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Interagency
Intelligence
Memorandum

Prospects for an Indian Nuclear Force

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19 June 1974

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19 June 1974

INTERAGENCY INTELLIGENCE MEMORANDUM*

SUBJECT: Prospects for an Indian Nuclear Force

The underground detonation of a nuclear device in the Rajasthan Desert on May 18, 1974, opened the possibility that, despite the asserted purpose of experimentation for peaceful purposes, India may move on to develop and deploy a nuclear strike force. This memorandum weighs the evidence, examines the options available to India, and attempts to forecast its probable course.

Principal Conclusions

There is no firm evidence to indicate what nuclear weapons policy the Indians have elected to follow. It is possible that they have not yet made a decision on this issue.

India's claim that it intends to develop only a capability for peaceful nuclear explosions (PNEs) cannot be dismissed. The device detonated last month is potentially suitable for several of the PNE applications suggested by India. Some applications, however, could be complicated by the radioactive products of the detonation and some could contravene the Limited Test Ban Treaty, which India has ratified.

* *This memorandum was prepared by the Central Intelligence Agency with the participation and concurrence of representatives of the Defense Intelligence Agency, the Bureau of Intelligence and Research, Department of State, and the Atomic Energy Commission.*

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Availability of nuclear weapons is not likely to be the major constraint on the size of any Indian nuclear strike force developed within the coming decade. India's ambitious atomic power program -- even if operated without abrogating IAEA safeguard agreements -- probably could supply plutonium sufficient to make more weapons than would be needed to arm any delivery force India would be likely to acquire. [redacted] 6.2(a)

India's 38 Canberras offer a contingency bomber capability, but a long-range aircraft or ballistic missile -- 1,400 nautical miles minimum -- would be needed for major targets in China. Indian purchase of long-range bombers from the Soviets -- the only non-US source for them -- is a possibility that must be taken into account. If India wanted an intermediate-range missile badly enough, a force of 10 to 15 missiles might be available as an outgrowth of the Indian space program by 1983 or 1984. Annual costs over the next 10 years of acquiring and deploying a limited strategic force of both bombers and missiles would impose only a minor economic burden, equating to less than 5 percent of the present defense budget.

India's aspirations, its capability for developing strategic strike forces, and its perception of the threat from China will motivate it to seek a strategic nuclear force, but its concern for the potential impact on its international relations probably will dissuade it from doing so overtly in the near term. India's most likely course over the next several years is the covert buildup of a small weapons inventory under the cover of a PNE program but with little or no improvement of delivery capabilities. A second, less likely option is the pursuit of a genuine PNE program without military purposes. US and Soviet positions could have considerable influence on the Indian decision.

Whichever course the Indian leadership pursues in the short term, it will feel increasing pressure over time to move toward an overt strategic weapons program, including aircraft, missiles, or both.

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THE ASSESSMENT

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1. Tight security and secrecy shrouded the research and development related to exploding a nuclear device [redacted] Covertness clearly would be desirable for a weapons program. But a secret development program had numerous political advantages, and there were no apparent advantages to giving forewarning. Announcement of the program would have forced India to cope with heavy foreign pressures during the development process. Advance publicity for a test that failed would have lowered India's declining international prestige and eroded already slipping domestic confidence in the Gandhi government. And foreign reaction to an explosion would have been much the same whether or not there was advance warning -- i.e., threats to reduce aid and Canadian suspension of assistance to India's nuclear program. Even if a test had been open to outside observers, New Delhi's protestations of peaceful purposes would have met the same widespread skepticism they are encountering today. Thus, covertness would be compatible with either a peaceful or a military nuclear program and a desirable procedure whatever India's political and strategic intentions.

International Political and Strategic Considerations

2. One of the motives affecting India's nuclear policy is the national prestige accruing to a "full member" of the nuclear club. New Delhi probably believes that its demonstrated capability to explode nuclear devices has enhanced its position in the Third World and reinforced its position in Asia. It may believe that a capability to make and deliver nuclear weapons would do more.

3. In terms of strategic considerations, India wants paramountcy in South Asia, a major voice in decisions affecting the Indian Ocean, and security from pressures from China. There is no current or foreseeable threat to India in South Asia that would require development of nuclear weapons. Pakistan can be dealt with by conventional forces, and Iran, although it will remain a source of concern, is not now developing a strategic threat that India could contain only by acquiring a nuclear force.

4. China is the only logical threat that could be seen as requiring development of a weapons capability at this time. India may perceive a need to offset the threat posed by China's nuclear

force, which includes intermediate-range ballistic missiles (IRBMs) deployed within range of northern India. India is well aware of China's established nuclear superiority, conferred by its long head start. A program to match China's capability would require a major effort over many years and an inordinate expenditure of resources. But India could see merit in acquiring a limited but credible nuclear strike capability against China.

5. India would have to weigh these motivations against the cost and difficulty of a nuclear weapons program, and especially against the potentially adverse effects on its other international aims. To support its internal priorities of agricultural and industrial growth and political cohesion and order, India's external policies are likely to continue to stress:

-- the normalization and improvement of regional relations, with Indian leadership and minimum great-power involvement in South Asian affairs;

-- reduced tensions if not normal relations with China;

-- improved relations with the US and a continuing, but increasingly independent relationship with the Soviet Union;

-- maximization of foreign assistance.

