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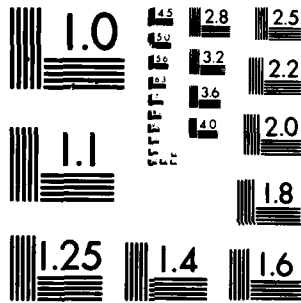
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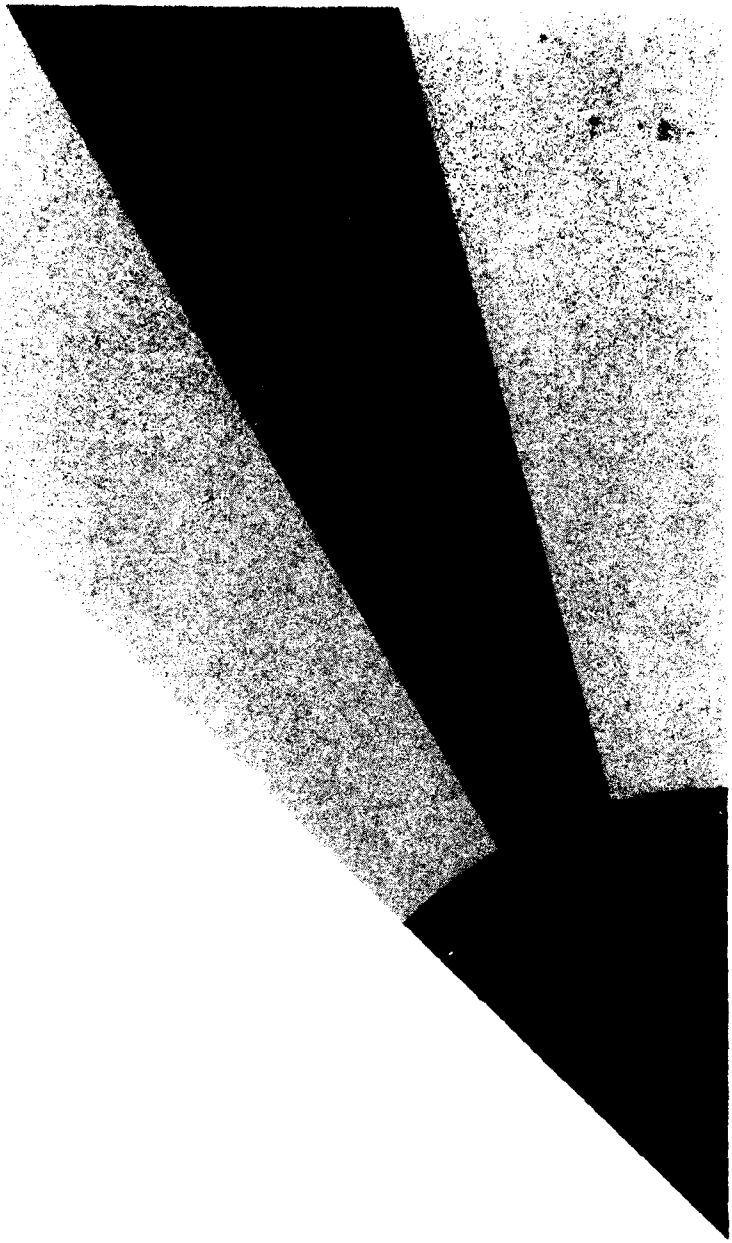
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VERIFICATION:

The Critical Element of Arms Control

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VERIFICATION:

The Critical Element of Arms Control

U.S. ARMS CONTROL AND DISARMAMENT AGENCY
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INTRODUCTION

“Verification” is a term which appears in the provisions of a number of recent arms control agreements, and it has figured prominently in public discussions of the Strategic Arms Limitation Talks (SALT) between the United States and the Soviet Union as well as in the talks themselves. Unfortunately, the meaning and purpose of verification are seldom carefully defined, and its place in the larger enterprise of arms control remains subject to widely differing interpretations. This is to some extent a result of the confidential nature of negotiations that involve fundamental questions of national security. But the primary reason is the considerable complexity—a complexity as much political as it is technical in nature—of the verification process itself.

A growing number of treaties and agreements testifies to the importance that arms control has come to assume in the foreign and national security policy of the United States. Verification is a central feature of our arms control policy today; it will become increasingly important in the future as the United States and other nations seek to limit further and eventually to reduce more and greater varieties of weapons. A firm and continuing commitment by the United States to negotiate limitations on its armaments presupposes a shared confidence on the part of the concerned branches of government and the public at large that arms control measures are compatible with—and indeed an integral part of—the security of our nation. Such confidence will itself depend in substantial part on our assurance that reciprocal limitations continue to be observed by others. Verification will have to bear much of the responsibility for providing this assurance. But it can do so only if the complexities of the verification process are faced and understood.

WHAT IS VERIFICATION?

To verify is to ascertain the truth or reality of something. Verification is the attempt to check the truth of a statement against the facts of the case—to look beyond words to deeds. As a technical term in the vocabulary of arms control, verification refers to the process of assessing compliance with the provisions contained in arms control treaties and agreements. It is the attempt to ascertain whether states are living up to their international obligations.

The Purposes of Verification

The verification of arms control agreements may be said to have three distinct purposes:

First, verification serves to detect violations of an agreement (or to provide evidence that violations may have occurred), and hence to furnish, as far as is possible, timely warning of any threat to the nation's security arising under a treaty regime.

