TACTICAL NUCLEAR WEAPONS: DETERRENT OR DETRIMENT (1) INEVITABLE: A COMPREHENSIVE TEST BAN TREATY (2)

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TACTICAL NUCLEAR WEAPONS: DETERRENT OR DETRIMENT

and

INEVITABLE: A COMPREHENSIVE TEST BAN TREATY

TWO MONOGRAPHS

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ABSTRACT

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Tactical nuclear weapons are defined as those weapons which can be delivered by conventional theater forces in the conduct of military operations. The benefits of a tactical nuclear capability are the provision of a deterrent to armed conflict, and of a warfighting capability should deterrence fail. The drawbacks inherent to possession of this capability arise from misconceptions and false perceptions, and include the misguided pressures to replace conventional forces with nuclear weapons, the overwhelming security requirements that can degrade warfighting capability, the destructiveness that can lead to the attitude that the weapons could or should never be used, and the persistent idea that the use of a tactical weapon might bring on a devastating strategic war. The ambiguous nature of these problems leads to debate which is very harmful because it degrades credibility and compounds the problem. Because the power of these weapons is there, or perceived to be there, regardless of their configuration, it is suggested that the existing stockpile is in fact the one which we should have; that the judgment of the military, the warfighting experts, should be used in implementing programs to maintain warfighting capability, and that this military judgment must be tempered so that it can be supported by the nation's civilian leadership. Since the existing stockpile has already been severely criticized, however, a compromise consensus must be developed in an attempt to reach the point where there is general agreement that the existing stockpile is acceptable.

TACTICAL NUCLEAR WEAPONS: DETERRENT OR DETRIMENT?

If I have a weapon, and you have none, there is every likelihood that you will try to avoid a fight with me. If you have a weapon, but mine is the more powerful, that likelihood might be diminished, but it still exists. And even if the unlikely event occurs, it will be to your advantage to avoid the situation where I can use my weapon, or else you may lose the fight.

There is alot of room to read ambiguities into that little parable, but nonetheless it presents a rationale for the battlefield tools which we call tactical nuclear weapons. These are powerful weapons, but with them comes a host of powerful problems. Technical questions of how to operate on the nuclear battlefield have occupied military planners for the last 20 years. The philosophic doubts over whether there can even be a nuclear war which is solely tactical have risen and fallen in some sort of ill-defined cycle during this same period. Even the definition of what is a "tactical nuclear weapon" is subject to controversy, because some of these are engines of destruction capable of devastating entire cities that may only be peripheral to the actual arena of conflict. Nevertheless, before we even start to talk about these weapons, some sort of definition is in order, and I will propose a brief one here. These are nuclear weapons which can be delivered by conventional theater forces to conduct military operations with the greatest effectiveness. The present delivery arsenal consists of

surface-to-surface, air-to-surface, and surface-to-air rockets; artillery tubes; fighter-bomber aircraft; and atomic demolition munitions emplaced by hand. Omitted from this list, of course, are the strategic delivery systems: submarine launchers, silo-emplaced missiles, and intercontinental bombers. The definition of tactical nuclear weapons obviously includes systems which can strike the same targets, with equal effectiveness, as the strategic ones; and it is here that some of the biggest problems arise. But let us deal with that point a bit later.

Perhaps the best way to tackle the question we have posed for this discussion would be to explore the reasons why any military force could benefit from the possession of nuclear weapons, and then balance this rationale by looking at the detrimental aspects of a tactical nuclear capability. By so doing, we may at least find out where the ambiguities lie in the parable which opened this essay, and thus gain an awareness of the strengths and weaknesses which tactical nuclear weapons project.

THE GOOD SIDE

For weapons to be good, it is axiomatic that they must have a purpose. But nuclear weapons present a special problem because man perceives in their power the seeds of civilization's destruction. What purpose can such weapons possibly serve? The simplest answer is that their very existence creates their purpose, which is, paradoxically, to prevent the use of the power which their existence

creates. The single word which is used to describe it all: deterrence. Back to the opening parable, and add another thought: if neither you nor I know who has the more powerful weapon, we will both avoid the fight, or at least the situation where the unknown power of these weapons might be used.

That argument fits very well the big brothers of our tactical nuclear weapons, the strategic forces whose utility lies in their utter uselessness. If the strategic nuclear threat fails to deter, the spectre of a world lost could become real. If the strategic forces are used, they have failed their real mission. Of course it can be argued, and these may be realistic arguments, that a strategic nuclear war would not be the end of our way of life, and we must be prepared to exploit the situation should the war occur. But who really knows? In Herman Kahn's words, "How many strategic nuclear wars have you fought?" Nevil Shute and Pat Frank, and even Terry Southern, may have helped us become accustomed to thinking the unthinkable, but no one yet has been able to still the fear that everyone would lose in a nuclear war.

