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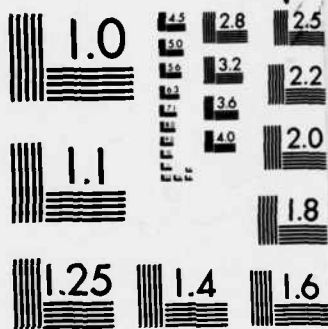
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by

Donald Wayne Phillips

June 1983

Thesis Advisor:

Michael Clough

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Second, the motivations for a country to "go nuclear" could change rather suddenly in an international system which is plagued by a greater fragmentation and diffusion of power.

This study finds that the present fragile nuclear non-proliferation regime is inadequate to limit the spread of nuclear weapons; thus the world is gradually moving into a period in which it may soon contain from 15 to 20 nuclear states; And the danger will be all the greater that a brush-fire war involving any one of them may take on global dimensions.

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Prospects for Nuclear Proliferation

by

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Lieutenant Commander, United States Navy
B.S., Southeast Missouri State University, 1971

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN NATIONAL SECURITY AFFAIRS

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ABSTRACT

This study attempts to survey and analyze the various problems relating to the proliferation of nuclear weapons and the future of the nonproliferation regime. Nuclear proliferation is the intersection of a number of important issues, none of which individually will decide how events will unfold.

The growing number of nuclear power industries throughout the world has led to the widespread availability of the necessary nuclear technology and fissile material used to construct nuclear weapons. Therefore, the capability is increasingly becoming available to many national leaders.

Second, the motivations for a country to "go nuclear" could change rather suddenly in an international system which is plagued by a greater fragmentation and diffusion of power.

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I. INTRODUCTION

The subject of nuclear proliferation always provokes a strong reaction. While most analysts believe the world will be a more dangerous place with the spread of nuclear weapons, a few argue that more nuclear weapons may actually lead to a more stable international system. For better or worse, a lesson of history is that by increasing the number of states or actors with any type of weapon, the chance is greater that someone will use them.

Proliferation, as applied to nuclear weapons, may be of two types, either "vertical" or "horizontal." Vertical proliferation is the numerical increase in the number and/or size of nuclear weapons within a state's arsenal, such as the United States or the Soviet Union. Horizontal proliferation is an increase in the number of states who possess, or may possess in the future, a nuclear capability. This study focusses on horizontal proliferation, which adds to the instability that characterizes a multipolar international system.

Nuclear proliferation alone is not going to exacerbate the dangers of a multipolar world. A state becomes a great power only by combining economic, military, social, political, and geographic assets in more effective ways than other states. Great Britain, France, and China have had

significant nuclear arsenals for years without altering the basic bipolarity of the international system. The addition of Israel, Brazil, Pakistan, or even numerous other states to the "nuclear club" is not going to automatically create an additional pole.

The international system is extremely sensitive to rapid changes, therefore an actual or perceived situation such as nuclear proliferation seemingly out of control would create instability in the international environment. Great effort must be made to ensure changes of this nature do not occur.

The prospect of more nuclear states should not necessarily be of concern, but an accelerating rate of change in the number of nuclear states could be a great danger to the world. An exponential growth rate in the number of nuclear states would cause general restraints to break down and decisions to forbear would be reconsidered because "everyone is doing it."

Widespread nuclear proliferation would alter the political interests and attitudes of most countries and would change dramatically the international political environment. For example: The number and diversity of countries and situations of strategic concern would be multiplied; the potential destructiveness of regional wars would be increased; the requirements for defense, security, and alliance strategy would be reviewed by many nations; and finally the fundamental concepts of international relations could be affected.

If ten to fifteen new nuclear states emerge in the next twenty years, the conceptual framework for dealing with such a situation will certainly be inadequate. In the past, miscalculation and faulty analyses have occurred over and over again, contributing to numerous wars, alarms, and crises. Much to the chagrin of national leaders throughout the world, there have been many unanticipated coups, revolutions, and unexpected actors of which former National Security Advisor Brzezinski lamented: "the intelligence community provides many facts but few findings."

The real problem of nuclear proliferation is that numerous countries are drifting upward to higher categories of competence. Manufacturing a nuclear bomb is not a simple basement operation, but neither is it an overwhelming or mysterious technical feat. It requires scientists with an understanding of the fundamental precepts of nuclear energy, a cadre of engineers, and a supply of fissionable material. (Fusion weapons will not become practicable in the near future for most countries.) More and more countries are moving toward all three, therefore proliferation will depend more upon political decisions and less upon technological progress. This means that any transient incentive or pressure in the ebb and flow of world politics which would influence a country to build nuclear weapons at some point in the future will just be that much easier to act upon.

This thesis is based upon the hypothesis that nuclear proliferation, irrespective of its "goodness" or "badness" is inevitable and will be "explosive" in nature, that is to say, many countries will acquire nuclear weapons in a relatively short period of time.

Given the importance of the subject, it behooves all actors to seek a slow, steady, and calculated progression toward further proliferation. Mankind simply cannot afford the sudden emergence of another Hitler armed with nuclear weapons.

II. HISTORICAL REVIEW

The science and technology that produced atomic electricity have also created the most horrible instruments of destruction the world has ever known. Possibly the greatest paradox of history is the ability to produce peaceful and unlimited energy as well as unlimited death and destruction by the same process.

The development and dissemination of nuclear energy for peaceful purposes present an inescapable dilemma: How does one guard against the dangers of proliferating nuclear weapon capabilities while advancing the benefits of the atom when the basic technology for both is largely the same?

Some believe the answer to this dilemma lies in the hopeful words of William Shakespeare, "out of this nettle, danger, we pluck this flower, safety."¹ Regardless of where the answer lies, seeking this duality of purpose has always been at the heart of U.S. nonproliferation policy.

On the military side, the question has been how to avoid or reduce the dangers of the proliferation of nuclear arsenals. With this in mind, the three wartime allies involved in the Manhattan Project--the U.S., Great Britain, and Canada--agreed that the establishment of effective international safeguards against military applications of nuclear power should precede any diffusion of nuclear technology and

materials for nonmilitary purposes. In line with this tripartite policy they proposed a commission on atomic energy, within the framework of the United Nations, for a reliable safeguards program aimed at eventual nuclear disarmament.²

A. BARUCH PLAN

In an attempt to find answers to the nuclear question, Secretary of State Byrnes established a study committee in January 1946. To serve on this committee, Byrnes appointed Dean Acheson (chairman), Vannevar Bush, James Conant, John McCloy, and General Leslie Groves. Acheson appointed David Lilienthal, a Harvard Law graduate and director of the Tennessee Valley Authority, as chairman of the board of consultants. Their job, as seen by Lilienthal, was to build a knowledgeable policy on questions of control, safeguards, enforcement, and international competition. Lilienthal once stated:

the work of this group for which I have been made chairman, is to develop a position based on facts not now known by our political officers, that will work, and have a good chance of being accepted, especially by Russia.³

The group considered the alternatives, rejecting some and setting others aside for further attention. Lilienthal asked at one meeting if a prohibition against all nuclear development may be the only way to save the world from an eventual nuclear holocaust. The response was predictable. They were simply too excited by the commercial and

humanitarian prospects of atomic development to accept that the best control may be one that prevented all use of nuclear energy.⁴

President Truman appointed Bernard Baruch as his representative to the United Nations Atomic Energy Commission (UNAEC). In a dramatic speech before the U.N. on June 14, 1946, Mr. Baruch outlined the proposals of the U.S. for the international control of atomic energy. He stated that, "we are here to make a choice between the quick and the dead . . . We must elect World Peace or World Destruction . . ."

He continued:

The United States proposes the creation of an International Development Authority, to which should be entrusted all phases of the development and use of atomic energy, starting with the raw material and including--

1. Managerial control or ownership of all atomic-energy activities potentially dangerous to world security.
2. Power to control, inspect and license all atomic activities.
3. The duty of fostering the beneficial uses of atomic energy.
4. Research and development responsibilities of an affirmative character intended to put the Authority in the forefront of atomic knowledge and thus enable it to comprehend, and therefore detect, misuse of atomic energy.

When an adequate system for control of atomic energy, including the renunciation of the bomb as a weapon, has been agreed upon and put into effective operation and condign punishment set up for violations of the rules of control which are to be stigmatized as international crimes, we propose that--

1. Manufacture of atomic bombs shall stop;

2. Existing bombs shall be disposed of pursuant to the terms of the treaty; and

3. The Authority shall be in possession of full information as to the knowhow of the production of atomic energy.

He went on to stress that the punishments for violations were not to be subject to veto in the Security Council.⁵

Baruch basically accepted the Acheson-Lilienthal report as American policy except for the two issues mentioned--sanctions against violators and the desire for no veto in the Security Council. He was of the opinion that world peace is impossible without force to sustain it. Consequently, he insisted that any plan for control of atomic energy contain a provision for sanctions and removing the veto from the Security Council. Acheson disagreed but President Truman did not.⁶

The Baruch Plan was preordained to fail. Nuclear disarmament and the development and dissemination of atomic energy for nonmilitary purposes were locked together in the U.S. proposal and conditioned on the prior establishment of effective controls and safeguards against military applications. The Soviet Union's counterproposal was a commitment to nuclear disarmament ahead of any international control and verification machinery. From the Soviet viewpoint, the U.S. would always retain at least a technological military superiority if they accepted the Baruch Plan.

Furthermore, as Khrushchev later said,

What would it have meant to put the development of atomic energy under U.N. control? That would have meant to put it under control of the U.S. inasmuch as the U.N. in point of fact, is a branch of the U.S. Department of State."

The Soviets were adamantly opposed to any system of international inspection, control, and punishment; they refused even to consider surrender of the veto, protesting that this did violence to the national sovereignty of the Soviet Union. In essence, during this period Stalin was not about to open Soviet borders to the Western world and expose their tremendous economic and military weaknesses.

For over two millenia nations have not voluntarily surrendered their sovereign prerogatives and this issue remains the unbudgeable obstacle to arms control and disarmament. While the prospects of opening U.S. borders for Soviet inspection were widely entertained in Washington in 1946, the same was not true in Moscow.⁸

B. ATOMS FOR PEACE

Failure of the Baruch Plan, as viewed by many in the U.S., was partly due to the inward-looking Atomic Energy Act of 1946 (McMahon Act). It provided for civilian control of the Atomic Energy Commission, government ownership of all fissionable materials and related production facilities, and placed a veil of secrecy over industrial research and development. Also under this act Great Britain and Canada,

wartime collaborators in the Manhattan Project, were denied any exchange of nuclear information.⁹

No serious disarmament negotiations were possible during the Korean conflict; in fact Great Britain exploded its first atomic bomb in October 1952, the U.S. its first hydrogen bomb in November of the same year, and in August 1953 the Soviet Union exploded its first hydrogen bomb.

Because of these events, President Eisenhower recognized that the U.S. policy of strict secrecy and no information exchanges on potential peaceful benefits actually decreased whatever chances that existed for the establishment of some international safeguards. Also, the political, economic, and scientific interests in the U.S. pressed for pursuing cooperative relationships, under safeguards, with select countries. The peaceful commercial uses came to be regarded not merely as an end in themselves but also as a means of shifting interest from the military to the peaceful uses of nuclear energy.

On December 8, 1953, President Eisenhower presented the U.S. "Atoms for Peace" proposal to the U.N. General Assembly. He outlined the dangers of atomic weapons and acknowledged that several nations already possessed them and eventually many others would have them too. Secretary of State Dulles, during his testimony before the Joint Committee on Atomic Energy in 1954, summarized the prevailing view.

Knowledge in the atomic energy field was growing in so much of the world that the United States could not effectively dam the flow of information, and if we try to do it we will only dam our own influence and others will move into the field with the bargaining power that it involves.¹⁰

While the idea of effective safeguards and controls was not forsaken, it definitely was relegated to a lesser position than the promotion of civil uses of atomic energy domestically and internationally. In the words of Willrich and Taylor,

Atoms for Peace signaled a major reordering of priorities. Prior to 1953, international control came first and peaceful nuclear development second. Thereafter, development came first and international inspection and control second, if at all.¹¹

The "Atoms for Peace" proposal led to a considerable erosion of the line between the peaceful and the military uses of atomic energy. It facilitated the spread of nuclear technology and nuclear materials, yet it reduced the safeguards necessary to prevent the diversion of fuel to making bombs.

For implementation of this new U.S. policy, the Atomic Energy Act of 1946 had to be changed. Congress passed the new Atomic Energy Act in 1954 and this act authorized a program,

to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and the health and safety of public.¹²

On March 19, 1955, President Eisenhower created the Cabinet position of Special Assistant to the President for Disarmament and named Harold Stassen to fill the post. The

President later gave Stassen negotiating as well as planning power.

In July 1955, at Geneva, Switzerland, President Eisenhower made another effort in arms control. Looking directly at Communist Party First Secretary Khrushchev, he outlined an "Open Skies" proposal that called for a swap of both military blueprints and of flights by the planes of one nation across the territory of the other. Americans at the time feared a "nuclear Pearl Harbor" and the Open Skies proposal was the reaction to the growing Soviet nuclear stockpile and the limited American knowledge of the Russians' nuclear delivery capability.¹³

As with the Baruch Plan, it appeared to the Soviets that the U.S. was again trying to gain an advantage. There existed neither a conjunction of political interests nor the equally necessary balance of military power to make agreement possible.¹⁴

The most positive development of the period was that the "Atoms for Peace" program eventually led to the formation of the International Atomic Energy Agency (IAEA), which entered into force on July 29, 1957. The IAEA safeguards initially were not applied universally, nor to all of a country's nuclear facilities, but only to a limited number of specific facilities and a small fraction of the fissionable material in the world. This was later strengthened by the nuclear Nonproliferation Treaty that entered into force on March 5,

1970. The safeguard system shall be discussed further in Chapter III in conjunction with the NPT.

The U.S., the Soviet Union, Great Britain, and China specifically developed nuclear weapons first and were only interested in peaceful uses secondarily; swords into plowshares. France and India have developed nuclear explosives from advanced peaceful nuclear programs; swords from plowshares. The latter experience is the greatest fear for the future.

C. PARTIAL TEST BAN TREATY

On March 14, 1954, a fishing boat named the "Lucky Dragon" returned to Japan from a trip to the South Pacific, where they had been exposed to radiation from a U.S. nuclear explosion test. Nearly all of the crew had come down with nausea, fever, bleeding gums, and other classic symptoms of radiation poisoning. It was confirmed within a few days that the crew indeed were suffering from radiation sickness caused by the U.S. test. The people of Japan, remembering Hiroshima and Nagasaki, refused to be reassured by U.S. officials and demanded that the U.S. conduct a formal inquiry.

The alarm felt by the Japanese people soon spread to the U.S. and the U.S. President did not help the situation when responding to a reporter's question:

it is quite clear that this time something must have happened that we have never experienced before, and must have surprised and astonished the scientists.¹⁵

Of course the press had a field day with the President's reply and many people throughout the world speculated that the nuclear test had somehow gotten out of control.

Throughout 1955, the Atomic Energy Commission (AEC) conducted an intensive public relations campaign designed to convince the American people that the fear of fallout was groundless. While the AEC tried to quiet public fear over fallout, a far-reaching debate broke out within the scientific community. Biologists provided the real scare when they suggested that fallout created a genetic danger for the human race. Professor C. H. Waddington, a Scottish geneticist, summed up the prevailing consensus when he wrote:

any atomic explosion which produces an increase in radioactivity, however small, in regions inhabited by man will add something to humanity's store of newly mutated and most harmful genes.¹⁶

These pessimistic assessments obviously did not go unchallenged, but the psychological damage had already been done.

Scientists failed to arrive at a clear consensus, but a majority seemed to feel that the dangers to human life were slight. The need for more information on the effects of radiation on human life was one area on which all scientists seemed to agree.

Within the context of the Cold War strategic doctrine of "Massive Retaliation," it was clear that the Eisenhower administration faced a real dilemma: How to continue to test and manufacture nuclear weapons in the face of such controversy about fallout and the effects on the human race?

Even in the face of strong public support for a test ban, President Eisenhower and his special assistant Stassen were opposed to the idea. Eisenhower indicated he was more interested in a comprehensive disarmament proposal than a piecemeal approach. "I see nothing to be gained," he declared, "by pretending to take bits of items of that kind and deal with them separately."¹⁷ For the moment, at least, the administration appeared to be unyielding in its commitment to a policy of conducting nuclear tests which it felt were vital to U.S. security. In so doing, the AEC announced a new series of atomic tests scheduled for late spring and early summer of 1957.

Eventually, though, world pressures required action by the nuclear states. Three developments occurred at the 1957 London session of the Subcommittee of the Disarmament Commission of the United Nations that set the stage for the Geneva test ban negotiations. The first of these developments was the announcement by the Soviet Union that it would allow control posts on its territory to monitor any agreement for the cessation of nuclear weapons tests. In conjunction with this announcement, the Soviets also declared their desire for a two- to three-year suspension of tests. Both of these announcements were dramatic changes from the past. Prior to this date, June 14, 1957, the Soviets had accrued considerable political benefits proclaiming to be the leader in pursuing a nuclear test ban and for various reasons had not

seen a need to seriously negotiate. Now the situation had changed.

The second development which contributed to the Geneva negotiations is that the Western nations had also altered their position during the course of the London session. They stated they would agree to a temporary suspension of testing while the control system was established and Stassen also hinted they might accept a loosening of the tie between the test ban issue and other measures of disarmament. This change of heart was a complete reversal of previously stated policy.

The final development during the London session which had a bearing on the Geneva negotiations was the introduction by the Western delegation of the idea of holding technical talks on control systems. Although the Soviets eventually rejected the idea of technical talks, it was important for later negotiations that they were introduced here and did gain some legitimacy.¹⁸

The partial test ban treaty was the end result of some five years of intensive though intermittent negotiations. They began in 1958 and moved through a tangle of proposals for both comprehensive and partial test bans.

After President Kennedy's inauguration, a new emphasis was placed on achieving a comprehensive nuclear test ban treaty. Kennedy was personally convinced that, on balance, a comprehensive nuclear test ban treaty was in the best

interests of the U.S. and ultimately would lead to reduced world tensions. This feeling could have emanated from the ill-conceived notion that a comprehensive test ban would prevent nuclear proliferation; a country cannot develop a nuclear arsenal if it cannot test weapons.

Even though the Soviets would accept command posts on their territory, it was clear by mid-1962 that they would not accept any proposal that involved on-site inspection of otherwise unidentifiable underground events by foreigners.

