Chapter 3. The politics of verification

I. Introduction

While the development of the remarkable technological monitoring capabilities described in the previous chapter has solved many problems in arms control verification, the most serious problems remain the political ones. In this area progress has been slow, erratic and ambiguous. The gap between technical capabilities and political will has consequently grown very wide, and while progress in technique is essentially unidirectional (a technical problem once solved is never unsolved), political 'progress' can change direction rapidly; *détente* can become confrontation almost overnight.

The politics of verification is intimately connected to the politics of arms control, which in turn cannot be separated from the politics of national security. These intimate connections make any attempt to single out verification risky and somewhat misleading. Nevertheless there do exist a few well-defined political issues which focus on problems of compliance and verifiability in arms control agreements, and it is worthwhile to identify these, as long as it is kept in mind that verification is not an end in itself, but only a small part of the total political relationship between states. This means that it is far more likely that political attitudes towards verification will be affected by political shifts in other areas than that progress in the verification area will be the cause of more sweeping changes in the political atmosphere.

This chapter first considers the two main protagonists in the arms race, the USA and the USSR, and examines their political actions and positions with respect to verification. Then an attempt is made to identify the roots of these actions in the domestic political situations of the two states. Next, the very considerable contributions of other states to the question of verification are examined and the political positions of such 'third parties' analysed. Finally, an attempt is made to analyse the subtle concepts of 'adequacy' in verification and 'trust' between parties to a treaty. Both of these concepts are fundamental to the problem of verification and both are of an essentially political or subjective nature, ensuring that they will be interpreted in widely divergent ways by groups with different interests and perceptions. The existence of such subjective concepts at the core of the verification problem, a core virtually

impenetrable by technology, is the basic cause of most of the frustration and misunderstanding this problem has created.

II. The USA and the USSR as international actors

The United States and the Soviet Union have been discussing arms control with each other in bilateral, multilateral and international contexts for over 40 years. If one focuses only on the official records of these negotiations it is easy to conclude that the problem of ensuring compliance with agreements has been by far the most important obstacle to progress in meaningful arms control or towards disarmament.

However, such a conclusion would be highly misleading. While concerns about verification have certainly been a constant factor in arms control negotiations, it has never been clear to what degree these concerns represent a genuine desire for enforceable and lasting agreements, or to what degree they represent a convenient device for prolonging negotiations and preventing agreement in areas where limitations are not really desired. For example, the Reagan Administration has maintained that a ban on anti-satellite weapons would be unverifiable.[1] But one analysis of the Administration's position has concluded that: "While verification figures to be the public argument employed by Administration opponents of an agreement, in fact many of these officials oppose the very concept of an anti-satellite weapons pact".[2]

Meanwhile other analysts have established a strong case that such a ban would in fact be highly verifiable, adding further to the suspicion that claims of non-verifiability are really a cover for opposition to an agreement.[3]

Despite such examples of political posturing, there remain genuine concerns about verifiability in the great majority of arms control proposals. It is the difficult task of the analyst and the citizen to find the shifting and indistinct line that separates the real from the spurious concerns about verification.

The debate on "agreement in principle"

Arguments over verification generally focus on the amount and type of monitoring or inspection as well as the relationship between these activities and the arms control or disarmament goals being negotiated. In fact the first important argument between the USA and the USSR over a disarmament issue was not about how much inspection would be needed but how the control measures adopted would relate to the goal, which was the elimination of nuclear weapons.

The first US plan to eliminate nuclear weapons was presented by Bernard Baruch on 14 June 1946. The USA advocated the creation of an International Atomic Development Authority "to which should be entrusted all phases of

the development and use of atomic energy...".[4] According to the plan:

> Once a charter for the Authority has been adopted, the Authority and the system of control for which it will be responsible will require time to become fully organized and effective. The plan of control will, therefore, have to come into effect in successive stages... As the successive stages of international control are reached the United States will be prepared to yield, to the extent required by each stage, national control of activities in this field to the Authority.[5]

The plan leaves no doubt that the creation of a workable control mechanism must precede any US commitment to relinquish its sovereign right to produce and retain nuclear weapons.

Five days later the Soviet representative, Andrei Gromyko, presented an alternative proposal:

> ...the Soviet delegation proposes ... an international convention prohibiting the production and employment of weapons based on the use of atomic energy for the purpose of mass destruction ... This act should be followed by other measures aiming at the establishment of methods to ensure the strict observance of the terms and obligations contained in the above-mentioned convention.[6]

The Soviet proposal makes clear that the commitment to and the act of nuclear disarmament must precede discussions of methods to ensure compliance.

The dichotomy between the US and Soviet perspectives can be simplified as follows: to the USA promises to disarm without assurance of adequate control are empty gestures, while to the USSR attempts to verify military activities in the absence of disarmament are tantamount to espionage. There is little reason to doubt that both of these positions are held with deep conviction and sincerity, their wide difference being a result of the very different historical, cultural and social experiences of the two nations.

The Soviet philosophy had not changed much by the late 1950s when discussions were under way on a nuclear test ban treaty. It was summed up graphically by Soviet ambassador Tsarapkin:

> It is as though we started to argue here on how to preserve a bearskin when the bear itself was still in the woods. We would be arguing about whether to put the bearskin in the refrigerator or to pack it in moth-balls in a trunk at home. In the end, we would disagree with you on which brand of moth-balls to buy and from which firm. The bear would be in the woods, alive and well, and we would have fallen out among ourselves over moth-balls.[7]

This imagery is highly illuminating but does not do justice to the US position. Tsarapkin sees the US delegates as wanting to argue about which

method is best for preserving a bearskin, while a US delegate might argue that the problem is more fundamental, that is, whether any satisfactory method exists to preserve the bearskin. If the two sides agree to go out and shoot the bear before assuring themselves that the skin is indeed preservable, they might have wasted their time. So it is prudent first to make certain that adequate bearskin preservatives exist and are obtainable.

However, if the US approach is taken, the question immediately arises of how effectively the bearskin should be preserved. What constitutes 'adequate preservation'? Here there is indeed a possibility, even a probability, for all kinds of disagreement and endless wrangling over details and subtle value judgements. Here the Soviet point of view seems to have real advantages. If both sides can agree in principle to shoot the bear and take the skin, then this agreement in itself ought to be sufficient to overcome smaller disagreements over details and justify a search for the best feasible preservation method. Once the skin is taken it becomes imperative to preserve it in the best possible way, and it is in the interests of both parties to collaborate on the preservation. It is better to have the bearskin—which is presumably valuable to both parties—and to do the best one can with preservation, rather than let the bear get away while the parties conduct an endless search for the perfect preservation method.

It is a constantly recurring theme in US–Soviet arms control negotiations that to the Soviet side agreements in principle are vital prerequisites to discussions of control mechanisms. A recent Soviet analysis has reiterated the same philosophy:

> The Soviet proposals closely connect control with the process of limiting and eliminating armaments. Control cannot and must not play a separate and superior role, and its scope, means and forms should be geared to the character and volume of disarmament measures.[8]

In other words, *agreement in principle* on what is to be controlled should precede discussions of how the control is to be implemented, thereby preventing "the kind of 'control' that is designed not for effective disarmament, but for very different purposes".[9]

These "very different purposes" are, of course, espionage, that is, an illegitimate desire to gain valuable military intelligence under the cover of arms control agreements. There is no denying that such fears are to some extent justified. As the previous chapter has shown, the technologies and methods of arms control monitoring are indistinguishable from those of military intelligence gathering, and the same data which are used in one government agency to provide evidence of compliance can be used by another to target nuclear missiles more accurately or effectively.

A good example of this dual nature of monitoring is provided by the so-called "Open Skies" proposal made by President Eisenhower in 1955.[10]

This proposal was made ostensibly to reduce "the fears and dangers of surprise attack" and would have involved complete freedom for reconnaissance aircraft of both countries to survey the territory of the other as well as an exchange of "complete blueprints of our military establishments".[11]

There is now solid documentary evidence that fears of a possible surprise attack by the Soviet Union against the United States were seriously held at the highest levels of the US government.[12] Therefore, the proposal for an Open Skies inspection scheme represented a genuine desire to reduce the suspicion and tension resulting from this concern. In this sense the Open Skies plan was a potential arms control verification measure.

The same collection of documentary evidence shows, however, that in 1955 the United States possessed all the necessary weapons for a counterforce nuclear attack against the Soviet Union. The major obstacle to confidence that such an attack could be carried out without a massive Soviet counter-attack was the lack of accurate and complete targeting data. The US Strategic Air Command was faced with a rapidly expanding target list, the expansion being "largely attributable to identification of additional 'counterforce' targets ... and to the poor quality of target intelligence through the 1950s, which encouraged creative guesswork".[13] In this context the Open Skies plan can be seen as a military intelligence measure of the highest importance, one which would strengthen the weakest link in US nuclear war-fighting plans.

The Open Skies plan was, of course, unacceptable to the Soviet Union, mainly for this latter reason. It was not simply obstructionism or a penchant for secrecy which caused this rejection, any more than it was a pure desire by the USA to carry out espionage which motivated its proposal in the first place. Given good intentions on both sides, an Open Skies agreement would have indeed reduced tension and fear of surprise attack and could have contributed to real disarmament. But given a continued commitment to military competition, a hostile political atmosphere and a clear imbalance of military forces, such an arrangement could in fact be dangerous to the weaker party and is obviously unacceptable. Indeed, many believe that the Open Skies proposal was made with the knowledge that it would be rejected by the Soviet Union.[14] However, now that the Soviet Union has accepted the legitimacy of satellite reconnaissance (see below) and perceives itself to be in a state of military parity with the United States, at least one suggestion has been made that the time may be ripe to resurrect the Open Skies idea.[15]

That such an idea still has little hope of success can be deduced from the continued high level of suspicion by the USSR of any Western efforts to increase 'transparency'. A recent article in a Soviet military journal has attributed to "evil intentions" NATO proposals for new confidence-building measures at the Stockholm Conference on Confidence- and Security-Building Measures and Disarmament in Europe. Such transparency it is argued "only introduces suspicion into interstate relations" and "boils down

to legitimized espionage" designed to "facilitate the targeting of Pershing II and cruise missiles". The alternative, according to the Soviet author, is "the adoption by all nuclear states of a pledge not to be the first to use nuclear weapons and the conclusion of a treaty on the mutual non-use of military force and the maintenance of relations of peace". If such treaties were agreed to, "the need to ... monitor the opposite side's military activities would disappear".[16]

The intimate connection between monitoring for arms control and for military intelligence provides a substantial basis for the Soviet claim that discussions of verification techniques in the absence of an "agreement in principle" are premature and unproductive. Such attempts to obtain agreement in principle have been a consistent feature of Soviet negotiating behaviour.[17] But to the US side such efforts are baffling and frustrating and generally seem just as clearly to have been made with the knowledge that they would be unacceptable. To most Americans this notion of agreement in principle seems empty without solid confidence that the agreement can in fact be implemented. It is just as easy to conceal indecision, insincerity and cynicism behind demands for agreement on vague and grandiose 'principles' as behind nit-picking demands for foolproof monitoring schemes.

For example, the two sides might agree in principle to repeal the second law of thermodynamics or invent an anti-gravity machine. Such goals would clearly be of great mutual benefit to both sides, but there is every reason to expect that despite the best efforts of their most brilliant scientists the "details" of the implementation would prove insurmountable. It is probably fair to say that to most US negotiators the "principle" of general and complete disarmament (a favourite principle of Soviet negotiators in the 1950s) appeared about as realizable as an anti-gravity machine. Ironically, the USA did commit itself to this principle in 1961 by signing a "Joint Statement by the USA and the USSR of Agreed Principles for Disarmament Negotiations".[18] But no sooner had the statement been signed than Presidential Advisor John McCloy informed his Soviet counterpart Deputy Foreign Minister V. Zorin that US adherence to the principles was contingent on a US interpretation of the verification provision which stated that "not only [should] agreed limitations or reductions take place but also that *retained armed forces and armaments* do not exceed agreed levels at any stage."[19]

Mr Zorin's reply was that while "The Soviet Union favours the most thorough and strict international control over the measures of general and complete *disarmament*... [it] is at the same time resolutely opposed to the establishment of control over armaments".[20] Here again the contrast is starkly drawn between the Soviet preference for deciding first where one wants to go and then looking up the best route to get there, and the US preference for looking for passable roads before deciding where it might be both desirable and possible to go.

The debate on on-site inspection

A second major area of disagreement, already implicit in some of the examples cited above, is the degree of intrusiveness necessary or desirable in a monitoring system. It is clear from the entire history of US–Soviet negotiations that even when agreements can be reached on desirable goals for arms control measures, significant differences remain on the need for intrusive inspection, in particular on-site inspection. A thorough analysis of the technical feasibility and political sensitivity of on-site inspection proposals is made in chapter 4. Here it is intended only to examine the difference in attitude and behaviour of the two states on this issue.

A recent compilation of the historical record of arms control negotiations shows that 91 per cent of all US verification proposals involve some form of 'intrusive' monitoring procedure, while only 50 per cent of these proposals included non-intrusive methods.[21] Soviet proposals tended to contain both types in roughly equal proportions, but it is important to note that there are far fewer Soviet proposals in the total sample, only 9 compared to the US total of 22. This means that while the United States has made 20 proposals including intrusive elements, the Soviet Union has made only 6. The two states have jointly proposed 4 measures including intrusive measures. A chronological ordering of the proposals including on-site inspection provisions reveals no significant changes in this frequency for either side in the period from 1960 to 1980.[22]

While this evidence supports the widely held belief that the USA is far more interested in on-site inspection than the USSR, it should also lay to rest the disturbingly common assertion by US officials that "the Soviets have never been willing to discuss onsite inspection".[23]

Unfortunately, the effort to infer actual US and Soviet attitudes from these data is greatly complicated by the need to ascertain how seriously or cynically each proposal was made. The history of arms control negotiations is replete with examples of proposals put forward in the full knowledge that they would be rejected by the other side. This game has even been given the name "onus-shifting" by one historian.[24]

For example, a few of the Soviet proposals were made in the context of calls for general and complete disarmament, always a guaranteed non-starter. Similarly, many US proposals were made in much the same spirit as the Open Skies proposal, under the assumption that they would be unacceptable to the Soviet side. An example is the US attitude towards a ban on multiple independently targetable re-entry vehicles (MIRVs) in the SALT I negotiations. Gerard Smith, the Chief US negotiator, writes that President Nixon "had directed us to raise the flag of on-site inspection if the Soviets proposed a MIRV ban. But he must have known that such a condition had little or no chance of being accepted".[25] Indeed, there has always been a serious question as to just how enthusiastically the United States would embrace on-site inspection should the

Soviet attitude suddenly change. In response to the suggestion of a US Senator that "the US is probably . . . unwilling to have communists running around our defense plants", William Colby, former head of the US CIA, responded: "Well, I am not sure that Lockheed would particularly like to see Soviet colonels walking through their secret skunk works".[26] So, while it is clear from the public record that the United States has placed far more emphasis on on-site and other physically intrusive forms of monitoring than has the Soviet Union, it is *not* clear what this record really means in terms of attitudes towards realistic verification possibilities. It is certainly true that both the excessive demands for on-site inspection by the USA and the excessive resistance to it by the Soviet Union have been in some measure simply negotiating postures intended to put pressure on the other side and play to public opinion while delaying or preventing progress. Just how large this proportion is cannot be assessed with any precision, but it is not the entire story. There remains some level at which there is an honest and fundamental divergence of views between the two sides on the need for and the propriety of physically intrusive inspection to ensure compliance. This means that even if both sides can stop their posturing on this issue and work sincerely towards an agreement, such an agreement will not necessarily be easy to achieve.

Evidence of convergence

Having established two major differences in the two sides' approach to verification it is now important to show that these differences are in no sense static or immutable. Each side has found itself playing roles more associated with the other side from time to time and, in the passage of nearly 40 years since the Baruch and Gromyko exchanges of 1946, there has been some tendency towards convergence, although the past few years have shown this to be a fragile and uncertain trend.