Second, by increasing the risk of detection and complicating any scheme of evasion, verification helps to deter violations of an agreement. The deterrent value of verification depends to a considerable extent on a potential violator being ignorant of the exact capability of the intelligence techniques used to monitor his compliance with an agreement—a fact which helps to explain the importance of secrecy regarding many of these techniques.

Third, verification serves to build domestic and international confidence in the viability of an arms control agree-

ment. By providing evidence that the parties to an agreement are in fact fulfilling the obligations they have assumed, verification contributes to mutual trust among the parties, and helps to create a political environment necessary for further progress in arms control. At the same time, it provides an important safeguard against wishful illusions, and against possible manipulation of an atmosphere of trust in the pursuit of unilateral advantage.

Why Is Verification Necessary?

That the question of verification arises primarily in the case of treaties and agreements related to arms control is not accidental. In some types of international agreements, such as tariff and boundary accords, the fulfillment or non-fulfillment of the obligations assumed is obvious to all concerned. In other types of agreements, such as treaties of alliance, obligations are undertaken with a view to future contingencies, and the intentions and likely behavior of the parties involved must be inferred from the nature of their commitments. Arms control agreements seek to regulate deeds rather than intentions; yet the performance or non-performance of those deeds is rarely self-evident.

That this is so is not surprising. A nation's armaments are an important guarantor of its security, and governments have always sought to deny to potential adversaries precise information regarding the numbers, quality, and disposition of their weapons and armed forces. Moreover, any arms program that is deliberately in violation of an arms control agreement is likely to involve a special effort to conceal the fact (or at least the extent) of the violation. Verification of arms limitation agreements is necessary because the information required to ascertain compliance will probably not normally be available—and because a nation cannot afford to rely for its own security on trust alone.

Verification and Intelligence

Reliable information regarding the armaments of potential adversaries is an essential element in the planning of a nation's military policy and in the conduct of its foreign relations. A considerable part of what currently goes under the name of verification consists of the application of modern intelligence techniques to matters that are regulated by international agreement. For the very reason that verification and intelligence are so intimately connected, however, it is important to emphasize the differences between them.

What distinguishes verification from arms-related intelligence most of all is its method or approach. While the chief mission of military intelligence is to determine the characteristics and activities of an opponent's weapons and forces, verification must assess whether those characteristics or activities exceed the limitations imposed by an agreement. Accordingly, the task of verification can be more demanding than that of traditional intelligence. Verification must attempt to prove a negative—that certain activities prohibited by treaty are in fact *not* taking place; and in order to do this it has to ask questions which traditional intelligence does not always ask. In verification, it is necessary to pay attention, for example, not only to military deployment and testing areas normally used by the other parties, but also to areas which *could* be so used. Verification must take its bearings—if only for purposes of analysis—from the possibility that the other parties to an agreement may deliberately violate its provisions; and it must work on the assumption that deliberate violations of an agreement would be accompanied by a concerted effort to conceal them.

A further and related point is that verification must be concerned with whatever might be in violation of an agreement, and not only with what is of immediate or direct military significance. Indeed, violations of slight military importance—unless they appear unintentional, and are corrected when discovered—may deserve particular attention. For a determination to act intentionally in violation of an

agreement, even where the transgression confers no significant advantage, could reflect a determination to violate more important provisions as well. Such violations might represent an attempt to test an adversary's resolve—or his verification capabilities. They could signal a decision to violate the agreement in related but more significant areas. Or they could be the only available indication of a large-scale program of covert violations.

It is one of the paradoxes of arms control that the verification of limitations on armaments may require *better* intelligence than would be needed to monitor those armaments in the absence of an agreement. This is so in part for the reasons just mentioned, and in part because it is likely to be more difficult to respond to violations of an existing arms control agreement than to react to military activities of a similar kind undertaken in the absence of an agreement. An adequate response to such violations might well necessitate withdrawal from the agreement—a step that could have wider political and military repercussions. Hence, the evidence indicating that violations are occurring will have to be of a higher quality than the evidence needed to react to comparable actions by an adversary without an agreement.

“Monitoring”—that is, the collection and evaluation of data pertaining to an arms control agreement—is sometimes distinguished from “verification” proper, or the determination of whether violations have actually occurred. Both activities may be regarded as part of the verification process in a broader sense. In any event, the collection of intelligence data pertaining to an arms control agreement is only the initial stage in the verification process. Once the relevant data have been assembled, it is then necessary to evaluate them with a view to the provisions of the agreement, and to marshal evidence of possible noncompliance. In a further stage, the evidence thus presented serves as the basis for determining whether violations have in fact occurred. This determination is rarely an automatic one, since evidence of violations can usually be interpreted in a variety of ways; it is a matter requiring judgment and decision at the political level. The stages of the verification process bear a certain

resemblance to the phases of a judicial proceeding: investigation, which may lead to indictment, which results in judgment of guilt or innocence.

When is Verification Adequate?

If nations of comparable strength freely contract mutual limitations on their armaments, they do so because each believes its net interests are better served by an agreement than by the absence of one. Also, the historical record shows that a great many such agreements have been observed. Nevertheless, the possibility remains that a nation might attempt to gain unilateral advantage through violating an agreement it has made. Where standards for verification are set too low, violations of this sort may be invited, and the constraints exercised by an agreement may become a liability for the side that commits itself to observe them.

