weapons and material storage sites would be excluded as targets in Pakistani deterrent planning.[26]

India had a long head-start over Pakistan in accumulating weapons-usable material, concentrating primarily on plutonium. Indian plans for separation of plutonium date back to the 1950s and actual separation began in the mid-1960s. India detonated its first nuclear explosive device based on plutonium in 1974, a quarter of a century ago. Conservative estimates of India's already-separated and safeguards-free plutonium inventory of 1995 suggested India then had the equivalent of about 65 atomic weapons. This plutonium stockpile was projected by the same conservative assumptions to reach a level equivalent to 85 to 90 weapons by the year 2000. Plutonium inherent in safeguards-free

spent fuel from Indian reactors that had not yet been separated in 1995 could, if reprocessed, at least double this Indian inventory, to between 170 and 180 weapon-equivalents by 2000. The amounts consumed by Indian nuclear tests in 1974 and 1998 would have had only marginal effect on these relatively large numbers. In addition, India has also been running pilot-scale

uranium-enrichment facilities for at least small quantities of HEU that could play a part in fabricating thermonuclear weapons.[27]

Compared to Pakistan's assumed inventory of about 25 nuclear weapons at the turn of the millenium, India's plutonium inventory could be sufficient for between 90 and 180 nuclear weapons. While Pakistani tested weapons probably still would be of no more than one or two design types (e.g., distinct for airborne and missile delivery) and designated mainly for strategic missions, India might have several types of weapon available, with differences of yield for several employment options (e.g., against tactical or battlefield, and soft as well as hard targets). Since India claims its nuclear weapons program responds to a nuclear threat from China, which has a strategic nuclear arsenal, only part of India's inventory would be assigned to Pakistan. From Pakistan's planning point of view, however, the number of weapons that India theoretically could use against Pakistan would constitute an unfavorable ratio of at least 4:1 and possibly as high as 8:1.

Given such an unfavorable ratio, one must infer that Pakistani defense planners will find it more difficult than India's to assign a portion of its inventory to be withheld as a second-strike or reserve force. In addition, as long as the inventory is so small, Pakistan's top defense officials would be inhibited from relying primarily on a retaliatory (i.e., second-strike) posture. Presumably they would conclude that if so small a nuclear inventory is withheld under Indian air attack, the Pakistani nuclear forces might not survive a conventional preemptive assault, let alone a nuclear counterforce strike.

Missile Delivery Systems

Pakistan and India both acquired nominally "nuclear-capable" airborne delivery systems as early as the 1970s, but both now emphasize ballistic missiles as nuclear strike systems (see Tables 1 and 2 below). This should be no surprise. The classical nuclear powers have relied on both aircraft and ballistic missiles. This diversity of delivery systems improves the inherent survivability of deployed nuclear forces against surprise attack. To a greater degree than tactical aircraft, however, ballistic missiles are symbolically potent. Once ballistic missiles have been launched at targets, they have a

higher assurance than aircraft of penetration. Leak-proof defenses against medium- and long-range ballistic missiles are extraordinarily difficult to devise. Ballistic missiles add to the credibility of classical nuclear deterrence by their near certainty of arrival. Once a nuclear-equipped

ballistic missile is on its way, the defender is nearly helpless to intercept the missile or otherwise limit the impact of its warhead on a designated target.

As with nuclear weapon capabilities, India has set the pace in the acquisition of missile delivery capabilities on the subcontinent. Pakistan invariably has come from behind, usually facing tougher procurement obstacles and the consequences of greater planning uncertainty. Key export controls and other barriers to nuclear and missile proliferation have usually been instituted after key Indian acquisitions from abroad, but before Pakistan's. By the terms of art in proliferation assessments, India's development of space and missile technologies is said to have accrued more "indigenous content" and India, therefore, has more easily escaped the sanctions of the major supplier countries. Pakistan's later development efforts have been caught in ever tightening intelligence scrutiny and export controls.

Pakistan had been forced by this uneven playing field to procure nuclear-capable ballistic missiles and missile-related technologies wherever it could. The chief supplier outside the missile export control regime that was accessible to Pakistan in the 1990s was China. By 1997, even China had become restrictive on missile sales to Pakistan.[28] As a result, according to some reports, Pakistan subsequently looked as far afield as North Korea to obtain production capacity for medium-range ballistic missiles that can target virtually all of India. At the same time, Pakistan has been developing indigenous missile-design and production facilities, particularly for short-range, solid-fueled ballistic missiles. There may have been a cultural tendency to underestimate how far Pakistan could go alone in ballistic missile development and production.

The table below compares Pakistan's reported and India's acknowledged ground-based nuclear-capable ballistic missiles, showing attributed range and payload, fuel type, and certain other characteristics. A common feature of the ballistic missiles in both countries is their suitability for mobile deployment. In a road-mobile configuration, the missile is usually loaded onto a self-propelled transporter-erector-launcher vehicle and accompanied by several support vehicles.[29] India's heavier

Agni-II and III missiles are being considered, lately, as railroad-based (rail-mobile) systems, although they could also be silo-based (see text and related notes below).

Table 1

Nuclear-Capable Ground-Launched Ballistic Missiles, 1999*

Missile Type	*Range (km)*	*Inventory/Status*	*Configuration and Payload*
India:			
Prithvi-I (Army)	150	75	1-stg, liquid, 800 kg
Prithvi-II (Air Force)	250	25 ordered	1-stg, liquid, 500 kg
Prithvi-III (Navy?)	350	R&D	1-stg, liquid, ? kg
Agni-I	1,200-1,500	superseded	2-stg, one solid, one liquid, 1000 kg
Agni-II	2,500	6?	2-stg, both solid, 1000 kg
Agni-III	3,000 plus	R&D	3-stg, 2 solid, 3rd fuel/payload unknown
Pakistan:			
Hatf-2**	300	in production	1-stg, solid, 500 kg
Hatf-3	600	in production	1-stg, solid, 500 kg
Shaheen-1**	750	in testing	?-stg, solid, 1,000 kg
Ghauri-I**	1,500	in testing	1-stg, liquid, 500-750 kg
Ghauri-II	2,000-2,300	in testing	1-stg, liquid, 700-1,000 kg

*Sources: Rodney W. Jones and Mark G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, *op. cit*., Section 10, "Missile Proliferation", including charts, pp. 253-269, and missile sections and their notes in the chapters on Pakistan, India, China and North Korea in the same volume; *The Military Balance 1999-2000*, London: International Institute of Strategic Studies (IISS), Oct. 1999, Table 53, pp. 307-311, and Table 19, p. 156-158; *India Today International*, April 26, 1999, pp. 28-30; and Pakistan Institute for Air Defence Studies, website page on "Pakistan's Missile Systems," <http://www.piads.com.pk/pms.html>. For general analytical background on ballistic missiles, see Aaron Karp, *Ballistic Missile Proliferation - The Politics and Technics* (New York: Oxford University Press for SIPRI, 1996).

** The Military Balance, op. cit., p. 158, suggests that the Hatf-2 and Shaheen-1 are based, respectively, on China's M-11 and M-9 designs, and the Ghauri-I on the North Korean No Dong missile, while a Ghauri-III multi-stage, liquid-fueled, 3,000 km missile reportedly under development is based on the Taepo Dong.

Key to ballistic missile range terminology:

The terminology normally used in major power arms control negotiations is:

SRBM (short-range ballistic missile): up to 1,000 kilometers
MRBM (medium-range ballistic missile): between 1,000 and 3,000 kilometers
IRBM (intermediate-range ballistic missile): between 3,000 and 5,500 kilometers
ICBM (intercontinental ballistic missile): in excess of 5,500 kilometers

Research institutions may use other range classifications. The International Institute of Strategic Studies in London, for example, gives SRBM range as 500 km or less, omits the MRBM category, treats IRBM range as 500-5,000 km, and treats ICBM range as anything above 5,000 km.

Table 2

Nuclear-Capable High-Performance Strike Aircraft, 1999

Aircraft Type	*Combat Radius (km) (inboard fuel tanks)*	*Inventory*	*Supplier*
India:			
Su-30 MK	1,200 km	30	Russia
Mirage 2000H/TH	750 km	35	France/UK
Jaguar S(I)	550 km	88	France/UK
MiG-27	250 km	147	Russia
Pakistan:			
Mirage IIIEP	600 km	16	France
Mirage 5	650 km	52	France
F-16 A/B	950 km	25	US

Note: Aircraft combat range is variable, depending on armaments configuration and payload weight, and on flight profile. Combat radius estimates given here are nominal and assume within-normal armament payloads, no external fuel tanks, no air-to-air refueling, and high-low-high flight profile. Maritime attack, reconnaissance, and transport aircraft, some of which would be nuclear-capable over land and which would expand the Indian delivery capability against coastal targets far more than the Pakistani, are excluded from this table. Also excluded are high-performance fighter-interceptor aircraft that could participate in nuclear delivery or ground attack. Current numbers are drawn from *The Military Balance 1999-2000*, op. cit., sections on armed forces of India and Pakistan.