Later in August 1962, the U.S. delegation introduced into the negotiations two draft treaties, one a partial and one a comprehensive ban. On July 2, 1963, Premier Khrushchev made his reply. Although he decisively rejected a comprehensive test ban treaty with on-site inspection, he did agree to a partial nuclear test ban treaty in three environments--outer space, the atmosphere, and under water--with the use of existing national verification systems. The treaty was formally signed in Moscow on August 5, 1963.¹⁹

Excluded from the treaty were those nuclear tests carried out underground and considered by the U.S. to be undetectable without on-site inspection--provisions unacceptable to the Soviet Union.

The pact did not include measures for disarmament and did not bind other nations. But hope was expressed that the treaty would serve as a step toward disarmament and eventually would be accepted by all states. President Kennedy

thought the greatest value of the treaty would be in the precedent set, as "a shaft of light cutting into the darkness."²⁰

Without deprecating the positive aspects of the Partial Test Ban Treaty (PTBT), it is important to point out its deficiencies. First and foremost, France and China have not signed or become parties to the treaty. Not only were they not parties, they actually conducted atmospheric tests during the test ban negotiations. Fourteen other countries including Argentina and Pakistan have signed but not ratified it. Second, the treaty contains a withdrawal clause whereby a party can withdraw from the treaty by giving three months' notice, if it decided that extraordinary events have jeopardized its supreme interests. Most important here is that this was the first time that a withdrawal clause had been included in any arms control treaty. Now withdrawal clauses are standard practice. The political liabilities would not be nearly so great for withdrawal from formal treaty obligations as would outright disregard. Third, it was widely accepted that the PTBT would actually stop development of new and more sophisticated nuclear weapons and actually halt nuclear proliferation. Nobody predicted that underground tests would exceed previous atmospheric tests; nor could anyone foresee how underground testing coupled with sophisticated computer technology could provide a loophole for the development of an entire range and class of new

weapons. The emergence of China, France, and India as nuclear powers, not to mention numerous other states that are on the verge, demonstrates the futility of attempting to prevent proliferation through a partial test ban.²¹

FOOTNOTES

¹David E. Lilienthal, Atomic Energy: A New Start, p. 103, Harper & Row Publishers, 1980.

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⁸Michael Mandelbaum, The Nuclear Revolution: International Politics Before and After Hiroshima, pp. 24-25, Cambridge University Press, 1981.

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¹⁰Testimony of John Foster Dulles, U.S. Congress, Joint Committee on Atomic Energy, Hearings on S. 3323 and H.R. 8862 to Amend the Atomic Energy Act of 1946, Part II, 83rd Congress, 2d sess. (1954), pp. 701-702, cited by Guhin, Nuclear Paradox, p. 10.

¹¹Mason Willrich and Theodore B. Taylor, Nuclear Theft: Risks and Safeguards, A Report to the Ford Foundation's Energy Policy Project, p. 180, Ballinger, 1974.

¹²Epstein, The Last Chance, pp. 14-15.

¹³Roberts, The Nuclear Years, pp. 32-33.

¹⁴Ibid., p. 33-34.

¹⁵Robert A. Divine, Blowing on the Wind: The Nuclear Test Ban Debate 1954-1960, p. 8, Oxford University Press, 1978.

¹⁶Ibid., p. 51.

¹⁷Ibid., p. 62.

¹⁸Harold K. Jacobson and Eric Stein, Diplomats, Scientists, and Politicians: The United States and the Nuclear Test Ban Negotiations, pp. 14-18, The University of Michigan Press, 1966.

¹⁹Arthur H. Dean, Test Ban and Disarmament: The Path of Negotiation, pp. 86-92, Harper & Row Publishers, 1966.

²⁰Kennedy, statement August 6, 1963, U.S. Department of State, Bulletin, v. 49:1963, p. 234, cited by Ruth B. Russel, The United Nations and United States Security Policy, p. 83, The Brookings Institution, 1968.

²¹Epstein, The Last Chance, pp. 52-53.

III. NONPROLIFERATION REGIME

In human history, tragedy or near-tragedy has often been necessary to motivate man to higher ambitions. Efforts between 1945 and 1963 aimed at the control of nuclear weapons basically ended in failure. But unexpectedly in October 1962, a series of events began that led to numerous achievements which we now call the nuclear nonproliferation regime. This regime is centered around the Nonproliferation Treaty (NPT) and the IAEA safeguards system.

The Cuban Missile Crisis in October 1962 clearly demonstrated to the U.S. and the U.S.S.R. that the avoidance of nuclear war between them was a necessary condition for their mutual survival. Second, in 1964, they both were jolted by a Chinese nuclear explosion. Third, by 1965, it had become clear that numerous other countries--India, Japan, the FRG, Sweden, Italy, Israel--were on the threshold of becoming nuclear powers.

President Kennedy expressed his dire concern over the nuclear proliferation problem during his report to the nation on the nuclear Test Ban Treaty:

We have a great obligation--all four nuclear powers [China had not yet detonated its first device] have a great obligation--to use whatever time remains to prevent the spread of nuclear weapons, to persuade other countries not to test, transfer, acquire, possess, or produce such weapons.¹

In essence, these events had significantly altered the political environment toward a policy of nuclear nonproliferation. Some concurrence of political objectives coupled with a cooperative spirit on the part of both superpowers led to limited yet cumulative nonproliferation achievements.

A direct communication link--the "hot line"--was established in 1963 between the heads of governments in Washington and Moscow for use in time of emergency. Also in 1963, the Partial Test Ban Treaty (PTBT) was concluded and entered into force.²

In 1967, the Treaty for the Prohibition of Nuclear Weapons in Latin America, known as the Treaty of Tlatelolco, was completed (and has been signed by twenty-two states of the region).³ This treaty contains three distinct provisions:

1. Prohibits the acquisition of nuclear weapons by the contracting parties.
2. Prohibits the receipt, storage, installation, deployment, and any form of possession of any nuclear weapons, directly or indirectly by the Parties themselves, by anyone on their behalf, or in any other way.
3. Nuclear Weapon States (NWS) will not use or threaten to use nuclear weapons against the Contracting Parties.

Although not all pertinent parties have been able to accept all three provisions, the Treaty of Tlatelolco has proved to be a positive aspect of the nonproliferation regime. It has also encouraged other states to pursue such a treaty in their respective area of the world.⁴

Also in 1967, the Outer Space Treaty was completed and entered into force. Contracting parties agreed not to place nuclear weapons in orbit around the earth, nor to install them in celestial space.⁵

The question of safeguards for nuclear nonproliferation agreements has always been an important and difficult issue. Although the machinery for safeguards has been intact since the formation of the IAEA in 1957, it has never been fully utilized.

On June 13 1968, the U N General Assembly passed the Nonproliferation Treaty (NPT) and with it a directive requiring all signatories to the Treaty to commence negotiations with the IAEA concerning safeguards for their nuclear activities.

During negotiations on the NPT, an argument emerged between the Nuclear Weapons States (NWS) and the Non-Nuclear Weapons States (NNWS) concerning the nature of the relationship between the arms limitation and security policies of the major states and the acquisition of independent nuclear weapon capabilities by additional states. This argument diminished the viability of the NPT from the very beginning.

Conditions leading to a soon-to-be onslaught of nuclear powers are amassing quickly in this high-technology, conflict-ridden world of today. The limitations of the NPT and the incomplete nature of the IAEA safeguard system has made the fragile nuclear nonproliferation regime suspect.

A. NPT NEGOTIATIONS

The origins of the NPT treaty are found in an Irish draft resolution, submitted on November 17, 1961. This resolution called upon all states, particularly those possessing nuclear weapons, to secure an international agreement under which nuclear states would agree not to relinquish control of nuclear weapons nor to transmit information necessary for their manufacture. Non-nuclear states would agree not to manufacture or otherwise acquire control of them. This proposal was adopted unanimously by the General Assembly on December 4, 1961. Sweden suggested that, in addition, the Secretary-General inquire under what conditions NNWS might be willing to bind themselves not to seek nuclear weapons in the future. Reciprocity was mentioned most often as the condition under which governments would adhere to the treaty.

Also in 1961, the U.N. General Assembly formed the new negotiating forum for disarmament--the Eighteen-Nation Committee on Disarmament (ENDC). It was to be comprised of the nuclear powers and some of their respective allies, as well as eight nonaligned NNWS that were to represent every region of the world. This Committee, meeting in Geneva, henceforth became the main forum for the deliberations over the NPT.

From 1963 until 1965, little progress was made because of the U.S. plan for the establishment of a NATO multi-lateral nuclear force (MLF). The Soviets viewed this scheme by the U.S. as contrary to the principle of nonproliferation

and accused the U.S. of trying to promote nuclear proliferation within NATO while preventing it in the rest of the world. The Soviets did not want the West Germans to have control of nuclear weapons.⁶

Early in 1965, the political atmosphere had changed and sustained negotiations upon the NPT commenced in earnest within the ENDC and continued until the treaty was concluded in June 1968. The NPT was opened for signature on July 1, 1968.

In November 1965, the U.N. General Assembly passed Resolution 2028, sponsored originally by the eight non-aligned NNWS in the ENDC, which summarized the main principles which the NNWS argued should guide subsequent negotiations on nonproliferation:

1. The treaty should be void of any loop-holes which might permit nuclear or nonnuclear Powers to proliferate, directly or indirectly, nuclear weapons in any form;
2. The treaty should embody an acceptable balance of mutual responsibilities and obligations of the nuclear and nonnuclear Powers;
3. The treaty should be a step towards the achievement of general and complete disarmament and, more particularly, nuclear disarmament;
4. There should be acceptable and workable provisions to ensure the effectiveness of the treaty; and
5. Nothing in the treaty should adversely affect the right of any group of States to conclude regional treaties in order to ensure the total absence of nuclear weapons in their respective territories.

1. Negotiation Stages

Basically, NPT negotiations evolved through five distinct stages. In each state, the U.S. and U.S.S.R. submitted draft treaties while the NNWS submitted criticisms and counterproposals. Eventually the U.S. and the U.S.S.R. submitted joint draft treaties to meet the criticisms of the NNWS. Landmark dates for the beginning session of each stage were: August 1965; August 27, 1967; January 18, 1968; March 11, 1968; and May 31, 1968.

2. Negotiation Issues

Throughout the negotiations, the two major questions at issue between the NWS and NNWS were deliberately and thoroughly discussed.

a. Arms Limitation and Disarmament Measures

Fundamentally, the NWS were opposed to tying related arms control and security measures to the NPT while the NNWS argued that the NPT was inextricably linked to such measures.

In the August 1965 draft treaties, neither the U.S. nor the U.S.S.R. incorporated any arms control or disarmament measure other than the non-dissemination of nuclear weapons by NWS and the non-acquisition of nuclear weapons by NNWS.

The three NWS that were sponsoring the NPT negotiations (U.S., U.K., U.S.S.R.) argued adamantly against linking arms control measures with the NPT. First they ar-

gued that progress in arms control and disarmament must be cumulative and failure to reach an agreement on the NPT would negate previous efforts in this area, such as the PTBT.⁸

Second, the three NWS claimed that nuclear proliferation was intrinsically dangerous to the stability of the international system, but nuclear proliferation was particularly dangerous to the NNWS because hostile neighbors may eventually exercise a nuclear option.⁹

Third, the NWS argued that the NPT negotiations were extremely complicated and tying the NPT to a package of related measures would only ensure stalemate and ultimately make an agreement impossible. In particular, both the U.S. and U.S.S.R. referred to the difficult questions of control and inspection which would be raised if the NPT was tied to other arms control and disarmament measures.¹⁰ As a matter of fact, this issue became so difficult that on August 24, 1967, after intensive secret negotiations, "they (U.S. and U.S.S.R.) submitted separate but identical drafts in the ENDC, leaving blank the article that was to embody the inspection provision."¹¹

Fourth, the NWS reasoned that the NPT was a precondition to arms control and disarmament measures since:

the United States and the Soviet Union are understandably very unlikely to begin to dismantle their own armouries while the possibility of what has been called 'horizontal' proliferation still exists "¹²

The NWS and NNWS mainly disagreed as to whether the NPT should be made contingent upon arms control and disarmament measures or whether the NWS should be obligated merely to undertake negotiations on such measures.

Without going into all the criticisms surrounding this aspect of the negotiations, it is important to note that India, Sweden, Burma, Mexico, and Brazil were able and capable leaders in the development of the NPT.

It became clear to the NWS that many NNWS expected progress on this issue and not merely a promise by the NWS that they would negotiate. To meet the objections presented by the NWS, the U.S. and U.S.S.R. submitted a revised joint draft treaty to the General Assembly which included an additional amendment in the preamble "to undertake effective measures in the direction of nuclear disarmament."¹³ The NWS also revised the accompanying draft resolution to stress effective measures of, rather than steps toward nuclear arms control and disarmament.

In the final analysis, it was apparent that the treaty's sponsors were unable to enjoin upon themselves that which they expected of the NNWS. The nuclear powers viewed their own security needs as requiring the continued testing of nuclear weapons, and considered obligatory steps toward their own nuclear disarmament as non-negotiable. In addition, the problem of nuclear proliferation would be defined in terms of "horizontal" rather than "vertical." Numbers of

weapons and sophistication would be considered somewhere outside the NPT.¹⁴

b. Security Guarantees

Because of the Chinese nuclear detonation in October 1964, the problem of extending security assurances to non-nuclear signatory states to the NPT became a matter of great concern. The NNWS had come to feel that accession to the NPT was a sacrifice for which compensation had to be obtained in the form of security guarantees from the NWS.

Security proposals ranged from a call for general and complete disarmament to the Swiss-Romanian proposition:

that nuclear states were to promise, formally and solemnly never to use nuclear weapons nor threaten to use these weapons against states which did not possess them and which undertook not to manufacture them.¹⁵

President Johnson assured NNWS that they could be sure of U.S. support against any form of nuclear blackmail. In the 1966 ENDC session, Premier Kosygin stated the U.S.S.R. desired to include in the NPT a statement prohibiting the use of nuclear weapons against a non-nuclear signatory which did not have them on its territory.

Obviously, NNWS desired negative security guarantees of the Kosygin variety, but because of NATO's inability or desire to match Soviet capabilities in Europe, the Kosygin posture was unacceptable to Western leaders. After all, NATO's deterrent strategy is based upon rapid escalation to tactical and ultimately strategic nuclear warfare.

After much debate, it became apparent that many NNWS sought iron-clad obligations from NWS, which for various reasons they were unable to commit. Since a certain impasse was developing, it was proposed that a U.N. resolution be passed rather than an article to the NPT concerning security assurances.

On June 19, 1968, the Security Council approved (10 to 0, with 5 abstentions) a declaration which stated:

1. That aggression with nuclear weapons or the threat of such aggression against a non-nuclear-weapon State would create a situation in which the Security Council, and above all its nuclear-weapon State permanent members, would have to act immediately in accordance with their obligations under the United Nations Charter;
2. Welcomes the intention expressed by certain States that they will provide or support immediate assistance, in accordance with the Charter, to any non-nuclear-weapon State Party to the Treaty on the Non-Proliferation of Nuclear Weapons that is a victim of an act or an object of a threat of aggression in which nuclear weapons are used;
3. Reaffirms in particular the inherent right, recognized under Article 51 of the Charter, of individual and collective self defense if an armed attack occurs against a member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security."¹⁶

This device has been widely criticized as being meaningless, partly because each of the overt nuclear powers is now a permanent member of the Security Council and has veto power there. Moreover, there is no prospect that the nuclear signatories of the NPT would commit themselves unilaterally or multilaterally to the assistance of the non-nuclear powers in general; even within alliances, the

credibility of nuclear guarantees is perpetually in doubt.¹⁷ DeGaulle used this argument in the 1960s while pursuing a thermonuclear capability.

B. STATUS OF NON-PROLIFERATION TREATY

The important aspect concerning the status of the NPT is that two of the NWS have not signed it and most of the threshold NWS have either not signed or ratified the treaty. (See Appendix B.)

C. NPT SAFEGUARDS

The IAEA was first created by the superpowers in 1957, then bypassed and virtually ignored. For several reasons the existing safeguards system of the IAEA was deemed inadequate for the purpose of the NPT. Therefore a Safeguards Committee was set up by the IAEA Board of Governors in April 1970 to propose the structure and contents of the agreements to be concluded between the IAEA and the NNWS to the NPT. The IAEA Board of Governors approved the Committee's recommendations of April 20, 1971.

The question of safeguards is of central importance to the NPT. Article III of the Treaty (Appendix A) establishes the framework within which safeguards, specifically those of the IAEA, are to operate. Under the Treaty, the IAEA is given the responsibility of providing safeguards for ensuring that NNWS do not engage in the manufacture of nuclear weapons.

For an NWS either to transfer nuclear weapons physically or to give technical information concerning their manufacture to NNWS would be a violation of the NPT, but there is no provision for safeguards against this type of violation. Thus, it is important to remember that the safeguard system maintains checks only on places where nuclear material is reported to be present by the host country; a limited part of the nuclear spectrum.

Considering that the world's nuclear reactors will be producing thousands of kilograms of plutonium per year by 1990 (See Table I) and only 10 kilograms are required to produce a weapon, it is important for us to understand exactly what the present safeguard system does cover and, more importantly, what it does not cover.¹⁸

1. Function and Objectives

Prior to the NPT, only a handful of countries had safeguards through individual agreements, so the meeting in Vienna in 1970 offered a rare opportunity for all the parties concerned to review together the basic philosophy, as well as the detailed procedures for implementing such a system.

There are some distinctions between the Statute of the IAEA and the NPT safeguard system that should be pointed out.

The IAEA Statute does not require any member of the Agency to submit to safeguards (except insofar as the state requests and receives nuclear assistance from or through

Table I

PROJECTED ACCUMULATED SEPARABLE FISSILE PLUTONIUM
FROM POWER REACTORS

Country	Separable Fissile Plutonium Accumulated (kg)				
	1970	1975	1980	1985	1990
Argentina	0	0	350	1,228	2,898
Austria	0	0	0	1,324	3,059
Belgium	0	0	1,272	4,953	9,858
Brazil	0	0	85	866	3,591
Bulgaria	0	0	711	2,291	3,871
Canada	90	1,665	4,938	14,283	27,075
Czechoslovakia	0	75	358	1,984	3,639
Denmark	0	0	0	324	1,134
Egypt	0	0	0	216	756
Finland	0	0	294	1,997	3,877
German Democratic Republic	51	170	1,188	2,838	4,488
German Federal Republic	277	1,657	7,621	21,638	38,927
Hungary	0	0	0	632	1,422
India	18	402	1,032	2,424	4,204
Iran	0	0	0	1,242	5,022
Israel	0	0	0	108	648
Italy	485	935	1,941	6,099	10,774
Japan	74	1,460	10,126	23,671	35,915
Korea (Republic of)	0	0	281	1,951	6,081
Mexico	0	0	56	1,111	2,221
Netherlands	8	153	628	1,103	1,578
Pakistan	0	61	201	605	1,405
Philippines	0	0	0	226	1,356
Portugal	0	0	0	216	1,296
Romania	0	0	0	316	711
South Africa	0	0	0	513	2,220
Spain	12	588	2,613	4,562	16,836
Sweden	0	212	3,169	9,244	15,629
Switzerland	5	622	1,671	6,366	11,371
Taiwan	0	0	206	1,961	6,241
Yugoslavia	0	0	0	555	1,110

SOURCE: SWORDS FROM PLOWSHARES by Albert Wohlstetter, 1977

the Agency), nor does it require that states make their international assistance or transfers¹⁹ subject to the recipient's acceptance of such controls.