Conceivably, violations of an arms control agreement could be relatively open, and calculated to achieve marginal (or even significant) gains by imposing on the good will of the other side or its political investment in the agreement. In most cases, however, it can be assumed that a potential violator would want to avoid detection as long as possible, and hence that deliberate violations on a significant scale would be accompanied by a commensurate effort at concealment or deception. The possibility of such deception poses something of a dilemma for arms control verification. Methods that are capable of monitoring treaty compliance under most circumstances might be unable to detect in time an elaborate, costly and ingenious program of concealed violations. And yet to insist on standards of verification that would serve to frustrate such a scheme in all cases is to insist on the impossible. If verification standards are set too high—if, for example, one side were to demand the right to station observers at every installation in another's territory capable of concealing a prohibited weapon—agreement will be pre-

cluded, and the possible benefits deriving from a treaty will be lost.

The question that must be asked, then, is not whether verification is or can be perfect, but whether it is adequate. If we are to obligate ourselves to an arms control agreement, we must be assured that its verifiability is adequate, on balance and for practical purposes, to safeguard our essential security interests.

In attempting to decide whether a prospective agreement is adequately verifiable, a number of factors have to be taken into account. It is necessary first of all to consider the other parties. Different standards will obtain in treaties between friendly nations than in treaties between actual or potential adversaries. That the United States, Great Britain, and Japan were largely indifferent to verification of the naval agreements concluded between them in 1922 is in part explained by the fact of past alliance or association.

Of equal importance in determining the adequacy of verification is the degree of risk posed by possible violations. Greater uncertainties may be tolerated in the verification of an agreement where violations would not create a substantial military or political threat. The Biological Weapons Convention of 1972 is a case in point. Its prohibitions on the development, production or stockpiling of biological weapons are difficult to verify, particularly in countries with relatively closed societies. On the other hand, the utility of such weapons is at best questionable; their effects are unpredictable and would be hard to control, and possession of them would not significantly affect the military balance between nuclear powers or provide a political advantage. Accordingly, the agreement was judged to be in the interests of the United States in spite of the difficulties of verification, and was ratified in the Senate by an overwhelming margin.

A further consideration is the relative ease or difficulty of responding to possible violations. It is easier to complain of a violation if the evidence substantiating it is based on direct observation than if it is based on inference. If violations of an agreement could be readily detected and yet could never be challenged because of the nature or the source of the

evidence involved, verification would lose much of its deterrent value, and the verifiability of the agreement might have to be judged inadequate.

Much will depend, then, on an assessment of the past record of the other parties, and of the current state of our relations with them. Much will depend on the risk posed by violations, and on our ability to counter them. Much will also depend on our own foreign policy choices. Beyond their direct contribution to national security, arms control agreements can serve to enhance a friendship or to initiate one, to moderate an adversary relationship or to ease international tensions. The political benefits that a treaty brings may serve to compensate for lessened verifiability, provided a precedent is not created which could compromise verification requirements in other areas of arms control.

VERIFICATION AND ARMS CONTROL IN THE NUCLEAR AREA

With the advent of the atomic bomb, the vast increase in the destructive power of weapons of war made it imperative to seek international agreement on the limitation and reduction of arms. And yet the relative ease of concealing nuclear devices, together with the swiftness of nuclear attack and the difficulty of defending against it in a period of rapid development in aircraft and ballistic missile technology, promised to make effective verification of such an agreement both difficult and necessary.

The Baruch Plan and International Inspection

The first American proposal for the control of nuclear weapons, the Baruch Plan (presented to the United Nations Atomic Energy Commission in June 1946), sought an international agreement that would prevent any nation from acquiring or owning the new weapons. It called for direct international ownership and supervision of the production of nuclear materials, and proposed a continuing system of inspection to guard against the illicit production and stockpiling of nuclear weapons. Though endorsed by a large majority of U.N. members, the plan foundered on the opposition of the Soviet Union. The Soviet Government objected to the extent of its provisions on inspection and control, and Soviet counterproposals were regarded by the United States and other nations as wholly inadequate for verification purposes.

In subsequent negotiations, it was to be the American

position that effective verification of a comprehensive disarmament treaty must require some form of inspection on the national territory of the parties. Yet the Soviet Government increasingly refused to consider suggestions of this kind, or else hedged them with restrictions that were unacceptable to the West. Accordingly, an impasse arose. Though agreement was eventually reached on a range of arms control measures, fundamental differences between the United States and the Soviet Union regarding the proper role of verification have persisted to the present day.

Verification and Secrecy

Whether the Soviet addiction to secrecy is entirely traceable to the nature of the Soviet regime is uncertain. Foreign observers of Russia under the Czars noted the existence of practices that strikingly resemble those employed in Communist Russia today to protect information—often of the most routine kind—from public exposure. In any event, the Soviet Government has always displayed an extreme sensitivity towards efforts by foreigners (and indeed by its own citizens) to inform themselves of matters connected in any way with its military capabilities.

This attitude has strongly affected the Soviet approach to arms control. The Soviets have acknowledged that a system of international inspection would be appropriate for verifying an agreement on general and complete disarmament. But they have usually taken the position that verifying a less comprehensive and more readily attainable agreement by methods of this sort is merely an invitation to espionage, and for this reason have rejected nearly every proposal that would permit foreign inspectors or observers on Soviet soil. It was for some time the characteristic Soviet position that compliance with an arms control agreement should be assumed primarily on trust.

The risks in an agreement based on trust would obviously be far greater for the United States and its allies than for the

Soviet Union. In the United States and in other open societies, much military and technical information is publicly available, and much more can be inferred from unclassified sources. Moreover, it is unlikely that violations of an international treaty by a democratic government could long be kept secret. But these inhibitions are absent, or are less effective, in totalitarian societies, with their minute and unremitting controls on information. It is primarily for this reason that the United States has often had to insist on more stringent requirements for the verification of arms control agreements than those favored by or acceptable to the Soviet Government.