When this article was written, of the missile systems listed in Table 1, only the Indian Army's Prithvi-I missile, garrisoned near Jullundur and close to the Pakistan border in June 1997, was actually "deployed" in the field as a combat-ready system, at least as that term is usually understood by defense practitioners.[30] Deployed systems are combat-ready when they are no longer on trial, are manufactured in significant numbers, assigned to and exercised with their military operators, and are essentially ready to fire, needing at most only a few hours of warning and technical preparation. The warheads garrisoned along with the Prithvi deployed missiles in 1997 reportedly were conventional. After India

tested the Agni-II on April 11, 1999, however, Indian reporting based on official interviews claimed that the Agni-II was “combat-ready” (ready to fire in 15 minutes), presumably in a nuclear mode, and that India had six Agni missiles in inventory.[31]

To maintain a credible nuclear deterrent posture under these circumstances, Pakistani defense planners presumably will move beyond the formerly recessed deterrence posture and undertake steps to produce, equip, deploy, man and exercise ballistic missiles with operational units. Even if these systems normally remain on a low-alert standby basis, the defense operational objective probably will be to reach a capacity with mobile missile units to generate full combat readiness within a day or two of strategic warning, as India apparently has already done in its case by garrisoning the Army's Prithvi SRBMs on the Punjab border.[32]

The low-alert standby status would depend on Pakistani planners being able to assume three conditions: (1) *strategic* warning of Indian ground force mobilization would become available at least days before a major conventional ground offensive could be mounted against Pakistan; (2) India would not itself launch a *nuclear* preemptive or decapitating first-strike out of the blue; and (3) India could not successfully preempt Pakistani nuclear assets by using *conventional* air-delivered weapons in a surprise attack. While plausible, these conditions might not be readily accepted as valid planning (i.e., worst case) criteria by all Pakistani planners. The Indian Air Force's war plans against Pakistan reportedly emphasize preemptive conventional attack on Pakistan's airfields, for instance, with negative implications for bilateral efforts to maintain military stability in future crises.[33]

The production capacity, inventory numbers and deployment status of Pakistan’s nuclear-capable ballistic missiles have remained obscure. As of mid-1999, Pakistani forces apparently had not fielded nuclear-capable ballistic missiles nor exercised them in combat ready status.[34] The trend in flight testing and demonstrated capability, however, is clear. Pakistani testing showed that strategically relevant targets throughout India are in range of missiles under development in Pakistan, as counters to India’s Prithvi and Agni missiles. Pakistan originally concentrated on solid-fueled SRBMs, reportedly acquiring missile-related technology and perhaps samples of actual M-11 missiles (a system designed for export) from China in the early 1990s. Pakistan may have developed and renamed an indigenously manufactured version of this type as its Hatf-2 (Guardian-2) missile. China claims the M-11 missile it exports has a range of 280 kilometers with an 800 kilogram payload -- just under the nuclear-capable 300 km range-threshold of the MTCR. The range of either the M-11 or of Pakistan's Hatf-2 would, if launched from inside Pakistan, fall short of New Delhi, India’s capital.

After the United States failed to persuade India to cease the development and testing of its Prithvi and Agni ballistic missiles (which began as early as 1983 and accelerated just as the East-West cold war wound down), Pakistan began openly testing ballistic missiles of significant range and payload, in the latter half of the 1990s. The ballistic missiles demonstrated by Pakistan in this later period varied in range capability from 600 to 1,500 kilometers. Pakistan's solid-fuel Shaheen (Falcon) missile, with a range of about 600 kilometers, would put New Delhi at risk. The most recently tested Ghauri-I and Ghauri-II missiles reportedly are capable of ranges between 1,200 and 1,500 kilometers, and there have been indications that such liquid-fueled missiles might attain a range of well over 2,000 kilometers. Even the Ghauri-II missile with a demonstrated range of 1,500 km could reach such key urban locations in India as Mumbai (Bombay), while a 2,000 km missile would also bring India's southern cities such as Chennai (Madras) and Bangalore within range of launch sites in southwestern Pakistan.[35] The ballistic missiles under development promise a target coverage capability exceeding that of currently available Pakistani high-performance aircraft (see Table 2).

The Indian Threat

Viewed from Islamabad and military headquarters in nearby Rawalpindi, the threat from India is perceived as a combination of offensive political and military pressures, rooted partially in Indian memories of the communal violence and bitterness of partition and partially in India's hegemonial aspirations. These are seen as antagonistic to Pakistan's foreign policy independence, and to its welfare and unity as an Islamic republic. India's annexation of the Muslim core of the former Kashmir state is perceived to keep Pakistan incomplete and festers as a radicalizing grievance in Pakistan's domestic politics. India's parallel domestic compulsions over Kashmir are instinctively understood by moderates in Pakistan's elite, but the reflection in India's unyielding policy on Kashmir, backed by its considerably greater power, is regarded as encroaching on Pakistan's integrity.

Instances of India's successful use of force to "cut Pakistan down to size," as in the 1971 dismemberment of East Pakistan, is viewed as proof of the lengths to which India will go with its superior military force -- especially when Pakistan has been put at a disadvantage by serious internal political difficulties. India's unilateral seizure of Siachen in 1984, and Pakistan's narrow escapes from broader war in the Brasstacks crisis of 1986-87, and successive Indian military mobilizations since, over Kashmir or the border with China in 1990, and most recently during the Kargil crisis of 1999, are

seen as reflections of India's dark side, its proclivity for military intimidation, and its underlying threat to Pakistan's survival.

These Pakistani security-deficit perceptions apparently have been accentuated by post-Cold War trends. During the Cold War, Pakistan found partnerships with major powers which not only helped define the newly independent state's sense of purpose in foreign affairs and provided incentives for a moderate course, but served implicitly as constraints on worst case threats from

India. But the end of the Cold War and somewhat abrupt termination of long-standing U.S. military cooperation with Pakistan, Pakistanis believe, emboldened India to assert itself more forcefully on the international stage, evidenced most recently by its May 1998 nuclear weapon tests and rhetorical challenges to China. The same factors have contributed to Pakistan's increasing diplomatic isolation and perceived vulnerability to Indian domination. The rise to power of the Bharatiya Janata Party (BJP), a descendant of India's Hindu chauvinist tradition, adds to the sense of alarm. Indeed, both countries are somewhat more susceptible than before to pressures from religious fundamentalists in domestic politics that impinge on external relations and that could become interactive.

On a material and resource level and compared worldwide, Pakistan is not a diminutive or easily ignored state. With a population of about 140 million, a territorial expanse of some 307,000 square miles (excluding Kashmir), Pakistan is twice the area of California. Pakistan's location on the Arabian Sea – connected with Iran and China, as well as Afghanistan and Central Asia – is naturally strategic. Pakistan has the potential to play a significant role in the future stability and development of connected regions and, conversely, could easily be a source of chronic trouble if efforts are made to isolate it from normal international relationships. Pakistan also has a significant military tradition and sizeable armed forces. That Pakistan has not been well run under recent elected governments is well known, but the polemical cliche heard in some intellectual circles that Pakistan has become a "failed state" is certainly inaccurate, and a regrettable digression from serious thought and analysis.

That said, Pakistan is dwarfed by an India that is four times larger in territory, nearly seven times larger in population, and at least twice as powerful in offensive ground forces – with an even sharper edge of four-to-one or more in air and naval power. India has a military-industrial base that is many times more extensive and diversified, with islands of technological proficiency that surpass those of Pakistan. India has strategic defense depth. It is difficult, for instance, to imagine India being deeply

invaded or pinned down for long by the conventional military forces of Pakistan. But, absent international restraints, the reverse is entirely plausible.

Today the Pakistani defense planner's worst nightmare is the threat of Indian invasion, whatever the immediate cause may be, to teach Pakistanis a permanent lesson, to impose on them lasting subservience to India's wishes, perhaps to set region against region, or even to break up

Pakistan as it currently exists. As Pakistanis visualize it, this threat could materialize as an outright conventional military invasion, driven by an upsurge of anger in India due to frustration over the resistance in Kashmir, or as a cumulative process of smaller encroachments. With the threat of all-out Indian invasion held in reserve, many Pakistanis perceive India's policies toward Pakistan as a deliberate strategy of intimidation through crises and covert probes manipulated to wear Pakistan down psychologically. They detect Indian designs to isolate Pakistan from external partners, play on its internal divisions, and distract the nation from normal social and economic activities, and divert scarce resources.

An examination of Pakistan's geography in relationship to India helps explain Pakistan's sense of vulnerability to a potential Indian conventional invasion and fight to the finish. Pakistan's southern flank lies exposed to India on a diagonal axis of roughly 2,000 km, from the Arabian Sea in southwest Sind to upper Punjab and Kashmir in the northeast. The terrain along most of this border is flat, and open to rapid armored force movement. Behind the border, Pakistan possesses very limited geographical defense depth. Pakistan's cities and population tend to be concentrated along the rivers in a territorial belt that is little more than 300 kilometers wide in the north and narrows at points to less than 100 kilometers across, for example, where southern Punjab ends and Sind begins. Punjab's largest city, Lahore, is within heavy artillery range of the Indian front lines near Amritsar, and virtually all of Pakistan is exposed to supersonic Indian air attack.