Tactical nuclear weapons present an additional and perplexing aspect, however. If we can accept for the moment that a truly tactical nuclear war might really occur, then tactical nuclear weapons may have to serve a purpose which extends beyond deterrence. In other words, the purpose of tactical nuclear weapons would have to be twofold: to deter war wherever their non-use may create this effect, and to fight on the battlefield if deterrence fails.

The perplexing part of tactical nuclear weaponry is that, by serving well its secondary purpose, it may seem to be undermining its primary role. For this reason, I have chosen to address their so-called warfighting capability as a "bad side" of nuclear weapons, so an expansion of this paradoxical statement will be coming up shortly. In any case, the good side of tactical nuclear weapons must lie in serving the dual purpose of first: deterrence; and second: warfighting.

It is quite arguable that by itself the existence of a tactical nuclear capability provides deterrence at least to some degree, but there is always the factor of credibility to consider. Sure we have them, but can we, and will we, use them? And who believes this? Since we have assumed for the moment that tactical nuclear war is possible, let's extend that to say that we would in fact use the weapons which lend their name to this war. Then the question of "can we use them" must be answered by their warfighting capability. If they can move, shoot, and communicate like conventional forces, then tactical nuclear forces can certainly fight a war, and a potential enemy is forced to accord them this capability. These weapons can also provide another dimension to the questions surrounding conflict termination, questions which we can only ponder by using judgment to temper conjecture. No one can really prove that tactical nuclear weapons will allow us to resolve a conflict on terms more favorable than those which might be available without them, but no one can disprove it, either. Warfighting

capability, despite the fact that it has a bad side as we will see, is an integral part of the credibility of a tactical nuclear arsenal.

Let's back up for a moment and look at the idea of a battlefield or tactical nuclear war. Our opening parable tried to say that where strategic nuclear power exists, opponents will confine their aggressions to avoid that arena. Actions and experience in Cuba and Vietnam lend some credence to that argument. The use of nuclear weapons solely on a battlefield can be viewed as such a confinement, but again who can say for sure that a strategic nuclear power would refrain from using all of its arsenal if things went badly on the nuclear battlefield? Or any battlefield? And just how far does a tactical nuclear battlefield extend, anyway? How many tactical nuclear wars have we fought lately?

The lack of a good answer to these questions is really the key to the good side of tactical nuclear weapons. The possession of this capability, in a form and manner which makes its use a very real matter of concern to an enemy, can deter that enemy from initiating any sort of hostilities which might stir up a tactical nuclear response, because by so doing he incurs the risk that some major portion of his own country may suffer nuclear damage even if the warfare is restricted. But more fundamental is the concern that a tactical nuclear war could mean an eventual strategic holocaust. It is important to recognize that there is no way for him to determine this, and that the deterrent value of tactical

nuclear weapons derives in part from this uncertainty. If tactical nuclear weapons can be firmly coupled to, or completely decoupled from, their strategic counterparts, an element of certainty enters the equation and the unknown quantity which has aided deterrence wanes. The benefits which derive from a tactical nuclear capability trade hard on the equivocal nature of the possessor; without it, they might disappear.

There is no 100 percent assurance of deterrence, though; in fact, if he comes, the knowledge that tactical nuclear forces oppose him may very well harden an attacker's resolve to use his strategic nuclear forces if necessary. But the cost of this last resolve, perceived by any rational government, can only mean that it feels the national life is at stake when it orders the attack. On the other hand, if an attacker is thwarted by tactical nuclear defense and refuses to escalate, tactical nuclear weapons have served their secondary purpose. Again, it must be recognized that to do so requires a warfighting capability in these weapons, and a miscalculation by the attacker as to the force needed to carry the battle. The benefits of being able to fight such a war successfully hardly need restating, even though there is no assurance that we ever would, or ever could, fight it.

It should be obvious by now that I intend to avoid any attempt to build scenarios which might support the rationale for tactical nuclear weapons. To do so would be to undermine the foundation of unanswerable concerns that is really the support for this rationale.

Students of modeling and wargaming will have to forgive me to taking this approach, but I see no other way to retain a manageable perspective. In fact, I think the ill-defined cycle which can be applied to the philosophic doubts about tactical nuclear war is generated by the seasonal popularity of the many scenarios which can be hypothesized for that sort of war. Although critics may point to this lack of specificity as a weakness in the rationale of deterrence and warfighting, it is in fact its greatest strength. The emphasis on making quantitative analyses and defining quantifiable alternatives stems from the capability to do so for conventional weapons systems, but obscures the importance of presenting a tactical nuclear posture which cannot be predicted, and thus circumvented, by an adversary. It seems to me that such a posture is mandatory because there are so many unanswerable questions involved. This can be interpreted to say that I have based the case for tactical nuclear weapons on the premise that no one can predict what will happen if we have to decide whether to use one. That's a fair statement.