Just one year after the presentation of the Gromyko proposal (see above) the Soviet Union elaborated its concept of monitoring and controlling a ban on nuclear weapon production.[27] This involved the creation of an International Control Commission with extensive powers of inspection and analysis. However, the plan was carefully stated to be "in addition and in development of" the Gromyko proposal, implying that there had been no change in the Soviet demand that all nuclear weapons be destroyed before any control mechanism was activated.

The Soviet position began to become noticeably more flexible after the change in leadership in 1953, and in the following two years there was considerable movement towards the Western position. This movement is best illustrated by a series of events in the spring of 1955, in the meetings of the United Nations Disarmament Subcommittee. On 8 March, the participating Western states (Canada, France, the UK and the USA) introduced a draft resolution which included the prohibition of nuclear weapons and major reductions in all armed forces and conventional armaments.[28]

As usual this resolution placed a heavy emphasis on effective verification and included provisions for an international "control organ". The Western philosophy towards verification was expressed in the explicit statement that no stage of the disarmament process was to begin until "the control organ reports that it is able effectively to enforce" it.[29]

This resolution was followed by a Soviet Draft Resolution on 19 March which expressed commitment to all the same goals but which followed the traditional Soviet line of calling for substantive acts of disarmament and various pledges, undertakings and conferences before the creation of a control organ with extensive powers of inspection.[30] Only after significant disarmament had taken place and a "complete prohibition of atomic, hydrogen and other weapons of mass destruction" had been put into effect would a "standing international organ" be created with "powers to exercise supervision, including inspection on a continuing basis".

The Soviet proposal was followed by an amended Western proposal in the form of an Anglo-French memorandum, which made some relatively minor concessions to Soviet demands for more "coordination" between the reductions of conventional and nuclear weapons.[31] Then on 10 May 1955 the Soviet delegation submitted an extensive new proposal (not a 'draft' proposal) which made significant concessions to Western demands for effective verification. This proposal was made up of many parts, but the most important for verification was the suggestion that "during the first stage" of the disarmament process "the international organ shall establish on the territory of the States concerned, on a basis of reciprocity, control posts at large ports, at railway junctions, on main motor highways and at aerodromes".[32] According to the Soviet proposal this would provide assurance against any attempt to mobilize forces for a surprise attack and would "create the necessary atmosphere of trust between States, thereby ensuring the appropriate conditions for the extension of the functions of the international control organ".[33]

This wording reveals an interesting divergence between Soviet and US attitudes towards "trust", a divergence which is analysed further below. More relevant for this discussion is the expressed Soviet willingness to institute major control mechanisms at the earliest stages of the disarmament process. The seriousness of the Soviet proposal was underlined in a speech by Soviet Premier Bulganin to a Warsaw Treaty Organization conference the following day.[34]

The Soviet concessions were seen as highly significant by Western delegates. The US delegate, James Wadsworth, stated on 11 May that "the Soviet Union has reversed its line and this time seems to be using ideas and language which are similar in many respects to the views put forward for many years by [the Western states]. We welcome this development".[35] Wadsworth's enthusiam was tempered by the reservation that Soviet inspection proposals "still appear to fall short of the minimum safety requirements", but the overall tone of the

assessment was positive. One week later this positive mood was reaffirmed in the statement that "what is important is the fact that, to a measurable degree, the gaps between us seem to have been lessened".[36] Unfortunately this positive assessment was offered in the context of a US decision to break off the negotiations temporarily, even though the Soviet delegation was anxious to continue them.[37] The negotiations were never resumed, and the United States subsequently withdrew "all of its pre-Geneva substantive positions taken in this Subcommittee or in the Disarmament Commission or in the UN on these questions in relationship to levels of disarmament".[38] Instead the USA shifted its ground completely when President Eisenhower made the Open Skies proposal in July 1955 (see above). Rather than capitalizing on the movement shown by the Soviet Union in the Disarmament Subcommittee, this proposal sent the whole issue of the relationship between disarmament and inspection back to square one.

This incident is the first but certainly not the last in which the Soviet Union has indicated its willingness to relax its insistence that agreements in principle must precede detailed provisions for control. The SALT negotiations have also demonstrated a slow but measurable progress in Soviet flexibility on this issue. For example, at an early stage of the SALT I negotiations the USA was insisting on specific numerical limits on various missile types, while "The Soviets never budged from the principle that numbers would be disclosed and discussed only after agreement on principles".[39] But a few years later, in the latter stages of the SALT II negotiations, the Soviet Union provided the US delegation with official data on Soviet heavy bomber and launcher numbers, a marked break with traditional Soviet behaviour. In fact, when these data were handed over the head of the Soviet delegation, V. Semyonov, informed his US counterpart that this action had "just repealed four hundred years of Russian history. But on reflection, maybe that's not a bad thing".[40] The great significance of this change also impressed US negotiators who had persistently pointed out both the technical and political advantages of an agreed data base as a benchmark for future negotiations.[41] Unfortunately, by its failure to ratify the SALT II Treaty the USA has also missed the opportunity to capitalize on this concession.

As a final comment on "agreement in principle" it is interesting to note that there has been at least one instance of the USA itself seeing the virtues of the Soviet position. At one point during the long and frustrating wrangling in the SALT I negotiations, US National Security Advisor Henry Kissinger said: "the only way to make progress was to *agree in principle* on a freeze and then negotiate the ABM agreement and details of the freeze".[42]

While history has shown the Soviet Union moving from unrealistic and extreme positions on matters of principle to more pragmatic ones, a similar story holds true for the United States on the issue of on-site or intrusive inspection. Early US positions in this area were highly intrusive and tended to

exacerbate, either wittingly or unwittingly, Soviet feelings of military vulnerability and fears of espionage.

The original Baruch Plan would have created an international authority with virtually total powers to intervene in national atomic energy programmes, and all through the 1950s US insistence on on-site inspection in many areas of arms control was a constant obstacle to agreement. But in the late 1950s and early 1960s, especially in connection with negotiations for a comprehensive nuclear test ban, the USA began to show some flexibility on this issue, moving from an initial position that *any* unidentified seismic event should be subject to on-site inspection, to a proposal that the number of on-site inspections be some small fraction of the annual number of unidentified seismic events, and then to a demand for a fixed quota of 20 on-site inspections per year. Meanwhile the Soviet position moved from accepting no on-site inspections at all to accepting a quota of three per year. Throughout this evolution the USA insisted that the required number of on-site inspections was a technical question while the Soviet Union insisted that it was a political question.[43]

With the advent of the Kennedy Administration in 1960 the USA showed further flexibility in the number of on-site inspections, dropping the number to a minimum of 10 and a maximum of 20.[44] Then the demand dropped to eight,[45] and then to seven, with a "fall-back" number of six which was not revealed.[46] There was even a growing body of expert opinion in the USA that the quota of three proposed by the Soviet Union would in fact be adequate to deter violations.[47] Meanwhile the Soviet Union, while refusing to raise its own offer of three on-site inspections, was the first to suggest the use of so-called 'black boxes', unmanned seismic stations placed on the territories of states agreeing to a test ban. The stations were to be placed in seismically active areas, and the host country would agree to allow international scientific personnel to visit them for data collection and maintenance.[48] There were good reasons at the time to believe that such a network of black boxes would greatly reduce or eliminate the need for on-site inspections, and there is even more reason to believe this now (see chapter 4, pp. 218–23).

However, the United States did not accept the black box proposal, and given the political and technical problems associated with any system of 'challenge' or 'demand' on-site inspections (see chapter 4) the significance of the US progression to lower numbers is easily exaggerated. The two sides remained much further from agreement than the numbers suggest. Nevertheless the US concessions did represent a substantial movement from the principle of unlimited on-site inspections which the USA had held to for many years. Meanwhile in the years since 1960 the steady improvement in the capabilities of national technical means of verification along with the development of a number of co-operative measures for the exchange of geological data and observers have pushed on-site inspection further into the background. The 1974 Threshold Test Ban Treaty[49] and the 1976 Peaceful Nuclear Explosions

Treaty[50] both contain innovative and significant co-operative measures to improve the efficacy of national technical means. Unfortunately these Treaties remain unratified by the United States, so these measures have not been put into operation.

It is fair to conclude that the United States has shown growing flexibility on the issue of on-site inspection, largely as a result of the improvements in national technical means, but also as the result of a willingness to explore and adopt other types of measure involving a greater degree of voluntary co-operation and mutual respect. The extent of the US change of heart can be grasped from a 1976 statement by the US Arms Control and Disarmament Agency (ACDA):

> 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. 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.[51]

At the same time the Soviet Union has come to recognize that some on-site inspection is unavoidable and has shown a willingness to accept it within certain narrow limits. An example is the acceptance of permanent on-site monitoring of the destruction of chemical weapon stocks under a treaty banning the possession of chemical weapons.[52]

Another encouraging sign of convergence is the similarity in assessments of the two sides of the 1972 Biological Weapons Convention.[53] This treaty embodies a very weak verification mechanism involving only an agreement "to consult one another and to cooperate in solving any problems which may arise" either bilaterally or "through appropriate international procedures within the framework of the United Nations".[54]

Such a provision might be expected to satisfy the Soviet Union, and this seems to be the case. A recent Soviet commentary asserts:

> Comparatively limited verification measures have been envisaged with regard to agreements banning weapons which of their very nature can be controlled without particular difficulty and do not require far-reaching inspection measures. Examples in point are the ban on bacteriological weapons and the modification of the environment for military purposes.[55]

What is more remarkable is the similarity between this statement and a US assessment made in 1976. The US Arms Control and Disarmament Agency suggests that the extent of verification required is related to the degree of risk posed by possible violations. Referring to the Biological Weapons Convention

as a case in point the ACDA analysis states:

> 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 ... 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...[56]

A final example of the progress that had been made up to 1980 in reconciling US and Soviet approaches is the Tripartite Report to the Committee on Disarmament concerning a comprehensive nuclear test ban.[57] Significant compromises by both sides are apparent in the agreement that "additional measures under negotiation to facilitate verification of compliance... must first be agreed in principle and then drafted in detail"[58] and the agreement that: "If a party has questions regarding an event on the territory of any other party it may request an on-site inspection... If the party which receives the request is not prepared to agree to an inspection... it shall provide the reasons for its decision".[59] Provisions such as these represent a serious attempt by each side to recognize and adapt to the concerns of the other.

These signs of convergence are encouraging, but more recent events suggest that they cannot serve as grounds for excessive optimism, at least in the short run. For example, the current US attitude towards the Biological Weapons Convention is far less sanguine than the one embodied in the ACDA quote. Vice-President George Bush, in presenting a new US draft treaty on chemical weapons, called attention to reports of alleged violations of the 1925 Geneva Protocol and 1972 BW Convention and asserted that one important reason for the persistence of such allegations is that neither treaty "includes any form of effective verification and enforcement".[60]

In fact, the traditional patterns of US and Soviet negotiating behaviour are still easily perceptible in current negotiations. For example, in the same address quoted above Vice-President Bush described a US plan for "open invitation" on-site inspection of suspicious activities related to chemical weapon production or stockpiling. Under such a plan a state would be required to "open for international inspection on short notice all of its military or government-owned or government-controlled facilities".[61]

Vice-President Bush asserted that such a broad verification proposal "goes way beyond what we would have done a few years ago",[62] and in this he is correct. In fact, it has all the aspects of a return to the much older US position of demanding virtually total access and freedom of movement by international inspectors on the territory of sovereign states. Even the name of the proposal, "open invitation", recalls the name "Open Skies", and Mr Bush's enthusiastic predictions that such a measure can "engender the kind of openness among

nations that dissipates ungrounded suspicions"[63] suggests early US efforts to use verification as a means of "opening" Soviet society.

That such hopes are still premature can be seen from the rapid condemnation of the plan by the Soviet Union.[64] The Soviet position on such "open" inspection schemes remains firm: "The USSR is categorically opposed to 'inspections', like the notorious 'Baruch Plan', the 'Open Skies' concept, and others that were put forward by the USA in the past and had the nature of intelligence-gathering operations. The Soviet Union will not agree to such 'verification' ".[65]

And Soviet negotiators continue to stress that satisfactory compliance mechanisms can be arranged only *after* agreements in principle or goals and objectives have been achieved. The Soviet representative to the CD chemical weapons negotiations has made this clear: "The problems which we have to solve in order to reach agreement on the prohibition of chemical weapons are many. They concern the scope of the prohibition, the arrangements and deadlines for compliance with the various obligations under the future convention and, *lastly,* control".[66] While it does seem that agreement in principle *has* been achieved on a chemical weapons treaty and that the remaining arguments are over control, this statement serves as a reminder that the Soviet approach to arms control verification is still different in important ways from the US approach. These differences can be expected to persist for the foreseeable future, but history has shown that they need not prevent the achievement of agreements when the will to reach agreement is present.

III. Domestic politics

Public opinion and Congress

It is a commonplace observation among arms control experts that "for all practical purposes verification is strictly an American concern".[67] A similar thought was expressed by an analyst of Soviet attitudes towards SALT, who devotes less than one out of 110 pages of his study to Soviet views on verification and concludes that "verification is primarily an American problem and thus not likely to be of much concern to members of the Soviet ruling elite".[68]

In what sense are these statements true? They certainly do not imply that Soviet leaders require no reassurance in the form of hard evidence that the USA is living up to its obligations. Soviet leaders harbour at least as much mistrust of US intentions as do US leaders of Soviet intentions. And there is also evidence from the historical record of arms control negotiations of Soviet concern for the verifiability of certain proposals. For example, during the SALT II negotiations the Soviet negotiators expressed great concern over the deployment of cruise missiles, because they can carry either conventional or nuclear warheads, an obviously important difference which cannot be detected

by national technical means. At one point the Soviet side reportedly offered a major concession in the form of a limited ban on telemetry encryption if the USA would accept a total ban on cruise missiles.[69]

The Soviet offer can be seen in two ways: either as an expression of genuine concern about verifiability or as a way of using US concerns about verifiability to extract concessions on actual weapon deployments.[70] These motivations are not mutually contradictory, so both can be present to some degree. However, given the difficulty of distinguishing nuclear-armed from conventionally armed cruise missiles and the unquestionable military importance of the distinction, it seems likely that verifiability was a major Soviet concern.

Nevertheless, despite the evident Soviet distrust of US motives and occasional examples of Soviet concern for the verifiability of certain treaty provisions, and even at least one instance of an attempt to reassure the Soviet people on the issue of verifiability,[71] it remains true that verification is far more a US than a Soviet concern.

The difference is the result of two important asymmetries between the two sides. First, information relevant to military and arms control issues is almost totally absent from open Soviet sources, while the United States produces a veritable glut of such information. A list of open US sources from which important (sometimes ostensibly secret) information can be obtained would include the annual report of the Secretary of Defense and posture statement of the Joint Chiefs of Staff, the budget documents released by the President, Congressional hearings and debates, and dozens of military and trade journals which carry articles, editorials and advertising which discuss in detail US military strategy, tactics, hardware and R&D programmes. Even the daily newspapers and weekly or monthly magazines frequently run articles based on investigations by journalists, opinion pieces by knowledgeable insiders and outsiders, and the ever-present 'leaks', often from sources close to sensitive information. This plethora of information is in reality far more than any thoughtful citizen or diligent researcher can handle, and much of it is inaccurate, speculative or politically inspired. Yet in its totality it provides Soviet intelligence agencies with a picture of the US military posture and plans which is far more complete and useful than that which US analysts can gather from Soviet sources, which are tightly controlled and of far less diversity and breadth of coverage.

The second major asymmetry derives from the contrast between the sharply pyramidal structure of decision-making power in the Soviet Union and the pluralistic and diluted system in the United States. The Soviet form of government ensures that only a few people near the top need to be reassured by being given access to intelligence information.This group, which, despite its frequent disagreements on arms control philosophy and policy,[72] is politically quite homogeneous, can relatively easily reach a consensus, either on the evaluation of intelligence data or on a willingness to take risks on less than absolutely verifiable agreements.