To Pakistani planners, the logical avenues of Indian military advance are obvious, following those that were actually exploited in the 1965 war and threatened by the Indian mobilization of forces in the Brasstacks Exercise of 1986-87. Were Pakistan's ground forces to collapse, Punjab could easily be overrun by armor, opposite Sialkot and Lahore, opening the door to occupation of the heart of the country. Punjab is expected to be the main invasion corridor because of its proximity to Kashmir and

Pakistan's political heartland. Alternately, Pakistan could be severed at its mid-point. With diversionary attacks toward Lahore in central Punjab, India could concentrate armored forces further south in Rajasthan for its main invasion across the desert, striking at Pakistan's vital north-south road and rail communication links where they narrow to a waist hardly 70 kilometers across, southwest of Rahim Yar Khan. This could cut off Punjab and the North-West Frontier, where most of Pakistan's air and ground force military assets are based, from the port at Karachi, the Navy, and resupply of oil and strategic goods from abroad. Such an invasion could be accompanied by Indian subversion of dissident groups, to threaten the breakup of Pakistan from within. India could also blockade Karachi from the sea, and indeed more than hinted at this option during the Kargil crisis.

Pakistan's limited defense depth and India's much larger conventional forces have been the starting points for Pakistani planners in devising and implementing Pakistan's national defense strategy. Despite the Cold War problems with the Soviet Union and Afghanistan through 1989, and some irritants with Iran, Pakistani defense planners have always viewed India as the chief military threat for sizing and organizing Pakistan's armed forces. Formerly conventional, the underlying threat from India now has an explicit nuclear overlay. In the event of war, this could shrink both the time for crisis management decision-making and the space for absorbing attrition prior to fundamental decisions about the use of nuclear forces.

What difference, we can ask, are nuclear weapons likely to make to Pakistan's defense policies, planning, and force structure? What will the nuclear forces themselves look like? What nuclear defense objectives will Pakistan's nuclear decision-makers concentrate on, and in what order of priority? Will the rationale be effective for Pakistan's security requirements? What special problems may Pakistan's nuclear posture and capabilities bring into being?

Nuclear Deterrence and Defense Posture

Pakistan's nuclear decision process is likely to continue to be stringently guarded and opaque. Pakistani authorities are unlikely to declare their operational nuclear strategy and military doctrine explicitly. Authoritative statements of nuclear policy by officials to the press probably will continue to be limited to broad generalizations of capacity to respond to aggression. With limited nuclear assets, concerns about their vulnerability, and fear of internal politicization of nuclear matters, secrecy will be paramount. From Pakistan's standpoint, as has been the experience with China, and even with India,[36] real transparency on nuclear weapons matters is regarded as destabilizing. However well-intentioned,

Westerners are unlikely to find it revealing to engage Pakistani defense authorities in open discussion of military strategic options, force structure and doctrine.[37]

India's official statements embrace a goal of "credible minimum nuclear deterrence," telegenically calculated to project an impression of "maximum restraint," and thus ostensibly reassuring to neighboring China and other interlocutors. Yet the terminology is also vague enough to invite incessant media speculation regarding its real meaning.

Pakistan appears to have adopted the same minimalist terminology on nuclear deterrence posture, at least in public. But the conjecture here is that Pakistan's actual nuclear security objective vis-a-vis India probably would better be described as "maximally credible nuclear deterrence" -- based on smaller forces within Pakistan's means, but rooted in a nuclear operational posture that is simpler, existentially direct, with little room for hesitation and almost none for nuclear war-fighting or graduated escalation.

To support maximally credible nuclear deterrence, in the context of the military and geographical asymmetries between India and Pakistan, Pakistan's smaller nuclear arsenal logically would be construed as a first-strike force, albeit launched only as a last resort (in extremis). Pakistani planners would seek to identify red lines that, if crossed, leave serious doubt that Pakistan's survival can be assured. Those red lines would not be specified publicly. But operationally defined, they would be the thresholds that set nuclear strike preparations in motion.

A first-strike doctrine would be chosen not because it could disarm India (this would not be technically plausible), but because it would signify that Pakistani escalation, as a last resort, would be sudden and all out, with catastrophic consequences for urban India. For the weaker side in the highly asymmetrical South Asian nuclear and conventional military balance, and with so small a nuclear force, Pakistani defense planners are likely to reach the conclusion that only a first-strike option would provide maximum nuclear deterrent credibility.

A first-strike posture does not require a public declaration, it merely requires that it not be precluded by a binding political commitment, law, or technical limitations on the use of the nuclear force. The fact that India has repeatedly proposed bilateral agreements on nuclear "no first use," while Pakistan has rebuffed them, indicates that India is well aware that Pakistan is likely to fall back on an unstated "first-use" nuclear employment doctrine and considers this a useful point to make in its own

public relations abroad. What is not clear yet is whether India recognizes how dangerous this posture is to India.[38] Silence is not proof that Pakistan has decided this matter, but it is consistent with the judgment that refraining from agreement with India suffices to preserve the option.[39]

If these inferences are persuasive, the problem that will come into focus is the likely predisposition in India to test the recessed envelope of Pakistani response -- to probe for the boundaries of red lines, perhaps by pursuing an incremental process of political-military intimidation. In this regard, it is plausible that Pakistani defense decision makers will conclude that it

is in their interests to let the impression take hold outside that while the leadership has an iron grip on nuclear safety and security in peacetime, under conventional wartime pressures this grip would be less predictable. A calculated appearance of wartime unpredictability could have its downsides in public relations battles abroad, but could reinforce the posture of maximally credible nuclear deterrence. It should be emphasized that this expedient is not the same as a bluff made, and that could be called, after the outbreak of a war, but rather a reputation earned in advance that presents the opponent with an impenetrable uncertainty regarding what may happen in the course of an avoidable war.

Such uncertainty may support a nuclear crisis stability objective of Pakistan's -- raising the threshold of Indian calculations of unacceptable nuclear risk well in advance of Indian decisions to initiate or widen a conventional conflict with Pakistan.[40] It implies the use of nuclear deterrence not only against nuclear use but against offensive conventional military action that would directly jeopardize Pakistan's vital interests – such as an Indian naval blockade of Karachi, or a conventional preemptive air and missile strike on Pakistan's airfields that aims to cripple Pakistan's air force. It implies that the safety margin for India of any significant offensive conventional use of military force against Pakistan on its territory has been narrowed substantially.

Force Structure and Employment Policy

Since Pakistan's available nuclear-equipped forces would be relatively small at the outset, a conceptual issue that would arise is whether to create an entirely new military service organization dedicated to nuclear operations, with exclusive control over warhead safety and security as well as operational nuclear forces. The conjecture here is that an alternative approach would be more likely, the recruitment and special training of select units within the Army and Air Force to handle nuclear weapons nuclear weapons logistics as well as field operations, integrated under service commands at

general headquarters in Rawalpindi. The special Army units would control the mobile missile systems, and the Air Force units would be responsible for dual-purpose aircraft that are equipped, designated and trained for nuclear missions. Two dozen nuclear weapons at the outset probably would be allocated about equally between manned aircraft and ballistic missile delivery systems.[41] Later with additional warheads and delivery systems, and improved conditions for nuclear force survivability, the mix probably would be more complex.

Pakistan's planners presumably would work through three principal requirements of a maximally credible deterrent strategy: (1) a determination as to whether one or two of the scarce warheads would be subject to use as warning shots to send the message that further pressure is likely to trigger full-scale escalation; (2) a selection of Indian targets that would seem to have the greatest strategic import, if Pakistan were forced to resort to nuclear strikes, and the specific allocation to those targets of Pakistan’s air and missile forces; and (3) operational measures to ensure the survivability of Pakistani nuclear systems and, if their use proves necessary, to ensure prior confidence in the effective execution of their missions.

Given the nuclear asymmetry with India, Pakistani planners may conclude that it is inadvisable to plan to initiate limited (e.g., tactical) nuclear use against attacking forces in a major conventional conflict with India, especially in densely populated Punjab, since retaliatory Indian tactical nuclear use inside Pakistan's narrow defense space could be strategically disabling to Pakistan. Conceivably, Pakistani planners would weigh the possible utility of one or two nuclear warning shots against isolatable Indian military targets elsewhere, to demonstrate resolve while seeking to avoid full-scale escalation, or to compell international intervention to halt the war. Pakistani analysis, however, might bring to view technically feasible, albeit potentially high-risk, options for limited uses of nuclear weapons by Pakistan that could serve as warnings to an invading India as well as to the international community and be employed against military targets with limited collateral effects on civilians, as for example: (1) against columns of Indian armor and troops entering Pakistan from Rajasthan through desert terrain, or (2) against one or more Indian naval vessels prepositioned nearby at sea in order to blockade Karachi.

Pakistan's likely target options for a strategic campaign, given the small nuclear inventory and Pakistan's geographic and resource constraints, probably would emphasize countervalue attacks,

implying unacceptable destruction in urban areas. The Pakistani target survey probably would turn up a small number of strategic infrastructural targets, such as big hydroelectric installations whose destruction would flood local terrain and divert resources to emergency relief, and ports, whose attack could disrupt international shipping. Since Pakistan's deliverable weapons would be too few to achieve strategic effect from targeting India's numerous military airfields, radar installations and army cantonments, the target plan probably would bypass ordinary military facilities.