In considering whether to undertake a major weapons program, India would have to consider the reaction of the powers that can help or hurt it the most.

6. Part of the input to this Indian evaluation will be the reactions of the major powers to the recent Indian test. Strongly negative responses by the US, the USSR, or China would be cause for concern. An adverse Soviet reaction would be of great concern, because the USSR plays an important role in Indian security calculations. But the Soviets would be loathe to burden their relations with India by pressing this point. Critical reaction from Washington would raise questions about the future availability of technical and economic assistance. Sharply adverse Chinese comment would indicate continuation or intensification of the

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decade-long strain in bilateral relations.

The reactions of these powers to the test of May 18 are not discouraging to India so far, although New Delhi probably cannot yet consider that the returns are all in.

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7. India will continue to watch great-power reactions with care. Possibly New Delhi has already concluded that a testing program, publicly labeled for peaceful purposes and conducted at a slow pace, would not cause undue concern in the three capitals. During this period of time, it appears unlikely that New Delhi would chance the possible adverse reaction from Washington and Peking -- and perhaps even from Moscow -- to an announcement that India had launched a program designed to produce nuclear weapons and acquire a credible delivery system.

8. In the more distant future -- beyond the next few years and into the 1980s, when India will have available much larger supplies of unsafeguarded plutonium and may have adequate technology -- India will still have to weigh the possible adverse affects of a proclaimed weapons program. If India's relations with the three powers remain relatively unchanged over the next decade, New Delhi will still hope to maintain the "special relationship" with the Soviet Union and will still need economic assistance from the Western aid consortium headed by the United States. Even if it opted for a nuclear weapons program, India would at that time still be no match for a nuclear-armed and missile-equipped China.

Peaceful Uses

9. Indeed, India's claim that it intends to develop only a capability for peaceful nuclear explosives (PNEs) cannot be dismissed. It has shown interest in the US PNE program and has participated in international technical meetings on PNEs, including three panel meetings sponsored by the International Atomic Energy Agency (IAEA). At the first panel meeting in 1970, the Indian representative described several potential PNE applications in his country, emphasizing the mining of such nonferrous metals as aluminum, manganese, copper, lead, and zinc. In addition, three means of using PNEs for general mining were identified -- to remove overburden and expose the ore, to break ore in preparation for underground rock-caving techniques, and to break ore in preparation for in situ leaching. The Indians listed several ore bodies as candidates

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for PNE mining. Following the May 18 test, Dr. H. N. Sethna, chairman of the Indian Atomic Energy Commission, stated that the explosion was an experiment to study the cratering and cracking effect on rocks, a plausible explanation in the light of India's expressed interests.

10. The Indian explosive device, although probably not optimized, might be suitable from the point of view of radioactivity for most of the potential uses described at the 1970 IAEA panel meeting. Such fission devices, with their radioactive products, would be ill-suited, however, for some of the applications suggested by the Indians. A detonation to remove overburden and expose ore would contaminate the surrounding area and release debris into the atmosphere -- possibly in contravention of the Limited Test Ban Treaty, to which India is a party. Indian development of a PNE program economically sound by US standards would be difficult and slow but would, along the way, provide a great deal of technology applicable to nuclear weapons.

Indian Capability to Produce Nuclear Weapons

11. Availability of nuclear weapons is not likely to be the major constraint on the size of any Indian nuclear strike force developed within the coming decade. India's ambitious atomic energy program -- even if operated without abrogating IAEA safeguard agreements -- probably could supply plutonium sufficient to make more weapons than would be needed to arm any delivery force India would be likely to acquire. 3.3(b)(1) 6.2(d) 6.2(a)

12. [redacted] If the Indians desire to develop nuclear weapons they probably already have more sophisticated devices on the drawing board. Data gathered from the present test would be a key element in shaping the path of their future designs [redacted] A more effective approach would be to use several more tests over a two- to three-year period to develop a lighter, more efficient weapon. [redacted] 3.3(b)(1) 6.2(d)

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13. The source of material for an Indian weapons program would be plutonium produced by India's growing number of nuclear reactors.

a. The oldest -- and almost certainly the source of the plutonium for India's first nuclear test -- is a 40-megawatt research reactor, called CIRUS, at India's principal nuclear R&D establishment, the Bhabha Atomic Research Center (BARC) at Trombay. The reactor was built with major assistance from Canada and -- at least initially -- used US-supplied heavy water as a moderator. Work started before safeguard programs were in effect, but the Indians agreed with the US and Canada that the reactor would be used only for peaceful purposes. The reactor began operation in 1960 and reached design power with Indian-produced fuel in 1963. It probably can produce at least 9 kg of plutonium per year.

b. Two US-built 200-megawatt power reactors are in operation at Tarapur. These boiling water reactors use slightly enriched uranium fuel supplied by the US under IAEA safeguards. The Indians have no native capability to produce enriched uranium to fuel these reactors and have contracted to buy this material under continuing safeguards from the US for the next 15 years.

c. The Canadians have helped India build two 200-megawatt Canadian-designed CANDU power reactors in Rajasthan (RAPP I and RAPP II). Both are under IAEA safeguards. The first began operating in 1973, and the second is scheduled for operation in late 1976. These reactors use natural uranium fuel and a heavy water moderator. The Indians fabricate the fuel at Hyderabad, using native uranium.

d. Two additional 200-megawatt CANDU reactors are under construction in Madras. These reactors are being built by the Indians alone and will be completely free of safeguards. They are scheduled for operation in 1977 and 1978

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India almost certainly would not seek immediately to build many weapons, because such a stockpile would far exceed the number needed to arm any delivery system it is likely to acquire within the next decade.