The NPT simply builds on the framework created by the IAEA Statute. The NPT:

1. Requires all non-nuclear-weapon parties to submit to IAEA safeguards by means of agreements to be negotiated with the Agency by these states, either individually or collectively, within specified time limits.
2. The NPT prohibits any party from supplying to any non-nuclear-weapon state (whether or not it is party to the Treaty) certain types of nuclear items for peaceful purposes, except subject to IAEA safeguards.²⁰

Although the NPT is less specific than the Statute as to the control measures, it supplies two provisions lacking from the Statute. First, an obligation to submit to safeguards, and second, a requirement that most international transfers of nuclear material or equipment be subject to controls.

In accordance with the NPT agreements, the Agency performs its duties by concentrating on strategic points in the nuclear fuel cycle. These points are selected in such a way that entire plants or parts of plants can be monitored as self-contained units. The use of material accountancy is the fundamental NPT safeguards measure and they are applied in such a way that, in effect, they verify the findings of the state's own system. Verification rights include the use of locks, seals, cameras, television, and other automatic devices, as well as inspections.

In sum, the basic objective of the NPT as set forth in Article III is:

to prevent the diversion by a non-nuclear weapons state of fissionable material from peaceful uses to nuclear weapons or other nuclear explosive devices;²¹

and if this diversion does take place,

to provide timely detection of diversion of significant quantities of nuclear materials from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices, or for purposes unknown.²²

2. Effectiveness

A detailed description and analysis of the IAEA's safeguarding responsibilities are beyond the scope of this work, which is concerned with the assessment of the effectiveness of the international safeguards system in preventing the proliferation of nuclear weapons.

The NPT safeguards system has many drafting limitations which could be characterized as intrinsic weaknesses. The mere fact that an international safeguards system exists is encouraging, but safeguards alone cannot insure success of the nonproliferation regime. Without discussing all of the system's problems, it is crucial to understand its major limitation.

a. India's nuclear explosion was declared by the Indian government to be a "peaceful nuclear experiment," and that they had no intention of developing nuclear weapons. The material used in the explosion came from a research reactor (outside IAEA safeguards) constructed under an agreement

with Canada. This agreement specifically stated that any nuclear material from the reactor would be used for peaceful purposes only. What is the difference between a peaceful nuclear explosion and a nuclear weapon? The technology is exactly the same, therefore the distinction can only be in the mind of the initiator.²³

As a result of this incident, Canada unilaterally imposed strict export regulations on Canadian nuclear materials hoping to prevent any additional "peaceful nuclear experiments" and further embarrassments.

As commendable as this action was, even the most strict regulations can be evaded.

A country that is not party to the NPT can build its own research or power reactor using natural uranium or thorium ore or it can acquire its own supply of plutonium if it buys or builds a small reprocessing plant. Only the NPT requires that all nuclear material in all peaceful nuclear activities of NNWS be placed under international safeguards.

If one thinks this is beyond the capabilities of NNWS, one only has to look at Table II. Not only have the majority of nuclear threshold powers not signed and/or ratified the NPT, many already have a separation capability. South Africa even has an enrichment facility.

b. It is clear from the wording of Article II of the NPT that the manufacture of nuclear weapons or explosive devices is contrary to the Treaty but anything short of

TABLE II

NUCLEAR THRESHOLD POWERS 1975

Country	Ore	Reactor power 1980 (megawatts, electrical)	Enrichment	Separation	NPT		Timescale (years)
					Ratified (R) Signed (S)		
Argentina	Yes	1000*	n.a.	Yes	No	No	10
Brazil	Yes	1500	n.a.	No	No	No	8
Chile	Yes	500	No	n.a.	No	No	16
Egypt	No	600*	No	No	S	S	10
India	Yes	3000	No	Yes	No	No	--
Indonesia	No	500	No	No	S	S	16
Israel	Yes	600	No	Yes	No	No	--
Japan	No	5000	No	Yes	S	S	3
Pakistan	Yes	1000	No	n.a.	No	No	8
South Africa	Yes	300	Yes	n.a.	No	No	3
South Korea	No	500	No	No	S	S	10
Spain	Yes	5000	No	No	R	R	10
Taiwan	No	1000	No	No	R	R	10

*Estimated.

n.a. = not available

SOURCE: PROSPECTS FOR NUCLEAR PROLIFERATION by John Maddox, 1975

manufacture is allowed. Since industrial activities are technically indistinguishable from military activities, violation would be difficult to prove.

In the nuclear fuel cycle, there is what is considered a "normal" amount of nuclear "material unaccounted for" (MUF). MUF can be as much as two percent, and with present technology cannot be accounted for in terms of absolute amounts. This would be desirable since bombs are made from absolute kilograms of fissionable material rather than from a percentage of something. The U.S. and U.K. have admitted to the disappearance of significant amounts of plutonium.²⁴ The best one can hope to attain with safeguards is a varying degree of suspicion.

c. Although Article III of the NPT refers to the IAEA Statute and safeguards system, it is not explicitly stated that NNWS party to the Treaty shall accept the IAEA safeguards as such. Remember, the IAEA itself is not a party to the Treaty and therefore has no legal basis.

For commercial reasons, Euratom²⁵ maneuvered for months hoping to substitute their own safeguard system for that of the IAEA as fulfillment of Article III of the NPT. Ultimately Euratom agreed to verification but it set a dangerous precedent.

d. The U.S. and other supplier states have continued to provide source or special fissionable material and

equipment to NNWS not party to the NPT, without insisting on international safeguards.

While this is legally not a violation of the Treaty, it is obviously a mockery since it grants more favorable terms to non-parties than parties.

The 1974 secret "London Suppliers Club" meeting made a faint attempt at resolving this problem. The loophole that remains still allows for diversion, if a state so desires, because NNWS not party to the Treaty continue to be subject to fewer safeguards than parties. NNWS party to the Treaty must submit all their imported nuclear materials to IAEA safeguards while non-parties must submit only future supplies. Thus indigenous or past imports are free of safeguards. This situation clearly does not provide an incentive for states to sign or ratify the NPT.

e. Know-how in any form is not covered by NPT safeguards. The "supplier club" also produced a "trigger list" that somehow was supposed to resolve the export-import safeguard problem. Any item on this list that was exported by a supplier state would supposedly automatically activate the safeguard system.

In reality, many of the supplier states have been unable to accept the political commitments necessary for this arrangement to work. Some states continue to sell "heavy water," capable of producing high-grade plutonium

without requiring safeguards. "Clearly, commercial competition has often taken priority over political wisdom."²⁶

f. Safeguards for state-of-the-art technology have yet to be implemented. "Breeder" reactors, as their name implies, create more fissionable material from the source material. For safeguards to just keep pace with their present limited scope they will need to be applied in such a way that they "pursue" the fissionable material from generation to generation. Otherwise the safeguard system will become even less useful.

When President Carter attempted to slow the commercialization of the breeder technology, he soon discovered powerful commercial opponents throughout the worldwide nuclear industry. Essentially, he was unable to slow the pace.

g. Maybe the most serious problem concerns the actual physical security of the nuclear material, which is left exclusively to each state, and not subject to international safeguards. Physical protection of international nuclear transfers is also left to the states concerned.²⁷

From the standpoint of the future spread of capabilities to make nuclear explosives with a short time delay, it is trends in the Materials Accounted For (MAF) that are likely to be decisive. The basic data on the special nuclear materials that are owned and controlled by national governments are not assembled and reported. Safeguards deal

with material that conceivably may be diverted and MAF does not qualify.

Moreover, the IAEA interprets its mandate as foreclosing any report on the size, physical state, and isotopic and chemical composition of any stocks of special nuclear material present and accounted for, not to report those missing and unaccounted for at specific facilities, except to a very narrowly circumscribed set of staff members of IAEA. Basically, there has been little analysis of trends in such accounted-for stocks. Attention, in short, has been on the minute amount that is unaccounted for and not on the 99 percent or so that may present the most important problem.

For the formation of timely and precisely adapted actions to inhibit the spread, the regular publication and analysis of trends in stocks of fissionable MAF is extremely important.

The early proponents of the idea of making plutonium safe by contaminating it with stable higher isotopes (denaturation) were ambivalent and troubled by the substantial technical shortcomings of the notion. But they clearly grasped an essential fact of international safeguards which, though reasserted from time to time, has a way of getting lost in international and national bureaucracies. That being, a safeguard involves more than simply detecting a violation of an agreement; it implies detecting the approach by

a government to getting a bomb in time for other governments to do something about it.

The hopes for a denaturing of plutonium that would compel isotopic separation were disappointed. However, chemical separation has remained as a barrier for plutonium that takes a substantial amount of time to surmount and any interpretation of safeguards that removes this barrier, thus leaving practically no warning time, should be recognized as abandoning the essential purpose of safeguards.

If the critical time to make an explosive is allowed to shrink to a few weeks, days, or hours, there will not be enough time for political or military action.

In sum, no existing international authority has the power to enforce NPT/IAEA safeguards. If national governments cannot or will not prevent diversions, then clearly an international authority will not be allowed to interfere in a state's sovereignty. Alerting the world community of states of a breach or suspected breach is about the best that can be said of the safeguards system.

The greatest danger for further nuclear proliferation stems not so much from an inherent deficiency of the NPT/IAEA safeguards but from the capabilities and attitudes of the nuclear threshold states that have shunned the NPT. These dangers have nothing to do with the adequacy or inadequacy of the safeguard system but are bound up in a

country's views concerning its security, and these are
military, economic, political, and prestige considerations.²⁸

FOOTNOTES

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²³*Ibid.*, pp. 10-11.

²⁴Ryukichi Imai, "Nuclear Safeguards," Adelphi Papers Number 86, p. 34, International Institute for Strategic Studies, March 1972.

²⁵Euratom is comprised of France, West Germany, Italy, Belgium, the Netherlands, and Luxembourg.

²⁶SIPRI, Safeguards Against, p. 17.

²⁷William Epstein, The Last Chance: Nuclear Proliferation and Arms Control, p. 153, The Free Press, 1976.

²⁸*Ibid.*, p. 159.

IV. AVAILABILITY OF TECHNOLOGY AND PLUTONIUM

There are, broadly speaking, two approaches to stemming proliferation. The first is technical: keeping the wherewithal to make bombs out of the hands of NNWS. The second is political: ministering to the fears and suppressing or appeasing the aspirations that propel states into the nuclear club.

The NPT proposed a complete change in the system that had governed nuclear technology transfers. The pre-NPT safeguards involved a willingness on the part of the recipient state to accept an abridgement of its national sovereignty in order to receive the commercial benefits of an international nuclear transfer, whereas the NPT safeguards system represented an intolerable infringement of the principle of national sovereignty as embodied in international law. As stated earlier, the NPT safeguards system included the whole range of a nation's peaceful nuclear activities, even those indigenously developed. Prior to 1968, concern over peaceful nuclear development had merely been an adjunct to the wider debate over international security and disarmament issues; after 1968, questions of peaceful technology transfers acquired a momentum of their own.

A country cannot acquire a serious peaceful atomic capability without moving to the brink of nuclear explosives.

President Johnson obviously failed to fully understand this premise when he promised to "share our technical knowledge and experience in peaceful nuclear research fully and without reservation."¹

If a date were to be set that marked when world opinion suddenly became aware of the relationship between civilian power plants and weapons proliferation, it would be May 18, 1974. On that day, India exploded a nuclear device that was made from fissile material from its Cirus reactor in Trombay. The explosion demonstrated that, given a modicum of technical skill, any nation could use fuel from nuclear power plants to fabricate weapons. It further showed that external assistance (in this case, from Canada) could help develop the technical skills needed for such an undertaking. Finally, the explosion also gave support to the view that it was now more urgent than ever to add the signature of each nuclear energy consumer to the nonproliferation treaty.

Countries that have responded to the energy crisis by establishing a civilian nuclear industry may soon be in a position to manufacture weapons components and then quickly acquire the necessary nuclear material from their reactors whenever they feel the international situation would seem to warrant full-scale production.

The civilian nuclear programs now operating assure that many countries have travelled a long way down the path to a nuclear weapons capability. In many cases, the remaining

distance will be short enough to mean that even a rather small impulse might cause a government to produce nuclear weapons, and that decision may provide enough reason for others to go nuclear. This would present a new and dangerous instability for the international system.

Technical innovations coupled with widespread familiarity with the necessary technology to acquire nuclear weapons could lead to this very situation. Relatively unsophisticated nuclear devices and conventional aircraft may be sufficient to provide assurance of narrow strategic objectives, not to mention possibly millions dead.²

The cost of acquiring such a nuclear force would vary depending on the nature of the force desired and the level of nuclear and related technological development already attained. Therefore, when examining Nth country weapons options, the standards of the five NWS should be set aside.

Critical to understanding why the current nonproliferation regime will in all likelihood deteriorate significantly in the next fifteen years is a clear comprehension of the technology involved and recent U.S. policy toward the spread of this technology. If this technology continues to spread unchecked, eventually the main fissionable material, plutonium, will become available to numerous countries in relatively large quantities. Once plutonium is available, the only "fire break" between NWS and NNWS is the political decision to go nuclear.

A. TECHNOLOGY

Until pure, or fission-free, fusion explosives become practical, any nuclear program requires fissionable materials. Three types of materials can now be used as core materials for nuclear explosives: uranium that is highly enriched in the isotope uranium 235 (U-235), plutonium 239 (Pu-239) which can be made by capturing neutrons in uranium 238 (U-238), and natural uranium 233 (U-233). None of these "weapons grade" materials exist naturally in significant quantities.³

The actual construction of a nuclear device is no longer the main concern of those wanting to prevent proliferation of nuclear weapons. That scientific knowledge is now widely disseminated, even to the general populace. The major obstacle to a country or a group of private individuals is the acquisition of the fissionable material necessary for making fission bombs. There are several options.

1. Build a uranium isotope enrichment facility for converting domestically available natural uranium to highly enriched uranium.
2. Build a natural uranium reactor using domestic or imported uranium, domestic or imported heavy water, and high purity graphite or beryllium for slowing down neutrons sufficiently to sustain a chain reaction, and build the reprocessing plant necessary to extract plutonium from the irradiated fuel.
3. Build a high energy charged particle accelerator, similar to some that are now used for basic high energy physics experiments, to produce neutrons, by bombardment of ordinary uranium, that are subsequently captured to make plutonium.

4. Build a reactor that used nuclear fuel material supplied by another country, and use some of the fresh fuel, if it contains highly enriched uranium, plutonium, or U-233 that is not effectively safeguarded. Otherwise, also with the condition that the reactor is not effectively safeguarded, extract plutonium or U-233 from spent fuel at a domestic, unsafeguarded fuel reprocessing plant.
5. Obtain a reactor, or assistance in building it, from another country, and exercise the appropriate one of the two options referred to under point 4. The second of these was apparently the option used by the Indian government.
6. Obtain a nuclear reactor and/or nuclear fuel from another country, and if the nuclear materials are effectively safeguarded from diversion for use in nuclear explosives, abrogate the agreement at some later time.
7. Arrange for the theft of weapons grade materials from another country where physical security measures applied to the materials are inadequate.
8. Arrange for the theft of weapons grade nuclear materials from facilities that are within the country and subject to safeguard agreements, but in such a way that the theft appears to be the work of a criminal group without any connections with the government.
9. Arrange for the theft of complete nuclear weapons from another country.

This list is not exhaustive, but each item is a credible option under the right circumstances.

Options 4 through 9 are basically political decisions and are presently outside the nonproliferation regime which is based, first on adherence to the NPT and its associated safeguards, and second, however naive, on the hope that honesty exists in international relations. Option 3 is presently economically unsound for most threshold nuclear states and also somewhat of a political option, since any country

building a high-energy charged particle accelerator would be suspect. Options 1 and 2 are economically feasible and would also be extremely beneficial in a country's nuclear energy program. Therefore, the efforts of adherents to the nonproliferation regime have been aimed toward preventing the spread of enrichment and reprocessing technology.

1. Enrichment Technology

When a country considers nuclear power systems for its energy needs, it must consider the economics of the entire nuclear fuel cycle. The potential buyer must be assured that it can either buy enriched uranium fuel directly or contract separately for natural uranium, uranium conversion services, uranium enrichment services, and fuel fabrication services. The availability of these services is obviously important. In light of the Carter administration's policy of attempting to restrict access to these services (to be discussed in more detail later), concern that there could be a world-wide shortage of enrichment capacity has developed. Because of this, a number of nations may decide it is both feasible and desirable to have their own enrichment capacity, so as to ensure fuel supplies for power reactors.

The feasibility of acquiring enrichment plants has been increased by recent technological developments.

During most of the nuclear age, concern about nuclear proliferation focussed on plutonium as the fissionable

material for weapons rather than on U-235. Mainly, this was due to the widespread belief that separating plutonium from the other products would be much easier and less expensive than obtaining uranium sufficiently enriched in U-235 to be useful for an explosive device.