The conjecture here then is that Pakistani planners would focus therefore on very important cities. The specific aim points within those urban areas, however, might include high value military production facilities as well as installations of high value to the modern economy. Aircraft missions might be structured for precision against certain coastal targets, flying in low over water to circumvent fixed air defenses. While Pakistani ballistic missiles today may have accuracy limitations that may preclude impact on precise aim points, the target screening probably would seek to limit collateral damage to the Muslim-populated neighborhoods that exist in most major Indian urban areas. While Pakistan does not yet have its own observation satellites or long-range, high-altitude photo-reconnaissance capabilities, the planners presumably would mine commercially available satellite photography that permits precise targeting coordinates and fairly high-resolution structural analysis.[42]

Deterrent Force Security and Survivability

Force survivability could pose considerable problems and thus preoccupy Pakistani defense planners in designing deployment configurations, operational plans, and command and control links. Concealment, secure transport, and safe handling of nuclear weapons themselves will be an enduring concern. Maintaining the secrecy of nuclear weapons storage locations would place a premium on keeping such facilities few in number, probably within existing military or industrial reservations. If the real locations became known to Indian or Indian-allied intelligence, however, these facilities probably would be more vulnerable to conventional aircraft strikes or commando raids than an infrastructure designed for wider dispersal. Pakistan eventually will have to build concrete-reinforced and underground storage facilities for nuclear weapons. Weapons that remain stored in survivable facilities, rather than mated with alert missiles in the field, could buy time to find alternatives to their

use before crisis gives way to war, or even during conventional war, for as long as conventional defenses are holding up.

Similarly, nuclear force survivability, physical security, safety, and related secrecy requirements will dictate careful screening, recruitment and technical training of nuclear missile operators, crews of nuclear-equipped aircraft, and the logistics support teams for both. Devising means to disperse and conceal the personnel, warheads and delivery systems at a wider number of facilities during times of crisis will require the installation of special handling equipment, encrypted and hardened communications links, and remote authorization means for weapons release and arming

procedures. Obvious signatures of nuclear installations and novel weapons handling procedures would have to be masked as well as possible. Replication of structures and procedures at non-nuclear support facilities and simulated nuclear personnel rotations and vehicle movements at redundant support facilities presumably will be designed and practiced.

Pakistan's choice of mobile ballistic missiles already provides one basic avenue to force survivability. As long as the missiles in question can be moved significant distances over desert or other rugged terrain, provided communications are reliable and impervious to outside jamming, and as long as targeting guidance can be altered and recalibrated from any site, the built-in mobility and dispersal of the deployed missile launchers will protect most from sudden, wholesale preemption. Even if the individual missile launchers cannot be dispersed optimally, survivability of a core nuclear force can be assured by fielding a sufficiently large number of missiles on launchers, only a few being nuclear-armed, and the rest conventionally-armed or even well-designed decoys. It is not clear from available information how rapidly Pakistan’s medium-range missiles, especially the liquid-fueled Ghauri class, can be moved from one location to another for effective concealment. Liquid-fueled larger missiles typically suffer greater logistical problems, take longer to prepare for launch, and probably are more susceptible to detection than the solid fuel shorter-range missiles attributed to Pakistan.

With adequate warning well-practiced alert procedures, aircraft are highly dispersable, provided airfields or airstrips with the minimum fuel and communications support facilities are widely distributed around the country. India’s acquisition of laser-guided bombs and highly capable strike aircraft already present a very serious conventional preemptive threat to Pakistan’s combat aircraft when they are on the ground at their main bases. To the extent that this conventional vulnerability is

addressed by dispersed modular airstrips, other means of temporarily dispersing aircraft and air defense improvements will facilitate the concealment and survivability of units with nuclear missions. For air force endurance, Pakistani planners probably would seek to negotiate sanctuary options to use prearranged airfields temporarily in neighboring friendly countries, including Afghanistan and the Gulf.

The short flight times of supersonic aircraft between India and Pakistan mean that tactical warning reaction times can be counted in minutes on one or two hands. Unless concealment and dispersal measures are extremely effective, the conventional air preemptive capability in India's

hands presents a serious challenge to Pakistani confidence in its airborne nuclear force survivability -- a potential Achilles heel for nuclear crisis stability. During a war, this condition could abbreviate the amount of time Pakistani commanders could deliberate before their red line criteria demand urgent consideration of strategic nuclear weapons use.

Notwithstanding some difficulties in fielding secure and survivable nuclear forces, the dispersal and concealment remedies available to Pakistani defense planners are not likely to be totally breached by a sudden Indian conventional attack or even by a campaign over several days. They could be, however, in a war of attrition over several weeks. As a result, the maximal credible nuclear deterrence objective, the nuclear shield, probably is secure even with a small Pakistani force of two dozen nuclear weapons for at least a few days. Launched during that period, at least half and probably more of the available weapons are likely to get through to significant urban targets in India.

If this condition is recognized in Indian assessments and assimilated in military planning, it probably will deter Indian decisions to initiate either large-scale conventional ground attacks or preemptive air attacks against Pakistan's core defenses, actions which by their nature could push Pakistan close to the breaking point. In conceptual terms, the addition of nuclear weapons that are likely to be used only in extremis and that can be expected to have high penetration if they are used could induce a significant measure of military stability for Pakistan in peacetime, provided neither state seeks to change the basic status quo by large-scale application of conventional force.

Nuclear Release Authority and Command and Control

No society or polity is immune to technical and political flaws in decisions of war and peace. Human error, egotism, mechanical breakdowns, bureaucratic routines, and factional struggles can derail methodical decision-making. Even methodical decisions and professionally run operations may have unexpected and unwanted consequences. Modern military organizations give precedence to elaborate procedures, but political-military crises and wartime operations are often messy affairs that outrun the best-prepared organizations.

At the technical level, Pakistan is disadvantaged in not having state of the art early warning systems and overhead surveillance to provide strategic warning and buy time to think through diplomatic and military options, or to pursue outside help. This implies the need for Pakistani ingenuity in devising fail-safe but highly responsive nuclear command and control. Trends suggest

that the Pakistani choice, in large part, will be to fence off the production of nuclear weapons and the design of nuclear command and control almost exclusively as a professional military preserve, and the military will seek to insulate nuclear operations completely from Pakistan's domestic politics.

Fencing off nuclear command and control may be reassuring for the safe handling and physical security of nuclear assets, but who will make the ultimate decisions on the overall strategy, on the objectives of nuclear plans, on the management of security crises, on the guidance criteria that would call for official warnings of nuclear response, and on the actual authorization of nuclear strikes? To what extent will the ultimate decisions on war and peace be in the hands of elected officials? The lines of authority in Pakistan on these fateful matters have long been contested in civil-military relations. The history of military dominance in Pakistani politics suggests that the military may reserve control over basic nuclear decisions, even as it has, by and large, reserved control over defense policy and weapons procurement, and perhaps over the use of military force generally.

After coming to power in February 1997 with an unprecedented National Assembly majority, Prime Minister Nawaz Sharif sought to undo the presidential primacy asserted until his death in the late1980s by General Zia-ul-Haq and to project his own primacy as Prime Minister against the President and the military chiefs. This effort collapsed on October 12, 1999 after Nawaz Sharif attempted to purge the top Army positions and dismissed General Pervez Musharraf, Chief of Army Staff, during his trip to Sri Lanka. With full Army backing, General Musharraf arrested Nawaz Sharif and suspended the constitutional government in favor of military rule for an indefinite period.

Even if the military's dominance of nuclear policy decisions is preserved and the military successfully insulates the nuclear command and control system from political interference, the top defense authorities will have to address two basic issues. One is how to structure the chain of command and communication between the centralized decisions of the national command authority and subordinates to whom some decisions must be delegated -- such as those involved in operational control over arming and launch procedures, custody over nuclear weapons, and alert and dispersal procedures during realistic training exercises and even more during actual military crises. The other issue is how to design command and control arrangements to structure the integration of inter-service nuclear weapons and operations, and coordinated or combined service operations.[43]

Inter-service nuclear integration will be sensitive organizationally, since military dominance in the defense sphere in Pakistan essentially has been Army dominance. The Army has had virtually

sole responsibility for supervising the development of Pakistan’s nuclear weapons, through a closely held defense research and engineering establishment. If the Air Force is to have specified nuclear deterrence missions and if the Navy is to coordinate its operations with the other armed forces in a potentially nuclear environment, however, personnel specially trained in nuclear operations will have to be installed in each branch of the armed forces and linked to a central chain of command. In Pakistan’s pre-1998 recessed deterrence configuration, this probably seemed unnecessary and would not have occurred spontaneously. If nuclear deployment becomes a fait accompli in India, however, Pakistani planners will be unable to avoid the issues of elaborating an integrated, cross-service nuclear chain of command to support force dispersal and survivability, and coordinated operations, as the underpinning of a maximally credible nuclear deterrent posture.

Triangular Nuclear Complications

For Pakistani planners, the near term imperatives will be to project a maximally credible nuclear deterrence posture against India and thereby achieve a measure of bilateral nuclear deterrent stability. With time, Pakistan may find that it has the means to expand and elaborate a more survivable force structure that will permit confidence in a second-strike nuclear retaliatory posture, a condition that might be conducive to a more relaxed management of foreign and defense relations. Other complications for Pakistan's nuclear security may arise before that condition is realized, however,

either from India's potential nuclear entanglements or crises with China, or from the repercussions of further nuclear weapons and missile proliferation in the Gulf region.