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India's Options for a Nuclear Delivery System

17. To achieve India's primary strategic objective of offsetting pressure from China backed by the implied threat of a strike with nuclear-armed missiles against India's northern cities, Indian strategic planning probably would call for a retaliatory capability against China's value targets -- its urban industrial centers. Such a capability would require bombers or missiles capable of carrying a nuclear payload at least 1,400 nm.

Aircraft

18. To buy a medium bomber appears to be New Delhi's only means of acquiring a reasonably effective long-range bomber capability within the decade. The 38 Canberra light bombers in its current inventory have a combat radius of only 1,000 nm with a 5,000-lb. payload, and their low speed and inability to penetrate at low altitude would make them likely victims of China's air defense system. Even more certain to perish would be Boeing 707s and 747s -- longer range aircraft that the Indians could theoretically transform into bombers despite the complexity and impracticality of the alteration.

19. India almost certainly would be unable to design and produce any medium bombers and there is no evidence that it is considering this option. India has had little success or experience in designing aircraft. Its most ambitious effort to date -- the HF-24 Marut jet fighter program -- has been beset with difficulties throughout its long history. Nor is India likely to be able to acquire a suitable bomber by means of licensed production. Even if it could get a license, which is improbable, it would face problems in the manufacturing process that would greatly delay such a program.

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20. India's most viable alternative would be to purchase medium bombers from the Soviet Union -- the only non-US source of bombers with sufficient range. In the late 1960s the Indians asked the Soviets to supply one or two squadrons of medium bombers as replacements for the aging Canberras. New Delhi spurned offers of subsonic TU-16 Badgers on the grounds that these bombers were only slightly better than the ones that it already had. As an alternative, the Indians requested the TU-22 Blinder supersonic dash bomber, but their interest in it waned when the Soviets suggested in 1972 that only a stripped-down version -- lacking sophisticated avionics gear -- would be available. Since then, discussions about these aircraft appear to have been in abeyance; when and if they are revived, the outcome will depend on a variety of considerations.

21. There is little doubt that the Indian military will remain desirous of a multipurpose, long-range bomber. But Indian political authorities, wary of Soviet aims in the Indian Ocean, are trying to reduce their dependence on the USSR; they would carefully consider the potential political cost before reopening the question. And the USSR might try to charge a considerable price for this assistance -- say, the use by Soviet forces of Indian port and air facilities, an arrangement New Delhi has hitherto repeatedly resisted. Moreover, the Soviets would now have to view a renewed Indian request for long-range bombers as a request for a nuclear delivery vehicle. Their longstanding opposition to nuclear proliferation would militate against such a deal. So would a strongly negative US reaction to a potential agreement, if the US chose to make this issue a matter of priority concern in US-Soviet relations. On the other hand, the Soviets could see some virtue in acceding to an Indian request. A strategic nuclear capability for India would increase Indian weight vis-a-vis China, impose additional targeting problems on China's limited strategic forces and thwart any improvement in Sino-Indian relations. And if Moscow were convinced that the Indians were determined to acquire a strategic nuclear capability -- by their own means, if necessary -- it probably would see outright refusal of bombers as a substantial risk to a highly valued relationship in a futile cause. At this time there does not appear to be any sound basis for judging how all these factors might net out. Thus an Indian request and a Soviet agreement are a possibility that must be taken into account.

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22. The Indians have been shopping for long-range maritime reconnaissance aircraft, but New Delhi is unlikely to use them in a nuclear role if it obtains any. Although the aircraft could carry a nuclear payload, they would be as vulnerable to the Chinese air defense system as converted civil aircraft.

23. If India did not acquire Soviet bombers, it could probably modify some of its current force of tactical aircraft, such as its MIG-21s or SU-7s. In addition, the Indians have long been seeking modern fighter-bombers: they have looked at the Soviet SU-20 Fitter C and the MIG-23B Flogger to purchase outright, as well as the Anglo-French Jaguar and French Mirage F-1 to produce under license -- following an initial direct purchase of a few units. Some of these aircraft could carry a weapon of the size India might develop -- 2,000 pounds, 30-inch diameter -- and reach high value targets in southern China on one-way missions. Although the Indian Air Force has indicated a preference for the Western aircraft, with the Jaguar as its first choice, the high cost and other demands on India's limited foreign exchange earnings have impeded conclusion of a contract.