Recently there have been developments that have altered this situation, and possibilities on the horizon may be even more dramatic. There are several alternative techniques that have been developed to the point where they are certainly more economical than the extremely expensive gaseous diffusion method--particularly if it is to be highly enriched (See Table III). Highly enriched uranium is the best material for nuclear weapons.⁵

a. Gas Diffusion

This is the most common method of enrichment. It is based upon the fact that lighter molecules in a gas move faster than heavier molecules, and thus strike the container walls more often. If one of the walls has holes large enough to let individual molecules through, but not large enough to permit bulk passage of the gas, more of the lighter molecules than the heavier molecules will pass through the barrier. By this device it is possible to increase slightly the concentration of lighter molecules in the gas.⁶

Gaseous diffusion plants are necessarily very large and consume huge amounts of electrical power. These

Table III

COMPARISON OF ALTERNATIVE ENRICHMENT TECHNOLOGIES

	Diffusion	Centrifuge	Aerodynamic	Laser
State of the Art	Mature technology; little room for improvement in large scale production; barrier technology classified	At the pilot plant stage; large-scale manufacturing processes not yet implemented; substantial growth potential; some details of technology classified	Technology thoroughly demonstrated; pilot plants not yet built; substantial growth potential. Becker nozzle technology in the public domain; South African process classified	Milligramme-scale separation achieved with U metal; no separation yet reported using UF ₆ ; fundamental problems still to be solved; commercial scale separation probably 8-12 years off
Requirements for Production	Knowledge of barrier technology needed; requires large scale production of pumps	Mass production of precision equipment	Some precision machining capability needed; overall, requirements probably less than for diffusion or centrifuge	Probably minimal for process based on UF ₆ , once principles have been demonstrated; probably more difficult in the case of U metal
Stages Required in Ideal Cascade (0.3% tails)				
3% enrichment	1,086	10	600	Possibly only 1
90% enrichment	3,731	35	2,000 (at a cut of $\frac{1}{4}$ -see Appendix C)	Possibly only 1

	Diffusion	Centrifuge	Aerodynamic	Laser
Suitability for a Nuclear Power Fuel Cycle	Not likely to be economically competitive for small or modest programmes; may not be competitive at all if pilot plant experience with others is satisfactory	Will probably be preferred (lasers excepted) where power costs are very high	Will probably be preferred (lasers excepted) where power costs are low, especially for small or modest scale operations	Likely to be particularly desirable because it will probably expend uranium supplies greatly
Adaptability of facilities developed for a power programme (enrichment to 2-3%) to weapons production	Least desirable; requires construction of additional stages or 'batch processing' which would be inconvenient and time-consuming because of large cascade inventory of gas	Much preferred to diffusion or aerodynamic processes because of possibility of increasing the number of stages by changing plumbing connections	Will require additional stages or 'batch processing'; latter is more feasible than with diffusion because of smaller inventory of gas in cascade	Will probably be best; process may lead naturally to highly enriched U
Suitability for a small or modest deliberate weapons programme	Unattractive because of large number of stages required; experience is with plants that are of large capacity	Very good; several plants now operating or planned of a scale interesting for weapons purposes	Unattractive compared to centrifuge but probably better than diffusion especially considering greater feasibility of batch processing	Probably preferred

	Diffusion	Centrifuge	Aerodynamic	Laser
Possibility of diversion of materials from power programme to weapons construction	Not serious if enrichment is only 2-3%; serious for all three processes if enrichment for power purposes is to 90-97% (i.e. for HTGR's)			Probably most worrisome

SOURCE: NUCLEAR POWER AND WEAPONS PROLIFERATION by Ted Greenwood, George W. Rathjens and Jack Ruina
(Adelphi Papers No. 130), 1976

plants are expensive and therefore will not be an attractive way for smaller countries to acquire fissile materials. Gas diffusion technology therefore allows for the control of proliferation by the virtue of the fact that expense restricts the number of states that could construct these facilities indigenously. However, the commercial availability of smaller, less-expensive enrichment processes could make this type of proliferation control obsolete.

b. Gas Centrifuge

This process entails separating hexifloride molecules by pumping the uranium hexafloride into a centrifuge and allowing the lighter U-235 isotopes to diffuse toward the center for collection.⁷

The electricity consumption of a centrifuge is considerably less than that of a gaseous diffusion plant, but is relatively expensive and therefore will probably not present a great proliferation danger.

c. Becker Nozzle

This is an aerodynamic process and may prove attractive in special circumstances.

The basic design of the Becker nozzle is that uranium hexaflouride gas, mixed with hydrogen, is blown at high velocity around a curved track. The heavier moledules tend to go to the outside, and the enriched U-235 is separated into an inner flow.⁸

Since this process does not require expensive rotating machinery or sophisticated permeable barriers, it will in all likelihood be much cheaper to operate. South Africa has a pilot plant using the Becker nozzle design and Brazil is scheduled to receive one from West Germany.

d. Laser

There are presently two types of laser techniques. One uses visible wavelength lasers to excite in U-235 a sequence of energy transitions in a stream of neutral uranium metal vapor, while the other technique uses an infrared laser to excite a molecular resonance of the U-235 component of hexafluoride gas.⁹

Although there are difficult problems yet to be solved, it is likely that laser enrichment will be demonstrated on a commercial scale before 1990. There are two distinct advantages over the other process: (1) the possibility that power requirements will be very low, and (2) the possibility that a high degree of enrichment will be reached in a single stage.

The laser process will cause highly enriched uranium to be more readily available for possible weapons production. At present, the situation in the enrichment market is characterized by the predominant position of the U.S. Department of Energy (DOE) which, apart from the capacities of Technabsexport (USSR) that are available to the Western world, is almost the exclusive supplier of the West. But

during this decade other suppliers such as EURODIF (Italy, France, Spain, Belgium, and Iran), URENCO (West Germany, Netherlands, and Great Britain), COREDIF (France and Iran), and PNC (Japan) will soon be producing and selling sizeable amounts of enriched uranium.

Enrichment is a vital but economically small component of nuclear power programs; nations are thus likely to construct or purchase their own plants rather than submit to a potentially unreliable and politically motivated supplier. Nations can now easily obtain their own plants and be capable of producing fuel with enough U-235 to make nuclear weapons. Countries can do this under the guise of promoting and developing their peaceful nuclear programs allowed by the NPT.

Because of its potentially serious impact on proliferation, laser technology should be tightly controlled and extensively safeguarded.

2. Reprocessing Technology

Nuclear reactors produce not only electricity but also plutonium. Unfortunately, from the nonproliferation viewpoint, reprocessing has a number of nonmilitary justifications. Denial of reprocessing by a country would mean foregoing both plutonium recycle (which could meet approximately 15 percent of fuel requirements for LWRs in the future) and fast-breeder reactors (which use plutonium fuel). While there are problems associated with both plutonium

recycle and fast breeders, current nuclear power industry forecasts include the expansion and spread of reprocessing technology, equipment, and facilities. (See Table IV.)

Spent fuel reprocessing offers a major source of fissile material in a period when the known deposits of commercially useful uranium ore may soon be exhausted.¹⁰ At the same time, it also increases the risks of weapons proliferation because of the possibility of plutonium extraction during reprocessing.

There are several different techniques to perform a chemical separation: All have as their goal the separation of plutonium and uranium from the other materials.

The Purex process is the main technique used, and has been since the declassification of the technology in the mid-1950s as a consequence of the Atoms for Peace program. The Purex process uses solvent extraction for separating uranium and plutonium from fission products and produces exceptionally pure streams of plutonium and uranium in the form of nitrates. This process can separate out over 99 percent of the uranium and plutonium available.¹¹

Heavy water reactors (HWRs) such as the Canadian CANDU produce about two grams of plutonium per kilogram and no usable uranium. This compares to approximately six grams of plutonium per kilogram for LWRs and some usable uranium, therefore, reprocessing from HWRs is less economical. Yet 100 percent of Argentina's, Pakistan's, and Canada's planned

Table IV

NON-MILITARY REPROCESSING FACILITIES

Country	NPT Party	Facility	Fuel Type	Design Capacity	Safe- guard	Status
Argentina	No	Ezeiza Nuclear Facility	Metal (research reactor fuel)	Lab scale	Yes	Shut down, but being reactivated for operation in 1977; may include redesign for low-enriched UO ₂ fuel
Belgium	Yes	Eurochemic, Mol	Metal and UO ₂ low-enrichment and metal high- enrichment	60-85 tonnes low-enriched, 1.25 tonnes high-enriched per year	Yes	Start-up 1966; shut down 1974
Brazil	No		UO ₂ low- enrichment		Yes	Purchase from Ger- many
Britain	Yes	Dounreay	MTR and fast reactor fuel	Small pilot plant	No	In operation
		British Nuclear Fuels, Windscale (United Reprocessors)	Natural U metal	2,000 tonnes/ year	No	In operation
			Low-enrichment UO ₂ head end	Small-scale commercial	No	Operated 1969-73; shut down for modifi- cation; will re- open late 1970s with refurbished head end to feed into natural uranium separation plant, depending on availa- bility of capacity

Country	NPT Party	Facility	Fuel Type	Design Capacity	Safe- guard	Status
Britain (continued)			UO ₂ low- enrichment	1,000 tonnes/ year	No	Start-up mid-1980s for expected domes- tic and overseas requirements
France	No	Cogema, La Hague (United Reprocessors)	Natural U metal Low-enrichment UO ₂ head end	800 tonnes/year 800 tonnes/year	No No	Start-up 1967 Start-up May 1976; 800 tonnes/year by 1982
		Cogema	Low-enrichment UO ₂	1,000 tonnes/ year	No	Under consideration
		Cogema, Marcoule	Natural & metal	1,000 tonnes/ year	No	Start-up 1958 for military purposes; will take over com- mercial role from La Hague
			LMFBR	5 tonnes/year pilot plant	No	Operational
W. Germany	Yes	KEWA (United Reprocessors)	UO ₂ low enrichment	1,500 tonnes/ year	Yes	Planning stage; start-up 1986 or later
		KEWA Karlsruhe	Breeder and UO ₂	200 kg/day pilot plant	Yes	In operation since 1971
		KFA Jülich	Graphite	2 kg/day pilot plant	Yes	Start-up 1977
India	No	Trombay	Thorium/uranium oxide	Lab scale	No	In operation
		Trombay Tarapur	Metal and UO ₂ Metal and UO ₂	350 kg/day 100 tonnes/year	No No*	In operation Being cold tested

Country	NPT Party	Facility	Fuel Type	Design Capacity	Safe- guard	Status
Italy	Yes	Eurex-1, Sallugia	UO ₂ and metal	Small pilot plant	Yes	In operation
		ITREC, Rotondella	Thorium/uranium	Small pilot plant	Yes	In operation
		Unnamed	UO ₂ low enrichment	500 tonnes/year		Start-up 1985; plans temporarily shelved
Japan	No	PNC	UO ₂ low enrichment	200 tonnes/year	Yes	Tested, closed for alterations; commer- cial operations late 1977 or beyond
		Tokai-Mura				
Pakistan		PNC	Metal	Small plant	Yes	In operation
		Tokai-Mura				
Spain	No	Centro Juan Vigon, Madrid	UO ₂ low enrichment		Yes	Purchase from France uncertain
			Metal	Small pilot plant	Yes	In operation
Sweden	Yes		UO ₂ low enrichment	800 tonnes/year	Yes	Under consideration
Taiwan	No	Nuclear Energy Research Institute	Metal	Lab scale	Yes	Being built
United States	Yes	Nuclear Fuel Services, West Valley General Electric, Morris	UO ₂ low enrichment	300 tonnes/year	No	Operated 1966-72; closed for expan- sion and rebuilding
			UO ₂ low enrichment	300 tonnes/year	No	Inoperable in present form

Country	NPT Party	Facility	Fuel Type	Design Capacity	Safe- guard	Status
United States (continued)		Allied General Nuclear Services, Barnwell	UO ₂ low enrichment	1,500 tonnes/ year	No	In construction; operation expected 1978 or after
		Exxon Nuclear, Oak Ridge	UO ₂ low enrichment	1,500 tonnes/ year	No	Application pending
		ERDA and General Atomic, Idaho Falls	HTGR fuel	Demonstration scale	No	Under consideration
		ERDA	LMFBR fuel	Demonstration scale	No	Under consideration
Soviet Union	Yes				No	Facility in operation
Yugoslavia	Yes	Boris Kidric Metal Institute		Lab scale	Yes	In operation

*Will be safeguarded when reprocessing American-supplied fuel.

SOURCE: NUCLEAR POWER AND WEAPONS PROLIFERATION by Ted Greenwood, George W. Rathjens and Jack Ruina
(Adelphi Papers No. 130), 1976

reactor capacity is based on heavy water. Also, India has 77 percent of its planned capacity based on HWRs. It is difficult to understand how these countries can justify a HWR based on economics.¹²

The answer may lie somewhere in motives--especially for India, Pakistan, and Argentina. The use of on-line refueling for HWRs makes the safeguarding of fuel assemblies more complex than with LWRs and it is therefore more difficult to detect diversion.

Reprocessing technology is now widely diffused and the cost is clearly not prohibitive. There seems little doubt that almost any state with a modest chemical industry could on its own build a reprocessing plant large enough to supply plutonium to a small explosives program.

A state may be interested in reprocessing:

1. because the likelihood of reprocessing and recycling eventually becoming attractive for economic or energy-conservation reasons, or the likelihood of eventually relying on plutonium breeders is very high, and that therefore a plutonium stockpile and a capability to handle mixed-oxide fuels should be initiated at an early date;
2. because of the attraction of creating an industry that will permit the exercise of the weapons option quickly; and
3. because it desires to separate the rather small quantities of high-level radioactive wastes from larger volumes of spent fuel and to dispose of the former permanently.¹³

Many threshold nuclear countries are not endowed with enough uranium ore to meet their energy requirements.

This is reason enough for them to take measures to ensure continued access to foreign energy supplies and to reduce their dependency on uranium ore imports. By developing reprocessing plants for spent fuel and implementing sizeable breeder reactor programs, many countries feel they can attain energy self-sufficiency.

The construction of a reprocessing plant, which could be clandestine, might take several months to a year. However, the time elapsed from the acquisition of the fresh fuel to the production of fissionable material would be on the order of days to weeks.

The ability to build a reprocessing plant is well within the reach of a large number of states and many states regard competence in plutonium technology as a hedge against future security threats or as a mark of national prestige.

Above all, the global nuclear community views the early establishment of reprocessing and recycling as a vital precursor to the introduction of plutonium breeder reactors. Without some form of reprocessing and plutonium reclamation, the breeder would be pointless.

3. Fast Breeders

Early projections of uranium sources showed that standard thermal reactors would consume all the world's uranium in a relatively short time, therefore, the development of "breeder reactors" was proposed as the solution. Such reactors actually produce more fissionable material than they

consume. They are able to do this by converting U-238 to plutonium (Pu-239) or by converting thorium-232 to U-233, another readily fissionable material, thereby greatly increasing the nuclear fuel supply.

Several varieties have been proposed, but the leading technology is the Liquid Metal Fast Breeder, "which would transmute a blanket of U-238 (placed around the core to absorb surplus neutrons) into fissionable plutonium."¹⁴

Advocates of the breeder frequently and publicly question the usability of "reactor grade plutonium" in a nuclear explosive. Their argument is based on the fact that reactor grade plutonium simply has a higher Pu-240 and Pu-242 content and therefore either is unusable or only of value for low kiloton weapons (remember a few kilotons killed millions in Japan).

In actuality, reactor grade plutonium is very usable: the radial blankets of such reactors will normally contain hundreds of kilograms of weapons grade plutonium on discharge. In fact, they will contain 96 percent pure plutonium-239, which is considerably purer than 92 percent limit used in the definition of "weapons grade."¹⁵

Breeders have provided the rationale for stockpiling separated plutonium since the mid-1950s. In 1956, India used the breeder argument as a reason to acquire a plutonium-producing reactor and separation plant. Early acquisition of this technology enabled the Indian government to respond rather quickly to the Chinese nuclear explosion of 1964 and their subsequent nuclear weapons program.

Because of expected levels of economic growth in both developing and industrial nations, as well as population growth, global energy requirements in forty years will probably be at least three times larger than today's. If this sociological pressure comes to bear, breeders could become extremely popular. Breeding recovers about "50 times more energy per pound of uranium than can LWRs and would multiply the energy value of uranium reserves."¹⁶ But doing so would entail commerce in plutonium that could be diverted to weapons.

If large numbers of fast-breeders come on the line during the next decade, approximately 3,000 metric tons of plutonium will have accumulated by the turn of the century, therein placing still more burdens on the International safeguard system.¹⁷

The breeder program would greatly complicate the proliferation problem and increase the possibility of theft or diversion of material suitable for weapons. Until recently the economics of the breeder have generally been considered so persuasive that the proliferation problem has largely been dismissed in government planning. U.S. policy has played a major role in promoting foreign breeder programs. Because of this encouragement, countries have anticipated early introduction of breeder technology and therefore acquired plutonium technology such as reprocessing plants, and even to stockpile accumulations of plutonium.

Widespread use of fast breeders will revolutionize the nuclear industry and will no doubt result in widespread

nuclear proliferation. Delay of the U.S. breeder program may not have a significant impact on the proliferation problem, but a continuation will only guarantee the early introduction of a massive plutonium economy.

On October 28, 1976, President Ford changed the course of U.S. nuclear policy when he stated:

I have decided that the United States should no longer regard reprocessing of used nuclear fuel to produce plutonium as a necessary and inevitable step in the nuclear fuel cycle, and that we should pursue reprocessing and recycling in the future only if they are found to be consistent with our international objectives.¹⁸

President Carter moved a step further by declaring that the United States "will defer indefinitely commercial reprocessing and recycling of plutonium produced in the U.S. nuclear power program."¹⁹

B. RECENT U.S. NUCLEAR POLICY

For more than twenty years, the U.S. policy pursued the commercial nuclear market on the theory that the combination of national safeguards and international inspections would provide adequate protection against diversion to military purposes. The slow realization that international inspection of plutonium stockpiles could not provide sufficient protection altered U.S. policy.

President Carter brought to Washington new ideas and new officials committed to the optimistic proposition that one can distinguish between peaceful and nonpeaceful uses of nuclear energy. This desire and belief has bedeviled U.S.

nuclear policy since President Eisenhower's Atoms for Peace Program.

However, unlike the 1950s or even the '60s and '70s, the international control of nuclear energy must be achieved in a world that now projects a quantum increase in the world's energy requirements.²⁰ Most experts agree that nuclear power is the most likely source to be pursued by most countries.

President Carter held certain convictions that caused him to alter the nuclear course drastically. First, he believed that if states suddenly decided to abrogate their safeguard agreements, there would be no protection for the enormous stockpiles of plutonium and enriched uranium that would soon be spread around the globe. Second, he believed that reprocessing and recycling of plutonium in LWRs was uneconomical and therefore the early introduction of plutonium into international commerce was unnecessary.

Although the U.S. command of the nuclear export market had diminished in the previous few years, it remained undeniably influential as a supplier to other countries heavily engaged in nuclear trade.