The Pakistani defense establishment presumably would gain important insights for crisis stability and nuclear deterrent credibility from constructing and gaming out scenarios that reflect such problems. The simulations would add external contingencies, plausible surprises, and novel pressures to the Indo-Pakistani nuclear relationship, and examine the implications for Pakistan's national security policies. They might test alternate propositions of Chinese intimacy and distance from Pakistani security interests, and probe the consequences, alternately, of leisurely and more urgent nuclear weapons buildups in China and India. An important dimension of such conjectural analysis would be the potential impact on the sufficiency of future energy supplies to South Asia and the Far East of nuclear weapons development in Iran and Iraq, perhaps resulting in future regional crises and military conflicts under nuclear conditions among Gulf states. How might Pakistan's

capacity to maintain its security from its immediate neighbor be affected by such developments in a neighboring region, or by the intervention in regional conflicts of the major nuclear powers?

While more difficult to use heuristically in Pakistan, Pakistan's foreign affairs and defense establishments eventually might develop simulation methods for internal insights into decision-making traits and pitfalls of nuclear crisis management. In this gaming context, Pakistani authorities might find a way to address, at first intellectually and then practically, the deeper emotional and political issues of civil-military relations and domestic pluralism that unsettle the development as well as the security of the nation. In this manner, it may also be possible to develop ways of assessing transnational criminal and terrorist threats to domestic security, with benefits in securing defense decision-making and the nuclear command and control chain from such elements.

Arms Control Policy

Any conjecture on the evolution of Pakistan's nuclear posture would be incomplete without considering how Pakistan may employ arms control proposals, negotiations, and potential agreements to enhance its nuclear security and strengthen its international standing. Over the years, Pakistan has developed sophisticated arms control positions and activities, despite skeptical receptions among some in the West. Pakistan has been specifically rebuffed by India, however, on a series of specific proposals

for a South Asian nuclear free zone, simultaneous accession to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and even bilateral nuclear non-proliferation guarantees.

On nonproliferation matters, Islamabad has long been ready to sign legally-binding agreements that India would join on equal terms. This condition has been met, to date, in three international instruments -- the 1963 Limited Test Ban Treaty (the LTBT prohibits nuclear tests in the atmosphere or outer space), the 1972 Biological Weapons Convention (BWC) which however has no inspection mechanism, and the 1993 Chemical Weapons Convention (CWC), which both India and Pakistan signed and ratified in the late 1990s.[44] Prior to May 1998, Pakistan also held the position that it would be prepared to negotiate legally binding bilateral agreements with India that would mutually prohibit nuclear weapons -- although India declined ever to even discuss such options. Pakistan, like India, adopted a non-binding unilateral moratorium on further nuclear explosive tests after the May 1998 tests.

How will Pakistani officials elaborate their arms control policy, now that both countries have become overt nuclear weapon states? Pakistan was less equivocal than India in their respective 1998 promises to sign the Comprehensive Test Ban Treaty (CTBT) before the end of 1999, but Pakistan became guarded about this commitment when India deferred its own decisions on the CTBT until after the Indian national elections of October 1999. The same month, the U.S. Senate voted against giving consent to U.S. ratification of the CTBT, making U.S. adherence and entry into force more uncertain than before. With a stronger electoral mandate in the October elections, India's BJP government shows signs of being willing to sign the treaty but only under new conditions that would cause the United States, at least implicitly, to recognize and accept India's status as a nuclear weapon state.[45] Pakistan probably will return to its earlier position of joining the CTBT only when India does, and only under the same terms.

On the proposed fissile material (production) cutoff treaty (FMCT), which may be years from completion, Pakistan's former position was that it would only sign up if India does too, and perhaps not even then. While the anticipated FMCT provisions might apply equally to both Pakistan and India in legal terms, their practical effect would be quite different -- India would have a large fissile material stockpile outside safeguards, while Pakistan's stockpile presumably would be quite small. Newly appointed Pakistani Foreign Minister Abdul Sattar reiterated this position on November 25, 1999 in

Islamabad, indicating (in the words of the reporter) that "Pakistan would participate actively in the FMCT negotiations once they reach a substantive stage," but that "issues related to verification and stockpiles would be of critical importance to Pakistan."[46]

The conjecture here is that Pakistani officials will examine, propose, and be prepared to negotiate binding regional and bilateral arms control provisions that could advance Pakistan's national security objectives in a meaningful way. The new test that would govern analysis of such concepts is the extent to which they would either enhance, or undermine, a maximally credible nuclear deterrence posture against India. As a general rule, the arms control concepts that would appeal most to Pakistani officials would be those that compensate for, or reduce, the conventional military and nuclear imbalances that Indian forces represent. To derive sustainable arms control positions, Pakistani decision makers probably will decide internally on nuclear and conventional force sufficiency criteria (perhaps expressed in the form of bilateral ratios, deployment locations, and estimates of strategic warning time lines) to determine the quantitative ceilings that it could live with if serious negotiations ensued. Progress in negotiating quantitative limits would lead, of course,
to consideration of how agreement on qualitative limits could enhance nuclear security and stability, a more complex but not necessarily insurmountable problem for serious negotiations.

Pakistan's defense planners (and India's) would have difficulty accepting anything like the public transparency and bilateral intrusiveness on the numbers, physical properties, and locations of strategic delivery systems or major conventional military equipment items that became possible in recent East-West nuclear and conventional arms control agreements. Those breakthroughs became possible only as the Cold War subsided and were tenable then only because of the political acceptability of parity as a basis for agreed ceilings, and because of the highly developed technical intelligence available to the core parties for verification purposes. Since these conditions do not exist today in the subcontinent, Pakistani decision-makers will have to be prepared to sustain proposals even when India rebuffs them as non-negotiable. If the proposals are not frivolous but are soundly constructed and have technical merit, the international community may come to recognize this.

The conjecture here is that Pakistani officials would see a national security logic in raising soundly constructed bilateral proposals that would, for example, call on India to:

1. mutually forgo deployment of nuclear forces, and if that is overtaken by events outside Pakistan's control, to accept ceilings on deployed nuclear forces, limits on ballistic missile range, a ban on introducing new types of ballistic missiles, and perhaps a ban on new basing modes;
2. mitigate India's preemptive conventional threat by restricting peacetime levels of conventional forces close to the borders, capping military exercises well short of the levels reached in recent years -- specifically, to remove a standing start invasion capability that requires a relatively high military alert status in peacetime;
3. accept and jointly invite international technical monitoring of confidence-building and nuclear crisis prevention measures by UN-organized or other mutually acceptable outside parties, arguably needed now to restore the viability of the 1991 Indo-Pakistani agreement to restrict violations of airspace, and to develop new crisis-prevention measures along the borders; and

4. conduct a joint military study of regional criteria for limits on the introduction of destabilizing arms and the technical basis for cooperative measures for controlling armed international terrorism in the region

Non-deployment of nuclear forces has already been compromised by India's deployment of nuclear-capable, dual-purpose missiles and by officially-inspired comments in the media that missiles have been mated with nuclear warheads. As of this writing, however, U.S. policy makers still seemed to believe it possible, technically, for India to revert to a status of no nuclear force deployment. Nuclear capability presumably is inherent in both air forces, but nuclear weapons may not have been released to air force bases and operators. A Pakistani proposal to mutually preclude nuclear deployment probably would still be credible if there is a possibility not only that it could be implemented in India but also that it could be monitored or guaranteed with high confidence by international means. A Pakistani proposal might be more credible, moreover, if it specified a monitoring mechanism or means of guarantee that would also be applied in Pakistan.

If time runs out and Indian nuclear forces are unmistakably deployed, Pakistan presumably would fall back to proposals for numerical caps as well as type restrictions on nuclear delivery systems (e.g., bans on nuclear cruise missiles and submarine-launched ballistic missiles). No precedent exists

for the monitoring of nuclear weapon or delivery system ceilings by international bodies (the IAEA probably would not be suitable for this mission). But it is not beyond the realm of legal theory or practical diplomacy for Pakistan, or even for a combination of other interested powers, to call for the United Nations Security Council to analyze these objectives and their application to South Asia on an emergency basis. Nor is it beyond U.N. authority to empower new agencies to help implement the terms of UNSC Resolution 1172 (June 6, 1998) that is intended to prevent acts of nuclear proliferation which threaten international peace and security.

Short of a Kashmir settlement and resolution of India's internal security problems in the northeast, India is unlikely to be receptive to sweeping conventional arms limitation proposals. However, in a nuclear environment in which reciprocal movements of concentrated conventional forces might spiral out of control (illustrated by the Brass Tacks exercise in the winter of 1986-87), there would be logical Indian as well as Pakistani incentives for confidence-building and nuclear risk-reduction measures to widen buffer areas between major conventional force garrisons near the borders. Pakistan's incentives include the need for compensation for the narrowness of its defense space and for India's conventional superiority. In this category, Pakistani proposals for unequal restrictions that are more severe on India and less on Pakistan, would be technically meaningful and politically defensible.