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Ballistic Missiles

25. If India wants an IRBM badly enough, it might be able to develop one by the early 1980s. The initial missile almost certainly would be based on a satellite launch vehicle that India has been developing since the 1960s. This early missile derivative probably could deliver a 2,000-pound payload to a range of at least 1,500 nautical miles -- adequate to reach most major targets in China from Assam, but its accuracy might be no better than 5 to 10 miles.

26. Any program by the Indians to develop a missile would have to grow from their modest space program. India has designed and tested only sounding rockets to date. The largest of these

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is some 25 feet long, with a maximum diameter of 1.8 feet. The focus of India's space booster development efforts at present is a four-stage, solid-propellant vehicle -- about 64 feet long with a maximum diameter of 39 inches -- similar to early versions of the US Scout. An adaptation of this vehicle appears to be India's best prospect for obtaining a ballistic missile in the shortest possible time. An IRBM made up of the first three stages of the satellite launch vehicle could carry a 2,000-pound payload -- almost certainly sufficient to accommodate one of India's early weapons -- to a range of at least 1,500 nm.

27. The principal space research facility is the Thumba Equatorial Rocket Launching Station (TERLS) on India's southwest tip. A science and technology center at TERLS is the focal point for development of the satellite launch vehicle. Facilities for making solid propellants and fabricating rocket motors have supported the sounding rocket programs and are being upgraded to produce prototype motors for the satellite launcher.

28. A test range near Madras, the Sri Harikota Island Rocket Launch Station (SHIRLS), will serve as the rangehead for Indian satellite launches. It is not yet complete, but some of India's larger sounding rockets have already been tested there. Major additions under way include a plant for making solid-propellant boosters and facilities for static testing and rocket sled testing.

29. Prediction that India could begin deploying an IRBM by the early 1980s is subject to considerable uncertainty. India's satellite launch vehicle is now scheduled to orbit its first satellite in 1978 (postponed from 1974), but so far not even the fourth and smallest stage has been flight-tested. One of the prime pacing factors for a missile program probably would be the availability of static test facilities at SHIRLS, which are not expected to be ready until at least 1975. India has major shortcomings in managerial skills and in its industrial base. Its greatest technological flaws are in the guidance area and, to achieve better accuracy than the estimated 5 to 10 miles, it probably would have to purchase major guidance components abroad. India probably could do so, but there is virtually no chance that it could acquire complete missile delivery systems abroad.

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30. Overall, it appears unlikely that the Indians will be able to attempt a satellite launch before 1980. Under an optimistic scenario, some three more years would be needed to flight-test, produce, and deploy IRBMs based on the launch vehicle. Facilities at TERLS and SHIRLS probably would be adequate to produce enough rocket motors and guidance systems for from 10 to 20 copies of a successful IRBM by 1984.

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Costs of a Strategic Nuclear Weapons Program for India

33. The deployment of strategic nuclear forces would constitute a manageable economic burden for India. A limited force probably could be deployed over the next decade for an annual expenditure equating to less than 5 percent of the present defense budget and about 0.2 percent of India's estimated $72 billion GNP. Such expenditures would not in themselves deter India from acquiring a nuclear force.

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34. The Indians have demonstrated a willingness to spend heavily for a nuclear program. Their budget figures indicate that they have spent a total of $1.2 billion on the program since its inception in 1954. Of this total, $725 million was for building nuclear installations -- research facilities, nuclear materials plants, and power stations -- and $475 million was for research and development. The budget for FY 1974 (April 1974 - March 1975) provided $200 million for all nuclear activities, and raised the expenditure on the nuclear program to nearly 2 percent of the central government's $11.8 billion budget.

35. The explosion on May 18 reportedly was the culmination of a five-year program that cost India $216 million, an amount equal to 75 percent of its budget for nuclear research and development during that period. This schedule seems reasonable because, in 1969-1970, the annual nuclear research budget jumped by 50 percent to $33 million. It has grown steadily since then, reaching $75 million in FY 1974.

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This increase would allow for the operation of facilities to continue production and recovery of plutonium, for fabrication of the devices, and for ongoing research aimed at improving the design and reducing the weight relative to yield. Continued research and development, including several additional tests, would account for the largest part of annual spending on the weapons program, but expenditure for such R&D probably would be below the level of recent years.

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38. India's incremental costs for using its Canberras as a delivery force for these nuclear weapons would be largely the cost of the weapons. But to acquire a squadron of 16 Soviet medium bombers to replace the Canberras, New Delhi would have to pay from $50 million to $160 million. Total expenditures -- including loan repayment, operating and maintenance costs, and the nuclear weapons -- would be $300 million to $400 million for a squadron of TU-16 Badgers and $400 million to $500 million for a squadron of TU-22 Blinders.

39. The cost of developing and deploying an IRBM delivery system with 10 to 15 launchers by the early 1980s probably would be $320 million to $665 million, with most of this going for R&D and the rest for producing the missiles, launchers, and supporting systems. Including the expenditure for developing and manufacturing the nuclear warheads, the average annual outlay for a missile system would run between $40 million and $80 million.