By contrast US national security policy is an overtly political matter marked by deep differences among a number of powerful interest groups, all of whom have ample access to the mass media and other means of influencing public opinion. Achieving any consensus in this climate is extremely difficult, and if risks are to be taken (and inevitably they must if real progress is to be made in arms control) then even the most cautious and resistant must either be convinced that the risks are acceptable, or be overridden by a substantial majority. In the latter case the dissatisfied group then has the option of pressing its case in the mass media and working through sympathetic members of Congress to undermine the decision.

Herbert York has emphasized two serious problems in the US system with respect to arms control, neither of which is faced by the Soviet Union. One is the requirement for a two-thirds vote in the US Senate to ratify treaties, and the other is the long presidential campaign that takes place every four years.[73] With regard to verification it is the former problem that has proven to be most serious. In order to get the necessary two-thirds majority for Senate ratification, treaties must often be tailored to fit the concerns of certain influential senators, and very often these concerns focus on the verifiabilty of the treaties. Throughout the SALT I and II negotiations the concerns of Senator Henry Jackson were constantly on the minds of the negotiators,[74] and Senators Jackson, John Glenn and Howard Baker all played important roles in the later stages of the SALT II negotiations and in the ratification hearings by emphasizing their concern that the loss of the US "listening posts" in Iran combined with Soviet encryption of missile-test telemetry would render crucial provisions in the treaty unverifiable.[75]

Of the two asymmetries the second is considerably more important than the first. While the absence of open Soviet sources undoubtedly makes intelligence gathering (and therefore verification) more difficult and expensive, US intelligence agencies do not seem to suffer from a serious lack of information about Soviet military activities. The intelligence problems created by the closed nature of Soviet society seem to be exaggerated. Former CIA director William Colby has stated: "While this is obviously a simpler process for the Soviet Union than for the United States, the fact is that we have been able over the past thirty years' development of our modern intelligence system to penetrate the screen of secrecy the Soviets raise around these weapons and forces".[76]

It must also be kept in mind that this extensive gathering of intelligence has gone on and will certainly continue to go on whether or not arms control agreements exist to be verified. According to former US Secretary of Defense Harold Brown, "Our need for such information did not begin with SALT.... With or without SALT we have a vital interest in keeping track of Soviet strategic forces. Doing so is our highest intelligence priority".[77]

The problem created by the first asymmetry, that of gathering intelligence in a tightly controlled society, is primarily technical and therefore more likely to be manageable. In contrast, the second asymmetry, the very different roles

played by intelligence information in the domestic politics of the two states, is far more subtle and difficult to reconcile. Difficulties arise most often in the USA in the interaction between the President's Administration and the Senate, where problems of verification and allegations of Soviet violations of existing agreements have become the major focus of a vocal group of US senators,[78] who are kept well supplied with arguments and information by current and former members of the intelligence community.[79]

The Senate has no formal role in the negotiation of treaties, and in particular in questions of verification, other than to ratify or refuse to ratify the final version of the treaty. It also has no alternative authoritative sources of information on which to base a critique of the Administration's assertion that a treaty is adequately verifiable.[80] The Senate is routinely given classified briefings, and attempts were made by the Carter Administration to involve certain senators in the negotiation process itself. In the case of SALT II this produced little or no ultimate benefit and had to be carried out over the objections of the Soviet negotiators.[81]

One other possibility is for the President to negotiate *agreements* rather than *treaties* on arms control. The former require only simple majorities in both houses of Congress rather than the difficult two-thirds majority in the Senate. For example, SALT I consisted of both a treaty (the ABM Treaty) and an "Interim Agreement" setting temporary limits to certain categories of strategic weapon.[82] The former was ratified by the Senate while the latter was approved by both houses. President Carter kept open the option of submitting SALT II as an 'agreement' up until the last stages of the process and then committed himself to submitting it as a treaty.[83] He was concerned that the use of the 'agreement' device would be seen as an attempt to evade effective Senate advice and consent, and this concern appears to be well founded. The US Arms Control and Disarmament Act of 1977 strongly limits presidential freedom of action in negotiating arms limitations or reductions, and the legislative history of this Act makes clear that the Congress intended to preclude unilateral presidential actions in arms control.[84] This law makes it highly unlikely that a future president will attempt to evade the Senatorial ratification process by negotiating agreements rather than treaties. It also makes clear the fact that future presidents who desire arms control treaties will have to involve the Senate more creatively and fully in the negotiating process than has been done in the past.

It has even been suggested that the Congress should play a much more active role in verification. An important argument for such involvement has been given by Representative Les Aspin: "When we involve Congress we also involve members of the out-party. And that minority participation is essential both to give public credibility to the verification process and to assure the out-party that the process is not being tampered with for political purposes".[85] The legislation introduced to implement this involvement was not passed in 1979 and since then there has been no formal change in the nature of Congres-

sional activity relative to verification. There are also serious questions about the way the Congress would handle problems of secrecy and confidentiality. Neverthless, such a proposal may help in reducing the impact of leaks (see below, pp. 157–58) and in preserving the political legitimacy of the compliance process.

Bureaucratic politics

Arms control agreements are not only the product of bilateral negotiations between governments; they are also the product of internal negotiations within blocs and alliances, as well as within the individual governments themselves. One study of Soviet bargaining behaviour analyses Soviet actions and positions in the nuclear test-ban negotiations within three separate frameworks: East versus West, Sino-Soviet relations, and internal Soviet bureaucratic and political controversies.[86] Another study highlights the shifting balance of power between 'arms-controllers' and 'militarists' within the Soviet government.[87] Meanwhile, analyses of US negotiating behaviour emphasize the sensitivity of West European allies to certain US negotiating positions[88] as well as the intense bureaucratic conflict within the US government which has accompanied all arms control negotiations.[89]

When one focuses on the narrow issue of verification, one finds very few instances of intra-alliance controversy. A possible exception is that of West European attitudes towards the Reagan Administration's 1984 charges of Soviet violations of previous agreements. According to testimony of Richard Perle, US Assistant Secretary of Defense for International Security Policy, the USA was delayed in making its charges public for "political reasons". According to Perle, "There are other members of the Alliance who don't take these violations as seriously as we do".[90] Aside from this politically sensitive area the most common West European view is that verification is much more a US problem than a European problem, "imposed by the political culture of the United States as much as by technical necessity".[91]

This West European attitude raises interesting questions in the context of concern over the threat of surprise attack in Europe and the efforts to improve and expand confidence-building measures at the Stockholm Conference on Security and Co-operation in Europe.[92] These questions are dealt with in more detail in chapter 4.

Bureaucratic and interest-group competition over verification can affect the arms control process in two major ways. First, the need to reach a compromise or consensus among competing agencies has a major impact on the kinds of proposal which are brought to the negotiations by each side. Bureaucratic rivalries can limit the effective uses of either monitoring or information-processing technologies, and bureaucratic perspectives and interests can use (or even create) verification problems to eliminate or water down proposals they find threatening to their interests. Second, internal conflicts can express

themselves in the day-to-day operation of the monitoring and compliance mechanisms once a treaty has been signed. Control of monitoring information and the analytical capabilities necessary to interpret it can be powerful bureaucratic weapons in an area as complex, ambiguous and sensitive as arms control compliance.

The role of verification in US bureaucratic politics is pronounced, although it must be kept in mind that concerns about verification are often expressed as surrogates for more substantive objections to agreements. Historically, it was generally true that the US State Department and the Arms Control and Disarmament Agency were more active proponents of making agreements and more willing to accept less-than-perfect verifiability than the Pentagon.[93] This changed, however, with the advent of the Reagan Administration when negotiators and bureau chiefs such as Paul Nitze, Eugene Rostow, Edward Rowny, Richard Perle and Kenneth Adelman were appointed. These were all people who had previously taken a much tougher stand on verification issues than such predecessors as Gerard Smith, Ralph Earle, Paul Warnke and Cyrus Vance. The Reagan Administration now presents a more united, albeit less flexible, front on this issue than did previous administrations.

The CIA presents an interesting example of bureaucratic conflict. During the SALT I negotiations in the early 1970s the CIA could be described as having "a strong bias in favor of the venturesome approach to SALT" and as taking a "cheerier view [on verification] than any competitor".[94] However, in the mid-1970s, as attitudes towards arms control began to harden in US domestic politics, the CIA's estimates of Soviet capabilities came under intense pressure from other bureaucratic interests. This culminated in the so-called 'Team-B' review of the CIA's intelligence activities in 1976, a review which called into serious question many CIA estimates of, for example, Soviet military spending and missile accuracy.[95] The Team-B review produced a major shift in CIA estimates creating a "new intelligence consensus... reflecting a growing general dissatisfaction with détente and accompanying doubt regarding the intentions of the Soviet Union".[96] This shift in consensus was accompanied by a series of rapid shifts in leadership of the CIA connected with the Watergate scandals and revelations of covert and illegal activities in various parts of the world.[97]

The chastisement of the CIA must be seen in the larger context of an old bureaucratic rivalry between the CIA and the military intelligence agencies, especially that of the US Air Force. In fact, much of the authority of the CIA in verification was given to it in the late 1950s when the Agency was given its own aerial reconnaissance mission "to be certain that the utilization of the photographic 'take' not be left solely in the hands of the Air Force".[98] An early manifestation of this bureaucratic rivalry was the struggle between the CIA and the Air Force over control of U-2 flights over Cuba, a struggle that delayed significantly the discovery of the construction of Soviet missiles sites

there in 1962.[99] In a later battle the Air Force gained control over the SR-71 high-altitude reconnaissance aircraft despite CIA objections.[100]

Such intense bureaucratic struggles have serious implications for current and future monitoring of arms control agreements. It can be argued that because a civilian intelligence agency such as the CIA has no weapon programmes or strategic doctrines to protect or promote, it is therefore more able to evaluate intelligence data without bias than an intelligence unit with explicitly military connections.

But the CIA has its own bureaucratic imperatives. One analysis points out that:

> ...the role of the intelligence community is somewhat ambiguous. Its dual role in building and operating intelligence collection systems on the one hand, and assessing verification matters ... on the other appears to represent a potential conflict of interest ... there is always the temptation for the intelligence community to promote treaty provisions that make intelligence collection easier, regardless of their direct relevance to arms control issues.[101]

It is quite clear that as long as monitoring for verification remains an offshoot of the much larger and more comprehensive military intelligence-gathering process, military interests will influence the processing and interpreting of data. Such biases can be expected to show up both in the kinds of verification arrangement embodied in treaties and in the day-to-day operation of the compliance mechanisms as well. It is an old maxim that "where you stand [on verification] depends on where you sit [in the bureaucracy]",[102] and this maxim seems particularly appropriate to US approaches to verification.

Another very clear illustration of this general principle is the position of the US national nuclear weapon laboratories on the issue of a comprehensive nuclear test ban (CTB). Throughout the efforts of the 1950s and 1960s to negotiate such a ban, influential scientists and administrators such as Edward Teller, Ernest Lawrence and Harold Agnew argued forcefully against a nuclear test ban, and encouraged their laboratories to produce data and evasion scenarios which would cast doubt on the ability of the USA to verify a ban on underground nuclear tests.[103] The idea of concealing an underground explosion by conducting it in a large cavity (called 'decoupling') was first proposed in 1959–60 as part of an effort to demonstrate the unverifiability of an underground test ban.[104] This evasion technique, which is discussed further in chapter 4, has remained one of the most popular in the arguments of those who oppose a comprehensive test ban. Years later, when the Carter Administration showed a serious interest in negotiating a comprehensive test ban, arguments by the administrators of the national laboratories were again influential in causing him to change his mind.[105]

The vested interest of the US national laboratories in continued testing of

nuclear weapons remains strong. The director of the US Department of Energy's Office of Military Applications has stated:

> Like any good corporation, we have an investment strategy which we have been pursuing for the last couple of years and we intend to pursue it in the decade of the eighties ... We think we need to increase our manpower in research, development, and technology by about 15% above what it was a couple of years ago. We think we need to increase the level of underground testing.[106]

And among the recent spate of assessments by seismologists of the verifiability of an underground test ban the one published by the Lawrence Livermore Laboratory is certainly the most conservative and cautionary.[107] But verification is not the central concern of the Livermore scientists. For example, one anti-CTB argument directed to a scientific audience by a Livermore scientist never even mentions verification as a drawback. Instead, it presents a number of reasons having to do with military security and technological progress why such a treaty would not be in the best interest of the USA, verifiable or not.[108]

None of these activities necessarily implies a lack of professional integrity or lack of desire for meaningful arms control measures. Indeed, they can derive from a high sense of professional integrity, as they have, for example, in the Peaceful Nuclear Explosions Treaty.[109] The verification provisions of this Treaty represent, according to a Livermore physicist who helped to negotiate them, a higher level than any other treaty of "substantive scientific and technical provisions". These provisions go on for many pages of extremely fine detail, a "prolixity" which "followed from a basic premise of the U.S. that verification provisions should be spelled out in full detail as precisely as possible in the treaty text".[110] Unfortunately, even this high level of technical comprehensiveness and precision has not been sufficient to permit the Treaty to be ratified by the US Senate or even for the Administration to press for such ratification.

Such an experience should cast some doubt on the necessity and desirability of expending so much effort to obtain so much precision. However, as long as the negotiation of such treaties remains the special province of lawyers and scientists, as it has traditionally been in the United States, such heroic efforts at comprehensiveness and precision seem inevitable. There is no question that the political content and impact of a treaty can be literally buried in the "prolixity" of technicalities, and this argues for a greater degree of political sensitivity than is ordinarily found in contract lawyers and physicists.

The other side of the coin of excessive professional zeal is the defence of bureaucratic interests, and even here it is not necessary to be disingenuous or unethical to interpret data to one's own advantage. Whether considering an estimate of another state's missile accuracy or the ability to identify relatively small seismic events, there are always margins of error, sometimes rather large

ones. The choice of a conservative or hopeful interpretation of such uncertain information will almost certainly be influenced by other factors, and bureaucratic or institutional bias is one such factor.

Do such bureaucratic conflicts exist in the Soviet Union? Any answer to this question must be strongly qualified, given the very fragmented and incomplete information available on the functioning of Soviet bureaucracy, especially in the military and intelligence areas.[111] The essence of verification is information, and while information is a precious and guarded commodity in any bureaucratic setting, the nature of Soviet society suggests that the handling of monitoring data and the production of intelligence estimates must be a source of awkwardness, at least, and probably considerable tension among various agencies. Analyses of the role of secrecy in other aspects of Soviet military activities have turned up signs of such tensions,[112] and in the peculiarly sensitive area of intelligence data: "Students have noted a high degree of compartmentalization in the Soviet bureaucratic structure, which may make it easier for the right hand to be kept in ignorance of what the left is doing".[113]

Western analysts do not present a consistent picture of Soviet intelligence activities. On the one hand, one learns that within the Committee on State Security (KGB) the First Main Administration (the Foreign Directorate) "is responsible for the collection of foreign *strategic intelligence* and the supervision of other Soviet intelligence organizations".[114] On the other hand, one learns that "the Soviet system does not contain the major non-military sources of military information found in U.S. politics—there is no equivalent to the CIA or to private consulting firms such as the RAND Corporation".[115]

From Soviet sources one can learn very little. One reliable source notes that Soviet military intelligence is divided into a number of branches with different functions, such as radio and radar, aircraft and satellites, naval intelligence and the monitoring of foreign publications, radio and television broadcasts, and so on.[116] When one adds to this the reasonable assumption that all of the information gathered by these agencies must be co-ordinated with economic and political intelligence gathered by civilian agencies, the implication is that there must be some interaction between military and civilian agencies and this must involve some flow of information from the military to the civilian sector.