Conventional force reduction proposals for border areas could include setback zones and red lines beyond which regular Army movements (as opposed to light Border Security Force patrols) would be regularly and openly notified in advance, with obligatory communications and procedures to resolve ambiguities. Numerical restrictions could be proposed on peacetime stationing of armored and mechanized forces exceeding certain levels in defined sectors behind the setback zones, e.g., no more than X main battle tanks and no more than Y self-propelled artillery within zones L, M and N. Each zone would be set back an agreed distance from the border, with bilateral military notifications, zone by zone, of routine personnel and unit rotations. The setbacks and zones in India could be much larger and more distant from the borders than in Pakistan.[47]

Pakistani proposals for outside monitoring assistance of confidence-building and nuclear risk reduction measures would be more difficult to develop and engage India on, unless regular information from international overhead monitoring could be agreed on, with ambiguities resolved bilaterally, following a challenge procedure. India and Pakistan already exchange notifications of missile tests, but there are many other events and activities that could be subjected to notifications and controls. From a

Pakistani standpoint, proposed controls on acquisition or testing of new types and new kinds of nuclear delivery system, as well as either equal access to, or mutual non-deployment of, active strategic defense systems would fall within that purview.

Finally, the joint military study concept would carry weight if bilateral discussions of common security problems -- affecting southern Asia as a whole -- were initiated. Pakistani officials presumably would have an interest in regulating access to advanced conventional arms transfers, such as Russian sales to India of Su-30MK attack aircraft (supposedly equivalent to the U.S. F-15), S-300 long-range surface-to-air missiles and support equipment, and nuclear submarine technology. Claims of "strategic restraint," curbs on arms racing, and stability objectives in general will be hollow, most would agree, if such procurement runs free. Thus a strong Pakistani argument could be advanced for India's cooperation through military exchange channels in developing common criteria to establish equal constraints on the level of sophistication of modern arms transfers to the region.

While many such Pakistani-sponsored arms control proposals may fail to reach fruition, the discipline of developing them and seeking bilateral and international discussion of their merits would have other benefits that almost certainly would work towards greater nuclear stability, if not reduced political tension, in a regrettably nuclearized relationship. If the only sustaining thread of mutual deterrence is a protracted nuclear balance of terror, punctuated by periodic military crises and political theater, the cumulative probabilities of nuclear exchange probably will rise to clinically excruciating levels. This will put a greater premium on cool heads and steady hands than fate usually affords. Pakistan's instinctual outreach for arms control remedies to the ramping up of its nuclear security dilemmas would be prudent. But too many in the West gloss over the fact that this is not a field that it can pursue alone.

Conclusions

From its perspective, Pakistan has been locked by its giant neighbor into a nuclear arms competition that not only mortgages Pakistan's security but its political and economic future. Once India overtly went nuclear in 1998 and Pakistan followed, it was virtually inevitable that Pakistan would attempt to devise a nuclear deterrence posture that would shield the country from nuclear blackmail and give the leadership the self-confidence to stand up against military intimidation. In the

event that India actually deploys nuclear forces, the challenge for Pakistani planners is to structure nuclear posture for maximum credible deterrence, while guarding against extraneous influences that could cause deterrence to fail. This task not only is inherently difficult but is compounded by the geographic and resource asymmetries between Pakistan and India. In addition, Pakistan's access to real-time surveillance data as well as to technologies that would contribute to the survivability of its nuclear forces -- thereby raising the threshold against their release -- is severely constrained.

Pakistan's planners are likely to enhance the credibility and survivability of their limited nuclear stockpile and delivery systems by diversification – between aircraft and ballistic missiles – and by dispersal. The deterrent force at their disposal in the near future is potent by nuclear definition, but by most comparisons, still a limited force. Their objective will be to give maximum credibility to that deterrent. While they may not formally declare that they must rely on a first-strike employment policy, a maximally credible nuclear deterrence posture with a small number of nuclear weapons virtually requires such a policy. It is doubtful that Pakistani planners could imagine launching a nuclear disarming strike against India. Indian fear of such a capability in
Pakistan's hands could be highly destabilizing -- were it actually true. A Pakistani no-first-use (second-strike) nuclear posture would only be feasible under changed conditions, however, where its forces are survivable against preemption, either because they are sufficiently numerous and hardened, or because the preemptive threat against them has been removed.

While some deterrent stability probably will accrue from a successful Pakistani projection of a will to use nuclear weapons in extremis, this approach is bound to be met with apprehension in international circles. If the nuclear deterrent is consistently employed as a defensive shield only, confidence may grow in its stability objectives. If, however, it is used systematically to shield unconventional warfare or its threatened use is brought into play as a sword to change the status quo – a potential the Kargil conflict illustrated, the bilateral nuclear military relationship could become critically unstable. India would be tempted to press the envelope by probing and testing Pakistani forbearance militarily, and this would naturally increase the risks of escalation. Indian freedom to run such risks with impunity are narrower in the post-nuclear weapons situation than before, but it is not clear that this has been recognized.

Maintaining a maximally credible deterrent force over time could place unprecedented demands on the society and economy. Pakistani planners will have to cope with challenges to the survivability of a limited nuclear arsenal. But they will also have to support a disciplined allocation of resources that

facilitates economic growth. Without economic health, nuclear security may be unsustainable over the long term.

NOTES AND REFERENCES

[1] India's so-called draft nuclear doctrine paper (entitled "Draft Report of National Security Advisory Board on Indian Nuclear Doctrine") holds clues to the thought process of the nuclear hawks but is based on a contemplated force structure rather than one that currently exists. The paper was released as a consultants' report in the lead-up to national elections. Although the Advisory Board was chaired by an official and the document was posted on the Ministry of External Affairs internet website, it was said that the content had not been adopted as government policy. It has been assumed, however, that the document foreshadows and explicit Indian nuclear weapons policy. The paper proposed a retaliatory (no-first-use) nuclear declaratory policy and the aims of "credible minimum deterrence" and of deployed nuclear forces survivable against, as well as responsive under, nuclear attack. It called for a triad of mobile ground-based missiles, and airborne and sea-based nuclear weapons. It proposed that conventional preemptive capabilities be used against any party that might threaten to use nuclear weapons against India ("any threat of use of nuclear weapons against India shall invoke measures to counter the threat"). The document said nothing about the origin or nature of threats that might justify such a departure from India's non-nuclear weapons tradition.

[2] Articles by retired civil and military officers and academic experts, and military defense-oriented Internet sites which have appeared in 1998-99, provide some measure of informed national debate but possibly insight into issues that are under official review. The most authoritative as of this writing may be Agha Shah, Zulfiqar Ali Khan and Abdul Sattar, "Securing Nuclear Peace," an opinion article in *The News*, October 5, 1999 that discusses Pakistan's likely nuclear posture of calibrated and proportional response to the Indian nuclear build-up implied by India's draft "nuclear doctrine" (see note 1, above). For other pieces by Pakistani experts on nuclear policy, see Shirin M. Mazari, "Formulating a Rational Strategic Doctrine," and M. Naim Shaikh, "Credible Nuclear Deterrence and Doctrine for Pakistan," posted by the Pakistan Institute for Air Defence Studies (http://www.piads.com.pk/...), along with the *Pakistan Defence News Bulletin*; the Pakistan Defense and the Pakistan Armed Forces websites (http://www.pakdef.com/ and http://www.pakmilitary.com/); and the Pakistani *Defence Journal* (http://www.defencejournal.com).

[3] A distillation of the conjecture in this article was published in two parts, "Pakistan's Nuclear Posture" and "Arms Control Diplomacy" in the op ed section of *Dawn* (Karachi), September 14-15, 1999.

[4] Many Western observers were gulled into believing that India and Pakistan would exercise self-restraint after the nuclear tests of May 1998. Indian and Pakistani officials as well as leading experts had led Westerners to believe that that the two governments would exhibit maximum self-restraint, "not repeating the follies of the cold warriors." If that was their expectation, Kargil and its aftermath suggests they could not live up to it.

[5] See Jason Burke's "In the Land of the Enemy" segment of the "Kargil War" cover story in *India Today International*, July 12, 1999, pp. 12-18. Burke reports that the Pakistani decision to launch such an operation dated back to October 1998, and that Nawaz Sharif, while probably not privy to the details of the planned operation, had been informed of its rationale (putting Kashmir back in the spotlight) and did not overrule it.

[6] The LOC in Kashmir is the "line of actual control" dividing the parts of the old princely state of Jammu and Kashmir that have been occupied by India and Pakistan since 1948. The LOC essentially is based on the ceasefire line dating back to January 1949 that separated Pakistani and Indian forces when hostilities there stopped. India and Pakistan agreed at Simla in July 1972 to delimit a "line of actual control" (LOC) basically corresponding to the old ceasefire line but with minor modifications. For a detailed discussion of the history of the ceasefire line, the LOC, and the issues of delimitation and demarcation, see Robert Wirsing, *India, Pakistan, and the Kashmir Dispute*, New York and London: St. Martin's Press, 1994, chp. 2, ff.

[7] Pamela Constable, "India Seizes Strategic Peak," *Washington Post*, July 5, 1999, pp. A1, A17.

[8] India did, however, mass forces at points along the 3,500 kilometer border with Pakistan to send the message that it was prepared to open other fronts or even risk a full-scale war. See Raj Chengappa, et. al., "Kargil War: Face-Saving Retreat," *India Today International*, July 19, 1999, p. 16. In retrospect, U.S. administration officials reportedly believed that India was very close to expanding the war against Pakistan. An unnamed U.S. official was quoted as saying: "This is one of the most dangerous situations on the face of the earth. ... It was very, very easy to imagine how this crisis ... could have escalated out of control, including in a way that could have brought in nuclear weapons, without either party consciously deciding that it wanted to go to nuclear war." See John Lancaster, "Kashmir Crisis Was Defused on Brink of War," *Washington Post*, July 26, 1999, pp. A-1, A-15.