Because the London Suppliers Group²¹ remained outside the IAEA system and its negotiations were kept secret, it had become suspect in the eyes of Third World countries, who interpreted it as another device by the developed world to perpetuate its economic and technological dominance.²²

Carter attempted to delay domestic construction of the ingenious breeder reactor and simultaneously encourage other countries to accept the International Nuclear Fuel Cycle Evaluation Program (INFCEP) he had initiated.

The main objective of the INFCEP was to rethink the technical options for slowing nuclear proliferation by encouraging the use of uranium derivatives of little use for military purposes.

Carter's fear was well-founded. He did not believe that existing safeguards could provide a probability of detection great enough to deter decisions to acquire nuclear weapons. Or, even if detection were possible, the warning would not come in time for international response prior to the realization of a weapons capability. Acquisition of these facilities or materials allowed states to move closer to weapons without having to make or acknowledge an explicit decision to do so.

The INFCEP was unable to succeed in reconciling the various national points of view about nuclear energy development. The U.S. attempt to depoliticize the conference by approaching what is basically a political issue from a purely technical angle failed because there is no such thing as a proliferation-proof nuclear fuel cycle, nor is there a "technical fix."²³ Hoping for technical fixes which are illusory may actually hinder proliferation efforts because they may undermine the development of sound institutional approaches.

Another problem that occurred during the INFCEP was the issue of nuclear exports and safeguards. The U.S. Congress, reacting to the Indian nuclear explosion and the controversial nuclear contracts signed in 1975-76 by West Germany and France with South Korea, Pakistan, and Brazil involving enrichment and/or reprocessing plants, passed the Nonproliferation Act of 1978 (NPA). This act requires:

foremost consideration be given to whether or not the transfer will take place under conditions that will ensure timely warning to the United States of any diversion well in advance of the time diverted material could be transformed into weapons.²⁴

Under this Act, new and strict conditions were placed on the technology activities of any country that wants to buy nuclear goods and services from the U.S.

The NPA is so complex and restrictive that countries will soon become frustrated to the point that they will eventually purchase their plants from someone else or they will build their own.

Buyers resent the need for prior approval by the U.S. for each specific retransfer or for reprocessing of spent fuel which is of U.S. origin or which has been used in a facility supplied by the U.S.

Long-term nuclear development in most countries has been predicated on recovery and use of plutonium, and on technological efforts to achieve greater independence through the development of breeder reactors. Thus, compliance with the

U.S. NPA threatens their long-range nuclear policies and possibly their national security.

Countries which make large commitments to nuclear energy obviously need access to fuel supplies and are unlikely to submit their energy source to a position which is dependent on the internal political situation of the supplier country.

To increase the likelihood of cooperation among technology suppliers, Carter undertook to increase U.S. capacity to produce and hence export enriched uranium, thereby providing enough enriched fuel to make dissemination of enrichment and reprocessing capabilities unnecessary.²⁵ Then a major contradiction of policy occurred. President Carter withheld government funds to the Clinch River Breeder Reactor, causing availability and terms of U.S. enrichment capacity to become unknown.

The world's confidence in the U.S. as a cheap and reliable supplier of enriched uranium was already in question because of the Nixon administration's insistence on transferring such facilities from government ownership to private industry.²⁶

Generally speaking, Carter's tactics alienated countries whose cooperation was vital for success. France resented U.S. pressure to cancel her agreement to supply Pakistan with a reprocessing plant. West Germany and Brazil both resisted U.S. efforts to cancel their agreement for Brazil to receive an entire nuclear fuel cycle. Finally, Japan was

unhappy about U.S. insistence to alter her Tokai-mura facility to prevent the production of weapons-grade plutonium.

C. PLUTONIUM

The press toward nuclear power and independence has led to actions and policies that have greatly increased the number of countries with quick access to highly enriched fissile material--the most vital ingredient of nuclear weapons--as part of their power programs.

Designing the bomb and getting the non-nuclear components are much easier than getting the fissile material in high enough concentrations for an explosive.

NNWS party to the NPT agreed not to make or acquire nuclear explosives; they did not agree not to acquire the prerequisites for doing so--materials and basic technology. The spread of nuclear power programs has thus made the availability of plutonium or highly enriched U-235 widespread. (See Table V.)

It only takes approximately ten kilograms of plutonium to make a Nagasaki-size bomb and ten to fifteen kilograms of enriched U-235 to make a Hiroshima-size one.

From these figures arises the prospect that by 1990 more than thirty countries will have the plutonium on hand with which to construct nuclear weapons. (See Figures I, II, and III.)

The Acheson-Lilienthal group clearly saw the dangers on the horizon when they tried to internationalize atomic

Table V

INFCE: ESTIMATED FISSILE PLUTONIUM CONTENT OF CUMULATIVE
SPENT FUEL ARISING

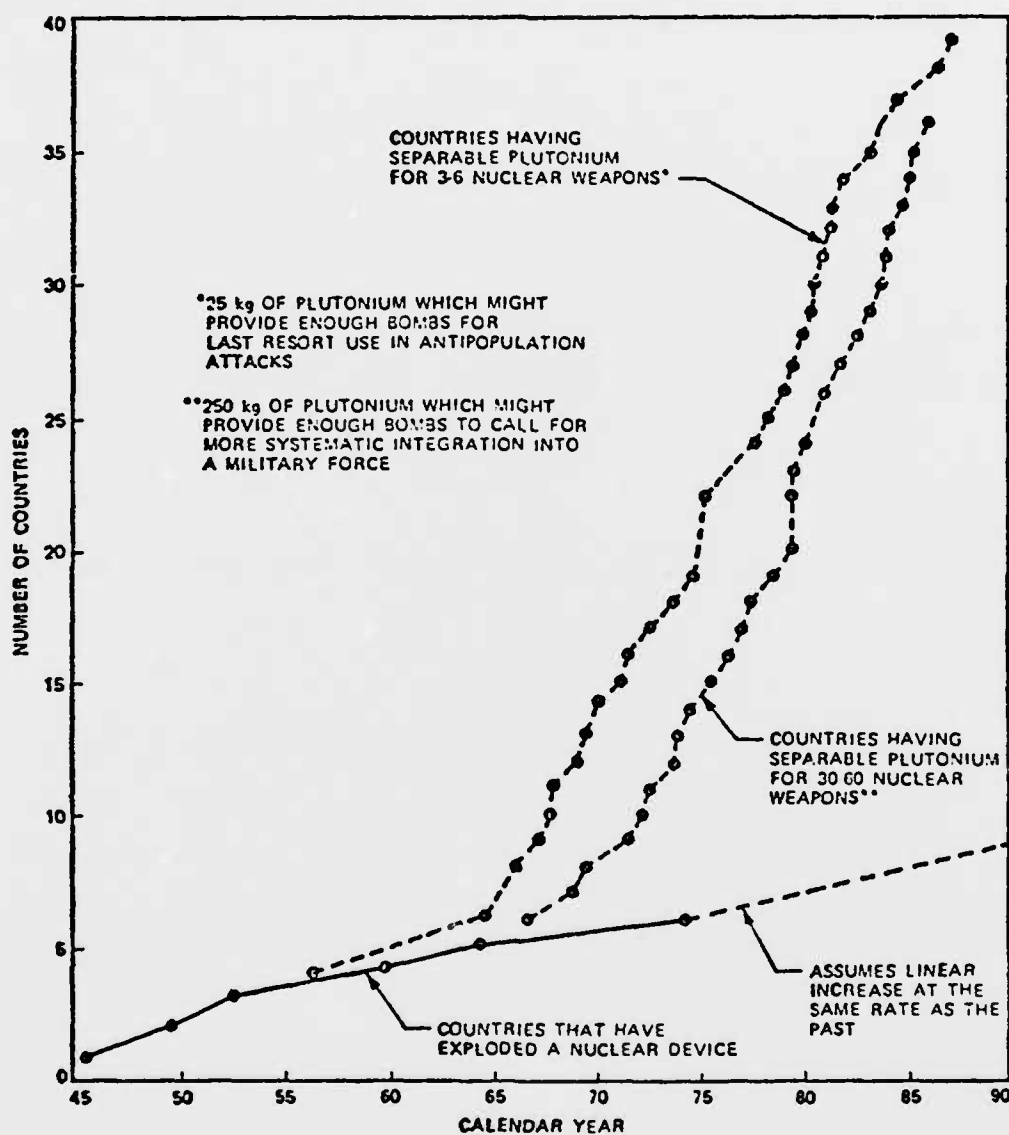
(Tons from January 1978)

Country	1985	1990	2000
Belgium	(4.96)	(10.40)	(27.30)
Denmark	--	--	(2.80)
France	20.00	52.00	135.00
Germany, Federal Republic	(17.16)	(39.71)	(107.45)
Ireland	--	--	--
Italy	2.06	15.00	*
Luxembourg	--	--	--
Netherlands	(0.77)	(2.45)	(9.82)
UK	2.50	6.00	29.00
EUROPE (EEC)	47.5	125.6	311.4
Austria	(0.55)	(1.10)	(2.20)
Finland	(2.33)	(4.58)	(12.08)
Greece	--	(0.22)	(2.30)
Iceland	--	--	--
Norway	--	--	--
Portugal	--	(0.42)	(6.01)
Spain	(6.99)	(17.55)	*
Sweden	(7.84)	(15.39)	(28.00)
Switzerland	4.20	8.30	18.80
Turkey	--	--	--
EUROPE (other)	21.9	47.5	69.4
EUROPE total	69.4	173.1	380.8
Canada	(22.35)	(48.79)	(175.65)
USA	(94.00)	(191.50)	(507.00)
N. AMERICA	116.4	240.3	682.7
Australia	--	--	--
Japan	23.00	50.00	200.00
New Zealand	--	--	--
PACIFIC AREA	23.00	50.00	200.00
TOTAL OECD	208.7	463.4	1263.5

Country	1985	1990	2000
Argentina	(9.45)	(21.78)	(95.56)
Bangladesh	--	--	(0.02)
Brazil	(0.46)	(4.05)	(38.00)
Egypt	(0.46)	(0.52)	(1.86)
India	(3.45)	(7.25)	(36.49)
Iran	(1.80)	(7.76)	(33.48)
Republic of Korea	(1.73)	(7.24)	(38.31)
Mexico	(0.45)	(1.51)	(15.34)
Morocco	--	--	(1.10)
Philippines	(0.16)	(0.66)	(2.31)
South Africa	(0.56)	(3.22)	(13.69)
NON-OECD	18.5	54.0	276.2
TOTAL	227.2	517.4	1539.7

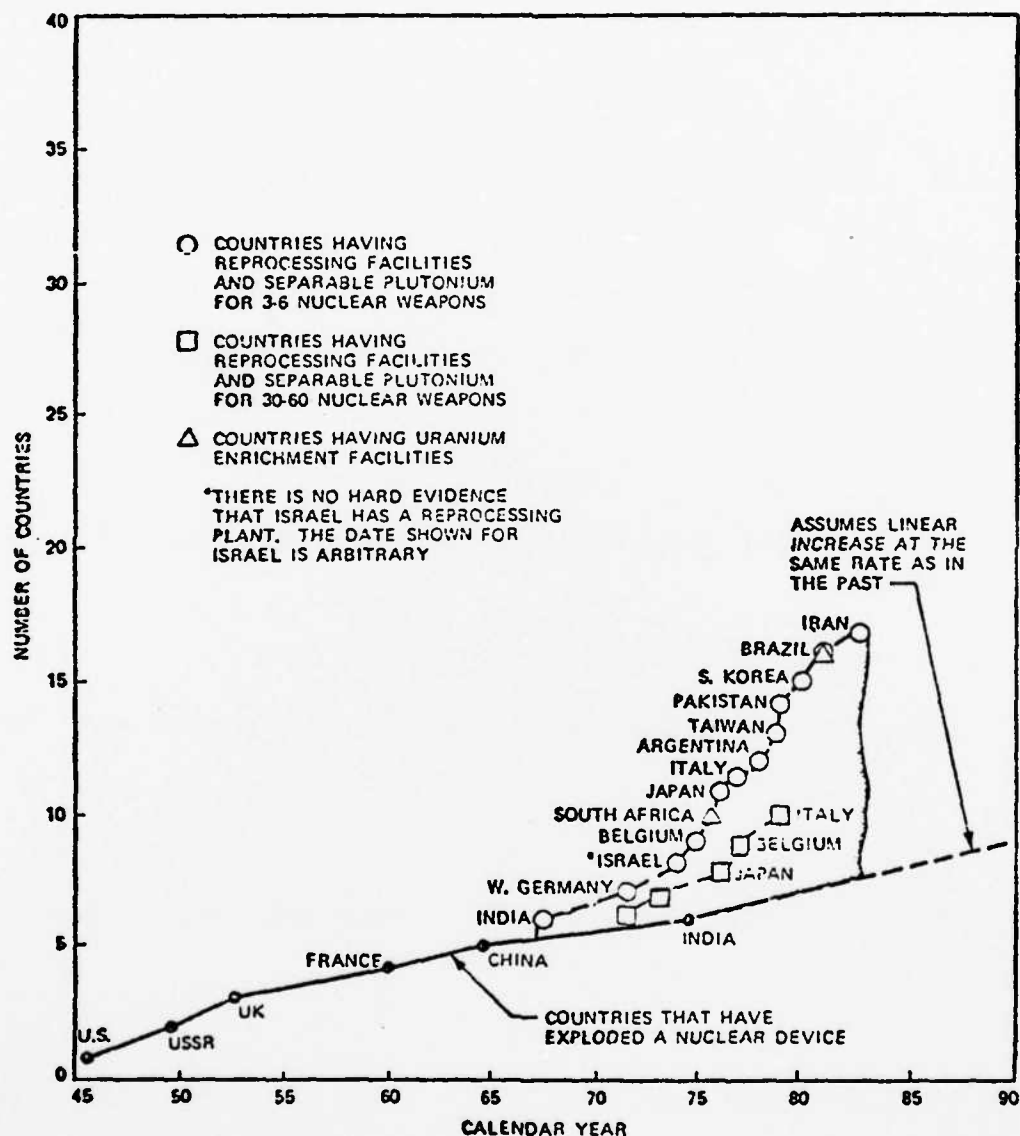
SOURCE: NUCLEAR FACTBOOK by Congressional Research Division,
1980

FIGURE I - THE OVERHANG OF COUNTRIES WITH ENOUGH SEPARABLE PLUTONIUM FOR PRIMITIVE OR SMALL MILITARY FORCES



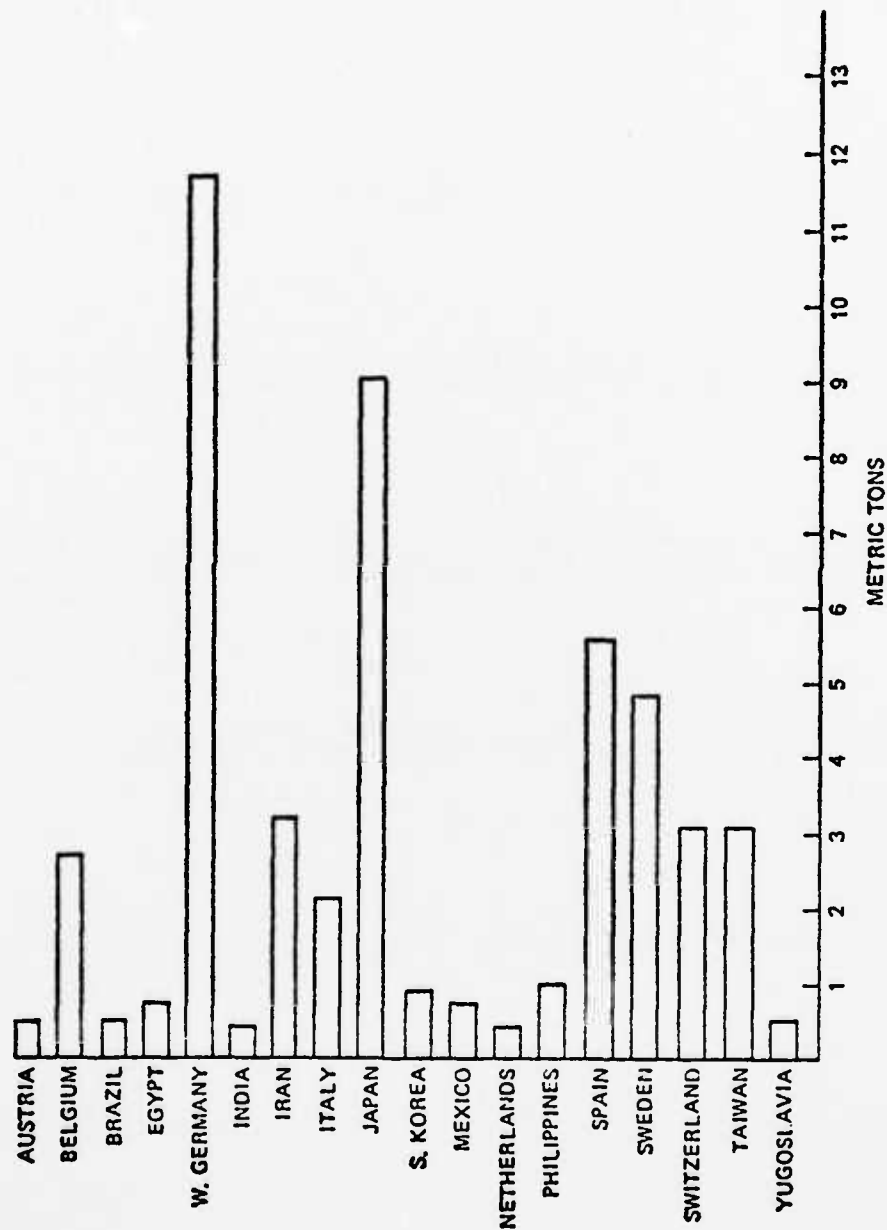
SOURCE: MOVING TOWARD LIFE IN A NUCLEAR ARMED CROWD? by Albert Wohlstetter, 1976

FIGURE II—COUNTRIES PLANNING TO HAVE PLANTS FOR SEPARATING PLUTONIUM OR ENRICHIING URANIUM IN QUANTITIES ENOUGH FOR SEVERAL BOMBS



SOURCE: MOVING TOWARD LIFE IN A NUCLEAR ARMED CROWD? by Albert Wohlstetter, 1976

FIGURE III-PLUTONIUM AVAILABLE FROM MOX REACTOR RELOADS IN THE EARLY 1990's
USING ONLY INDIGENOUSLY PRODUCED PLUTONIUM



SOURCE: MOVING TOWARD LIFE IN A NUCLEAR ARMED CROWD? by Albert Wohlstetter, 1976

energy. That effort obviously failed and the political leadership of that period mistakenly thought that civilian reactor safeguards could be stretched to cover the more dangerous elements in the fuel cycle--when that day came. The U.S. followed a course that allowed for the use of plutonium to go forward unhampered. There is where the damage was done.²⁷

Not only did the plutonium economy proceed unfettered, the U.S. actually encouraged it by selling nuclear technology to NNWS.²⁸

If U.S. policies are to cope with the spread of military nuclear technology rather than encourage it, it is essential that they be more than symbolic and well-intentioned, more than "allusive and sentimental," as Robert Oppenheimer called "atoms for peace." They need to be concrete and aimed precisely at the problems posed by changes in the real world.