Still, the historical evidence does suggest a stronger control by the military over strategic intelligence in the Soviet Union than in the United States. This was quite evident, for example, in the early stages of the SALT negotiations when Soviet negotiators from the diplomatic side were found to be quite poorly informed on the details of the weapon systems and deployment and testing procedures under discussion, and negotiators from the military side were reluctant to give them the necessary information.[117] Although this situation seems to have improved considerably since the early 1970s,[118] it can still be seen as an aspect of what many Western analysts have interpreted as a serious mutual distrust between the military and political hierarchies.[119]

Just how this combination of secrecy and specialization affects Soviet

negotiating positions is extremely unclear. Only some vague hints of bureaucratic conflicts over verification provisions have been detected by US negotiators. For example, Ralph Earle II, the chief US negotiator in the later stages of SALT II, suggests that Soviet willingness to accept unmanned seismic stations and even on-site inspection on their territory in the context of a comprehensive test ban does not imply a willingness to do so in other circumstances, for example, in a chemical weapons ban. This may reflect a difference of bureaucratic attitudes between different agencies.[120]

If it were true that arms control monitoring data are almost totally controlled by the military, this would have serious implications for Soviet conduct of the compliance process. High-level policy makers are inevitably dependent on analyses by experts, especially on such complex technical questions as those which arise in arms control verification. It has already been noted in the US context that the temptation for such experts to bias their analyses is great, especially when major bureaucratic or economic interests are involved. However, the historical record of Soviet handling of compliance issues does not show evidence of such a pro-military bias, so it seems reasonable to conclude that the Soviet political leadership has found ways to keep this problem under control. Just what those ways are, however, is not possible to determine.

IV. The role of other states

So far this discussion of the politics of verification has focused almost entirely on the internal and mutual interactions of the Soviet Union and the United States. Such a focus misses the substantial international interest which verification has generated, even before there was a US–Soviet confrontation. In fact, disarmament has traditionally been far more an international concern, discussed at international conventions and embodied in international treaties, than it has been a purely bilateral concern of two great powers.[121]

Since the end of World War II and the creation of the United Nations, international interest in disarmament has remained high, but the realities of the world distribution of military power, and especially nuclear weapons, have made bilateral agreement between the United States and the Soviet Union an essential condition for the achievement of successful international agreements.

Discouragement and even anger over this unequal situation are common among neutral, non-aligned and developing nations: "First and foremost it should not be tolerated that the two superpowers exercise a world hegemony based largely on their incessant arms race and at the same time play an insincere game of disarmament at the negotiating tables."[122] Similarly, from a different part of the world: "Common security has to be based on a sense of common destiny binding all nations together. The concept will be robbed of all its meaning if it were to stop at endorsing the fashionable cult of arms

control which would perpetuate the dominance of nuclear weapon powers..."[123]

This inequality or "hegemony" is not confined to the weapons themselves but extends to the technological capabilities "to exercise the legal rights of states parties to arms control/disarmament agreements to verify compliance to these agreements".[124] Without these technological capabilities states remain either insecure or militarily dependent on one of the great powers (or quite often both). Their insecurity is increased by the ability of more technologically, militarily and economically powerful states to monitor their resources, military capabilities and economic development. Noting that "it seems unfair that legal rights have been established allowing the space powers to practice certain space reconnaissance activities without somehow protecting the rights of other states", two Egyptian authors list three important consequences of this asymmetry in technical capabilities: (*a*) the threat to the interests and security of developing states from their lack of control over military reconnaissance of their territories; (*b*) the possibility that strategic data gathered by satellites might be supplied to other states without the approval of the monitored state; and (*c*) the general trend in international law tending to legitimate the unilateral exploitation of space for reconnaissance purposes.[125]

Similar concerns could apply to the many other intelligence-gathering technologies controlled only by the rich and powerful states. It is also clear that the USA and the Soviet Union are not unconscious of this asymmetry in power, and on at least one occasion concern has been expressed that "other nations could create great difficulties if they were compelled to admit that many of their tightly protected secrets were in fact not secret at all".[126]

There is one important way that third countries do participate in verification, but it is a passive participation based on the same inequalities in power just mentioned. Many countries serve as 'platforms' for the intelligence operations of one of the superpowers. NATO and Warsaw Treaty Organization (WTO) states, Australia, Japan, China, Cuba and others permit their territory to be used for air bases, electronic listening posts and communications links. These serve important intelligence and verification functions for the USA and the USSR.[127] This use of the territories of third parties as part of 'national' technical means is one of the least discussed but potentially most controversial of all arms control issues.[128] In return for the use of their territory these states may receive economic concessions or military aid or protection, but what they do *not* receive is the right of access to the information collected on their territories. While some of the data may on occasion be shared with the host country, this sharing remains at the discretion of the state that owns the equipment.

As long as a handful of states retain control over the technology which can monitor arms control agreements, such agreements cannot be truly international, no matter how many states subscribe to them. An interesting case in point is the Sea-Bed Treaty,[129] which forbids the emplacement of weapons of mass destruction on the ocean floor and which provides for open and equal

rights to observe suspicious activities by all states party to the Treaty.[130] But this equality of access is not achievable in practice, since only the two major powers possess the technology to gain access to the ocean floor for the purpose of monitoring activities there. So while the Treaty gives any state party the right to "consult and cooperate" with other parties to investigate possible violations, such consultations will in effect be "reduced to consultation between a less-developed party and one superpower in opposition to the other superpower".[131] Such problems would seem to be inevitable as long as the most sophisticated and effective monitoring technologies remain under the exclusive control of states.

It is ironic that the nuclear weapon,which has to a great extent produced the situation of hegemony criticized above, has also produced the one genuinely international verification mechanism: the safeguards system administered by the International Atomic Energy Agency. But even here the problem of nuclear hegemony cannot be avoided, since the IAEA safeguards are administered largely under the Non-Proliferation Treaty (NPT), which itself enshrines the fundamental asymmetry between nuclear weapon and non-nuclear weapon states.[132] The two classes of state are subjected to different restrictions; in particular, only the non-nuclear weapon states are required to submit to safeguards.[133] Such agreements on the part of nuclear weapon states are entirely voluntary. A number of states have refused to sign the Treaty and accept the safeguards ostensibly because of this asymmetry.

The persistence of these problems has led a number of states to become more active in promoting international verification mechanisms to accompany such international treaties as a comprehensive nuclear test ban, a chemical weapons ban, the Biological Weapons Convention and others. The forum for these proposals has generally been the Committee on Disarmament (CD) in Geneva, which now consists of 40 states and which has on its permanent agenda a wide range of disarmament and arms control problems.[134]

The most active states in making verification proposals, more active in fact than the USA and USSR, have been Sweden and Japan (see table 7). Both have been consistent advocates of international verification agencies with control over such technical means as reconnaissance satellites and seismic networks, as well as authorization for carrying out inspections on a routine or challenge basis.

For example, Sweden has been a leader in developing the concept and the detailed elaboration of an international seismic monitoring network. The current proposal for such a network suggests the use of more than 50 well-equipped seismological stations around the globe, an international exchange of data from these stations over the existing telecommunication system of the World Meteorological Organization (WMO), and the processing of these data at several special International Data Centres to which all participating states would have access.[135] Work on this system has progressed to the point of a

Table 7. State verification proposals according to arms control objective[a]

State	Nuclear weapons	Chemical/ biological weapons	Other weapons of mass destruction	Other arms control objectives (cumulated)	Total
Sweden	24	15	2	2	43
Japan	24	14	1	0	39
USA	17	13	3	5	38
UK	22	11	0	0	33
USSR	7	7	5	4	23
Netherlands	9	8	1	0	18
Canada	11	3	0	3	17
Finland	1	11	0	0	12
Italy	4	2	1	4	11
Australia	6	1	1	0	8
France	0	4	0	2	6
FRG	1	3	1	0	5
Socialist states (joint)	0	4	1	0	5
USA/USSR (joint)	0	2	0	2	4

[a] The numbers in this table represent a sum of actual verification proposals made by each state up to 1981 in four categories plus comments it has submitted in response to the proposals of others. It therefore "reflects state participation in a sense which is broader than the making of verification proposals alone" (Crawford, A. and Gilman, E., *Quantitative Overview of the Second Edition of the Compendium of Arms Control Verification Proposals*, ORAE Report No. R89 (Dept of National Defence, Ottawa, April 1983), p. 79).

Sources: Adapted from Crawford & Gilman (see note above), p. 80; and personal communication with A. Crawford.

detailed design for an experimental test of the system and acceptance by the WMO of the use of its communication system for the experiment.[136]

While there remain technical and administrative problems to be resolved in this system, there is little doubt that given sufficient motivation and support they could be resolved in a relatively short time to create a highly satisfactory international seismic-monitoring network. This, coupled with the national networks and analytical capabilities of the major states and the supplemental monitoring capabilities of satellites, would provide ample assurance against any significant clandestine nuclear weapon testing programme anywhere in the world.

Unfortunately, the fundamental problems are not technical and administrative; they are political. It is a fact of international political life that no real progress in nuclear arms control can be made until the two major nuclear powers are willing to commit themselves to such progress. Therefore until the United States and the Soviet Union can come to terms on a nuclear test ban, there is little that states like Sweden or Japan can do except to continue to

prepare the foundations for administering and verifying a treaty if and when it does become a reality.

An effective political mechanism which smaller states can use to exert pressure on the major nuclear powers simply does not exist. The Non-Proliferation Treaty stands as evidence of the inherent asymmetry of political power in the field of nuclear energy and nuclear weapons. This asymmetry makes any approach to international forms of verification extremely difficult as is shown in chapter 4.

V. Adequacy

How much verification is enough? This question has been the focus of an intense and virtually continuous debate in the United States since the beginning of the SALT process, that is, since the time when actual arms control agreements began to be negotiated between the United States and the Soviet Union. Before that time the only agreements reached were those which were either easy to verify with very high confidence by national technical means (the Partial Test Ban Treaty) or for which verification was thought to be unimportant (the Outer Space Treaty of 1967). However, when negotiations began to deal with systems having real or potential military and/or symbolic value, the question of verification came to the fore and has remained there ever since.

Soviet versus US views of adequacy

While the United States has had to grapple constantly with the question of a minimum acceptable level of verification, the Soviet Union has never faced this problem, at least in public. Indeed, the Soviet Union has faced the opposite problem, that is, what is the maximum amount of monitoring and 'inspecting' it would tolerate.

Soviet attitudes towards verification have been summarized in the following seven 'basic principles':

> 1. The conduct of verification should in no way prejudice the sovereign rights of states or permit interference in their internal affairs.
>
> 2. Verification cannot exist without disarmament but must stem from a precise and clear agreement on measures for the limitation of armaments and for disarmament.
>
> 3. The scope and forms of verification should be commensurate with the character and scope of the specific obligations established...
>
> 4. The detailed elaboration of the verification provisions is possible only after an agreement on the scope of the prohibition has been mapped out.
>
> 5. We proceed from the assumption that a State becomes a party to a convention not in order to violate it but in order to abide strictly by the

> obligations it has assumed under it, and therefore that verification should not be built upon the principle of total distrust by States of one another...
>
> 6. International forms of verification should be limited.
>
> 7. ...in the conditions of the present-day development of science and technology, any fairly less serious violation of an agreement in the field of disarmament ... has no chance of remaining undetected for very long.[137]

To discern a definition of 'adequacy', that is, what would be a minimum acceptable level, in these principles is not easy, since most of them deal with upper limits instead of lower ones. However, principles 3, 4 and 7 seem to suggest a vague concept of adequacy. The means of verification must be commensurate with the specific obligations, should derive directly from these obligations and should take into account the deterrent effect of the risk of detection.

As abstract 'basic principles' these form a coherent and logical approach to verification, but problems begin to arise immediately when they are applied to practical situations. Unfortunately it is not possible to find in Soviet writings on verification any attempt to derive specific guidelines for decision making on arms control agreements. Instead, the chief function of the above principles has been to act as constraints on US demands for more extensive verification.

It is therefore not surprising that the phrase 'adequately verifiable' was invented in the United States. President Nixon, in his charge to the US SALT delegation used the phrase,[138] and it is used as well in the law establishing the US Arms Control and Disarmament Agency which was amended in 1977 to require that "adequate verification" accompany any arms control agreement.[139] The term "adequate" was preferred by the Senate to the word "effective" suggested by the House of Representatives on the grounds that it was less ambiguous. Interestingly, the word "effective" has now been resurrected by the Reagan Administration as the new standard of acceptability for verification measures.[140] The significance of this change is analysed below.

An official formulation of the US view of the abstract principle of adequacy is given by the following list of basic principles analogous to those offered by Issraelyan from the Soviet side. A US Arms Control and Disarmament Agency publication addresses the question "when is verification adequate?" and produces the following list of factors which must be taken into account in answering the question:

(*a*) the existing degree of friendship or hostility between the states in question; (*b*) the degree of risk posed by possible violations; (*c*) the ease or difficulty of responding to possible violations; and (*d*) the political benefits to be gained from the treaty.[141]

It is clear from these principles that a very high level of verifiability would be required in a treaty dealing with militarily significant weapons negotiated with a hostile or untrustworthy state. On the other hand, a treaty of high symbolic value dealing with a marginal military system and negotiated among friendly states would require very little verification.

Such self-evident generalities are not very helpful as policy guidelines and, just as in the Soviet case, it is necessary to bring these basic principles down to the real world of arms control negotiations, a world in which it must unfortunately be assumed that at least two of the negotiating states maintain a hostile relationship with each other. Under the Nixon, Ford and Carter Administrations a treaty would have been considered adequately verifiable if "any Soviet cheating which would pose a significant military risk or affect the strategic balance would be detected by our intelligence in time for the United States to respond effectively".[142]

This definition, or very slight variations from it, formed the core of the argument that the SALT agreements were adequately verifiable. But this definition has come under increasing attack and has now been abandoned by the US government. The balance of this section is devoted to an attempt to understand the significance of this change.

The first problem with the definition is that it begs more questions than it answers. It depends for its usefulness on a consensus as to the meanings of phrases such as "significant military risk", "strategic balance" and "respond effectively". But the debates of the past decade over SALT and other arms control proposals have revealed that these are in fact highly controversial phrases in the USA. Their meaning seems to depend heavily on individual attitudes towards more fundamental questions such as the political utility of marginal advantages in military power and the proper goals of arms control.

One analysis of US attitudes towards verification had divided the spectrum of attitudes into three 'schools': the "substantive", the "legalistic" and the "metaphysical".[143] The definition quoted above is characteristic of the concept of adequacy held by the substantive school, and its demands on verifiability are actually comparatively low. They depend on the assumption that the levels of armaments on both sides are already very high and that a *de facto* state of strategic equivalence exists. Therefore, any attempt to affect this balance in a significant way would require a substantial effort, and the very scale of this effort would make any attempt to do it clandestinely almost certain of failure. This connection was made clear by Secretary of Defense Harold Brown in testimony on the SALT II Treaty:

> In short, there is a double bind which serves to deter Soviet cheating. To go undetected, any Soviet cheating would have to be on so small a scale that it would not be militarily significant. Cheating on such a level would hardly be worth the political risks involved. On the other hand, any cheating serious enough to affect the military balance would be detectable in sufficient time to take whatever action the situation required.[144]

This "double bind" concept has been called the "basic canon of the arms control community"[145] and it formed the basis of arguments made by the Nixon, Ford and Carter Administrations for the ratification of the SALT treaties.

Members of the substantive school are not greatly concerned with "minor" violations, as witnessed by the response of Gerard Smith, the chief US negotiator in SALT I, to recent charges of Soviet violations by the Reagan Administration: "Smith added that the alleged violations had no 'substantial' military significance and did not alter the balance of power between the two countries."[146]

In contrast to this view the "legalistic" school considers *all* violations important, even if from a purely military or strategic point of view they are minor. According to this school the degree to which the parties adhere rigorously to all the provisions of a treaty is an important measure of the goodwill and trustworthiness of those parties. For example, "The principle effect of the violations is not the immediate military consequences, but the issue of how we conduct negotiations in the future and the expectations we set for these negotiations. We just have to be more careful".[147]

Another argument of the legalistic school is that small violations of an agreement can be used to test the resolve of another party. In this view: "We should not tolerate non-adherence in small things lest we lose our credibility in insisting on adherence in large".[148]

This perceived need to enforce adherence in small or militarily insignificant matters places a far greater burden on verification efforts and raises the standard of adequacy well above that of the substantive school. It forces the monitoring systems to observe much more closely and comprehensively and therefore inevitably raises the false alarm rate. It places a heavy demand on the analytical capabilities of the intelligence agencies and it strains the resilience of the political commitment to maintaining the viability of treaties.