[9] See Pamela Constable, "Border Conflict Ebbs as Fighters Leave Kashmir," *Washington Post*, July 17, pp. A1, A-16. Once the Indian Army grasped the nature of the challenge it faced and the shortcomings of manpower and equipment at its disposal, it prepared its counter-attack deliberately and effectively. The infantry units sent to scale the heights under fire and drive the intruders out in close combat acquitted themselves well, with courage and tenacity, a credit to the professional cohesion and improvisational skills of the Indian Army.

[10] The crafted language of the Clinton-Sharif joint statement in Washington avoided an open-ended U.S. commitment to become directly involved in the Kashmir affair. It stated: "The President [Clinton] said he would take a personal interest in encouraging an expeditious resumption and intensification of those bilateral efforts [i.e., the dialogue begun in Lahore in February], once the sanctity of the Line of Control has been fully restored." See "Joint Statement by President Clinton and Prime Minister Sharif of Pakistan," Washington, D.C.: The White House: Office of the Press Secretary, July 4, 1999. In effect, Clinton's promise of involvement depended on the withdrawal of the intruding forces and was limited to facilitating success of negotiations in the existing bilateral channel. But even that level of interest was not welcomed by India, which has striven to prevent a renewed internationalization of the Kashmir dispute. See Bradley Graham and Nathan Abse, "U.S. Says Pakistan Will Withdraw," *Washington Post*, July 5, 1999, pp. A15, A17.

[11] Pamela Constable, "Pakistan Aims to 'Avoid Nuclear War'", *Washington Post*, July 13, 1999, pp. A14, A16; Constable, "Kashmir Deal Wins Support," *Ibid*., July 10, 1999, p. A13.

[12] *Washington Post*, July 19, 1999, p. A14.

[13] This political goal might have been anchored more firmly if the effect of the Kargil intrusion -- implicit pressure on India to withdraw its unilaterally inserted forces on the Siachen Glacier -- had been announced explicitly as a demand of Pakistan. This was not possible as long as Pakistan officially denied that the intrusion had state backing. Once Nawaz Sharif

undertook to effect a withdrawal under the terms of the Washington joint statement of July 4, this specific link between the Kargil operation and India's unilateral military occupation of Siachen lost its immediate military and diplomatic salience.

[14] July 15, 1999, p. A24.

[15] Special Correspondent, “Military attaches visit wreckage site,” *Dawn*, August 13, 1999. Pakistan escorted 23 foreign defense attaches to the wreckage site and the attaches used a global positioning system receiver to verify its exact location within Pakistan. See “PN aircraft: Diplomats say India 'overreacted',” *Dawn*, August 14, 1999.

[16] The agreement restricts “combat aircraft,” which includes reconnaissance as well as armed fighter or bomber aircraft, from travelling closer to the border than 10 kilometers, except with prenotification. Unarmed helicopters are permitted no closer than 1 kilometer, except with prenotification. Pakistan technically violated the agreement (10 kilometer limit) by not supplying a prenotification of the flight. U.S. State Department spokesman observed, however, that there is a substantial difference in the seriousness of the violations -- between Pakistan's failure to prenotify and India's shooting down a slow-moving, unarmed airplane. See Sridhar Krishnaswami (reporting from Washington, D.C.), “Pak., India violated '91 accord: U.S.,” *The Hindu*, August 13, 1999. India violated the border as well as the air agreement by sending helicopters to the crash site to recover wreckage inside Pakistan within two hours of the shoot-down, in order to display wreckage to journalists in Delhi. India subsequently attempted to helicopter journalists to the site but the helicopters turned back when they found that a Pakistani military team had gotten to the site. The Pakistani team fired one surface-to-air missile at the MiG fighter aircraft covering the helicopters, but the missile missed its mark.

[17] Special Correspondent, “No threat of war: Fernandes”, *The Hindu*, August 13, 1999.

[18] Prime Minister Vajpayee used the occasion of Independence Day to exhort the country to consolidate the post-Kargil ``patriotism,'' asserting that ``we will protect our national interest at all costs: whether it is in developing atomic weapons capability, whether it is in developing missile-capability, whether it is in driving adversaries out of our land.'' See Harish Khare, “Agni-2 to be inducted,” *The Hindu*, August 16, 1999. Two days later, the Indian national security "advisory board" published India's draft "nuclear doctrine." See report by Pamela Constable, "India Drafts Doctrine on Nuclear Arms," *Washington Post*, August 18, 1999, p. A1.

[19] Pakistan claimed to have set off five detonations on May 28, 1998, and a sixth on May 30. See Tim Weiner, “Pakistan, Answering India, Carries Out Nuclear Tests,” and John F. Burns, “Arms Race Feared,” *New York Times*, May 29, 1998; John Ward Anderson and Kamran Khan, “Pakistan Sets Off Nuclear Blasts,” and Steve Coll, “The Race May Be On – And May Be Hard to Stop,” *Washington Post*, May 29, 1999; *The Economist*, May 30, 1998, pp. 16, 41-42.

[20] "Pakistan didn't test Hydrogen Bomb after Indian failure," *Pakistan Defence News Bulletin*, June 8, 1998, claims: "Pakistani nuclear scientists believe that the Indian thermonuclear test was a failure, because its yield was too low to be credible, but warn that India has probably accumulated enough data from that and accompanying tests for their thermonuclear capability to be accepted at the same level as Pakistan's. ... After the recent series of tests, according to Pakistani scientists, both countries should be able to test thermonuclear devices with almost guaranteed success by the end of the year, when the test results are integrated into the computer simulations and preferably after cold tests are conducted. ... They emphasized that, from a military point of view, both Pakistan and India should be assumed to be thermonuclear powers." See Pakistan Institute for Air Defence Studies website (http://www.piads.com.pk/pknukenews.html).

[21] India claimed at the time to have carried out five nuclear weapon tests in the May series, three simultaneous explosive device tests on May 11, 1998 (one of a Hiroshima-size atomic device, another of a higher-yield “thermonuclear” device, and the third a low-yield “tactical” device), and two additional, low-yield device tests on May 13. See R. Jeffrey Smith, “India Sets Off Nuclear Devices,” *Washington Post*, May 12, 1998; “Ground Zero,” a special report in *Newsweek*, May 25, 1998, pp. 28-37; and Michael Elliott, “Out of Pandora’s Box,” *Newsweek*, June 8, 1998, pp. 20-27. Indian official sources have since informed Indian reporters that the Agni-II medium-range ballistic missile tested in April 1999 was designed as a nuclear-class missile and that the 1998 nuclear tests validated a warhead that could be used on Agni-II and on the planned Agni-III intermediate-range ballistic missile. See, for example, “Interview with A.P.J. Abdul Kalam,” *India Today International*, April 26, 1999, p. 31.

[22] Analysis of the seismic shocks set off by the Pakistani tests left no doubt that it had detonated at least one nuclear explosive device of militarily significant yield. Based on seismic indicators, some technical experts in the West were

skeptical that the numbers, yields, and other nominal results of both Indian and Pakistani tests were as each had claimed – although none doubted nuclear detonations had occurred on both sides. The seismic signal of Pakistan's claimed five detonations on May 28 registered a single shock wave in the magnitude of between 4.8 and 4.9 on the Richter scale, indicating according to preliminary analysis an explosive force of between 8 and 17 kilotons (the uranium Hiroshima bomb had a yield of about 15 kilotons). Thus, there could have been either a single successful detonation, or two or three detonations simultaneously, but with a composite seismic signal comparable to that of a single early generation fission device. The seismic signal of the Indian series of May 11 also showed what might have been either a single event or simultaneous detonations, but registered at 5.3 on the Richter scale, suggesting a total yield of 25 to 30 kilotons. This result would correspond to the expected yield of a "boosted" device, but significantly less than a true thermonuclear (H-bomb) explosion. Indian scientists have hinted that they do not need full-scale tests any longer to validate their objectives. See William J. Broad, "Explosion is Detected by U.S. Scientists," *New York Times*, May 29, 1998, and Michael Hirsh and John Barry, "Nuclear Jitters," *Newsweek*, June 8, 1998, p. 24.

[23] Public sources and research estimates are compiled in Rodney W. Jones and Mark A. McDonough, et. al., *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, Washington, D.C.: Carnegie Endowment for International Peace, Brookings Institution Press, 1998, Section 6, chapter on Pakistan, especially p. 131, notes 3 and 4 on pp. 138-139, and note 56 on p. 141. Pakistan's nuclear facilities and their locations and technical characteristics may be found on pp. 144-146.

[24] Natural uranium contains a fraction of less than 1 per cent of the U-235 isotope, which is used -- usually in concentrations of 90% or more -- for nuclear weapons. Low-enriched uranium (LEU) for light-water power reactors may have a U-235 fraction as high as 4 or 5%. LEU can be more rapidly enriched to weapons grade levels than natural uranium. Assuming LEU had been stockpiled, Pakistan would have been able to accelerate production of HEU.

[25] Pakistan has invested resources and construction efforts over the years in attempting to establish plutonium production facilities. While it had not succeeded in bringing any weapons-grade plutonium-producing (e.g., at Khushab) or chemical separation facility of substantial capacity (e.g., at Chashma) into operation as of 1998 (see sources in preceding note), Pakistan might eventually achieve a breakthrough in this area as well. The chief advantage of plutonium is that a plutonium nuclear weapon core can be smaller and lighter than one of equivalent yield using HEU. Smaller and lighter warheads can be delivered more easily to longer ranges.