Florence Nightingale summed up what U.S. policy should attempt to accomplish when she said: "Whatever else hospitals do, they should not spread disease."

FOOTNOTES

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³First Annual Report on Nuclear Non-Proliferation, Supplement to Annual Report to Congress, p. 14, U.S. Department of Energy, Office of Policy and Evaluation, 1979.

⁴Theodore B. Taylor, "Commercial Nuclear Technology and Nuclear Weapons Proliferation," in Nuclear Proliferation and the Near-Nuclear Countries, Onkar Marwah and Ann Schulz, eds., pp. 112-113, Ballinger Publishing Company, 1975.

⁵Ted Greenwood, George Rathjens, and Jack Ruina, "Nuclear Power and Weapons Proliferation," Adelphi Papers Number 130, p. 21, International Institute for Strategic Studies, Winter 1976.

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⁸Albert Wohlstetter, Swords From Plowshares: The Military Potential of Civilian Nuclear Energy, pp. 37-38, The University of Chicago Press, 1979.

⁹Nuclear Energy Study Group, Nuclear Power Issues and Choices, p. 371.

¹⁰Organization for Economic Cooperation and Development, Uranium: Resources Production and Demand, pp. 15-22, 1975.

¹¹Wohlstetter, Swords From Plowshares, p. 38.

¹²Albert Wohlstetter, Moving Toward Life In A Nuclear Armed Crowd?, pp. 91-92, Pan Heuristics, 1976.

¹³Greenwood, Rathjens, and Ruina, Adelphi Papers Number 130, p. 20.

¹⁴Albert Wohlstetter and others, Nuclear Policies: Fuel Without the Bomb, p. 18, Ballinger Publishing Company, 1978.

¹⁵Ibid., pp. 38-39.

¹⁶Nuclear Proliferation Factbook, p. 206, Congressional Research Service, Environment and Natural Resources Policy Division, 1980.

¹⁷U.S. Atomic Energy Commission, Nuclear Power Growth 1974-2000, p. 28, 1974, cited by Lawrence and Heisler, International Energy Policy, p. 28.

¹⁸"Statement of the President on Nuclear Policy," Office of the White House Press Secretary, 7 April 1977, cited by Wohlstetter, Swords From Plowshares, p. 78.

²⁰Abraham Bargman, "Nuclear Diplomacy," in The Changing United Nations: Options for the United States, David A. Kay, ed., p. 160, Praeger Publishers, 1977.

²¹This group was originally known as the Zanger Committee and included Canada, France, Great Britain, Japan, U.S., U.S.S.R., and West Germany. Later expanded to also include Belgium, Czechoslovakia, East Germany, Italy, Netherlands, Poland, Sweden, and Switzerland.

²²Charles K. Ebinger, "International Politics of Nuclear Energy," The Washington Papers Number 57, v. VI, p. 53, Sage Publications, 1978.

²³Pierre Lellouche, "International Nuclear Politics," Foreign Affairs, pp. 338, Winter 1979.

²⁴Victor Gilinsky, "Plutonium, Proliferation and the Price of Reprocessing," Foreign Affairs, v. II, pp. 380-381, Winter 1978-79.

²⁵International Institute for Strategic Studies, Strategic Survey 1977, p. 109, 1978.

²⁶George H. Quester, "Nuclear Proliferation: Linkages and Solutions," International Organization, v. 33, p. 562, Autumn 1979.

²⁷Wohlstetter, Nuclear Policies, p. 88.

²⁸Albert Wohlstetter, "Spreading the Bomb Without Quite Breaking the Rules," Foreign Policy, v. 25, pp. 91-95, Winter 1976-77.

V. DETERIORATION OF NONPROLIFERATION REGIME

"Those who now most oppose our methods will come to adopt them."

Adolf Hitler

To arrest the spread of nuclear weapons would be to perpetuate an international status quo in which some countries are denied political and strategic assets that other countries, certainly no more deserving, are entitled to have. Yet to condone nuclear proliferation for the sake of equality within the international system seems absurd. Pretending equality and nuclear safety are fully compatible values might lead to the achievement of neither. One cannot be pursued while the other is ignored.

Whether any given country decides to use its capability to acquire nuclear weapons depends on how that country views its needs and interests in the context of the military, political, economic and moral climate of the world.

There are specific factors that profoundly influence a country's attitude toward going nuclear. Countries have different situations regarding their security, their political problems, their economic position, and the importance they attach to such matters of status and prestige.

Predicting the precise nature of the international non-proliferation regime for the next ten to twenty years would

be a difficult, if not impossible, task. History has taught us well about the unpredictability of the world we live in-- events often occur unexpectedly and with sudden swiftness. While single events rarely alter the international system itself, they can be one of a progression of events that can influence the system, and thus drastically affect the fragile nonproliferation regime.

Once the regime is weakened and eroded, it is predictable that numerous countries will feel constrained to convert their technological capability into military form, either, by manufacture or acquisition of nuclear weapons or, what is more likely, by exploding a nuclear device for allegedly peaceful programs.

There is a strong and persuasive argument that this progression of events is now occurring and will soon culminate in a multitude of nuclear explosions around the world.

The Chinese and Indian nuclear explosions show a definite linkage; the U.S. nuclear and/or conventional reliability is being questioned throughout the world in the post Vietnam-Watergate era; U.S. participation in regional conflicts has been restrained since the arrival of U.S.-Soviet parity in both nuclear and conventional forces; and all nations now fully understand the stark realization that they are energy vulnerable. Moreover, Brazil, China, India, Japan, and West Germany are eager to become international

actors in the fullest sense, which can only aggravate regional insecurities.

Development of nuclear weapons need not be accompanied by the articulation of a well thought-out doctrine. Rather, simple possession of a few nuclear weapons might be regarded generally, as a good thing, providing diffuse benefits. Included in these benefits would be uncertainty on an adversary's part, increased self assurance in bargaining with other countries, greater international status, improved morale within the scientific-industrial establishment, strengthening public support and lessening domestic opposition, and finally and probably most importantly, a perceived security insurance.

This section does not attempt to describe the probable forces and doctrine of each of the 30-35 potential future nuclear states. Any attempt to do so would involve a heavier emphasis upon detailed country-by-country analysis than possible; it would also be greatly handicapped by the difficulties of attempting to predict such specific details ten to twenty years in advance.

The following is a discussion of the various incentives and/or pressures the leaders of any country will have to deal with when considering the nuclear option.

A. SECURITY INCENTIVES

Nuclear weapons confer enormous advantages upon a country possessing them, and can offset imbalances in population,

industrial potential, natural resources, and other components of military power. Even a few bombs with embryonic delivery capabilities could make devastating strikes against selected cities.¹ (See Table VI.)

The extent to which security interests encourage or discourage the acquisition of nuclear weapons can best be examined by distinguishing between (1) essentially regional security interests, and (2) security interests that derive from the possibility of confrontation with major military powers with global interests.

If a NNWS has a pressing concern for its military security, acquiring nuclear weapons clearly becomes a salient policy option.

There are four specific military objectives for which the acquisition of nuclear weapons seem an appropriate option:

1. Deterrence of, defense against and/or retaliation for a nuclear or conventional attack or nuclear blackmail by the U.S. or the U S.S.R.;
2. deterrence of, defense against and/or retaliation for a nuclear or conventional attack or nuclear blackmail by a minor NWS;
3. deterrence of, defense against and/or retaliation for conventional attack by neighboring or regional adversary NNWS or group of NNWS adversaries or domination of such NNWS adversaries;
4. anticipatory reaction to the prospective acquisition of nuclear weapons by a local or regional NNWS adversary in order to deter or dominate such an adversary.²

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PROSPECTS FOR NUCLEAR PROLIFERATION(U) NAVAL
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TABLE VI

Major Coastal Cities of Hostile Nth Country Pairs

Argentina- Brazil	Buenos Aires Recife, Rio de Janeiro
Egypt- Israel	Alexandria Haifa, Tel Aviv
Egypt- Libya	Alexandria Benghazi, Tripoli
Greece- Turkey	Athens Istanbul
India- Pakistan	Bombay, Calcutta, Madras Karachi
India- Iran	Bombay, Calcutta, Madras
Indonesia- Philippines	Djakarta, Surabaya Manila, Cebu
Iran- Iraq	Basra
Iran- Saudi Arabia	Jidda
Iraq- Syria	Basra
Israel- Iraq	Haifa, Tel Aviv Basra
Israel- Libya	Haifa, Tel Aviv Benghazi, Tripoli
Israel- Syria	Haifa, Tel Aviv
Japan- CPR	Osaka, Tokyo, Yokohama Dairen, Shanghai
Japan- Soviet Union (Eastern)	Osaka, Tokyo, Yokohama Vladivostok

TABLE VI
(continued)

Major Coastal Cities of Hostile Nth Country Pairs

Libya-	Benghazi, Tripoli
Algeria	Algiers, Oran
South Africa-	Cape Town
Zaire/Nigeria	/Lagos
South Korea-	Pusan
North Korea	
Taiwan-	
CPR	Dairen, Shanghai
West Germany-	
Soviet Union (Western)	Odessa
Yugoslavia-	
Soviet Union (Western)	Odessa

The first of these objectives would be global while the remaining three would be in the regional context.

1. Global Security Interests

There are basically two sorts of global security interests: 1) the desire to deter or protect against threats or military incursions by major NWS with global interests (U.S. and U.S.S.R.); and 2) the aim of increasing or decreasing the involvement of the superpowers in regional disputes.

Defensively, a country pitted against a superpower would be able to inflict damage many times greater than with conventional weapons. Although the superpower would be able to annihilate the lesser nuclear power, the price may be so high as to outvalue the objectives of the aggression. The objectives themselves--ports, industries, cultural centers, or people--may be obliterated if the nuclear exchange actually occurs. This is the basis of nuclear deterrence theory and makes nuclear weapons extremely attractive to small nations confronted with belligerent and military superior neighbors.

The element of uncertainty introduced by nuclear possession should not be underestimated. Rarely are superpower interests challenged sufficiently by small countries to warrant even a small risk of nuclear retaliation. Therefore the possession of nuclear weapons by small countries would probably serve as an effective deterrent against

direct military intervention by a superpower, and countries concerned about such intervention might find that option attractive.³

General Charles de Gaulle's early concept of the utility of French nuclear weapons may be the same reason that other countries now feel that nuclear weapons do in fact have a significant military utility. "To be able to tear off an arm from a potential adversary" might constitute a sufficient deterrent for a smaller country.⁴

It is difficult to predict if the nuclearization of a regional dispute would draw the superpowers in, but generally speaking it seems unlikely they would seek a unilateral advantage from a local conflict. In all probability, they would jointly intervene to diffuse tensions for fear of hostilities getting out of control.⁵

2. Regional Security Interests

Many NNWS face problems of national security within their regions which seem likely to provide the major incentives for developing nuclear weapons. (See Appendix C.) Whether in the Middle East, South America, Southeast Asia, Africa, Europe, or the Asian subcontinent, a country will evaluate whether it goes nuclear or not mainly because of what it regards as threats or potential threats to its security from its neighbors. Pakistan is most concerned about what India is doing while Argentina is most concerned about Brazil.⁶ None of the major participants is likely to

acquiesce readily to second-class non-nuclear status or to a position of marked nuclear inferiority vis-a-vis its regional opponent(s).

a. Defense Against Invasion

Many NNWS feel that possession of nuclear weapons will provide a defense against invasion. This type of defense would be especially attractive to a country confronting an opponent whose conventional forces are superior, for example, Pakistan versus India or Taiwan versus China. Nuclear weapons would also be valuable to a country in which terrain forces the opponent to mass its troops and equipment through natural invasion corridors, for example, North Korea versus South Korea and Israel versus Egypt.⁷

Any state engaged in a border dispute or a regional confrontation with a nuclear armed state would have an incentive to develop its own nuclear capability. The objective would be both to neutralize the political and military advantage of the opponent's nuclear weapons and to deter attack by conventional forces.

b. Anticipatory Acquisition

In the case of a long standing confrontation or competition between NNWS in which one suspects the other of developing nuclear weapons may also encourage the other to go nuclear. Acquisition by either Argentina or Brazil, Indonesia or Australia or North or South Korea would likely spur the other to follow suit rapidly, as did India after

the Chinese explosion and the declaration of Pakistan to get "the" bomb.

Even if there were no evidence of an actual weapons program, a government that believed its regional rival would inevitably acquire a nuclear capability might feel compelled to begin its own program.

The development of nuclear weapons may also be beneficial to the leaders of a state whose regional security is likely to deteriorate because of international political considerations. Two particular sets of circumstances that might lead to this conclusion by a government are worth identifying.

States that face gradual but relentless political isolation within the international community would form one group. These states are generally referred to as "pariah" states and include South Africa, Taiwan, Israel, and South Korea. Israel and South Africa are prime suspects concerning the possible nuclear explosion that occurred at 3:00 A.M., local time, on September 22, 1979, in the Indian Ocean near the southern tip of Africa.⁸

These states would not want to use nuclear weapons, but rather would see the uncertainty and changed psychological environment that resulted from their acquisition as sufficient to deter hostile acts by their opponents.

The second set of countries that may decide to go nuclear because of changed political conditions would be

countries that see a long-term deterioration and eventual unraveling of existing alliances and security guarantees as occurring.

For whatever reasons, a weakening of U.S. security guarantees to countries such as Australia, South Korea, The Philippines, Japan, and/or West Germany could stimulate significant pressure to acquire nuclear weapons. Hence, the production of nuclear weapons as a feasible and acceptable alternative to politically unpalatable security arrangements may soon become the norm rather than the exception.

In summation, the Indian nuclear program can be used to demonstrate the linkage of decisions among regional antagonists to get nuclear explosives, and also the fact that the linkage is a network of competing national interests and domestic factions.

The Sino-Soviet split and confrontation in the late 1950s coupled with the Sino-Indian conflict in 1962 had a direct bearing on the Chinese nuclear explosion in 1964. The Chinese explosion generated a policy debate among Indian domestic factions that led more or less steadily to a nuclear explosion nearly ten years later.

Fear of possible blackmail by a nuclear armed Indian government and defeat in the 1971 Indian-Pakistani war in turn has led to Pakistan's decision to get nuclear weapons,

"even if," as former Prime Minister Bhutto said, "we have to eat grass."

Maybe the most damaging aspect of both the Chinese and Indian nuclear explosions is the generalized lowering of the nuclear taboo. This consequence could prove fatal to the nonproliferation regime.

3. Security System Breakdown

The major issues revolve around two premises.

1. The position of the near-nuclear country vis-a-vis present nuclear states (for example, whether or not the near-nuclear country is under a nuclear umbrella in which it has a reasonable degree of confidence), and;
2. the nature of any perceived threat(s) to its national security, or, conversely, the extent of the country's international ambitions.

Since 1961 when Pierre Gallois professed the fear that the U.S. would never retaliate against Moscow because she had invaded Europe, there has been a strong argument for independent nuclear forces.

Some recalcitrant nations have asked some ponderable questions concerning U.S. security promises. Would the U.S. protect a NNWS against nuclear attack by credibly threatening retaliation? Second, can the nuclear umbrella deter conventional attacks? Third, can the umbrella deter acquisition of nuclear weapons in a regional context?¹⁰

There is a plausible argument that a U.S. President may not even respond to a selected nuclear strike on the U.S. homeland for fear of annihilation.

Present NATO doctrine, which is the strongest U.S. security commitment, advocates escalation to strategic nuclear weapons. Does it not seem somewhat ridiculous that NATO would continue to adhere to an escalation doctrine when strategic parity is accepted by both the U.S. and the U.S.S.R.? Granted this is only doctrine and deterrence its goal, but credibility is the key word. Therefore, questioning of U.S. credibility does not seem nonsensical.

Many countries meet their security needs through alliances with NWS, yet these treaties can be hazardous. First, there is the fear that when the need arises, help will not arrive. History is full of nonperformance. Second, there is always the possibility that a partner will draw all members of an alliance into a war when only one country has a grievance. World War I is a good example of this problem.¹¹

The Indian experience can again be used for example. Countries outside credible alliance systems are particularly likely to opt for nuclear weapons. After the Chinese nuclear explosion, the Indian government quietly and cautiously tried to gain nuclear security guarantees from both the U.S. and/or the U.S.S.R. Their attempts yielded nothing very substantial, thus May 18, 1974, became inevitable.¹²

The questionable credibility of the U.S. strategic nuclear umbrella is causing a number of formerly satisfied allies seriously to consider investing in their own nuclear

weapons, not to mention those countries outside the U.S. guarantee (such as India).¹³

B. POLITICAL INCENTIVES

NWS have recognized since the outset of the nuclear age that nuclear weapons have served important symbolic functions. Nuclear weapons symbolize a country's modernity, scientific prowess, and technological capability and thus clearly possess political as well as military utility.

It is important here to distinguish between the weapons and the politics. As Clausewitz said, "War is not a mere act of policy but a true political instrument, a continuation of political activity by other means."¹⁴

The foremost political incentive for acquiring nuclear weapons is their ability to enhance national power. Over time, a new nuclear state could expect to increase its influence in international forums as well as increase its regional status. This change in role would occur because of subtle alterations in the psychological orientation of states toward the new NWS. It would be a gradual and complex process, but nonetheless real.¹⁵

How much more importance the outside world has attached to China since she entered the nuclear club. China cannot be considered as an insignificant or overrated international actor because of one ominous fact--she has developed nuclear weapons. Bombs do make a difference.

The second most important political incentive for a country to develop nuclear weapons is prestige. Prestige could almost be said to be the resultant of national power. Some would argue that the only hope for nuclear disarmament is for the nonproliferation regime to develop in such a way that a country becomes more prestigious by not having nuclear weapons. It does not appear likely this course will be followed.

1. National Power

Military power is a symbol and a source as well as an instrument of political power. A country can engender pride, enhance its prestige, and influence the psychological climate by acquiring a strong military force. In the international arena where conflicting national interests are pursued and frequently settled short of war, military capability often is a country's most useful asset.