It is in the matter of proof that the legalistic approach encounters its greatest problems. In this view an arms control treaty is a 'contract' whose individual provisions are to be scrupulously adhered to, in analogy with contracts made within the US legal system. But it is almost never mentioned that this system also has as one of its fundamental principles that parties are assumed to be innocent until proven guilty. In this legal tradition violations of a contract must be proved before they in fact become violations. If this same standard were applied rigorously to arms control treaties, the legalistic approach would at least be logically consistent. But such a consistency has not always been manifested in US approaches to verification, where an insistence on rigid adherence to the letter of a treaty has often been accompanied by the presumption that the Soviet Union will probably attempt to cheat. It is far too easy for suspicion to become its own 'proof' under such conditions.

Suspicion is raised to the status of a fundamental principle in the metaphysical school where "even strict compliance with some provisions could be interpreted as 'sinister' ".[149] The basic approach to verification of this school is best summarized by the so-called 'theorem': "We have never found anything that the Soviets have successfully hidden".[150]

Analysis of such a statement must begin with the recognition that it is not

in any sense a theorem. A theorem is defined as "a proposition that is not self-evident but that can be proved from accepted premises".[151] But the statement in question *is* self-evident; it is a tautology, that is, a "needless repetition of an idea in a different ... phrase". Something which has never been found has obviously been successfully hidden; no proof of such a statement is either necessary or possible, nor does it require any evidence of either a positive or negative nature to sustain it.

The constant repetition of such a tautology (and it is found repeatedly in the more conservative assessments of verification) can serve only one purpose: to create and sustain an attitude of constant suspicion and fear. That this is its inventor's purpose can be inferred from his paraphrase of Hamlet in the same article: "There are more ways to hide ICBMs in heaven and earth than are dreamt of in your philosophy".[152] The "game" is one of "hiders and finders", and the hiders always seem to have the advantage.[153] It is undoubtedly this attitude that the Soviet Union is reacting to when it refers to the "principle of total distrust of one another", a principle which it sees as fundamentally incompatible with a successful verification mechanism (see principle 5 on p. 140).

The essential demand of the metaphysical school is not that the Soviet Union demonstrate *compliance* with arms control treaties, but that it prove the *absence of non-compliance.* The essence of this demand can be illustrated in the following challenge by a senator of the metaphysical school to Harold Brown who was explaining the concept of adequate verifiability: "... the repeated use of the word 'adequately' bothers me. And I guess Mrs Brown would be a little suspicious of you if you were to come home tonight and tell her that you were adequately faithful to her, wouldn't she?"[154] Dr Brown's interesting answer to this question is given below, but for now the focus should be on the implications of the question itself. First, the question attempts to compare a standard of behaviour with a standard for monitoring behaviour. Second, it suggests a standard of international behaviour in which treaty obligations are in some sense equivalent to marriage vows. What the question ignores is the fundamental assumption of trust on which a marriage is based and which often is sufficient to establish a shared understanding of what "adequately faithful" means.

One can call upon Shakespeare again to see what happens when this understanding is undermined. Othello, with the help of Iago, finds certain evidence of Desdemona's non-compliance with their agreement and, in effect, demands proof of the absence of non-compliance. Such proof cannot be given, and Shakespeare makes very clear what lies at the end of this particular road.

What separates the metaphysical school from the substantive and legalistic schools is the question of "whether monitoring is expected to prove compliance against the presumption of violation or prove violation against the presumption of compliance".[155] It must be made very clear that while the latter task may be made more or less difficult, it is at least in principle possible.

The former task, as Desdemona learned so tragically, is in principle impossible. In the face of such a demand the concept of verification itself becomes meaningless.[156] Verification means the ascertaining of truth or correctness of a statement by the use of evidence. It therefore deals only with "the *fulfilment* and confirmation of an *anticipated* result", that is, compliance.[157] To require a verification system to demonstrate the complete absence of non-compliance is to ensure that it will fail.

The approach to verification of the Nixon, Ford and Carter Administrations can be characterized as a mixture of the substantive and legalistic schools, although the arguments for ratification in Senate hearings tilted strongly towards the substantive end of the spectrum. During the 1970s the metaphysical school acted as an outside critic, which grew progressively in influence, but which had little or no effect on the actual negotiations. With the advent of the Reagan Administration the centre of gravity of US verification policy now lies somewhere between the legalistic and the metaphysical. The demise of the substantive school has been symbolized by the change in standard from "adequately" to "effectively" verifiable.

The meaning of this change in terminology can be seen first by another reference to a dictionary, where "effective" is equated with words like "operative", "active" or "impressive". On the other hand "adequate" is defined with terms like "sufficient", "suitable" or "barely satisfactory".[158] The change seems to imply a more active role for verification than had been contemplated under the previous administrations. To be "effective" rather than merely "adequate" the verification process must have goals beyond those of simply verifying compliance with treaty provisions; it seeks to "effect" something. One way to put this is: "We need a positive assessment that the agreement is being carried out, not just a negative one that no violations of any importance have been detected."[159]

Just how the goals of the new standard are seen by the Reagan Administration has still not been made entirely clear. However, some idea can be obtained from the following principles laid down by Eugene Rostow, the Reagan Administration's first director of ACDA:

> First we shall not confine ourselves to negotiating only about aspects of the problem which can be detected by national technical means. We shall begin by devising substantive limitations that are strategically significant, and then construct the set of measures necessary to ensure verifiability.
>
> Secondly we shall seek verification provisions which not only ensure that actual threats to our security resulting from possible violations can be detected in a timely manner, but also limit the likelihood of ambiguous situations developing.[160]

The first of these principles can be interpreted as essentially equivalent (with only a change in rhetorical emphasis) to principles 3 and 4 stated by Soviet Ambassador Issraelyan (see p. 140). The second principle uses the previous

concept of adequate verifiability (i.e., that actual military threats can be detected in a timely manner) as a base and then extends this to a limitation of the possibility of "ambiguous situations".

The problem of ambiguity

"Ambiguity is the problem."[161] "Ambiguous provisions result in compliance questions and compliance questions, *even if ultimately resolved*, strain the atmosphere for arms control negotiations."[162] So one operative 'effect' to be achieved in 'effective verification' is the reduction or removal of ambiguity. This can be done in two ways, both of which have been suggested by officials of the Reagan Administration. One way would be "to go for simpler arms control agreements that are not involving such arcane requirements of verification".[163] The other would be to demand of the Soviet Union a greater willingness to consider "cooperative measures"[164] to improve the verifiability of agreements. Such a willingness would serve as "a litmus test of their commitment to serious limitations".[165]

Both of these alternatives pose their own problems. While 'simpler' arms control agreements may reduce the ambiguity of the verification process, they may not achieve meaningful objectives. For example, a restriction to unambiguously verifiable agreements would rule out such vital measures as a chemical weapons ban or a comprehensive nuclear test ban. On the other hand, demanding more "cooperative measures" from the Soviet Union as a "litmus test of their commitment to serious limitations" sounds suspiciously like earlier US efforts to force the Soviet Union to conform to US standards of openness, a favourite goal of the metaphysical school. The Bush proposals for a chemical weapons ban (see p. 126) appear to be consistent with this interpretation. But such proposals can be predicted in advance to be unacceptable, especially when they are presented as "litmus tests".

The goal of reducing ambiguity in arms control agreements is certainly a desirable one, especially in view of the volatility of the US political process. And it is undeniable that the previous standard of adequate verifiability left ample room for ambiguity. But not even the most ardent advocate of effective verification would argue that ambiguity can be removed entirely, and a case can even be made that some ambiguity may be desirable in certain cases to permit some flexibility in interpretation and implementation. But even if absolute precision is the goal, it can never be possible to eliminate the possibility of differences in interpretation, technical limitations and other sources of ambiguity.

If some ambiguity is inevitable, then the problem has come full circle and the question boils down to how much ambiguity can be tolerated. In other words when does verification become "adequately effective"? Such playing with words is only partially facetious. It illustrates the ultimate frustration

encountered in any attempt to make the inherently subjective objective. It cannot be done.

Quantitative approaches to adequacy

Ambiguity is frustrating to many people, especially scientists, and from time to time efforts are made to find objective measures of adequacy or effectiveness. The most common approach to this problem is to compare the risks inherent in a given arms control proposal to the benefits expected from it. In order to make such a comparison both risks and benefits must be quantified in some way and must be commensurable, that is, measurable in the same units.

It is enough to define the problem in this way to see how difficult (many would say impossible) it is to solve. While risks can be quantified to some degree under certain assumptions in certain special cases, there is virtually no way to measure quantitatively the benefits of most arms control or disarmament measures. While there may sometimes be measurable economic benefits, and while some quantitative estimates might be made for the reduction of risks of accidents, the greatest proportion of the benefits are in their contribution to the reduction of international tensions and the risk of war. Such benefits cannot be measured quantitatively, and few analysts attempt to do so.

The risk inherent in a particular provision is proportional to both the probability of successful violation and the magnitude of the consequence of such a violation.[166] This assures that relatively inconsequential violations pose little risk even if they are easy to accomplish, while serious violations (often called 'break-outs') pose significant risks even if their probability of execution is relatively low. This methodology may be familiar to many from the debate over the safety of nuclear power plants in the USA during the 1970s. It is now widely used in many areas of risk assessment.

In order to quantify risk both probability and consequences must be quantified. The former can in fact be quantified for a number of possible agreements. One example is in the detection of underground nuclear explosions. A seismograph in a certain location is subjected to a known level of seismic noise (see chapter 2) and, therefore, can detect signals from actual events with a probability that depends on the ratio of the signal strength to the noise level (S/N).[167] Knowing how seismic signals decrease in amplitude with distance from the source then allows the computation of a relationship between the probability of detection of an event and its distance from the seismograph. These individual probabilities can then be combined mathematically to give the detection probability of a network of seismographs spread over many locations. It is then possible to design a network adequate to detect and identify seismic events of a given strength anywhere in the world with a known probability.[168] This procedure leads to a well-defined and

credible value for the probability that an underground nuclear test of a given yield could be carried out without detection.

The next question, however, is how large this probability should be to serve as an 'adequate' deterrent to potential violators. Already at this stage subjective values begin to enter the calculation. Does one take the point of view of the detector and demand a high probability of assurance of detection, say 90 per cent?[169] Or does one work on the assumption that a potential violator would be effectively deterred by even a relatively low probability (say 30 per cent) that a clandestine test would be identified?[170]

There is no objective answer to this question; the answer clearly depends on the level of hostility and suspicion between the parties at the time the agreement is negotiated. It also depends on the other half of the risk calculation, that is the consequences of a successful or unsuccessful violation. But how does one estimate quantitatively the gain or loss of military and/or political advantage from the successful execution of a clandestine test or series of tests of warheads small enough to evade detection? And how does one estimate the political costs of being caught in an attempt to cheat?

There are several other approaches to the problem of defining a quantitative standard of adequacy. One set uses the mathematical theory of games in an attempt to see how two 'players' will behave in a situation in which cheating successfully and unsuccessfully has certain risks and benefits (called payoffs).[171] While this technique can provide an interesting qualitative description of certain kinds of decision making, the simplifying asumptions which must be made to make it analytically soluble render it hopelessly inadequate for the treatment of real verification problems. Another approach formulates 'breakout scenarios' of various magnitudes in order to test the 'sensitivity' of the strategic balance to clandestine weapon deployments.[172] But such scenarios also suffer from highly simplified analytical assumptions and tend to be devoid of political content, making their usefulness questionable even as heuristic aids.

A possibly more promising quantitative approach begins from the assumption that small marginal changes in some measure of military power become less and less significant as the absolute magnitude of the measure becomes larger. For example, one proposal for a cut-off on the production of fissionable materials assumes that a "fissile production cutoff agreement would be adequately verifiable if it were possible to detect with a reasonable probability the clandestine production or diversion of an amount of fissile material greater than ten percent of the current US stockpile over a period of ten years".[173]

This implies that an adequate monitoring system would be incapable of reliably detecting any production capability less than one per cent per year of the current US stockpile, equal to either 6.5 tonnes per year of highly enriched uranium or 1 tonne per year of weapon-grade plutonium.

From one point of view this definition seems quite reasonable and conservative; one can hardly imagine the 'strategic balance' being upset by the secret

expansion of nuclear explosive stockpiles by one per cent per year. But from another point of view there are serious political problems with such a definition, since one per cent of the US stockpile of fissionable materials could be used to produce at least 1 000 nuclear weapons.[174] How does a government reassure a suspicious public and Senate that a monitoring system which can permit as many as 1 000 secret new nuclear weapons per year on the other side is 'adequate'?

The actual problem of clandestine weapon production is, of course, more complicated than this question implies. It is one thing to produce the necessary explosives clandestinely, but it is quite another thing to turn them into weapons, provide them with delivery systems and integrate them into military plans clandestinely. Still, the numbers themselves are so large that such careful qualifications are likely to be overwhelmed in the inevitable simplifications of public debate. Former US Defense Secretary Harold Brown has made clear the political difficulties: "For an American president, the political problem is the real one. For President Carter (or even President Reagan) to be accused of... taking a position ... that allowing the USSR that many bombs a year in violation of an agreed ban is adequate verification ...would quite likely make the front page of the *New York Times*".[175] This example raises as clearly as any other the complex and controversial distinction between politically significant violations and militarily significant ones, a distinction which is examined in detail in chapter 4.

The role of doctrine

The debate on adequacy of verification must ultimately be considered in the context of the debate on military-strategic doctrine. This boils down to the question of whether marginal advantages in military forces, in particular in nuclear weapons, carry with them corresponding marginal political advantages. There seems to be an intimate connection between the position people hold on this doctrinal issue and the standards of adequacy they apply to verification of arms control agreements.[176]

The two poles of the debate are delineated by the following statements. The first is by Gerard Smith, the chief US negotiator in SALT I: "If there was to be success at SALT, I felt that the two sides would to some extent have to pursue a similar strategic doctrine, that the prime (but not necessarily sole) purpose of strategic nuclear weapons is to deter the use of such weapons by the other side... This in simple terms is the doctrine of 'assured destruction' ".[177] It is implicit in the doctrine of assured destruction that nuclear threats, even when made from a position of considerable superiority, are incredible and therefore have no political utility. A state with a secure retaliatory capability need not fear such threats and can tolerate even rather substantial shifts in the strategic balance.

On the other side can be found the following views: "Weapons imbalances

can be as useful for deterrence and coercion as for war fighting, a circumstance both the USSR and the US obviously appreciate".[178] And "If one assumes that no capabilities beyond those required for a 'minimum deterrent' are significant, then none of the SALT II limitations are 'strategically significant': they may assure the Soviet Union strategic nuclear superiority, without denying us a 'minimum deterrent' ".[179] In this view marginal weapon imbalances or strategic superiority are (or at least can be) politically significant and, by implication, must be preventable if an arms control agreement is to be meaningful.

When this abstract doctrinal argument is brought down to the level of verification one tends to find assured destruction advocates belonging to the substantive school and agreeing with the 'double bind' analysis offered by Harold Brown.[180] The other side, who believe that nuclear superiority remains a useful political tool even in the face of an opponent with an assured destruction capability, tend to be found in the legalistic and to some extent in the metaphysical schools and to deny that there is any logical or practical connection between the verifiability of a particular issue and its military-political significance.[181]

This is not the place for a careful discussion of the doctrinal issues involved in this debate. It must suffice to emphasize that this debate, which has raged almost unabated in the United States ever since the nuclear age began, is at the root of much of the internal dissension that marks US approaches to arms control in general and verification in particular.