40. Thus, given a capability to purchase or develop the necessary hardware, India could have both nuclear-armed Soviet bombers and its own IRBMs for a total expenditure over the next decade of $770 million to $1.4 billion. Of the total amount, $300 million to $500 million would be for the aircraft, $320 million to $665 million for the IRBMs, and $150 million to $200 million for the nuclear devices. The average annual increase to the defense budget (presently $2.7 billion) would be $77 million to $140 million.

India's Policy Options

41. In the light of the various political, economic, and technological considerations affecting India's nuclear policy for the next five to ten years, we have examined three policies that India might follow:

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-- a continuing development for peaceful purposes ("Option A"),

-- a continued emphasis on nuclear reactor and PNE programs with the covert buildup of a small inventory of fission weapons or devices ("Option B"), and

-- a program to deploy nuclear-armed aircraft, missiles, or both ("Option C").

Each of these alternative policies is viable in terms of plutonium availability.

42. Option A would suppose a continuation of India's nuclear power program, with optimization for power and with recovered plutonium being stored, used, or sold for peaceful purposes. No weapons development would be funded even for contingency purposes. However, the technology developed for PNE would be eminently suited for application to nuclear weapons developments should the decision be made. The Indian-announced program to develop peaceful uses for nuclear explosions would be implemented through a series of underground experiments. Even with the allocation of plutonium to experiments, foreign sales, and the Indian fast breeder reactor program, there would still be a buildup of surplus plutonium recovered from the expanding number of operational reactors.

43. Option B would suppose limited covert stockpiling, with military involvement ranging from minimal to modest. At one extreme, control over all devices and weapons, as well as all decisions regarding testing, would remain with the AEC, although military representatives would be informed. At the other extreme, tests would be programed jointly with the military and designed to meet military needs, and the slow, unannounced buildup of nuclear weapons would be accompanied by development of contingency plans for their use. All reactors probably could be optimized for power, and the overt activities would appear similar to those under Option A. In time, selected military forces would develop nuclear doctrine, tactics, and organizational plans, but specific mission assignments would not be levied, no military units would be deployed, and the existence of the stockpile would be known to

very few high-level officials and military officers. At least initially, the Indians probably would plan to use the Canberra as a contingency delivery vehicle; an attempt to purchase a longer range bomber would be an indication of intent to build a nuclear strike force. Contingency plans for use by fighter aircraft or the ground forces might also be developed.

44. Option C would foster efforts to purchase a long-range bomber, or to establish a strategic missile program, or both, and would select air force and possibly other military components for nuclear missions and take steps to bring them to operational status. A group would be established to develop a missile system as a specific follow-on to the space program now under way. Facilities would be constructed for the development and production of nuclear weapons. Although it seems unlikely that India would initially acknowledge such a policy -- in its early stages this would not be necessary even for funding purposes -- its existence would eventually be recognized by intelligence, the timing depending upon the nature of the program. Unless India acquired an improved bomber capability, the program could have little payoff prior to the 1980s.

45. These policy options are meant to outline a number of choices now open to the Indians as a result of their initial nuclear explosion. Considering the embryonic state of the Indian nuclear program, actions under all three options could appear similar to the outside observer for the first few years. Any present choice among them need not be a permanent commitment, and the Indians could reexamine it from year to year in the light of the political realities at home and abroad and in the light of the leadership's assessment of the constraints India's technology places upon it. Thus Option A could meld into Option B and B into C as the military leadership sees a growing inventory of nuclear devices and the problems with the space program are resolved.

46. For the variety of considerations detailed above -- political, strategic, economic, and technical -- India will probably recognize that a declared decision at this time to produce weapons and develop a strategic delivery capability (Option C) would create enormous complications in India's international position. It would hurt its relations with Pakistan and Iran, and seriously impair its relationship with the US and other major sources of assistance. In terms of China,

a well-funded Indian strategic development program would encourage arms competition and further increases in military budgets. While the economic burden of Option C could be borne, it may not be attractive because of the recurrent problems in India's nascent space program and in the technically weak aircraft industry. It would thus seem more prudent for India to delay adopting a full strategic weapons policy at this time.

47. For the next several years, the Indian decision on nuclear policy thus appears to come down to a choice of Option A or B. Other than pronouncements at the time of the nuclear test, there is no evidence available that indicates the present Indian choice between the two. The major difference between A and B would be the design, fabrication, and storage of a few nuclear weapons.

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48. Because of India's aspirations, its possession of fissionable materials, its potential to develop strategic strike forces, and the presence of a nuclear power directly to the north, it seems likely that India will move toward Option B within a few years if it has not chosen already to follow that course of action. It is possible, however, that India has not yet made any decision to go beyond peaceful uses of its nuclear power. US and Soviet positions could have considerable influence on India's decision.

49. Under either Option A or Option B, much of the world would expect that India was stockpiling some nuclear weapons. In either case, the potential Indian capability would assure the attention of a potential aggressor. But this situation could hardly satisfy the Indian military leadership in the long run. Especially if Option B were followed, it is likely that, over time, there would be increasing demands for an effective operational force, particularly as the inventory of weapons accumulated. Accordingly, pressures for a change to Option C are likely to grow.