Still, it would be wrong to think that the Soviets are completely blind to the disadvantages of secrecy. A military capability of which no one is aware is admirably suited for repelling an attack; but it is useless for deterring one. Moreover, uncertainty as to the extent of an adversary's strength encourages apprehension—particularly when coupled (as in the case of Soviet encouragement in the late 1950's of the Western belief in a "missile gap") with attempts to exploit that uncertainty; and apprehension can lead to accelerated arms programs (as the Soviets were to learn in the early 1960's). Where the intentions of the other party are in doubt, or are assumed to be unfriendly, secrecy has a destabilizing effect on the military balance. The progress of arms control in recent years provides evidence that the Soviets have begun to recognize this fact.

Breaking the Impasse: From Adversary Inspection to the Limited Test Ban Treaty

By 1955, both the United States and the Soviet Union had come to acknowledge that it would be extremely difficult to verify any accounting for the nuclear weapons and materials already produced, and hence that the complete elimination of such weapons was not a practicable goal for the foreseeable future. Accordingly, attention began to focus on

the possibilities of partial disarmament and measures that would facilitate it (such as a ban on nuclear testing), and on steps to avert the danger of surprise attack.

The Open Skies Plan, proposed by President Eisenhower at the Geneva conference of that year, called for inspection of United States and Soviet territory by aircraft of the other side as a warning system against surprise attack. By providing for inspection on a bilateral or "adversary" basis rather than under the auspices of an international body, this proposal (though itself rejected) set an important precedent—a precedent soon utilized in the 18-nation Antarctic Treaty of 1959. Under the terms of this treaty, all parties—including the Soviet Union—agreed to open their installations on that continent to inspection by any of the other signatory nations.

In the summer of 1958, technical experts from the West and the Soviet bloc met in Geneva to discuss the feasibility of methods for verifying a complete ban on nuclear testing. The conference concluded that such a ban could be effectively verified by existing techniques of seismic monitoring (supplemented by on-site inspections in cases of ambiguity), and it recommended the establishment under international authority of a network of monitoring posts both in the territory of the nuclear powers and in conveniently situated third countries. Later in the same year, a similar conference of experts gathered in Geneva to consider possible techniques for monitoring military deployments in order to detect preparations for surprise attack. In the course of this conference, the Soviet Union proposed, in connection with measures to reduce foreign forces and establish a denuclearized zone in Central Europe, a warning system involving aerial reconnaissance as well as ground observation posts along the East-West border. It was also at this time that the technical possibilities of photographic and radar reconnaissance by orbiting space satellites were first explored.

Though these conferences did not produce immediate results at the political level, they prepared the way for a rethinking of the verification problem. In September 1961, after several years of fruitless effort to negotiate a comprehensive test ban involving on-site inspections and an inter-

national system of verification, the United States and Great Britain broke with earlier policy and proposed a ban on atmospheric nuclear tests that would be monitored solely by "existing means of detection." Soviet acceptance in principle was soon forthcoming. The inadequacy of techniques for monitoring underground tests at long range prevented negotiation of a comprehensive ban, but agreement was eventually reached on a ban on nuclear testing in the atmosphere, under water, and in outer space. The Limited Test Ban Treaty of 1963, which relied for the monitoring of compliance solely on what came to be called "national technical means" of verification, marked an important step in the post-war history of arms control.

Technical Verification and the Commitment to SALT

The United States Government was, by 1963, fully confident of its ability to detect violations of a ban on all forms of nuclear testing other than underground testing. It was much less sure, however, that an agreement limiting military forces—whether conventional or nuclear—could be verified adequately by existing methods of detection. But continued improvement in our monitoring techniques, and particularly in our ability to observe deployments of strategic forces, soon made it appear that an agreement limiting certain categories of strategic weapons might well be sufficiently verifiable by our technical means alone. At the same time, it was recognized that verification of limitations on strategic weapons would present greater difficulties and involve greater risks than verification of the Limited Test Ban Treaty. Only after an extended policy review was a decision taken, in 1967, to pursue with the Soviet Government the possibilities for an agreement on strategic arms placing reliance on national technical means.

The Strategic Arms Limitation Talks (SALT) began in November 1969. The Interim Agreement on Strategic Of-

ensive Arms and the Treaty on the Limitation of Anti-Ballistic Missile Systems, signed in May of 1972, were the outcome of the first phase of SALT. These agreements were the first arms control agreements to make explicit provision for verification by national technical means. Under Article XII of the ABM Treaty and Article V of the Interim Agreement, each party agreed to use for the purposes of assuring compliance "national technical means at its disposal in a manner consistent with generally recognized principles of international law." What is more, each party undertook not to interfere with the means of verification of the other, or "to use deliberate concealment measures which impede verification by national technical means." These provisions represented an important step forward. By pledging not to interfere with or to impede the monitoring activities of the other party, the Soviet Government showed that it was ready to temper its traditional preference for secrecy—in an area of the greatest sensitivity and importance for both sides—in order to satisfy the verification requirements of the United States.

METHODS OF VERIFICATION

A variety of methods and procedures may be employed in the verification of arms control agreements. What type or combination of methods is used depends on the character of the restrictions agreed to and the estimated importance of possible violations; and a judgment as to the political benefits and liabilities of a particular kind of verification may also be involved. At the same time, the nature of the agreements concluded by the United States in recent years has itself been greatly influenced by the technical and political possibilities of verification. Indeed, the need to insure adequate verification is one of the principal factors limiting the progress of arms control today.