[26] In fact, a Pakistani academic expert, Shirin Mazari has posited Indian nuclear research and even nuclear power installations as logical targets for a small Pakistani nuclear deterrent force. See "Formulating a Rational Strategic Doctrine," op. cit.

[27] For the public research sources and estimates that support the points in this paragraph, see Jones and McDonough, *Tracking Nuclear Proliferation, op. cit.*, Section 6, chapter on India, especially pp. 111-112, 115-116, and associated notes on pp. 119ff, together with map and charts of facilities on pp. 126-130.

[28] China had responded significantly by September 1997 to US diplomatic efforts to win China's agreement to detailed nuclear export controls and at least partial conformity with the Missile Technology Control Regime (MTCR) restrictions on exports of nuclear-capable missiles and missile-related technologies. See chapter 3b on China in Jones and McDonough, *Tracking Nuclear Proliferation*, *op. cit.*, especially pp. 55-57.

[29] Support vehicles might include fuel tankers (e.g., for a liquid-fueled missile transported without its fuel, and ordinary fuel for the other motorized vehicles), mobile radar, radar electronics control and fire-control vans, point defense surface-to-air missiles or artillery, and temporary shelter and provisions for personnel.

[30] India claimed that it had "inducted" a contingent of the Prithvi-I missiles and stored them near Jullundur, but denied they were "deployed." For the controversy, see account in the author's "Pakistan's Nuclear Posture: Arms Race Instabilities in South Asia," in *Asian Affairs: An American Review*, Vol. 25, No. 2, Summer 1998, pp. 72, and 84; and Jones and McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, op. cit., pp. 116.

[31] In response to the question "Have you mated nuclear warheads that were tested in Pokhran with the Agni?", the answer quoting Indian India's missile developer, A.P.J. Abdul Kalam, was: "Yes, Agni-II is designed to carry a nuclear warhead if required. In any case, we had already tested an Agni-class payload at Pokhran last year [1998]." The reporting of the Agni-

II test also claimed that the Agni-II was “combat-ready,” illustrated a rail-mobile basing scheme, and indicated that rail cars designed to “house” Agni were contracted for with the Coach Factory at Kapurthala three years ago. It implied, without saying as much, that the Wheeler Island used as a missile test site had been cleared of villages and might be, de facto, India’s first Agni missile base. Raj Chengappa, “Missiles: Boom for Boom,” *India Today International*, April 26, 1999, pp. 28-30.

[32] The Prithvi system is operationally cumbersome, and its fuel is loaded by tankers only after the missile and launcher have been set up at a launch site. Moving these systems from garrison to pre-surveyed sites and preparing them for action would take at least one or two days after orders are received.

[33] See Eric Arnett, "Nuclear Stability and Arms Sales to India: Implications for U.S. Policy," *Arms Control Today*, Vol. 27, No. 5, (August 1997), p. 8, and related discussion in Rodney W. Jones, "Pakistan's Nuclear Posture: Arms Race Instabilities in South Asia," *Asian Affairs: An American Review*, Vol. 25, No. 2 (Summer 1998), especially pp. 73-81.

[34] The only fielded Pakistani surface-to-surface ballistic missile is the Hatf-1, with a nominal range of about 80 miles. While theoretically nuclear-capable, its range is too limited to make it a nuclear delivery system of choice. Therefore, it is excluded from this analysis.

[35] Firing positions in the south of Pakistan, in the desert east of Karachi, could define a 2,000 km. arc extending to Calcutta in eastern India and almost to Cape Comorin at the southern tip. Bases in northern Pakistan could be as much as 1,000 km further than southern Pakistan from sites in southern India.

[36] Whereas Western arms control experts take satisfaction in the Indo-Pakistani agreement to notify their ballistic missile tests, these notifications, perversely, have become confidence-building measures (CBMs) only for the domestic bureaucracies and publics involved -- assuring them that notice is being taken of their accomplishments. Between the two societies, the tests are provocative. The public relations fanfare attending the tests has become tantamount to sticking a finger in the other's eye, stimulating counter-demonstrations, rather than reducing tensions -- in accordance with the theoretical goals of CBMs. Missile test notifications have little confidence-building (arms control) value unless they are conducted within a legal regime that establishes limits, under which the tests fulfill obligations to show that the limits are being observed. In the case of deployed US and Russian strategic missiles which are being reduced by treaty agreements, for example, CBMs are practiced to preclude misperception, by pre-notifying the other side that an action detectable by the other side's national technical means or early warning systems is a test and not the sign of a missile strike underway.

[37] This may change at a much later stage, when the essentials of Pakistan's posture have already been pieced together through the gradual accumulation of information and analysis in public knowledge.

[38] China officially proposed an international ban among the nuclear weapon states on first use of nuclear weapons, and is the only such state to have consistently maintained a no-first-use declaratory policy. India's national security advisory board also incorporated the concept of an international ban on first use in its draft "nuclear doctrine" of August 17.

[39] Even if there were a bilateral agreement on “no first use,” of course, military experts would not expect it could hold up if Pakistan’s survival were at stake. Nor would they share any illusion that India would adhere to such an agreement, either, if during a widening conventional war India reliably detected the preparations to launch a Pakistani all-out nuclear strike and reckoned it might limit the scope of that strike by executing nuclear counterforce strikes in a nuclear preventive warfare campaign. As mentioned earlier, India's draft "nuclear doctrine" of August 17 already proposes conventional preemptive strikes against parties that simply threaten nuclear weapons use against India.

[40] This new nuclear-specific risk could be altered over time. It could even be eliminated, or at least tempered by: (1) a mutual nuclear stand-down and rollback of Indian and Pakistani nuclear forces; (2) a larger and more robust Pakistani nuclear force that has the inherent capacity to shift to a secure second-strike posture, and (3) negotiated arms control that limits the hair-trigger and preemptive potentials of future Indian forces.

[41] While ballistic missiles have been the main theme in nuclear-capable missile proliferation for the last two decades, today cruise missile technologies are spreading rapidly. Cruise missiles are unmanned aircraft with built-in flight control and navigation systems that can be launched from aircraft and naval platforms as well as from ground sites. They are already in use in South Asia as recoverable platforms for photographic and signals surveillance, reconnaissance and warning, and as

conventional anti-ship systems. India is said to be developing a 600 km range, nuclear-capable cruise missile called Lakshya. Since Pakistan has not thus far exhibited nuclear-capable cruise missile acquisition or development activities, they are not part of the present conjecture, but could become an avenue of integrating the Navy directly in nuclear deterrent operations using surface naval and submarine platforms.

[42] Pakistan's space efforts will also grow in due course, and have already begun to use indigenously-assembled observation and communication satellites launched commercially in Kazakhstan. Pakistan recently announced that it hopes to develop a space launch vehicle (SLV) capable of lofting small satellites into low-earth orbit by the year 2003. SLV operations may support advances in ballistic missile weapon technologies of atmospheric reentry and terminal guidance, as well as missile defenses and their countermeasures.

[43] Other approaches are conceivable but improbable. For example, it would be possible to develop both missile and airborne nuclear forces as specialized organizations within the Army. Alternatively, the nuclear forces could be assembled as an altogether new organization of special forces distinct from the traditional services, although it might recruit from and reconstitute personnel from all three. These alternatives probably would be resisted, the first at least by the Air Force, and the second by all three existing services.

[44] India revealed in the course of adhering to the CWC and taking a position on the Board of Executives that it had an active chemical weapons production program and weapons inventory, but was renouncing these weapons and would proceed to eliminate them under the terms of the Convention.

[45] Former Foreign Minister of Pakistan, Agha Shahi noted recently that "among the concessions reportedly being sought by India for signing the CTBT are missile testing, weaponization (because of alleged deployment of Chinese missiles in Tibet), high technology transfer and enhanced economic interaction." He advocated further that Pakistani signature of the CTBT be made to depend on Pakistan receiving equally "any concessions or favours extended to India for adhering to the treaty." See his opinion piece, "CTBT and Deterrence," in *The Nation*, November 30, 1999.
[46] See Hasan Akhtar, "Sattar's address at Institute of Strategic Studies: Pakistan to reply if India tests Nuclear device," *Dawn*, November 26, 1999.

[47] While Islamabad might discover that negotiating ceilings on various categories of conventional forces and on the details of a zonal setback scheme seems interminable, adding new procedures to an existing practice of interim notifications of military exercises and movements -- regarding the size and character of deployed and rotating military units -- could have useful crisis-prevention effects. Agreement to exchange and host teams of military observers for each zone on a routine and continuing basis could do a great deal to reduce the destabilizing effects of sudden force movements. While Pakistan as well as India will have major concerns about the loss of sensitive information from this practice, the risk reduction benefits of mutual observation arguably would greatly outweigh such information losses. Pakistan would stand to gain from controlled access transparency in this conventional force context. India would lose some of the intimidating effects of its larger forces, but would lose little information of strategic value. Both might gain from mutual observation of service resolve and organizational discipline. If agreed zones and force restriction criteria can be stipulated even before they are finally negotiated, data transmitted from voluntary international monitoring could preclude false alarms.