On this level a very similar comment can be made about the Soviet Union, which has been conducting its own debate on strategic nuclear doctrine ever since the death of Josef Stalin in 1953.[182] It is interesting to speculate that the two sides of this debate may be distinguished by different approaches to the problem of 'co-operative measures' in arms control verification. Those in the Soviet Union who consider nuclear parity or assured destruction sufficient may argue for a greater willingness to share information and make concessions on on-site inspection in order to reach agreements which will preserve this parity. That such concessions are from time to time made indicates that they are being advocated by reasonably strong political forces. On the other hand, those who believe in the usefulness or danger of superiority, when held by the Soviet or the US side, will tend to see the ability to withhold military information as an important Soviet advantage, one which it would be reckless to negotiate away without equally significant concessions from the other side.

There is no hard evidence with which to test this hypothesis, but one former US negotiator has noted that:

> ...the Russians rightly understand every verification provision that gets into a treaty to be a concession that they are making to us ... every stage is an extraordinarily difficult effort—which the Soviets expect to be a two-way process, with Soviet concessions on verification (both monitoring and

> precision) compensated by U.S. agreement on points of concern to the USSR.[183]

One would need to add to this observation only the additional suggestion that some part of the "extraordinary difficulty" may occur in the political debates within the Soviet Union itself.

One loose end remains to be tied in this discussion of adequacy in verification: Harold Brown's response to the senator's question about the adequacy of his fidelity to Mrs Brown (see above, p. 144). Dr Brown's answer was, "In that case as in this, I suppose it would depend upon the alternative offered".[184] The alternative in arms control to a working consensus on the definition of adequate verifiability is no arms control at all, so it is essential to draw some conclusions from the above analysis as to what sort of consensus might be possible.

In choosing among the substantive, legalistic and metaphysical approaches one must consider the technical and political demands each places on the verification process. From this point of view the metaphysical approach is clearly unacceptable, and the legalistic approach seriously problematic. The former, in fact, if not in explicit words, denies the possibility of meaningful arms control or disarmament, while the latter places so much emphasis on sensitive and comprehensive monitoring that it promises constantly to create at least as many problems as it solves. The substantive approach would set a much higher threshold on violations and in some cases may appear to involve some risks, but it has the virtue of focusing on the military significance of possible violations, a criterion which seems less vulnerable to ambiguities, false alarms and shifts in political attitudes than more legalistic, technically arcane and sensitive criteria.

It cannot be emphasized too strongly that no matter what criterion of adequacy is chosen it will always be subject to strong influence by the prevailing political climate. As is stated at the beginning of this chapter, it is far easier for shifts in political relations to affect attitudes towards verification than it is for verification, no matter how adequate or effective, to improve the political climate. This leads to the conclusion that the best approach is one which does not place unreasonable demands on a system which is inherently fragile. The substantive approach based on military criteria of adequacy shows the best promise of staying within this limitation. It also has the virtue of focusing the public debate on arms control onto issues of military-strategic doctrine and the role of military force in international politics. This is where the debate belongs.

As to the distinction between 'adequate' and 'effective' verification, this seems little more than a semantic and symbolic device with which the Reagan Administration has attempted to establish its break with previous US approaches to arms control. As the above analysis has shown, changing the word does not change the problem. The problem remains to find the

appropriate level of verification necessary to reassure governments and citizens that arms control agreements are being complied with. If this problem can be solved the word used to describe the solution will not matter very much. The achievement of a public and leadership consensus on a substantive criterion of adequacy will not be easy. It will require much education and reassurance from a government strongly committed to arms control. And it will also require a high level of commitment by all parties to bilateral or international treaties to a scrupulous adherence to their obligations. Finally, there is no escaping the need for trust, a much maligned and misunderstood concept, which is the next subject for analysis.

VI. Trust

No word is more fundamental to the problem of verification than 'trust', and no word has suffered more from both hypocrisy and scepticism in the history of arms control efforts. It is a concept on which US and Soviet positions seem furthest apart, yet the processes by which trust might be enhanced through verification measures are never examined in detail by either side. That which is not taken for granted is dismissed out of hand. But no discussion of verification would be complete without an attempt to analyse two of the most basic assumptions of Western approaches to verification: first, that verification can operate as a substitute for trust and, second, that verification can lead to the building of trust.

A particularly clear statement of these assumptions is the following: "Verification systems which are now essential because of lack of trust, can, by the assurance of compliance they can provide, become one of the most powerful tools for building the sought-for mutual trust... In sum we have the following equation: the more absolute the verification—born in mistrust—the greater the progress toward absolute trust".[185]

Another suggests that "The successful verification of a cut-off [of fissionable materials production] would have great psychological and political importance. It might profoundly affect conventional beliefs that nothing can be done to halt the arms race".[186]

While these statements may exaggerate the intimacy of the cause–effect relationship between verification and trust, they nevertheless make clear the basic assumption underlying the role of verification as a 'confidence-building measure' (see chapter 1). It is therefore essential to examine this assumption critically, to ask in short: can confidence-building measures really build confidence?

Any approach to this question must recognize that trust operates on two quite distinct levels. First, there is the notion of trust between states who sign a treaty or agreement. On this level states are independent unitary actors

whose degree of trust in each other's intentions is reflected in the compliance provisions embodied in the treaty. Second, there must be the recognition that states are not in fact unitary actors but carry out policies which are the result of internal political debate and compromise. Trust plays a crucial role in this internal process as well, especially in an area characterized by high degrees of both technical complexity and secrecy, not to mention occasional illegality. Those who do not have access to monitoring and intelligence data, and could not interpret them even if they did, must trust those who do see the information to interpret it with skill and integrity and to act appropriately on the basis of these interpretations. A strong argument can be made that this problem of internal trust is considerably more important to the success of arms control than the problem of trust between states.

Internal trust

As suggested above, the problem of maintaining internal trust derives from two major sources: technical complexity and secrecy. The technical sophistication of virtually all national technical means of monitoring implies that only highly trained specialists will be able to transform the raw data from photographs, seismographs, radar and radio antennas, infra-red sensors, radiation meters, and so on, into an understandable and useful form for policy makers. Meanwhile the dense cloud of secrecy under which the intelligence-gathering and interpreting process is carried out implies that very few people will have access to crucial information and be aware of the nature and reliability of its sources.

The need for political leaders to depend on expert technicians in order to make critical decisions is more and more a characteristic of modern life. In such highly technical areas as nuclear energy, environmental protection, military preparedness, economic policy and arms control those who must take responsibility for making decisions cannot begin to absorb and master all of the factual and analytical work that must precede such decisions. In the vast majority of cases policy makers have only the vaguest understanding of the technical details of the systems they are controlling.

It is not only the technical complexity of the data that is inaccessible to decision makers, but also their sheer volume. Just the interpretation of satellite photographs, which provide only a small fraction of all intelligence data collected, requires the sustained work of hundreds, possibly thousands, of highly trained professional photo-interpreters whose job is to extract important information from photographs on which the layperson would see only fuzzy blotches of varying shape and size. The classic example is the photographs of Soviet missile emplacements under construction in Cuba shown to President Kennedy in October 1962. To anyone who had not been trained to interpret such photographs and who was not already familiar with the configurations

of Soviet missile emplacements such photographs would be useless. Indeed, acccording to McGeorge Bundy, an advisor to President Kennedy at the time: "it was the persuasive conviction of the experts and not the naked appearance of the first photographs which was immediately conclusive to President Kennedy on October 16. If he had not learned to know and trust those experts, he might well have doubted their story".[187]

A more recent example involved the showing to a selected group of journalists of infra-red and low-light motion pictures taken by US reconnaissance aircraft over the south-east coast of El Salvador.[188] The films were alleged to provide hard evidence of the shipment of weapons by Nicaragua to rebel forces in El Salvador. But the journalist writing the account could say only that he saw "fuzzy white objects", "a cluster of small white outlines", "white blots" or "small white forms" on the film (see figure 7, p. 33). The interpretation of these images was done for him by voice-over commentary on the films. To this journalist the evidence remained "inconclusive", and US embassy officials could only say that "in conjunction with other evidence we have, some of which is sensitive, they make an interesting case that arms are being infiltrated into the country, and from Nicaragua."

This example makes clear that the simple release of monitoring data will in most cases be useless in informing the public. Interpretation by experts will inevitably have to accompany any attempt to use intelligence data in the domestic political process, and it is not difficult to list the qualifications such experts must have if they are to do their job properly. They must have the best possible data-gathering and processing equipment, they must maintain a high standard of professional competence and, above all, they must confine themselves to purely objective, non-political assessments of the data they analyse. All political judgement must be left to those who carry political responsibilities.

These requirements clearly define the problems of expertise. However sophisticated the hardware becomes there will always be interesting, possibly critical, data which are just beyond its reach, and however well trained the experts, there will inevitably be mistakes, misinterpretations and lack of initiative to contend with. For example, it has been suggested that the US allegations of the use of 'yellow rain' by the Soviet Union or states friendly to it resulted from faulty interpretation of evidence by intelligence analysts who were scientifically incompetent. The question then arises as to "how far back . . . into the intelligence-evaluating channels . . . such deficiencies extend. And can we assume that the people in government who have to act on the intelligence appraisals have a proper capacity for distinguishing what may loosely be called a scientific fact from a scientific opinion?"[189]

These are serious problems, but they can be dealt with by careful hiring and training practices. Such problems are not crippling to the verification process as long as the condition of professional detachment is fulfilled. As long as confidence remains in the essential objectivity and integrity of the experts, their

technical and human limitations can be accepted as a fact of life without compromising the value of what they do produce.

Unfortunately, however, this primary requirement is the most difficult to preserve precisely at the times when it is most necessary: when an issue has become politically controversial. Analysts are asked not only to describe what the data *say*, but also what they *mean*. They are pressured to resolve ambiguities which, as professionals, they would prefer to see remain as ambiguities. And their cautious and tentative interpretations are often introduced into the public debate and distorted beyond recognition by misunderstanding, oversimplification and misrepresentation.

The essence of the problem is that equally competent experts can be more or less in agreement on what the data say but be in bitter disagreement about what they mean. As these disagreements emerge into the public debate, people become confused and begin to lose confidence in the experts themselves. People are accustomed to disagreements between politicians, but disagreements among experts on arcane and dangerous technical issues are extremely discomforting. The public has no independent means of analysing the data and, as happened in the case of nuclear power plant safety in the USA, the issue can reduce to one of pitting 'our' experts against 'their' experts.

These pressures to take political positions in the debate external to the policy-making process are compounded by the pressures to produce politically and bureaucratically 'acceptable' analyses within the process. There are many bureaucratic levels between raw intelligence data and the final decision makers, and at these levels are career officials who "have a strong interest in cooking raw intelligence to make their masters' favorite dishes".[190] It is a rarely achieved ideal in which intelligence provides the objective facts that then determine policy choices. More often, "Policy is made and *then* supported by intelligence . . . [T]his is partly . . . to avoid giving the intelligence service any more power than can be helped. There is also a concern that intelligence operators interested in policy may become the advocates of some pet scheme at the expense of reporting facts".[191]

Fears of just these kinds of pressure made many in the CIA reluctant to take on the responsibility for verification in the 1960s.[192] And these fears seem to have been justified, especially during the Nixon Administration when the demands of the SALT negotiations caused National Security Advisor Henry Kissinger to put intense pressure on intelligence analysts to produce numbers and assessments which would be useful to him in negotiations with the Soviet Union. According to one account of this process:

> By early 1970 [CIA Director Richard] Helms had been convinced that it was far safer to misrepresent the intelligence than to do battle with the White House. The CIA no longer automatically analyzed intelligence data on critical issues, but immediately turned over the raw information to

> Kissinger and the National Security Council (NSC) for them to analyze as they saw fit and draw whatever conclusions they chose.[193]

An example of the results of this process is the story of a former NSC staff member who was given the task of projecting Soviet nuclear submarine and submarine-lanched missile production capabilities. According to the analyst, "My clear task was to make sure that the Soviet proposals came up in the middle range. The NSC had no illusions about what they were being asked to do: falsify national intelligence estimates ... the numbers allegedly supplied by the Soviets ... had originated with Kissinger, not Brezhnev".[194]

A number of other such attempts to manipulate the intelligence process for political purposes could be mentioned. For example, there have been two recent resignations from the CIA over alleged pressures to make intelligence estimates conform to US policy in Central America.[195] And charges of political manipulation of intelligence data were at the heart of the legal action taken by General William Westmoreland against the Columbia Broadcasting System.[196]

Kissinger's manipulation of information during the SALT I negotiations caused problems for the US and Soviet negotiating teams[197] and might be interpreted by some as unethical manipulations of the professional intelligence process. At the same time others might defend such actions as legitimate on the grounds that the numbers themselves were not strategically significant and that the manipulation was necessary to achieve political goals which were far more important than some abstract notion of pure objectivity. But whatever value judgement one places on these activities there can be no illusions about the role such political manipulation plays in undermining trust in intelligence expertise. Once this trust is undermined there is little that can be done to restore it except to make available the controversial data and allow independent assessments to be made.

This immediately raises the difficult problem of secrecy. Some secrecy is both necessary and desirable in any system of verification. Not only must important sources of intelligence be protected, but some uncertainty on the part of all parties to a treaty as to the monitoring capabilities of other parties has a useful deterrent effect on violations. However, secrecy also creates serious obstacles to public confidence in the verification system as well as to the effective operation of the system itself.[198] And in an interesting reversal of the 'deterrent' argument Paul Warnke, the chief US negotiator on SALT II, has suggested that the deterrent effect of verification might even be *enhanced* by the release of more information: "I suspect that we are even better than [the USSR] think we are and, therefore, if they knew a little more, they would be even more worried about cheating".[199]

Unfortunately, increased openness faces major bureaucratic obstacles. In a sensitive area like intelligence, information becomes both a precious currency and a potent weapon, and access to secret information is both a tool and

symbol of political power and bureaucratic status.[200] During the SALT I negotiations Henry Kissinger succeeded in gaining almost complete control over the flow of information within the national security bureaucracy, often withholding from both the Secretary of State and Secretary of Defense information essential to the performance of their official responsibilities.[201] During the negotiations Dr Kissinger relied almost entirely on Soviet-supplied interpreters because he did not trust intepreters supplied by the US State Department.[202] This can be compared with the Soviet willingness to use US-supplied data on force levels in order to avoid the need for Soviet military officials to reveal actual Soviet numbers in the presence of Soviet civilian diplomats (see above, p. 135). While much of what has been said so far about public trust has had a distinctly US context, this problem of information-as-weapon is common to bureaucracies everywhere and, were they free to do so, Soviet and US national security managers would certainly find many common problems in this area to discuss.

When the seemingly irresistible force of the need for public confidence meets the seemingly immovable object of the desire for absolute secrecy, something must give way. In the Soviet system, of course, the 'irresistible force' half of this equation is absent. Soviet citizens are simply assured that "in our century of developed electronics and space flights, those who are entrusted with such verification possess all the necessary facilities for immediately finding out any violation of the treaty if it occurs".[203] Still, even in the absence of serious concerns about public opinion, many Soviet officials are surely aware of the price that is paid for excessive secrecy and compartmentalization in the form of decreased efficiency and creativity in solving problems.

In the US system the usual method for reducing accumulated tensions between secrecy and public demand for information is for the system to spring leaks. Such leaks of supposedly secret information have become a standard part of the US political process and are used at all levels of the political and bureaucratic hierarchy to achieve various political goals. Certain journalists and journals have become well known as conduits for leaks, and outside critics and supporters of various policies learn to recognize these valuable bits of information as they appear. According to one US Congressman, disputes within the intelligence community can create "a field day for rumormongers": "A piece of evidence suggesting a violation is leaked and presented as positive proof of a violation. Then a piece of contrary evidence is counter-leaked as positive proof that nothing whatsoever happened. The end result is to discredit the whole verification process".[204] This is one of the problems that has led the Congressman to propose a much closer involvement of the US Congress in the entire verification process (see above, p. 130).