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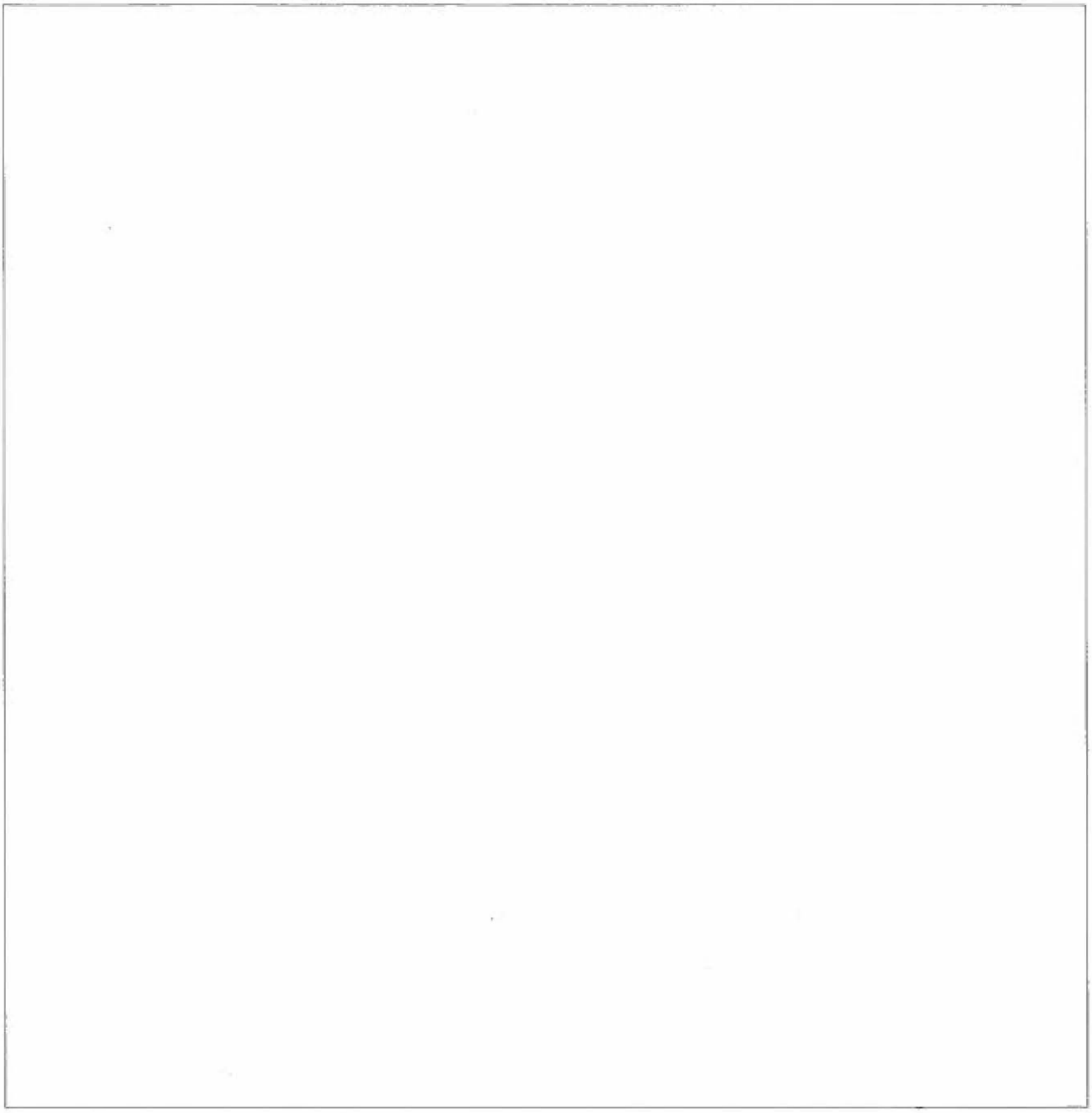