National Technical Means

The scientific and technical discoveries that have revolutionized warfare in the nuclear age have been accompanied by important advances in the technologies available for arms control verification. These technologies include photographic, radar and electronic surveillance capabilities, seismic instrumentation to supply information on the location and magnitude of underground nuclear explosions, air sampling systems of high sensitivity, and advanced techniques for the analysis and evaluation of the data collected.

Verification by "national technical means"—by sophisticated methods of data collection which do not operate from installations in the territory of the parties being monitored—has a number of important advantages. It does not compel the formal acceptance of a foreign presence by the other parties to an agreement. It does not require elaborate stipu-

lations for reciprocity, or for balanced and equitable participation in an inspection system, or for ensuring the independence and effectiveness of observer teams. Because national technical means are unilaterally controlled, the data they provide are reliable and readily accessible. And national technical means can be flexibly deployed in response to changing security requirements, and in accordance with the most recent technological improvements.

Technical verification, like other forms of verification, is subject to definite limits. For example, the number of reentry vehicles contained in a missile cannot be reliably determined except through observation of test firings. But improvements in technical methods of verification have greatly broadened the range of possible agreements; and further improvements may open up further possibilities for arms control. It is, of course, equally important that we maintain our present capabilities. Many of the technical systems that contribute importantly to the monitoring of current agreements—and that could be valuable in verifying future agreements on strategic arms and nuclear testing—are located in other countries, and their continued availability should be a matter of concern.

Inspection and On-Site Monitoring

“Negotiated inspection measures” (as they are sometimes called) are arrangements providing for access to the territory or to facilities in the control of the parties to an agreement. Such access may involve mobile inspection teams, fixed posts manned by observers, or unmanned monitoring instruments equipped with devices to prevent tampering. It may be permitted either on an *ad hoc* or a continuing basis, and its scope may vary from the authentication of certain limited and well-defined acts to a relatively free-ranging investigation of whatever the inspectors themselves might judge relevant to verification. Finally, inspections may be conducted by representatives of other parties to the agree-

ment on an "adversary" basis, or by representatives of an international organization.

While the Soviet Union has been unwilling thus far to permit inspection of its own territory, it has joined with the United States and other countries in a series of multilateral treaties which make provision for the inspection of facilities (including Soviet facilities) outside the territory of the parties. The Antarctic Treaty (1959), which forbids military activity of any kind on the continent of Antarctica, permits inspection of facilities there by any of the parties; the Outer Space Treaty (1967), which forbids the testing or deployment of weapons of mass destruction or the establishment of military bases in outer space, provides for inspection of any installations on the moon or other celestial bodies; and the Seabed Arms Control Treaty (1971), which prohibits the emplacement of weapons of mass destruction on or beneath the ocean floor, provides for observation and (where necessary) inspection of activities undertaken there by any of the parties. Under the terms of these treaties, inspections may be carried out by any of the parties at its own discretion. Several other agreements—most notably, the Treaty on the Non-Proliferation of Nuclear Weapons (1968)—provide for inspection on a continuing basis by an international body.

In estimating the role of inspection measures in future arms control agreements, it is important to distinguish between the symbolic or political value of such measures and their actual value for verification. Under the kind of conditions likely to be negotiable in the foreseeable future, inspection teams may lack the freedom necessary for discovering or observing violations of a serious nature. Mobile inspection can be frustrated and obstructed in a variety of ways, and its value is likely to consist primarily in providing evidence of obstructive activities that may be designed to conceal violations rather than in supplying evidence of the violations themselves. Other forms of on-site monitoring—particularly fixed posts for observing military movements—are likely to prove more useful in verifying certain kinds of agreements. Future progress in some areas of arms control may well depend on a greater readiness on the part of other

nations to consider arrangements of this kind. At the same time, their role will remain limited, and they should be regarded primarily as a supplement to national technical means.

Information Exchange

A third category of verification methods involves procedures which are neither wholly unilateral nor wholly cooperative. These are procedures that do not require access to the territory of the other parties to an agreement, but do require the other parties to furnish certain kinds of information.

In 1974, the United States and the Soviet Union signed an agreement (the Threshold Test Ban Treaty) limiting the yield of underground nuclear tests. A protocol to this treaty provides for the exchange of specified technical data as an aid to verification by national technical means. Information to be exchanged includes the precise location of testing areas and various geological data regarding these areas; and, for calibration purposes, the parties are to exchange precise information—yield, date, time, and depth—on two nuclear tests. An analogous method currently being explored is the analysis of economic data that bear on military budgeting practices.

For obvious reasons, it would be imprudent to place sole reliance on information supplied by the parties whose activities are being monitored. Still, the cooperation involved in such exchanges establishes an important precedent, and the information itself can be expected to provide a useful check on data obtained through other verification channels.

International Organizations

Certain kinds of arms control agreements are best monitored by a system of verification that is international in

character. The most important agreement of this kind concluded to date is the Non-Proliferation Treaty of 1968. Many nations have an economic interest in the development of nuclear energy for peaceful purposes, and yet wish to prevent the acquisition of a nuclear weapons capability by nations that do not now possess it. The Non-Proliferation Treaty requires nonnuclear states that are parties to it to accept a set of safeguards on peaceful nuclear materials, including periodic inspections and audits, to discourage their diversion to military purposes. These safeguards must be directly negotiated with and are administered by the International Atomic Energy Agency (IAEA), an organization operating under the auspices of the United Nations. Safeguards are not required under the Treaty for nations already possessing nuclear weapons; but the United States, to allay any lingering concerns among nonnuclear states that they might incur commercial disadvantages by accepting IAEA safeguards, volunteered to accept IAEA inspection of all its nuclear activities except those with direct national security significance.