While leaks play, to some extent, the role of a safety valve in the US political system, they do not resolve the contradiction between the demands for secrecy and the need for public confidence in official decisions. Leaks are inevitably

and properly seen as politically motivated, and they are almost never accompanied by enough supporting data to make them credible to someone who is not already convinced of their truth. In fact, politically or ideologically motivated leaks from the intelligence community ultimately serve only to undermine even further public confidence in the competence and objectivity of intelligence professionals even if, as is often the case, they are not responsible for the leaks.

Information, in order to inspire confidence, must be freely given and clearly credible or must come from a source which is seen to have no political interest at stake. The Carter Administration took several steps to release information which had previously been treated as secret. In 1978 President Carter acknowledged publicly the official 'secret' that the United States used reconnaissance satellites to photograph the territory of the Soviet Union.[205] This 'secret' had been common knowledge for almost 20 years but for political reasons, which are discussed in chapter 4, had never been admitted officially. The Carter Administration also released a summary of the issues which had been discussed in the Standing Consultative Commission regarding ambiguities and irregularities in Soviet and US behaviour under the SALT I Treaty.[206] The proceedings of this Commission are supposed to be absolutely secret, and President Carter risked serious criticism from the Soviet Union for breaking this secrecy. However, this criticism has turned out to be relatively mild,[207] indicating a willingness of the Soviet leadership to take into account the demands of the US political process.

As useful as these relaxations of secrecy were they were not sufficient to overcome the suspicions of opponents of the SALT agreements that other, possibly more damaging evidence was being withheld. Every government must face the prospect that in maintaining secrecy it can invite charges that it is covering up failures in the intelligence process or weakness and irresolution in the face of apparent violations.[208] Even the release of some information will often not solve the problem but only bring charges of selective manipulation and whet appetites for even more information.

As one might expect, opinions are deeply divided over the solution to this problem. On one side are those who would strengthen secrecy and plug the leaks. According to General David C. Jones, former Chairman of the US Joint Chiefs of Staff: "this whole subject of verification has been discussed too much in public, and continued discussion of the subject is likely to end up in jeopardizing some of our intelligence gathering systems".[209] But William Colby, former Director of the CIA, has advocated a significant relaxation of secrecy with respect to intelligence information: "Intelligence can contribute to the public debate... The functions of intelligence have to be shared with the people. This is very much a change in the operation of intelligence. It's an old myth ... that everything should be secret".[210]

In attempting to evaluate these two positions it must be kept in mind that

information is a two-edged sword, and that its release will not necessarily reduce tensions or promote arms control objectives. For example, General Bernard Rogers, Commander of NATO forces in Europe, recently argued that aerial or satellite photographs of Soviet military deployments in Eastern Europe should be revealed. He told a group of newspaper reporters: "I wish we could have spent the afternoon here just showing you photographs from overhead platforms... How we can see the offensive orientation of the Warsaw Pact. They've got acres and acres, in various locations, of river crossing equipment. It isn't to cross rivers going east... It's to head west, you see".[211]

If General Rogers is correct in his interpretation of these photographs, their release would clearly not be helpful in reassuring the people of Western Europe of peaceful Soviet intentions. But if the pictures *were* released, others would also have the opportunity to examine them and might arrive at different interpretations. In particular it would be interesting and instructive to learn how one determines from pictures of bridging equipment in which direction it is intended to be used. But in the present situation in which such photographs are kept secret the concerned public has only its preconceived ideas and attitudes on which to decide whether to accept, reject or ignore General Rogers' interpretation.

Without minimizing the genuine problems involved it does seem that Mr Colby's approach offers the greater promise for real progress in arms control. US officials who seem quite eager to point out the negative effects on mutual trust of Soviet concerns for secrecy seem much less willing to understand the damaging effects of their own obsession with secrecy in dealing with the US electorate and Congress. Given a genuine interest in arms control, any present or future US Administration is going to have to rebuild the confidence which has been lost in US verification capabilities through the acrimonious debates over SALT. It is difficult to see how this confidence can be regained without the release of considerably more information than has been freely available in the past. If one picture is worth a thousand words, then one high-quality satellite photograph may prove more effective than a thousand exhortations to trust the experts.

However, even more fundamental than reassuring public concerns about verification is the re-establishment of a leadership consensus on the US approach to arms control. The loss of public confidence has resulted far more from the breaking up of this consensus than it has from concerns about technical inability to monitor Soviet behaviour.[212]

Rebuilding this consensus will not be easy. In a poll taken immediately after the 1980 election which brought the Reagan Administration to power, 90 per cent of respondents favoured continued US–Soviet negotiations on arms control, but about half of those in favour of negotiations also agreed with the statement that while the USA would keep its end of the bargain the Soviets probably would not.[213] The ensuing four years of Reagan Administration,

characterized by extremely bellicose rhetoric in its early stages and numerous accusations of Soviet treaty violations (see chapter 4), can hardly have improved this situation.

Trust between states

It is assumed in the discussion that follows that the internal problems of confidence described in the previous section have been brought under control and that two (or more) states face each other as unitary actors in arms control negotiations. The question to be addressed is: can verification substitute for a lack of trust and actually lead ultimately to the growth of trust?

That one must begin from a baseline of very little mutual trust will not be difficult to demonstrate. On the US side the almost total absence of trust in the Soviet Union is generally asserted as the foundation of US compliance policy. For example, the final report on SALT II verification by the Foreign Relations Committee of the US Senate begins with the assertion by its Chairman: "It is agreed that the United States cannot rely upon or trust the Russians to comply with [the treaty's] terms".[214]

William Colby was once head of the CIA and is now a strong public advocate of arms control agreements. He can be categorized as a member of the substantive school of verification, and his views typify those of the more liberal US advocates of a nuclear freeze and a reduction of tensions between the USA and Soviet Union.[215] Yet even Mr Colby makes clear that "the first and most obvious fundamental is, of course, that we should not 'trust' the Russians".[216] More recently, Walter Mondale, the 1984 Democratic candidate for the US presidency, stated with considerable emphasis in a televised debate with President Reagan: "I don't trust the Russians".[217]

In the United States it has become *de rigueur* to begin discussions of verification with this almost ritualistic incantation. It serves the purpose of demonstrating that the speaker is not a sentimental disarmer or unwitting dupe of Soviet trickery. To some extent it is a 'credibility ritual' which Americans have come to expect of anyone with pretensions to expertise in arms control verification. This can partially explain the extraordinary frequency with which this assertion recurs in US politics, but it is also certainly true, as the previously cited public opinion survey indicates, that lack of trust of Soviet motives in signing arms control treaties is a pervasive attitude in the United States. It is probably useless to speculate on whether it is the prevailing public climate of distrust which forces politicians to emphasize their own distrust, or whether the politicians in fact create the public attitudes. Both views are certainly true to some extent and they tend to reinforce each other.

Expressions of lack of trust in the United States are far less common on the Soviet side. Gerard Smith, the chief US negotiator for SALT I, was impressed

by the fact that during the entire two years of negotiations leading up to the agreements "the closest the Soviets ever came to suggesting that the United States might violate an agreement was a statement that a party to an agreement might evade its terms by helping to build up allied strategic forces".[218] Yet there are limits to such restraint, and occasionally a Soviet spokesman will remind the world that "we have no reason for trusting others any more than others trust us".[219] At the same time it remains one of the basic Soviet principles of arms control verification that it "should not be built upon the principle of total distrust by states of one another and should not take the form of global suspiciousness".[220]

On no other issue is the distinction between Soviet and US positions so clear. To the USA, verification must be based on the premise of distrust, that is, the assumption that states (or at least the Soviet Union) sign treaties while maintaining the option, if not the conscious intent, of secretly violating the agreements if an opportunity presents itself in the form of either complacency or irresolution on the other side. To the Soviet Union, verification must be based on the premise that states sign treaties with every intention of living up to their obligations. To the USA confidence is *a priori* non-existent and must be built by the accumulated evidence of compliance, while to the USSR initial confidence is assumed and can only be eroded by evidence of non-compliance.

It needs to be emphasized that these differences in attitude are not explained simply by the observation that Soviet society is 'closed' while US society is 'open'. There is in fact no logical connection between the tightness of control over information and political activity within a state and its trustworthiness in adhering to international agreements. Indeed, it can be argued that a state which exerts a strong control over its internal politics is far less likely to have its chief of state sign an arms limitation agreement only to have it fail in the ratification process because of political forces beyond his control. Similarly, if the intention does exist at the highest levels to adhere to an agreement there is less likelihood in a highly centralized state that independent bureaucratic and/or political actors will take initiatives which undermine the confidence of the other side in the stability of the agreement.

This argument is certainly not intended as an endorsement of highly centralized control over information and political expression. Its purpose is simply to emphasize that the presence of such control in no way constitutes a *prima facie* case for the inherent deceitfulness of the state which possesses it. It is quite possible for such a state to see its best interests served by meaningful and reliable arms control agreeements with potential adversaries and therefore to be committed to scrupulous adherence to the provisions of existing agreements. Nor is there anything inherently trustworthy about the behaviour of pluralistic states in foreign affairs. The interactions between domestic and international politics are far too subtle to allow for such generalizations.

Chronic distrust can exist, and often has existed, between states with very similar political systems, whether pluralistic or centralized. Therefore, the problem of building trust through verification of compliance with arms control agreements goes well beyond the question of the relative 'openness' or 'closedness' of US and Soviet societies.

The hypothesis that arms control verification can build trust must be examined against the background of the following constraints:

1. Arms control agreements are limited instruments which regulate only relatively narrow aspects of the military and political competition. It is assumed that the competition continues unabated in all areas not covered by the agreement. Anything not forbidden is permitted.
2. Verification, however adequate or effective, can never be absolute, and the comprehensiveness and sensitivity of any monitoring process are inherently limited by the need to keep information rates and false alarms to an acceptable level.
3. While it is possible to use evidence to prove non-compliance with an agreement, it is impossible to use evidence to prove total compliance. However much evidence of compliance is gathered, the possibility that some non-compliance remains undetected will always exist. The Katz tautology (see above, p. 143) is simply another way of stating the logical impossibility of proving the absence of non-compliance.

Within the context of these constraints, and assuming that the verification process starts from a lack of trust in the intentions of the other side, one can identify a number of very serious obstacles to the building of trust through verification. The first is ambiguity, something the Reagan Administration has already stated must be reduced substantially if verification is to be effective. Eugene Rostow (see p. 146) is correct when he points out that ambiguities increase suspicion, even if they are successfully resolved, but the unstated assumption underlying his argument is that the ambiguity arises in an atmosphere already characterized by distrust. In this atmosphere the presumption of guilt which is temporarily reinforced by the ambiguity is never fully removed by the clarification. In the USA in the 1950s, people who were accused by Senator McCarthy and others of being communists or communist sympathizers suffered heavily even if they were later shown to have been falsely accused. Similarly, even if it were demonstrated conclusively tomorrow that 'yellow rain' is a natural phenomenon unrelated to chemical warfare, this would not undo all of the damage that has been done to the political atmosphere by accusations that the Soviet Union is responsible for using or encouraging the use of such a weapon. Where there is a presumption of guilt, accusation based on ambiguous evidence leaves an added taint of guilt. Conversely, where there is a presumption of innocence, ambiguity can almost always be resolved to sustain and even enhance the presumption of innocence.

It is possible to construct quantitative models that illustrate the way in which the same evidence can be used to support both a positive and a negative prejudice.[221] The example assumes a mobile ICBM system in which some agreed number of launchers are moved around among some much larger number of shelters, similar to the Carter Administration's 'shell game' plan for the MX missile. However, to facilitate verification that the allowed number of launchers is not exceeded, some specified number of randomly chosen shelters is opened to allow satellites of the other side to see how many of them contain launchers. Then, on the basis of a statistical calculation, the monitoring side can decide whether the number of launchers actually observed is consistent with the number expected.

This is all straightforward except for the very last word: 'expected' on the assumption of compliance or 'expected' on the assumption of non-compliance? It can be demonstrated straightforwardly that *both* hypotheses can be 'confirmed' (in the statistical sense) with the *same* observed data. Even in this most objective of monitoring situations one can still see what one expects to see.[222]

This phenomenon has been demonstrated in many psychological experiments with individuals and groups. In one such experiment certain students were chosen from a group to act as supervisors of the work by other students on a set of assigned tasks.[223] Each of the supervisors was responsible for ensuring that the output of two student workers met specified standards. The situation was arranged so that the supervisor could closely watch the work of one student but could not easily monitor the actions of the other. The experiment was planned to ensure that, to the supervisor's knowledge, both of his workers produced the same amount of work. After several periods of work, the supervisor was instructed to choose which worker he needed to watch more closely. In almost all cases, the supervisor's choice indicated that he perceived the student who had been working without close monitoring to be more trustworthy. The reason should be clear—while the outputs were the same (and, hence, the supervisor was confronted with the same stimuli), the supervisor had reason to suspect that the observed student might have been working only because he was being watched. However unjustly, the supervisor's perception of trustworthiness was influenced by this extraneous knowledge.

This example makes clear the very real possibility that the institution of more and more comprehensive and intrusive inspection measures in an atmosphere already poisoned by distrust can serve to reinforce distrust between the parties: "If we assume something approaching a 100 percent willingness to cheat, then verification by technical means becomes politically ineffective. In an atmosphere of intense distrust the verification system will be asked to verify things that resist verification and to provide unreasonable reassurances".[224]

Another possible consequence of attempting to accomplish too much with verification could be to institutionalize distrust. Institutionalized distrust is a familiar feature of modern societies. It is manifested in the auditing of income

tax returns, the 'frisking' at airport boarding areas, the searching of baggage at customs counters and in breath tests for alcohol on highways. Encounters with such manifestations of official distrust can range in impact from the mildly annoying to the deeply humiliating, depending on the sensitivity with which they are carried out. They are never pleasing or flattering. Citizens submit to such experiences either because they recognize and accept the legitimate authority of those who conduct them or because they have no alternative.

It is an entirely different matter to institutionalize such distrust among equals. Unless inspections are conducted with sensitivity and skill by an authority with universally recognized legitimacy, they can become an irritant leading to even greater hostility and distrust than would have existed without them. And to maintain a consensus of legitimacy for an inspection programme, the programme must adapt to the widely varying cultural and political characteristics of the states to be inspected. While these two constraints do not rule out an effective inspection mechanism, they do make the design of one extremely difficult, even when the political atmosphere is relatively cordial. When the atmosphere is hostile the task becomes virtually hopeless, since there is no authority with the power to impose it on the states involved.

So far the problems identified have had to do with ambiguous behaviour. But even more insidious than the confidence-eroding nature of ambiguities is the probability that in an atmosphere of distrust even clear evidence of compliance can be seen as having sinister implications. If one knows one is dealing with a cheater, then when one observes evidence of compliance it is natural to assume that this evidence has been planted in order to distract attention from the real cheating which is going on elsewhere.

For example, Katz argues that what appears to be US success in gathering intelligence on Soviet missile forces is due to the fact that "the Soviets have been cooperating with the US intelligence systems". They have not made the task easy; "Rather, they don't make things impossible". He then argues that since success has been based on Soviet co-operation, it is impossible to say how effective US intelligence methods would be if the Soviet Union were actually hiding missiles.[225] In short, it is not what is seen which is worrisome; it is what is *not* seen.

A bizarre example of this phenomenon is related by Steinberg in his account of the 'missile gap' scare of the late 1950s, when a number of Democratic presidential candidates accused President Eisenhower of allowing the Soviet Union to gain an enormous lead over the USA in ICBMs. There was no hard evidence for this gap but: "Maxwell Taylor and John Kennedy saw the lack of evidence of large-scale Soviet missile deployment as *evidence that such deployment was imminent*".[226]

It is one thing to be pessimistic and always assume the worst, but it is quite another to use in support of one's pessimism evidence for precisely the opposite conclusion. This is very close to the thinking of the hypochondriac who sees the absence of illness as evidence that he will soon get sick,

and the obverse of the chronic optimism of the compulsive gambler who sees every losing streak as evidence that his luck is about to take a turn for the better.