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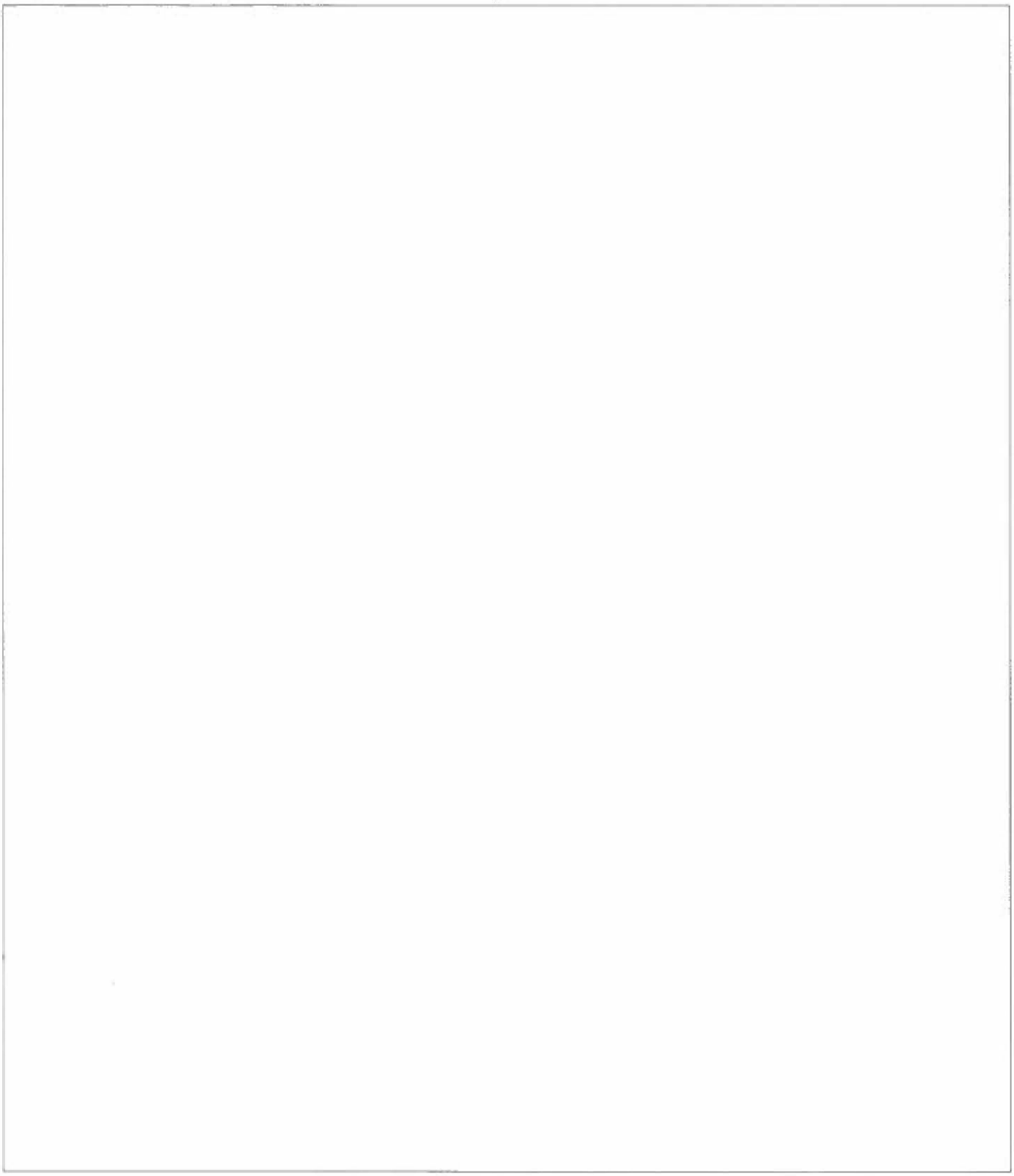

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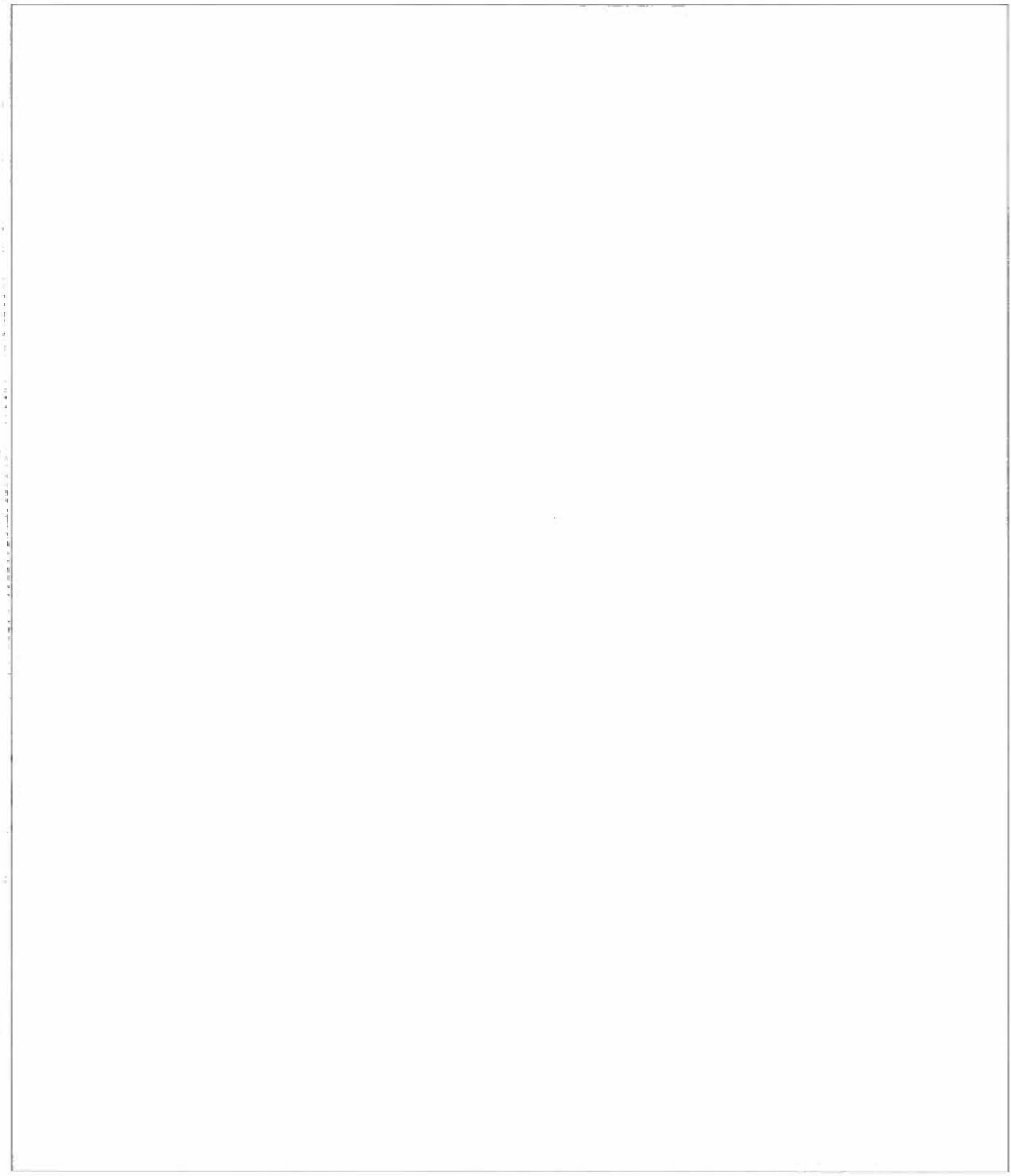