The 1967 treaty providing for a nuclear weapons-free zone in Latin America has similar arrangements with the IAEA for the regulation of peaceful nuclear activities. In addition, "to ensure compliance with the obligations of this Treaty," the contracting parties established a regional organization with extensive structure and functions, the Agency for the Prohibition of Nuclear Weapons in Latin America. In countries where the treaty has come into force (it is not yet ratified or in effect for several of the signatory nations), the agency is empowered to make special inspections on the request of any party when a violation is suspected, and the parties undertake to grant "full and free access to all places and all information" necessary for verification.

Verification by international organizations may have an important role to play in a variety of multilateral arms control agreements in the future. At the same time, it is necessary to bear in mind the limitations inherent in verification of this kind. While it is true that charges of violations brought by an international body are likely to carry greater

weight in the world community than allegations made by adversaries, it is also true that an international body may encounter internal, politically motivated opposition to seeking out evidence of violations, or to reaching a formal verdict concerning evidence that may actually be discovered. Such organizations are also likely to be deficient in staffs and funding, as well as in the advanced and sensitive technologies required for verifying many kinds of agreements.

VERIFIABILITY

To say that the United States will only enter into arms control agreements that it considers adequately verifiable is to raise a series of questions. How good are our verification techniques? To what extent are arms control agreements in fact verifiable? To what extent must agreements be verifiable in order to be compatible with our security?

A Misconception About Verifiability

There is a widely held view that verifiability is a question of black and white—that an arms control agreement either is verifiable simply, or else not at all. Actually, verifiability is more nearly a question of shades of gray. Apart from a very few cases—a ban on large ships in a circumscribed ocean area, for example, or a ban on above-ground testing of nuclear devices with a large yield—no agreed limitations on modern weapons can be verifiable with total certainty through present techniques of verification, or indeed through any practicable techniques that can now be imagined. Given a determination to violate an agreement and to brave the consequences of possible detection, and given sufficient expenditure of resources and time and sufficient ingenuity, the most determined verification effort could probably be frustrated or evaded to some extent.

This should not be taken to mean that violations will necessarily occur, or even that they are likely to occur. Nor does it mean that arms control agreements which the United States has made or is likely to make are not adequately verifiable. It is only to say that perfect intelligence is no

more available for verification purposes than it would be in a world without arms control treaties. Judgments of verifiability are relative rather than absolute, and they require a balancing of considerations of different kinds.

In estimating the verifiability of a given arms control agreement, it is necessary to take into account both the capacity of existing detection systems and the ability of the other side to evade detection if it should choose to do so. While an agreement might be relatively difficult to monitor with the techniques at our disposal, this fact alone need not disqualify it. If violations are likely to involve high risks or heavy expenditures with little prospect of a commensurate advantage, such an agreement could well be considered adequately verifiable.

Similarly, an agreement limiting certain kinds of arms might be relatively easy to monitor given the practices and operating procedures currently in use by the other side. Yet if those practices or procedures could be easily altered (or substitutes devised) in ways that could substantially facilitate violations, such an agreement might be considered inadequately verifiable. If, for example, the presence of a certain kind of missile can be reliably detected by observation of a particular type of transport vehicle usually associated with it, an assessment of verifiability would require considering how easily other vehicles could be adapted to the same purpose.

Evaluating our verification capability requires consideration of a number of factors, of which timeliness is perhaps the most critical. Timely intelligence is frequently as important as accurate intelligence, during peacetime no less than in war; timely assessment of treaty compliance can be essential, particularly in cases where treaty violations could be the initial step in an effort to obtain a significant military advantage, or could constitute an immediate military threat. If assessing compliance with a particular agreement would require a prolonged period spent in collecting, analyzing and evaluating the relevant data, the agreement might have to be considered inadequately verifiable.

Agreements and What They Limit

Arms control agreements may impose a variety of restrictions, some of which tend to be more easily verifiable than others. Generally speaking, bans are more easily verified than numerical limits. A ban on any deployment of mobile missiles, for example, would be easier to verify than a limit on the number that may be deployed: observation of a single missile would be sufficient evidence that the ban had been violated, while some uncertainty as to the number actually deployed would always remain. A ban on research connected with a particular type of weapon is much more difficult to verify than a ban on its testing.

The characteristics of the weapons or forces to be constrained are of course central to the determination of verifiability. Though generalizations are hazardous, some rough rules will be found to apply in most cases. Objects that are large and stationary (for example, underground silos for ballistic missiles) are easier to count and keep track of than objects that are small and mobile (for example, soldiers). Since nuclear bombs and missiles are relatively small and relatively mobile, agreements designed to limit strategic weapons have focused not on bombs and missiles themselves but on the platforms and launchers—the silos, submarines, and heavy bombers—required to deliver them.

Agreements restricting the quality or technical characteristics of weapons rather than their quantity are as a rule more difficult to verify. A numerical limit on anti-ballistic missile (ABM) complexes, for example, is easier to verify than a prohibition on improving air defense systems in order to give them an ABM capability. Similarly, a limitation on the number of strategic launchers is easier to monitor than a limitation on the type of warhead permitted for those launchers.