Without a doubt, countries want all the trappings of power. Before World War II a huge fleet complete with battleships was indicative of power. After the War, it was the aircraft carrier. Even Brazil and Argentina bought carriers. Now countries are beginning to realize the carrier is no longer the symbol of power, but nuclear weapons are.

France, China, and to some degree India are examples of the independence that indigenous nuclear arsenals (capability in India's case) represent. These countries are in

an envious position among many nations of the world because of their nuclear capability. They are no longer dependent on a separate nuclear force and can bargain from a position that more represents their interests. More important, perhaps, is their ability to stand aside during a major confrontation of the two superpowers.¹⁶

2. National Prestige

Nationalism is by far the strongest political force in the world today, having become so after about three centuries of evolution. The greatest danger of nationalism in the modern world is that its loyalties are too narrow. Nationalism does not admit of obligations beyond its own frontiers, of rights and duties which transcend the state.¹⁷

Whether or not the nuclear age soon becomes the second stone age could be directly related to how the non-proliferation regime handles the force of nationalism.

When France tested its first nuclear weapon on February 13, 1960, President de Gaulle sent the following telegram to his representative at the test site.

Hurrah for France! From this morning she is strong and prouder. From the bottom of my heart thanks to you and those who have brought her this magnificent success.¹⁸

Prestige is relative and can be increased through the acquisition of nuclear weapons (such as France) or depreciated through the acquisition of nuclear arms by another nation (Pakistan, when India detonated),

particularly if it is a smaller country with overlapping spheres of influence.

Tremendous pressure would accrue to Brazil, for instance, if Argentina should explode a "peaceful nuclear device," as it would to West Germany if a Swedish or Swiss explosion occurred. Sadly, NWS have been granted greater status and influence in the international arena.

Prestige in the broadest sense was an important factor in both the British and French decisions and presumably predominant in the Chinese and Indian decisions.

Acquisition of nuclear weapons does not make a country great. But in a world where a few countries dominate the wealth and power, while others struggle for economic independence and self respect, it is not beyond belief that national leaders could see nuclear weapons as an easy way to exercise their sovereignty.

Nuclear weapon development could also be seen as a way to help alleviate the frustrations of poverty and economic failures. They might be expected to bolster a nation's self confidence and prestige, or to restore or strengthen popular support for a particular regime. It should be remembered that in the U.S. the space program at one time or another has served many of these functions.

Pakistan can be used as an example to further explore the prestige factor in acquiring nuclear weapons.

Prestige and internal pressures have played a significant role in the Pakistani drive for nuclear weapons, especially in light of Indian public criticism. Under both the Bhutto and Zia governments, completion of the nuclear program in the face of outside criticism acquired a nationalistic appeal within the government, and both regimes feared a halt of the program would lead to a loss of domestic support.

Prime Minister Bhutto made clear what Pakistan's ultimate intentions were and why.

We all know that Israel and South Africa have full nuclear capability. The Christian, Jewish, and Hindu civilizations have this capability. The Communist powers also possess it. Only the Islamic civilization¹⁹ was without it, but that position was about to change.

Pakistan is dangerous enough, but what happens if a country like Japan, which aspires to become a permanent member of the security council, decides it has to pay the club entrance fee by developing nuclear weapons? If the norm is weakened and proliferation seems inevitable, the psychological impact of multiple withdrawals of the NPT could result in a snowballing effect.

C. BUREAUCRATIC PRESSURES

To fully understand any governmental policy decision, it is imperative for one to realize that hidden coalitions of bureaucratic factions often strongly influence the final outcome. Private business interests or personal interests of

government officials must be sought out and identified in order to understand the positions adopted at all stages of the diplomatic process. Decisionmakers are frequently isolated from those bureaucrats who are truly motivated by a "national interest."

Holders of bureaucratic offices attempt to get ahead by expanding their bureaus' services, operations, and tables of organizations. Individuals whose future is tied to the success of a certain project or who have spent an entire career promoting a particular idea will fight to the death. It is basic human nature to protect one's turf.

Certain businessmen would sell their soul for a profit and could hardly be trusted not to sell critical materials needed for nuclear weapons. This aspect cannot be limited to private concerns as there are also tremendous pressures among supplier states to provide nuclear materials and equipment.

In India, the only real support for the NPT came from senior civil-service employees who feared a cut-off of U.S. or Soviet aid necessary to keep their particular bureaus in operation.²⁰

Even in the U.S., the country that arguably stands to gain the most from the NPT, several areas of in-fighting were evident. The Arms Control and Disarmament Agency (ACDA) was solidly in favor of the treaty, but other

sections of the State Department were not. Certain desk officers were especially sympathetic to the country in which they had spent a large part of their career when that country decided not to support the NPT. Bureaucrats in favor of peaceful uses of nuclear energy, in some cases even peaceful nuclear explosions, also balked.²¹ Even after the Indian nuclear explosion, much of the bureaucracy in the U.S. persisted in the fiction that India had not violated their Agreement on Cooperation with the U.S. in using U.S.-supplied heavy water to produce plutonium for explosives.

In sum, bureaucracies within potential nuclear countries make it possible to drift into a military program without taking a positive decision until very late, or possibly after the fact. As previously stated, the legitimate acquisition of large quantities of highly concentrated fissile material has facilitated the decision to make bombs in the past. The U.K., France, and India all decided to produce and separate plutonium well before they overtly decided on a nuclear weapons program.²²

Traditionally nationalistic, chauvinistic, and expansionist elements would inevitably support a nuclear program.

In most countries, those branches of the military which would gain the most decisive advantage in their operational roles are most active in promoting a decision in favor of

producing bombs. For any NNWS to make the fateful decision to "go nuclear" some component of the military and technical communities must favor it.

Generals believe that the simple possession of nuclear weapons will deny an enemy the advantages of concentration. Tactical theories based on the use of nuclear weapons have gained an important place in the tactical doctrine of the U.S. Army. In those countries where military staffs have considerable influence, these considerations must be expected to carry significant weight.

The morale of any military organization is directly related and dependent upon the knowledge that their equipment is technically as good as the enemy's.

Many times elements of the scientific and industrial communities may argue for nuclear weapons because they feel renunciation could have economic costs. Scientists have argued in the past that valuable spin-offs in the peaceful application of nuclear energy may be lost if weapons research is explicitly forbidden, since the technologies often overlap. It should be pointed out that in this country scientists and bureaucrats promote the space program in the name of everything from medical research to weed control.

In general, the military and scientific communities will strongly support nuclear weapons programs as a means of extending their own power and importance.

Kissinger's remark at the 1974 Moscow summit summed up the problem: "both sides have to convince their military establishments of the benefits of restraint, and that is not a thought that comes naturally to military people on either side."²³ Clearly, the arms control voice is much too weak within a bureaucratic structure dominated by the military and their political allies.

D. ARMS CONTROL PRESSURES

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

NPT; Article VI

This article was an attempt by the NWS to overcome the objection of the NNWS that it was unfair for some states to be prevented from acquiring nuclear weapons while others were allowed to retain and even improve the quality of their weapons. It was widely believed, that over the long haul, such an arrangement was nonviable.²⁴

Most NNWS rejected the argument of the NWS that under Article II (See Appendix A) of the NPT the great powers have the right to increase their stockpiles of nuclear weapons while the NNWS are forbidden from acquiring them. These NNWS see the greatest danger to international stability arising not from the horizontal proliferation of nuclear

weapons but from the vertical proliferation of the superpowers.

The Indian government has called the Strategic Arms Limitation Treaty (SALT I) a smokescreen that not only enabled the superpowers to "legitimize" their existing stockpiles of launchers but also "licensed" their continued proliferation in the form of MIRVed warheads. Professing concern about nuclear proliferation on the one hand while seeking approval of the neutron bomb on the other seem ridiculous to most NNWS.²⁵

The NNWS have good reason to question the "good faith" of the superpowers. For the uneducated, the past few years may have seemed like a period in which significant strides in arms control has taken place. The superpowers have worked hard at projecting this image (See Table VII). Indeed more arms control pacts have been concluded between 1959-1974 than ever before, but none of them have restrained the strategic arms race.²⁶

Instead of reducing existing high levels of nuclear forces, SALT I permitted both sides to build up substantially (See Table VIII). These numbers have increased even more today.

Pentagon advocates of new strategic weapons contend that the production of these new "bargaining chips" strengthen the hand of U.S. negotiators at SALT vis-a-vis their Soviet counterparts. Later, the theory goes, these

TABLE VII
ARMS CONTROL SINCE 1959

MULTILATERAL AGREEMENTS:

Antarctic Treaty 1959
 Limited Test Ban 1963
 Outer Space 1967
 Latin American Nuclear-Free
 Zone 1967
 Non-Proliferation Treaty 1968
 Seabeds Arms Control Treaty
 1971
 Geneva Protocol
 (signed in 1925 - reintro-
 duced before U.S. Senate
 since 1970)
 Biological Weapons
 Convention 1972

U.S./U.S.S.R. BILATERAL AGREEMENTS:

"Hot Line" Agreement 1963
 Improved "Hot Line" Agreement 1971
 Nuclear Accidents Agreement 1971
 ABM Treaty (2 sites) 1972
 Interim Agreement on Offensive
 Strategic Arms 1972
 ABM Protocol (1 site) 1974
 Threshold Test Ban 1974

SOURCE: THE DEFENSE MONITOR by The Center For Defense Information, 1974

TABLE VIII
STRATEGIC NUCLEAR WEAPONS

	1972	1974	ADDED SINCE SALT I
United States	5760	7940	2180
Soviet Union	2200	2600	400

SOURCE: THE DEFENSE MONITOR by The Center For Defense Information, 1974

systems can be dismantled for equal concessions from the Soviets. The problem arises after the weapons are approved, produced, and deployed. Pentagon rationale then changes and the weapons system such as MIRV is no longer expendable, but a vital part of the U.S. deterrent. Such doublethink may undermine long-range national security, as Senator Stuart Symington put so aptly before the Senate Armed Forces Committee:

The ABM was sold as a bargaining chip; Trident was sold as a bargaining chip, and this new counterforce targeting is being sold as a bargaining chip. It took us four years to win World War II. What we dropped on Germany and Japan in four years was one twenty-fifth of one percent in TNT equivalent of what we have in the nuclear stockpile ready to drop tomorrow . . . Looking at the other vital aspects of true national security, the economic picture, I am worried about still more bargaining chips that pop up regularly and so heavily increase our military cost.²⁷

As George Kennan once said, there is no absolute security in a world of nuclear explosives, and perhaps the greatest danger one can run is to seek absolute security."

The raw megatonnage available to the leaders of the superpowers today is great enough to destroy civilization as we know it--possibly forever. Many have argued that precisely because of this capability nuclear weapons will never be used, but this has done little to allay the fears of people throughout the world.

The U.S. and the U.S.S.R. can hardly claim they have always behaved responsibly with their nuclear arsenals. The

U.S. actually used nuclear weapons in wartime and there is strong evidence that both have threatened to use them in the period between 1953 (Korea) and the worldwide alert in October 1973.

President Nixon and Secretary of State Kissinger only exacerbated the negative feelings (concerning nuclear threats) among NNWS when they moved the U.S. toward a counterforce strategic doctrine. This was dangerous because it undermined the conditions of stable deterrence. Of course, Nixon and Kissinger were searching for an effective and politically inexpensive means of projecting U.S. nuclear power in international politics.²⁸ In the wake of Vietnam, this was somewhat understandable, nonetheless they were threatening a wide range of nuclear use in order to maintain the international status quo.

The fear of NNWS is genuine and it is easy to see why they have little faith in the "good faith" of the superpowers.

How does vertical proliferation affect horizontal proliferation? It seems plausible for a link to exist between the two. It is difficult to see why some nations would continue to forego nuclear weapons, while the superpowers continue to increase and perfect their nuclear arsenals. This augmentation and improvement has the political impact of renewing the glamour of nuclear weapons, thereby making further proliferation more likely.²⁹

The failure to agree on a Comprehensive Test Ban (CTB) also increases the likelihood because continued U.S.-Soviet testing only reinforces threshold nuclear states' impressions that nuclear weapons can have a military and/or political application.³⁰

Some U.S. and Soviet officials still argue for an exemption for the testing of "peaceful nuclear explosions." Obviously all segments of the U.S. population either do not fear nuclear proliferation³¹ or have different motivations. India should have taught the world a lesson about slipping in the back door.

Not only are the two superpowers failing at strategic arms negotiations they continue to blatantly violate the spirit of the NPT in other areas--namely the modernization of their tactical nuclear forces. This is one area that some threshold nuclear states may feel they can match the superpowers successfully. A tactical nuclear doctrine is a militarily useable doctrine.

As a practical matter, it is very difficult for the political leaders of a nuclear capable country to tell its citizenry that it will continue indefinitely to forswear nuclear weapons while the superpowers produce as fast as they can.

Article VI of the NPT is a major quid pro quo for adherence to the treaty. If there is continued nuclear stockpiling by the NWS and observance of the treaty by the NNWS,

the motivation to remain a member will become less and less. It will become a situation of the strong get stronger and the weak get weaker.

If this attitude develops many NNWS may soon withdraw (including Japan and West Germany). If this happens, the cornerstone of nonproliferation regime will have folded and in all likelihood the regime itself.

FOOTNOTES

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- ¹⁹International Institute for Strategic Studies, Strategic Survey 1979, p. 16, 1980.
- ²⁰Quester, The Politics of Nuclear Proliferation, p. 240.
- ²¹Ibid., p. 24.
- ²²Wohlstetter, Nuclear Policies, p. 49.
- ²³David Johnson and Gene La Rocque, "The Mythology of National Defense," Bulletin of Atomic Scientists, p. 23, September 1974.
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- ²⁵Charles K. Ebinger, "International Politics of Nuclear Energy," The Washington Papers Number 57, v. VI, p. 46, Sage Publications, 1978.
- ²⁶Center For Defense Information, The Defense Monitor, v. 3, p. 5, 1974.
- ²⁷Ibid., p. 7.
- ²⁸Johnson and La Rocque, Bulletin of Atomic Scientists, p. 26.
- ²⁹George H. Quester, "Nuclear Proliferation: Linkages and Solutions," International Organization, v. 33, p. 550, Autumn 1979.
- ³⁰Ibid., pp. 551-552.
- ³¹For this point of view, see Kenneth N. Waltz, "The Spread of Nuclear Weapons: More May Be Better," Adelphi Papers Number 171, pp. 1-30, International Institute for Strategic Studies, Autumn 1981.

VI. CONCLUSIONS

The Devil: "I have examined Man's wonderful inventions. And I tell you that in the arts of life man invents nothing, but in the arts of death he outdoes Nature herself, and produces by chemistry and machinery all the slaughter of plague, pestilence, and famine. The peasant I tempt today eats and drinks what was eaten and drunk ten thousand years ago; and the house he lives in has not altered as much in a thousand centuries as the fashion of a lady's bonnet in a score of weeks. But when he goes to slay, he carries a marvel of mechanism that lets loose at the touch of his finger all the hidden molecular energies, and he leaves the javelin, the arrow, the blowpipe of his fathers far behind. In the arts of peace Man is a bungler . . . his heart is in his weapons."

Act III, Man and Superman,
by George Bernard Shaw (1903)

There are two questions that must be asked when contemplating the possibilities for nuclear nonproliferation.

1. Is it feasible to have an international system in which certain countries derive political and technological benefits by virtue of their possession of nuclear weapons and at the same time prevent other countries which are within the reach of this technology from aspiring for these same benefits?

2. Is it realistic to envisage a world where certain powers have military doctrines based on the use of nuclear weapons and prevent these same doctrines from being adopted by other countries?

These questions exhibit in stark detail the hypocrisy of the NWS's nonproliferation policy. They also point out the unwillingness of decisionmakers to examine the close linkage between a country's decision to acquire nuclear weapons and its perception of a serious or overwhelming security threat.

The world grows increasingly complex each day. In most nations of the world, domestic political weaknesses and economic difficulties exert higher degrees of pressures for short-term nationalistic responses to urgent resource, economic, and security problems that can only be solved, if at all, by multinational efforts.

The U.S. has found it increasingly difficult to manage its sphere of influence. Once cooperative and often subservient nations have recently shown a greater independence. With the spread of nuclear weapons and the dangers associated with that spread, the possibility for profound change in the structure of world politics exists.

There is little reason to believe that a world of twenty or thirty nuclear countries would inevitably produce global holocaust or that small nuclear wars would be a common occurrence. Nonetheless, nuclear threats will become more common and nuclear exchanges more likely, possibly including conflict between the great powers. In 1995, as in 1914, a series of moves in a complex interlinked environment could produce a global catastrophe. Keeping the probability of

such a disaster from happening will obviously be the most pressing problem of the two superpowers.

The spread of nuclear technologies, both civilian and military, is inherently destabilizing. The most serious trends are the spread of inexpensive isotope separation and reprocessing equipment, the accumulation of reprocessed plutonium, and the diffusion of technology for effective delivery systems. The susceptibility of these technologies to effective international control is minimal. The tremendous increase in the number of technology suppliers has greatly reduced the effectiveness of unilateral decisions by any one country or small groups of countries. Basically commercial competition is too great for a denial approach to work.

Technology spread is particularly dangerous insofar as it limits the chances of restraining the rate of nuclear weapons proliferation. As nuclear power programs grow, nations will inevitably edge closer to the capacity to make a bomb. As a state sees its neighbor creeping toward the nuclear club through the construction of a series of nuclear power plants and related facilities, it might worry that fabrication of a bomb is only a matter of time and thus move to acquire its own weapons.

Those states that face local confrontations and disputes are the most likely nuclear proliferants. Once a confrontation actually develops into a crisis in which one or both

sides possess nuclear weapons a higher probability of them being used results.

This statistically higher risk is amplified by the fact that some new proliferants will be less self-controlled and less prudent than the older NWS, an unpopular but certainly a logical expectation. Nuclear hostilities have to be more of a possibility in the hands of messianic leaders or regimes threatened with extinction or countries lacking adequate conventional capabilities.

U.S. military forces have frequently been required to preserve the balance of power in regional confrontations. Korea and Vietnam demonstrated the ease with which the U.S. can be dragged into a conflict. This military involvement has been dictated by a lack of credibility of the indigenous forces when confronted by a conventionally armed neighbor.

It is comforting, and therefore popular, to assume that nuclear weapons will be as unusable once widespread as they are generally assumed to be unusable today. But this simply is not true.