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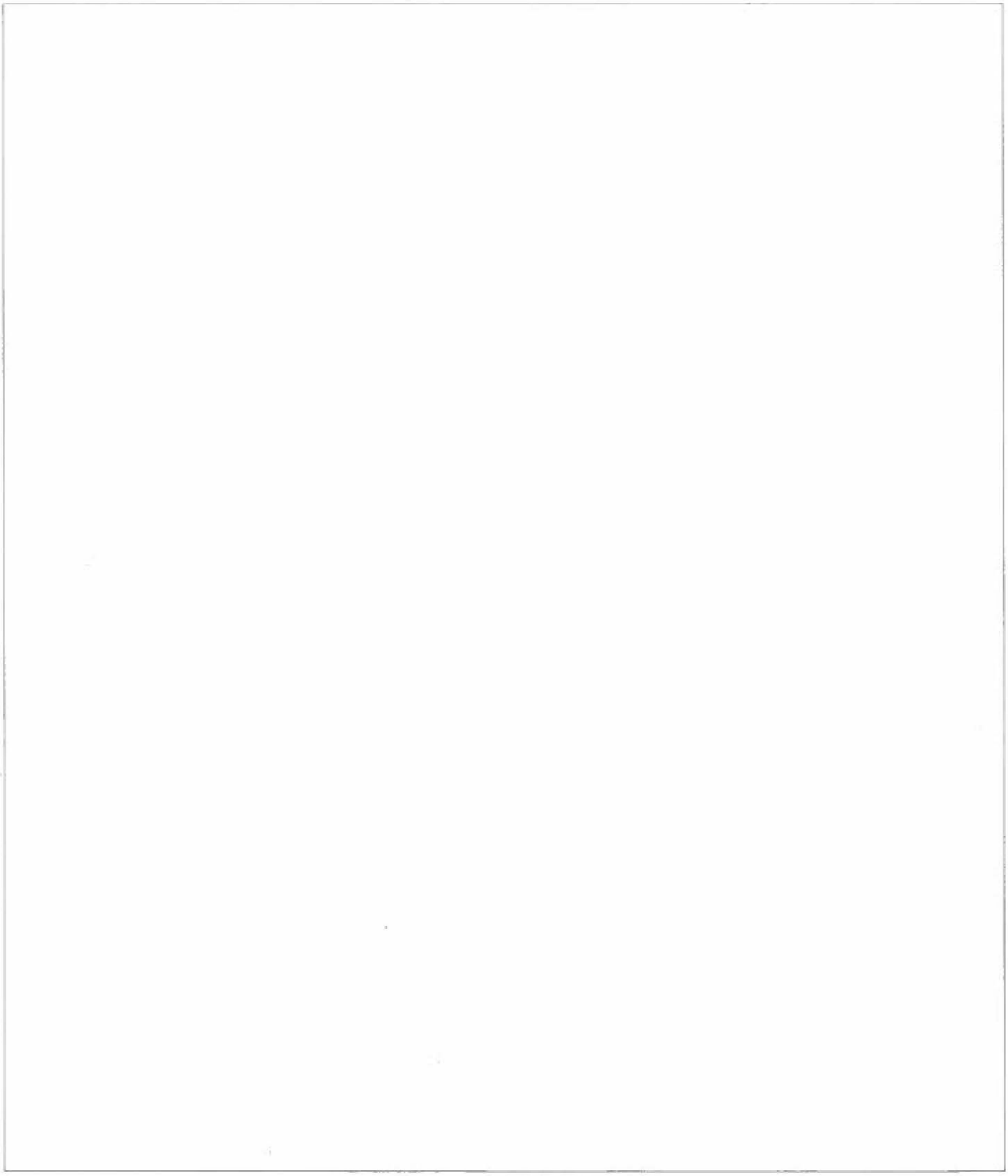

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