A related difficulty is created by weapons which are not constrained by an arms control agreement, yet which share (or could be modified to share) certain characteristics of the weapons one is seeking to limit. Tactical weapons which have or could have a strategic capability—or which bear

external resemblances to strategic weapons—pose a problem for the verification of limitations on strategic weapons. They could serve to mask violations, or they could raise questions regarding compliance even in the absence of violations.

Inference and Observation

In some cases, verification may depend on inference as well as on direct observation. When the presence or absence of a certain type of weapon cannot be detected by direct observation, much can often be learned from the military support facilities and maintenance equipment generally associated with it. But whether or to what extent inferences drawn from such facilities or equipment can serve as a criterion of verifiability is a difficult question. It is sometimes hard to know whether the use of a certain kind of equipment is a matter of necessity, convenience, or mere habit. Moreover, to rely on inferences of this sort is to be at a disadvantage in challenging possible violations, since alterations in the equipment used might not itself constitute an illegal act.

In the case of agreements which are difficult to verify by direct observation alone, verifiability may sometimes be improved by the negotiation of specific constraints on the facilities, equipment or procedures to be employed in connection with a particular type of weapon. In the ABM Treaty, for example, the United States and the Soviet Union agreed, in order to "enhance assurance of the effectiveness of the limitations on ABM systems," not to deploy in the future radars for early warning of missile attack except at locations along the periphery of their territories and looking outward. The purpose of this provision is to ensure that radars used for early warning do not form an integral part of an anti-ballistic missile capability.

Another class of constraints is one that could provide advanced warning of an intent to obtain important military capabilities prohibited by treaty. In the ABM Treaty, for

example, the development and testing of a mobile land-based ABM system is prohibited. Without this constraint, it would be legally possible to construct large numbers of systems which could be illegally deployed in a relatively short time.

While many negotiated constraints can prove useful, restrictions affecting aspects of a weapons system that may be only peripherally related to its essential function may have only limited effectiveness. Technology can work in unexpected ways; the further removed the constraint from the function it is intended to constrain, the more likely it is that technical advances will make the constraint ineffective.

Evaluating Verifiability

To what extent an arms control agreement is verifiable is a question that depends largely on technical factors. Whether an agreement is sufficiently verifiable to justify committing ourselves to it is a matter of military and political judgment. It is essential, for example, that assessments of verifiability incorporate an estimate of the *potentialities* for violation; but assessments of this kind should not be understood to include an estimate of the *likelihood* of violation. How easily another party could cheat if it decided to do so is one question. Whether it is likely to make that decision is another question, and one that cannot be resolved by the essentially technical process of determining verifiability.

A judgment of verifiability is a judgment as to the relative difficulty of violations and the prospects of detecting them should they occur. A judgment as to the intentions of another party is part of an essentially political assessment—an evaluation of whether the verifiability of an agreement is adequate to safeguard our security. While technical judgments of verifiability properly belong to experts in verification intelligence, judgments regarding the adequacy of verification are the province of those responsible for directing national policy. Verifiability is one of the considerations that enter into an evaluation of the overall merit of an arms

control agreement; as was pointed out earlier, it is not the only one. Possibly the most difficult and the most critical aspect of the verification process is ensuring that the technical facts of verifiability are properly conveyed to those who must assess them in the light of the political facts of life in the nuclear age.

VERIFICATION, NONCOMPLIANCE AND RESPONSE

To think seriously about the possibility of violations of an arms control agreement is not necessarily to question the motives or good faith of the other parties, nor does it demonstrate pessimism regarding the future of arms control. Questions of compliance may arise from actions that are entirely innocent; and, no matter how carefully drafted an agreement may be, differing interpretations can arise. At the same time, however, history is not without examples of nations that have deliberately violated international agreements when it seemed in their interest to do so, and it is the part of prudence to recognize and be prepared to deal with this eventuality.

The Types of Possible Violations

Violation or infringement of an arms control agreement might take a variety of forms. Violations could be local in character—the result of accident, oversight, or the unauthorized action of a military commander; they could be deliberate and yet limited—the result of a misunderstanding, or of a conscious attempt to stretch or test the bounds of a treaty; or they could be deliberate and massive, and intended to achieve a significant military or political advantage.

Massive violations, while obviously the most serious, could be difficult to detect, since cheating on a large scale would presumably be accompanied by a program of deception commensurate with it. For certain agreements, unambiguous evidence of massive violations might not become available for some period of time; and any evidence that

was available could be mistaken for evidence of local or limited violations.

While the possibility of massive violations cannot be safely ignored, it is more likely that violations would occur at the margins of a treaty. Violations of this kind might not possess great military significance, and they might arise merely through misunderstanding of the treaty itself or of the sensitivities of other parties. On the other hand, there is always a danger that a party might attempt to capitalize on its adversaries' investment in an agreement, in an effort to gain increments of military or political advantage at a minimum of risk. Such violations would raise serious questions. To overlook them would be to set a precedent for further probing and more serious violations; and they could lead to doubts as to the good faith of the party—doubts that would necessarily affect the course of arms control efforts in the future.

Verification and Response

Detecting violations of an arms control agreement is not enough. What serves to deter a potential violator is not so much the risk of detection as fear of the political and military consequences of detection once it happens. If a potential violator expects that the reaction of the injured party or of the world at large will be severe enough to outweigh the benefits gained through violating an agreement, violations will be effectively deterred. But if that reaction can be weakened, or its effect neutralized, the violator could enjoy the fruits of illegal action without paying the penalty of exposure. This is to defeat the very purpose of verification.