Ironically because of Vietnam, a "nuclear Vietnam" may soon be in the offing. In the foreseeable future it is highly unlikely that the U.S. will become militarily involved in the same limited manner in another regional dispute (witness El Salvador). Therefore, regional nuclear belligerents may use nuclear weapons. Not all threats of nuclear aggression will be offset by a promise of nuclear response.

The alliance systems centered on the U.S. are less effective than when created. The world is changing. This weakening is a product of several factors, including defeat of the U.S. in Vietnam and the resultant Nixon Doctrine; a determination not to get burned again overseas; and the concern about the futility of armed action against the Soviet Union, which is the heart of the much-desired detente policy.

Nuclear proliferation will further reduce the superpowers' (especially the U.S.'s) ability to control events. It will have a dissolvent effect on alliances, expose overseas forces to huge new risks, and ultimately impose large costs in shaping an internal defensive system to protect U.S. cities against terrorist attacks.

Countries which feel threatened, abandoned, or lack confidence in the U.S. nuclear arrangement are the countries most likely to acquire nuclear weapons (See Appendix C). South Korean confidence in the U.S. agreement was shaken by the U.S. failure in Vietnam and President Carter's ill-thought-out troop withdrawal initiative. Israel fears they may be forced into making what they consider to be fatal concessions, or possibly abandoned outright in a crisis that threatened superpower confrontation. Taiwan, Japan, and Australia are concerned about the U.S.-China rapprochement. Argentina and Brazil are bitter rivals and are members of a decreasingly viable Hemispheric collective security system. Pakistan has received conventional arms from the U.S. but

hardly expects the U.S. to intervene on their behalf. South Africa is totally isolated politically, and India is openly unaligned.

Even NATO has its problems and it is not totally incomprehensible that events could occur to cause countries such as Sweden, Switzerland, Spain, Italy, or West Germany to feel a need for their own nuclear weapons.

Nuclear proliferation prospects must not be considered exclusively from a security perspective. Power and prestige are important motivating forces.

Each state that ratifies the NPT helps to refute the curious though tenacious notion that the detonation of a nuclear device heralds a nation's arrival as a great power. The Indian nuclear test and continued testing by the NNWS have significantly weakened the nuclear taboo against nuclear weapons.

It is one thing for highly industrialized countries to have nuclear weapons, but for countries such as Pakistan or Argentina to acquire them is a different matter. If several of the poorer countries of the world decide to "go nuclear" the richer NNWS will be under unbearable internal pressures to also acquire them. Proliferation to only a few countries might well revitalize the belief that possession of nuclear weapons, irrespective of military risk or gain, or even morality, constitutes an almost unrivaled source of political power.

Whether proliferation threatens the international system itself will depend upon who joins the nuclear club and how fast its membership expands. The greater the number of countries that have nuclear weapons, the greater the probability that they will be used. The farther they proliferate, the greater the risk that nuclear weapons will enter areas troubled by Political quarrels.

Kenneth Waltz's argument that "more may be better" is based upon the premise that nuclear weapons will everywhere be introduced in a way and at a pace that will make for stable deterrence. But there are three special features of a proliferating world that do not always insure deterrence. These are: (1) utility--the perceived coercive and military value of nuclear weapons to states facing a local confrontation; (2) uncertainty--the inflamed suspicions, reduced predictability of behavior, and increased risk of miscalculation that would result from the existence of undisclosed nuclear capabilities (much as Israel and South Africa have already done); and (3) the unevenness with which nuclear weapons will spread to various regions.

Nuclear proliferation is probably inevitable but more is not better. To the contrary, "less is better" and "later rather than sooner."

Proliferation is more of a menace to the international system than is the superpower arms race. Proliferation increases the chances that nuclear weapons will actually be used, whereas the arms race is not likely to dislodge the constraints against the mutual assured destruction doctrine.

The purpose of arms control is not necessarily to disarm, but to prevent accidental, catalytic, or preemptive nuclear war, thus the politicians, technicians, and diplomats had best address itself more to the proliferation problem.

There are, broadly speaking, two approaches to stemming nuclear proliferation. The first is technical: keeping the wherewithal to make bombs out of the hands of NNWS. The second is political: tending to the fears and suppressing the aspirations that cause countries to "go nuclear."

Technical and economic barriers are becoming increasingly unreliable as technical and industrial skills and capabilities increase. This very technology has led us to a nasty choice between nuclear proliferation and the need for energy supplies. Many seem to think that technology is the answer to everything and it will bail us out of this dilemma. Can we afford to count on it?

Although there are technical things that can and should be done, a technical fix does not seem to be the total answer. True, the fundamental element of nonproliferation policy should be to encourage a broad consensus to avoid a

plutonium economy For this to become a reality, widespread cooperation on a level so far unattainable will be needed. Political barriers against nuclear weapons will have to be constructed higher and stronger than has previously been possible.

Any international reexamination of the fuel cycle can hardly be credible if the U.S. continues to forge ahead with its own plans for reprocessing fuel and with its program for early commercialization of the breeder reactor. Strong U.S. leadership is essential.

Recent U.S. policy has been one of actively promoting nuclear energy in NNWS in forms that provide access to readily fissionable material, subsidizing the financing of nuclear power programs, providing research reactors, assisting in "critical experiments" that involve hundreds of kilograms of separated plutonium and highly enriched uranium, urging that NNWS recycle plutonium, and arguing for domestic recycling as essential to the future nuclear energy.

President Carter recognized the problem, but the U.S. bureaucracy continues to argue that the U.S. should be a reliable supplier of nuclear services, equipment, and material so as to be able to influence importers with safeguards. The logic here is faulty as the Indian "peaceful nuclear experiment" so vividly illustrates. U.S. threats and sanctions were not taken seriously by the Indian government and so they grossly abused U.S. and Canadian help to acquire a nuclear

capability. Besides, safeguards cannot be effectively applied to fissile material only a few hours away from a bomb.

Although safeguards cannot prevent a determined country from developing nuclear weapons, they can help to deter it and provide assurances to others that it has not done so. Because of such positive features they should be pursued at every opportunity.

Probably the most realistic approach to nuclear nonproliferation is to tackle each nuclear candidate's energy and security problems individually rather than through international conferences such as the INFCEP.

By discouraging or penalizing the dangerous forms of nuclear energy that permit access to fissile materials while encouraging the development of non-nuclear energy supplies the U.S. can provide the necessary leadership to check nuclear proliferation.

A credible U.S. deterrent force could also do wonders to slow nuclear proliferation. Even the most adventurous leaders of the world would not seriously contemplate attacking its neighbor if it truly believed the U.S. would react with force (not necessarily nuclear).

Generally speaking the major suppliers of nuclear technology are not serious about halting nuclear proliferation. Stopping it costs something and up until now nobody is seriously interested in paying the price.

To ignore the problem or to pretend that "more may be better," or to assume that these weapons must spread by some sort of natural law, just as every weapon has, only insults the very genius that created the "nuclear dilemma."

Under the present nonproliferation regime, civilian nuclear energy programs assure that many new countries have traveled a long distance down the path leading to a nuclear weapons capability. The distance remaining will be shorter and covered much more rapidly.

If fools and folly rule the world, the end of man in our time may come as a rude shock, but it will no longer come as a complete surprise.

Abdul Rahman Payhwak

APPENDIX A

TREATY ON THE NONPROLIFERATION OF NUCLEAR WEAPONS

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty",

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to cooperate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States

from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in cooperation with other States to, the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the cooperation of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons

and the means of their delivery pursuant to a treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and diversion for armaments of the world's human and economic resources,

Have agreed as follows:

ARTICLE I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

ARTICLE II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices

directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

ARTICLE III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b)

equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article.

3. The safeguards required by this article shall be implemented in a manner designed to comply with article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international cooperation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit.

Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

ARTICLE IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

ARTICLE V

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made

available to non-nuclear-weapon States Party to the Treaty on a nondiscriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

ARTICLE VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

ARTICLE VII

Nothing in this Treaty affects the right of any groups of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

ARTICLE VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view of assuring that the purposes of the Preamble and the provisions of the Treaty are being realized. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

ARTICLE IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland and the Union of Soviet Socialist Republics, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of

ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to article 102 of the Charter of the United Nations.

ARTICLE X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such

notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

ARTICLE XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

In witness whereof the undersigned, duly authorized, have signed this Treaty.

Done in triplicate, at the cities of Washington, London and Moscow, this first day of July one thousand nine hundred sixty-eight.

APPENDIX B

STATUS OF THE NON-PROLIFERATION TREATY 1980

PARTIES (108)

Afghanistan*	Honduras*	Paraguay
Australia**	Hungary**	Peru
Austria**	Iceland**	Philippines**
Bahamas	Indonesia	Poland**
Bangladesh	Iran**	Portugal
Belgium*	Iraq**	Romania**
Bolivia*	Ireland**	Rwanda
Botswana	Italy*	San Marino
Bulgaria**	Ivory Coast	Senegal
Burundi	Jamaica	Sierra Leone
Cameroon	Japan*	Singapore
Canada**	Jordan*	Somalia
Central African Republic	Kenya	Sri Lanka
Chad	Khmer Republic	Sudan*
Congo	Korea (ROK)	Swaziland*
Costa Rica*	Laos	Sweden**
Cyprus**	Lebanon**	Switzerland
Czechoslovakia**	Lesotho**	Syria Arab Republic
Dahomey	Liechtenstein	Taiwan
Denmark**	Liberia	Thailand**
Dominican Republic**	Libya	Togo
Ecuador**	Luxembourg*	Tonga*
El Salvador*	Malagasy Republic**	Tunisia
Ethiopia	Malaysia**	Union of Soviet Socialist Republics+
Fiji**	Maldives Islands	United Kingdom+
Finland**	Mali	United States+
Gabon*	Malta	Upper Volta
Gambia	Mauritius**	Uruguay*
Germany (GDR) **	Mexico**	Venezuela
Germany (FRG) *	Mongolia**	Vietnam (South) **
Ghana**	Morocco*	Western Samoa
Greece	Nepal**	Yugoslavia**
Grenada	Netherlands*	Zaire**
Guatemala	New Zealand**	
Guinea-Bissau	Nicaragua*	
Haiti*	Nigeria	
Holy See*	Norway**	
	Panama	

SIGNATORIES--NOT RATIFIED (8)

Barbados*	Turkey
Colombia	Yemen, Arab
Egypt	Republic of
Kuwait	Yemen,
Trinidad &	Democratic
Tobago	Republic

NONSIGNATORIES (32)

Albania	France+	Pakistan
Algeria	Guinea	Qatar
Argentina	Guyana	Saudi Arabia
Bahrain	India ^o	South Africa
Bhutan	Israel	Spain
Brazil	Korea (DPRK)	Tanzania
Burma	Malawi	Uganda
Chile	Mauritania	United Arab
China+	Monaco	Emirates
Cuba	Niger	Vietnam (North)
Equatorial	Oman	Zambia
Guinea		

+ Nuclear weapon state

** IAEA safeguards agreements in force as required by the NPT

* IAEA safeguards agreements signed or approved by the board of governors

o India has detonated a "peaceful nuclear device"

SOURCE: Nuclear Proliferation Factbook prepared by Environment and Natural Resources Policy Division, Library of Congress, 1980

APPENDIX C

Potential Nth Countries: Possible Reasons, Constraints, and Triggering Events

Country	Potential Underlying Pressures or Reasons ^{2a}	Most Critical Constraints	Possible Triggering Events	NPT Party
Algeria	Preserve regional status and influence; fashion	Limited technological and industrial base	Nuclearization of other countries; increased availability of necessary inputs	No
Argentina ^{2aa}	Quest for regional status and influence; strengthen domestic morale; pressures from military	Risk of unauthorized seizure; reaction of regional opponents	Foreign crisis; domestic crisis; nuclearization of other countries	No
Australia	General deterrent effect; preserve regional influence; fashion	Dependence on foreign nuclear inputs; reaction of other countries	Reduction of alliance credibility; nuclearization of other countries	Yes
Brazil	Quest for regional and global status and influence; pressures from military	Risk of unauthorized seizure; dependence on foreign nuclear inputs	Nuclearization of other countries; changed perceptions of nuclear weapons' utility (as source of status and influence)	No
Chile	Fashion; preserve regional status and influence	Limited technological base; reaction of other countries	Nuclearization of other countries; increased availability of necessary inputs	No
Cuba	Fashion	Limited technological and industrial base; reaction of other countries	Increased availability of necessary inputs; nuclearization of other countries	No
Egypt	Deterrence of nuclear rival; buttress to bargaining position; quest for regional status and influence; strengthen domestic morale	Risk of unauthorized seizure; reaction of regional opponents and allies; limited technological and industrial base	Nuclearization of other countries; increased availability of necessary inputs	No
Greece	Deter nuclear rival; buttress to bargaining position; preserve regional status	Limited technological and industrial base; reaction of regional opponents	Increased availability of necessary inputs; breakdown of international constraints; nuclearization of other countries	Yes
India	Deterrence of nuclear rival; buttress to bargaining position; quest for status and influence; strengthen domestic morale; scientific momentum	Reaction of other countries; dependence on foreign nuclear inputs	Nuclearization of other countries; domestic or foreign crisis; weakening of international constraints	No

¹ The following countries are those which appear in the proliferation projections developed in Section II.

^{2a} For certain countries the overt emergence of particular pressures or reasons would depend upon international and domestic changes such as are discussed in Section II. Thus, some potential pressures or reasons may well remain latent until, if ever, those changes occur.

^{2aa} Most critical potential Nth countries--based upon analysis at the end of Section II--are placed in boxes.

Country	Potential Underlying Pressures or Reasons	Most Critical Constraints	Possible Triggering Events	NPT Party
Indonesia	Diversion of domestic attention; quest for regional status; fashion	Cost; limited technological and industrial base	Domestic crisis; nuclearization of other countries	No
<u>Iran</u>	Deterrence of nuclear rival; defense against invasion; buttress to bargaining position; quest for regional and global status and influence	Dependence on foreign nuclear inputs; reaction of allies and opponents	Nuclearization of other countries; weakening or breakdown of international constraints; foreign crisis	Yes
Iraq	Deterrence of nuclear rival; buttress to bargaining position; preserve regional status	Limited technological and industrial base; reaction of regional opponents	Nuclearization of other countries; increased availability of necessary inputs	Yes
<u>Israel</u>	Deterrence of nuclear rival; defense against invasion; buttress to bargaining position; weapon of last resort	Reaction of regional opponents, allies, and other nations	Reduction of alliance credibility; nuclearization of other countries; foreign crisis	No
Italy	Quest for status and influence; fashion; strengthen domestic morale; bureaucratic politics	Reaction of allies and other countries; problems developing credible nuclear strategy	Leadership change; reduction of alliance credibility; nuclearization of other countries	Yes
<u>Japan</u>	Deterrence of a nuclear rival; buttress to bargaining position; quest for global status and influence	Domestic public opposition; problems developing credible nuclear strategy; dependence on foreign inputs; reaction of other countries	Reduction of alliance credibility; domestic political change; foreign crisis; nuclearization of other countries	No
<u>Libya</u>	Buttress to bargaining position; nuclear intimidation of non-nuclear rivals; quest for regional status and influence	Limited technological and industrial base; reaction of opponents	Increased availability of necessary inputs	Yes
Nigeria	Fashion; quest for regional status	Limited technological and industrial base; cost	Increased availability of necessary inputs; nuclearization of other countries	Yes
North Korea	Deterrence of nuclear rival; buttress to bargaining position	Limited technological base	Increased availability of necessary inputs; nuclearization of other countries	No
<u>Pakistan</u>	Deterrence of nuclear rival; defense against invasion; buttress to bargaining position; strengthen domestic morale	Cost; limited technological and industrial base; reaction of regional opponent	Nuclearization of other countries; foreign crisis; increased availability of necessary resources	No
Philippines	Buttress to bargaining position; fashion	Cost; limited technological and industrial base	Nuclearization of other countries; increased availability of necessary inputs; breakdown of international constraints	Yes
Romania	Weapon of last resort	Reaction of allies	Weakening of international constraints; nuclearization of other countries	Yes

Country	Potential Underlying Pressures or Reasons	Most Critical Constraints	Possible Triggering Events	NPT Party
Saudi Arabia	Deterrence of a nuclear rival; weapon of last resort; buttress to bargaining position; quest for regional influence	Limited technological and industrial base; reaction of regional opponents	Nuclearization of other countries; increased availability of necessary inputs	No
South Africa	Demonstrate national viability; quest for global status; strengthen domestic morale	Reaction of other countries	Foreign or domestic crisis; nuclearization of other countries; changed perception of nuclear weapons' utility (as source of status)	No
<u>South Korea</u>	Defense against invasion; deterrence of nuclear rival; intimidate non-nuclear rival	Reaction of allies and regional opponents; dependence on foreign nuclear inputs	Reduction of alliance credibility; weakening or breakdown of international constraints	Yes
Spain	Fashion	Dependence upon foreign nuclear inputs; reaction of other countries	Leadership change; nuclearization of other countries; breakdown of international constraints	No
Sweden	Defense against invasion; fashion	Problems developing credible nuclear strategy; domestic opposition	Changed perception of nuclear weapons' utility (as buttress to armed neutrality); nuclearization of other countries	Yes
Switzerland	Defense against invasion; fashion	Problems developing credible nuclear strategy; domestic opposition	Changed perception of nuclear weapons' utility (as buttress to armed neutrality); nuclearization of other countries	No
Syria	Deterrence of nuclear rival; preserve regional status and influence; buttress to bargaining position	Limited technological base; reaction of opponents	Nuclearization of other countries; increased availability of necessary inputs	Yes
<u>Taiwan</u>	Defense against invasion; buttress to bargaining position; demonstrate national viability; strengthen domestic morale	Dependence on foreign nuclear inputs; reaction of allies and other countries	Reduction of alliance credibility	Yes
Turkey	Intimidate non-nuclear rival; quest for regional status and influence; fashion	Limited technological base	Increased availability of necessary inputs; nuclearization of other countries	No
Venezuela	Preserve regional status and influence; fashion	Limited technological base	Nuclearization of other countries; increased availability of necessary inputs	Yes
<u>West Germany</u>	Deterrence of nuclear rival; buttress to bargaining position	Reaction of opponents and of allies; domestic opposition	Reduction of alliance credibility; weakening or breakdown of international constraints; foreign crisis; nuclearization of other countries	Yes
Yugoslavia	Weapon of last resort	Reaction of opponent	Foreign crisis	Yes
Zaire	Fashion	Limited technological base; cost	Increased availability of necessary inputs; nuclearization of other countries	Yes

SOURCE: MOVING TOWARD LIFE IN A NUCLEAR ARMED CROWD? by Albert Wohlstetter, 1976

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