One final example will illustrate the self-fulfilling nature of distrust. It concerns what de Rivera has called the "construction of reality"[227] and is best typified by Goethe's observation that "in the end we are all dependent on monsters of our own creation".[228] John Foster Dulles, US Secretary of State from 1953 to 1957, believed that "a communistic government was essentially evil"[229] and "feared that if we were drawn into agreements with the Kremlin on particular issues the effect on public opinion might be to undermine our ability to keep up our guard".[230] These assumptions made Dulles incapable of interpreting the evidence of change in Soviet behaviour following Stalin's death in 1953 in a way that would cause a change in his basic assumptions. A study of Dulles' publicly expressed attitudes towards the Soviet Union showed that there was no correlation between Soviet behaviour and Dulles' attitude. This raises the important question:

> If there were factions in the Soviet Union who desired friendlier relations with the United States, what could they have done (in the realm of political practicality) to convince the Secretary of State of their sincerity? It would appear that no matter what the Soviet Union could have done, the Secretary would have interpreted the very acts that should have led him to *change* his beliefs in such a way as to *preserve* his beliefs.[231]

While these examples effectively illustrate the destructive effects of distrust, one cannot ignore the fact that the same self-magnifying mechanisms can operate to produce unwarranted complacency. US officials were so convinced in 1941 that Pearl Harbor could not be attacked that they attributed evidence of Japanese intelligence gathering to "Japanese diligence".[232] And Josef Stalin was so convinced that Adolf Hitler would not betray their non-aggression pact that he ignored obvious evidence of German preparations for an invasion of the Soviet Union.[233]

The lesson to be learned from these examples is not that pessimism is necessarily more or less dangerous than optimism, but that whatever prejudice one starts with will have a strong tendency to be reinforced by the evidence one obtains from monitoring. This calls into serious question the notion that a verification system intended as a "substitute for trust" can ever result in a building of trust. This may have been what Soviet Premier Brezhnev had in mind when he told a US Senator: "The danger today is not that the current methods of verification are inadequate, but that this issue might be used to fuel a propaganda campaign that would only trigger distrust between our countries and poison the political atmosphere".[234]

Recognition of this possibility is not confined to the Soviet Union. Many of these potential problems of arms control agreements were recognized by

Western analysts years ago,[235] and according to a more recent Western assessment:

> Transparency has revealed defense establishments of great technical complexity, in the process of constant change. Where the meaning of certain activities is inherently obscure, greater amounts of information are bound to lead to conflicts of interpretation and thus of policy choice. Transparency has a confidence-eroding as well as a confidence-building dimension.[236]

How then can confidence be built? There exists a vast amount of solid evidence of compliance with arms control agreements which could serve to reinforce trust. There also exists a vast amount of highly ambiguous evidence of possible non-compliance (see chapter 4) which can serve to reinforce the absence of trust. It seems clear that in order for the first process to prevail some modicum of trust must be created to begin it.

An analogy which suggests itself is a cloud of water vapour in which the temperature and density have the correct values to produce condensation and rain, but in which rain does not form. The drops will not form unless the cloud also contains small 'nuclei' (for example dust particles or ice crystals) onto which the water vapour can condense. In fact rain can often be produced artificially by seeding saturated clouds with ice or silver halide crystals. These nuclei are an indispensible initiating factor which are qualitatively different from the water which condenses on them to form rain.

The building of confidence can be seen as very similar to the building of raindrops. The political atmosphere can be full of evidence of compliance, but confidence will not grow unless a nucleus of some kind is present. This nucleus must be of an essentially different nature, that is, it cannot itself be constructed out of evidence of compliance. It is more a willingness to be convinced or a "disposition to be reassured".[237] It was precisely this willingness that was absent in Secretary of State Dulles and which others find so threatening today. It represents a certain leap of faith and must ultimately derive from a sense of shared danger and shared interest in the reduction of this danger.

This does not imply that all conflicts and tensions between the USA and USSR must be resolved before the process of building trust can begin: "Compliance issues can be handled satisfactorily even if superpower relations are far from ideal. But the essential precondition for success is that both sides believe it is in their interest to maintain the viability of previous agreements".[238]

Another US statesman, hardly less anti-communist than Dulles, recognized the need for this leap very early in the nuclear age. Henry Stimson, Secretary of War in the Roosevelt and Truman Administrations, at first held hopes that by maintaining its monopoly over nuclear weapons the United States could coerce the Soviet Union into accepting US plans for the post-war world. However, in 1945 Stimson became the first senior administration official to

become disillusioned with this notion and advocated that a direct approach be made to the Soviet Union to negotiate a sharing of information on atomic energy.[239] In his letter of resignation to President Truman, Stimson wrote: "The chief lesson I have learned in a long life is that the only way you can make a man trustworthy is to trust him; and the surest way to make him untrustworthy is to distrust him and show your distrust".[240] However impressive the technological progress in verification capabilities may have been over the nearly 40 years since these words were written, their essential truth remains undiminished.

VII. Trust and adequacy

In the 1950s the frustration bred by unsuccessful efforts at disarmament led to the ascendency of the concept of arms control. If the arms race could not be ended it would have to be managed, and verification would become an essential tool in this management. This led to many attempts to formulate some general principles connecting the demands for verification with the overall state of the arms competition, some of which are examined briefly above.

Probably the most influential and lasting of these efforts was one put forward in 1961 by Jerome Wiesner, President Kennedy's Chief Science Advisor.[241] Wiesner assumed that disarmament would have to begin and proceed in an atmosphere of mutual distrust between the disarming parties, both of whom would begin the process from some relatively high level of armaments. Both sides would first agree to dismantle some relatively small fraction of their forces. At this stage, since both sides retain a powerful nuclear force, the importance of verifying that no cheating took place on the size of this reduction would not be great, so the inspection effort could be relatively minor.

As subsequent steps were taken and the sizes of the retaliatory forces on both sides became smaller and smaller, so the potential danger of one side cheating would increase, since a marginal superiority which is innocuous at high levels might become (or appear to become) decisive at low levels. Extending this argument to its logical conclusion leads to the prediction that complete nuclear disarmament is an unstable and potentially very dangerous situation, since a marginal advantage of only a few weapons could give its possessor enormous power.

The most important implication for verification of Wiesner's analysis is that the amount of inspection must increase as the level of armaments is reduced. That this conclusion is still widely accepted is illustrated by the following statement of the Palme Commission: "The more deeply a treaty bites into existing arsenals or the more tightly it binds possible future developments of military technology, the more comprehensive must be the means of verification

specified in the agreement".[242] The same connection between reduced armament levels and increased verification demands is suggested in the concluding paragraph of the study which looks at the verification of a cut-off in fissile material production (see pp. 148–49): "Of course, if and when nuclear disarmament proceeds to the point where the stockpiles have been greatly reduced, the task of adequate verification may become more difficult".[243]

The relationship between verification and disarmament implied by these statements is illustrated in figure 40, usually called the 'Wiesner curve'.[244] The graph shows the progress of nuclear arms reduction over time as well as the degree of inspection required to prevent significant violations. The final objective, to be reached at time *A*, is some minimal level of nuclear weapons on both sides—in other words, a permanent stable balance. Along with the curve showing a decreasing number of 'legal' weapons, Wiesner draws another curve to illustrate the acceptable uncertainties at each period of time. As the legal number of weapons decreases, so must the uncertainty, so the two curves get

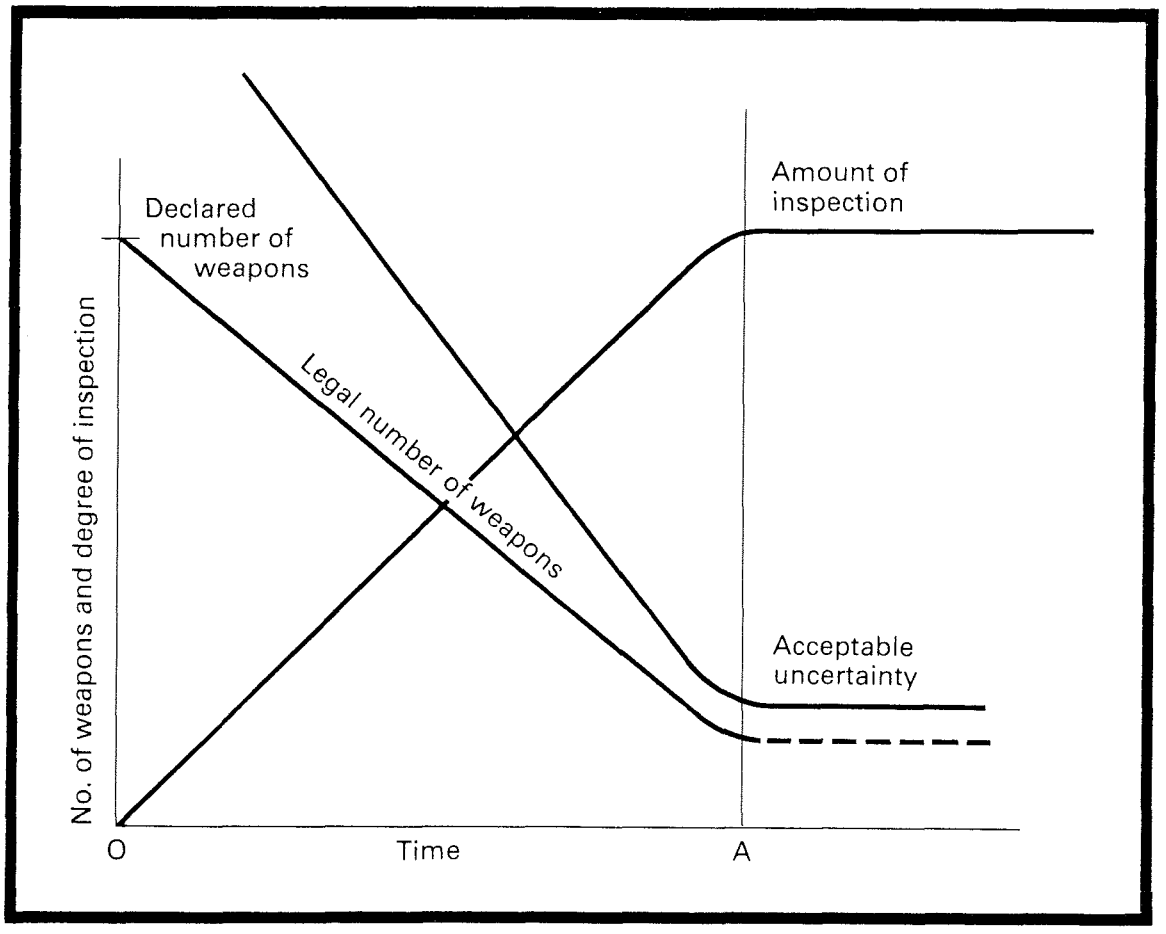

Figure 40. The Wiesner curve
The curve shows the relationship between the degree of disarmament achieved and the demand for inspection. All of the variables are plotted without units, so the sizes of the final 'minimal deterrents', the final magnitude of the inspection system, and the time required to complete the process are all unspecified. In particular, time 'A' may be 5, 10 or even 50 years in the future.

closer together, and the curve for 'amount of inspection' goes steadily upward. Wiesner does not state it explicitly, but is is implicit in his analysis that if the disarmament curves were extended to zero, the uncertainty would also have to be zero (or at least extremely small), and the amount of inspection would therefore be intolerably high.

The evidence accumulated over the more than 20 years since this model was proposed suggests that while it may have some usefulness in dealing with certain special cases of quantitative arms limitation, it is almost certainly invalid, and even misleading as a general description of the relationship between the degree of disarmament and the demand for verification.[245] Since the model was proposed in 1961 the numbers of weapons on both sides have grown substantially, suggesting that demands for verification should have decreased. They most certainly have not; if anything they have become even more stringent and politically sensitive than they were in 1961. The historical experience is therefore more consistent with a model in which the level of suspicion and fear, instead of remaining constant, is proportional to the level of armaments.

To understand the failure of the Wiesner model it is necessary only to state clearly the assumptions on which it is based. First, it assumes that the task of inspection is to effect disarmament "in a context of acute distrust between powerful nations".[246] This high level of distrust is implicitly asumed to remain constant during the disarmament process. Second, the model assumes that only militarily significant violations need to be deterred, and that the military significance of violation depends on the marginal advantage it achieves relative to the existing levels of armaments. In other words, 10 clandestine nuclear weapons are assumed to be far more significant when measured against a base of 50 than against a base of 5 000. These assumptions will be recognized as those of the substantive school of verification described above.

There are a number of reasons for the failure of Wiesner's model to predict the course of events since its formulation. The first is the essentially quantitative approach to both armaments and inspection implied by the graphical presentation in figure 40. Both armaments and inspection are plotted in terms of amounts or numbers, ignoring the extremely important qualitative dimensions of both of these factors. The most important changes in armaments since 1961 have been qualitative rather than quantitative, and this trend is still accelerating. The actual number of nuclear weapons possessed by the United States in 1984 is not much greater than the number in 1960, but the accuracy, reliability, flexibility, survivability and mobility of these weapons have been increased enormously. Similar trends are well advanced on the Soviet side.

Increases in monitoring capabilities have been both quantitative and qualitative since Wiesner constructed his model, but in recent years the emphasis has shifted almost entirely to qualitative improvements—better sensitivity and resolution, improved reliability and survivability, more rapid data processing, and so forth. Future developments in sensor and information-

processing technology promise to be almost entirely qualitative. Unfortunately, as has already been noted (see chapter 2), the improvements in monitoring technology are not keeping pace with the qualitative improvements and proliferation of weapon technology. Models based on purely quantitative approaches to arms limitation are not very useful even as conceptual guides to the evolving connection between verification and arms control.

Another problem with Wiesner's model is the implicit assumption that the political significance of possible violations is closely related to their military significance. As a member of the substantive school Wiesner may believe that this is the way things ought to be, but the history of arms control negotiations shows that the reality is quite different. Along with the commitment to qualitative improvements in weapons has come what appears to be an increasing belief in the political utility of even small marginal military advantages.[247] This belief is rarely expressed in the positive sense of a state openly exploiting its own perceived advantage. Instead it manifests itself in an exaggerated sensitivity to perceived marginal advantages of the other side and the concern that they have acquired this advantage because they see political utility in it. How much of this concern is genuine and how much is rationalization is very difficult to determine. Under these conditions the legalistic and metaphysical concepts of verification are more logically appropriate, and these have in fact come to dominate the US approach to the problem. The result of such an approach is that the "balance of terror" becomes "delicate",[248] and more monitoring rather than less is required to prevent the clandestine development of some supposedly potent advantage.

Even if the above-mentioned difficulties could be solved by constructing a more sophisticated model, there would remain an even more fundamental flaw in the Wiesner curve. This can be found in its assumption that a constant level of distrust will be maintained during the process of disarmament. One criticism which appeared soon after the publication of Wiesner's model argued:

> If the process of disarmament, once commenced, were to continue, it would almost necessarily transform both the attitudes of states toward one another and the general character of international society. It seems most implausible to postulate as constant the political atmosphere that exists today during the course of disarmament from beginning to end. Either trust and harmony would emerge to a much greater extent than they exist today or the disarmament process would not proceed very far.[249]

This argument is consistent with the results of other psychological experiments similar to those cited above in the analysis of trust (see pp. 163–66). These experiments showed that people who had previously engaged in some form of co-operative activity showed a significantly enhanced tendency to trust each other in subsequent competitive situations relative to people who had had no previous co-operation.[250]

All of this suggests that there would almost certainly be a strong correlation between the degree of disarmament and the level of trust, precisely the reverse of the apparent growth of distrust in lock-step with an escalating arms race. The question comes down to finding some way to reverse the arms race, and this must confront another 'double bind': hostile states will not begin to disarm until they trust each other but will not trust each other until they begin to disarm. This dynamic feedback relationship suggests that disarmament and trust must progress closely together or they will not progress at all. Such a feedback loop, however, gives very little guidance as to how much verification is necessary to help the process, and, as has already been argued, too much verification could even interfere with it.

In the end the political role of verification remains elusive. The problem cannot be reduced to a scientific formulation, and it remains in the very apt words of Amrom Katz "the art of the state".[251]

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