Finding the proper response to suspected violations can be a delicate and difficult task. To invoke sanctions against a nation which fails to comply with its international obligations is an eminently political act, and one that is necessarily influenced by political considerations. But the political dimension of response involves certain hazards. Some governments might feel compelled to react to evidence of violations

with excessive harshness, if pressed to do so by public opinion or by a threatening international situation. Based on historical assessments of arms control agreements prior to World War II, some have expressed concern that at a future time reaction to arms control violations might be inhibited. According to this concern, responsible officials might feel it advisable not to react to evidence of violations if they found limited violations preferable to the consequences of an open arms race, or if they feared that domestic opinion would not support the necessary increase in arms budgets.

There is also a danger that assumptions about domestic or international politics may influence interpretations of the evidence on which a decision to respond is based. Assumptions of this kind could lead those responsible for analyzing verification data to see evidence of violations where none really exists, or to minimize the significance of any evidence that is available. For those who must grapple with the dilemmas of response, nothing is more essential than an objective assessment of what may be complex, incomplete or ambiguous evidence. Fortunately for the United States, the openness of our governmental process, together with the traditional independence and professionalism of the organizations concerned with verification intelligence, serve to promote the required objectivity.

The Dilemmas of Response

In deciding how to respond to a suspected violation, a number of factors have to be taken into account. It would be necessary to consider, in the first place, the quality of the evidence available. Is the evidence sufficient to establish with reasonable certainty that a violation has taken place, or can it only show that a violation has probably or possibly occurred? Also, even if verification analysts are convinced that a violation has certainly occurred, is the evidence clear enough to convince political leaders, the public, allied governments and neutral opinion—or some or any of these?

In addition, the source of the evidence has to be taken into account. Can we afford to publicize evidence—or even the

fact that we possess evidence—gathered by intelligence techniques that could be seriously compromised if their precise capabilities became known?

A further consideration would be the scope and magnitude of the suspected violation. Does the violation materially affect our security, and if so, how serious is the risk it poses?

In evaluating the risk a violation may involve, it would also be necessary to evaluate its purpose. What is the intention of the party committing the violation? Is it an isolated event, or part of a larger strategy with wide international implications?

Finally, any decision would have to be carefully tailored not only to the facts of the case but to the objectives of national policy. Accordingly, it would be necessary to estimate the likely impact of any response on the violating party and on the international community generally.

The central dilemma of response is the problem of ambiguous evidence. If we react to any evidence of violations no matter how ambiguous, we may put ourselves in the position of alleging violations which in fact never occurred. A false challenge may seem like a provocation; a large number of such challenges may needlessly undermine public confidence in an agreement, and can be expected to have a disruptive effect on our relations with the party challenged. In addition, it risks disclosing valuable information about our verification capabilities, and it could impair the credibility of challenges that are backed by more solid evidence. Particularly if our response is to be a severe one, then, we must take care that the evidence is adequate to support it.

On the other hand, our threshold of response must be low enough to demonstrate our determination to resist any encroachment on treaty obligations. To tolerate violations—even where the evidence for them is less than conclusive—is to risk weakening public confidence not only in a single agreement but in the entire enterprise of arms control. And since in some cases there may never be better than ambiguous evidence of violations, it may be necessary to run the risk of false challenge if there is to be a response at all.

The Modes of Response

If some element of ambiguity is likely to be present in the evidence available for many kinds of violations, it is nevertheless possible to reduce its impact. Discussion of compliance questions with the party involved may lead to changes that serve to alleviate our concern. In 1972, in accordance with the provisions of the SALT I agreements, the United States and the Soviet Union established a Standing Consultative Commission (SCC) for the purpose of promoting and implementing the objectives of those agreements. In this regard, the SCC is empowered to "consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous." The SCC thus serves as a useful forum for raising and clarifying ambiguities connected with verification of the SALT accords, and provides a mechanism by which the parties can avoid the disruptive consequences of more public forms of response.

A number of other agreements also contain provisions for settling disputes relative to compliance. The Seabed Arms Control Treaty provides that, if observation of the activities of one of the parties raises doubts about the fulfillment of its obligations, other parties shall be entitled to consult and cooperate on further verification procedures. Where serious questions of compliance remain, the matter may be referred to the Security Council of the United Nations for appropriate action.

Request for clarification is one possible response when there is ambiguous evidence of a violation, and it will usually be the initial response. If satisfaction is not forthcoming, or in cases where the evidence is relatively clear, a variety of responses may be considered. These range from diplomatic protests of varying degrees of intensity to public requests that an action be discontinued or reversed, notification that compensatory action will be taken, various kinds of military measures, and—as a last resort—denunciation of and withdrawal from the agreement. A policy of firm response at the appropriate level can help to ensure the effectiveness of our verification effort—and of the arms control agreements which verification is designed to safeguard.

CONCLUSION

We live in an age which is characterized by vast and growing potentialities for destruction. Arms control offers a means of lessening the dangers that face us. But if arms control is not to prove an illusory enterprise, the agreements we make must be capable of adequate verification.

This is not to say that verification should be expected to satisfy all doubts or remove every uncertainty. There is no easy way to guarantee peace and security in an uncertain world. The dangers of a continued competition in armaments make it imperative to explore the alternative of agreed restraints; but they should not lead us to imagine that such an alternative can be realized without effort and without risk. New and more comprehensive arms control agreements are likely to pose greater challenges to our verification capabilities. But these are challenges we should be prepared to accept. If the uncertainties of the future are real, the opportunities for arms control are also real. We cannot afford to neglect them.

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