THE BAD SIDE

While the "good side" arguments were devoted to the rationale for having tactical nuclear weapons, nothing is really gained by trying here to construct a reason for not having them. Rather, let's look at the aspect of what drawbacks there are in possessing a tactical nuclear capability, and this will perhaps lend itself to some clearer idea of what we ought to be doing with what we have.

At the top of the list of misconceptions of tactical nuclear capability is the idea that tactical nuclear forces can substitute for conventional forces. The increased fire power available in nuclear warheads certainly substitutes for a large number of high explosive warheads, but that does not translate into elimination of forces. In the one place where a tactical nuclear strategy is defined, NATO has declared that a nuclear response to conventional aggression is a conceivable and acceptable military doctrine. The initial response, however, is certain to be conventional, since conventional forces will have to cope with the attack until conception allows acceptance and the nuclear response is made. And when it is made, if it is to be confined to the battlefield, there must be a tactical target which presents the opportunity to deal a severe blow. The role of conventional forces in nuclear defense can, therefore, be interpreted as forcing an attacker to present a nuclear target. Opposed by small or non-existent defenses, an attacker's posture is more easily configured to thwart the effects of a tactical nuclear weapon. Our own tests in the 1950's showed that conventional forces could function effectively after being exposed as observers to a nuclear blast. Without pursuing this point further, it should be clear that an interaction exists, but to attempt to calculate the concomitant force requirements is not our purpose here. Suffice it to say that tactical nuclear weapons provide a capability and a credibility that must be exploited by conventional forces, but the implication that the former can function

without the latter, or with only token support from the latter, is a drawback to possessing tactical nuclear weapons. With the current atmosphere supporting overseas force reductions, the temptation to succumb to this attitude may be great indeed.

There is a corollary to this last thought which proposes that US forces can be reduced and the tactical nuclear capability retained in the hands of US custodians with allied troops, as a sort of expanded Program of Cooperation such as is in effect with certain of our NATO allies now. The implication here is not that the weapons would lose their effectiveness because of the loss of the complementing conventional capability, although a reduction of US forces might well be taken as the signal that everyone else can afford to do likewise. Rather, the drawback inherent in an approach of this sort is the removal of an uncertainty: the possibility of a tactical nuclear response by a nation without a strategic nuclear capability of its own leaves fewer doubts about whether a strategic nuclear exchange is at stake. In other words, if possession of the weapons should lead us to an apportionment of this sort, the war-fighting capability might not suffer, might even be enhanced, but the deterrent qualities of the arsenal would suddenly fall to an entirely different perspective in the eyes of a potential adversary. This is not to say that deterrence would be wiped out, or that it would probably fail, but it would certainly be degraded. Perhaps this drawback is most clearly stated by saying that tactical nuclear weapons have the potential to lead us in good faith into attempts to deploy them which could seriously hamper their usefulness.

Also high on the list of disadvantages is the security problem which appears when tactical nuclear weapons are deployed. To serve their deterrence and warfighting functions, the weapons must be available to the user, which we have interpreted to mean somewhere in the user's proximity. This is certainly a reasonable interpretation, particularly since it has been exercised only for those areas where the purpose of a tactical nuclear capability is served, e.g., NATO. But even so, it means that our nuclear weapons are on someone else's soil, albeit guarded by men with the best-laid plans. Speculation on the consequences of this fact can be left unsaid for our purposes, but the speculation by itself is the drawback that must be recognized. It tends to cast a pall over the entire idea of keeping a military force in someone else's yard. More to the point, though, it leads to the imposition of locks and double locks on the nuclear weapons until the capability to use them may well be called into question. I am including under "locks and double locks" the added problems of obtaining any sort of release or clearance to move the weapons from storage to firing positions, and the cumbersome procedures that are often self-imposed upon the efforts to actually prepare and fire them. Related to this thought is the concurrent difficulty of providing the large numbers of personnel demanded not only to implement technical procedures, but to check and guard those locks and double locks. It is entirely within the realm of possibility that the apportionment of soldiers to these tasks could, if large enough, degrade the

capability of forces to function in their conventional role. We might say, then, that tactical nuclear weapons can project an image which will lead to their being rendered impotent by those who possess them. The longer these weapons lie unused, the less regard is accorded to their operability. The very real danger here is in the misplaced reliance which we may have accorded to their warfighting capability. As a further note, when the impotence which results from too much security (if there is such a thing) is perceived by an adversary, the deterrent capability disappears as well, and may even turn into an encouragement to attack.

Now to the warfighting capability, which I promised to address as a drawback. Why should this be so? To begin with, warfighting capability indicates destructiveness, and the immense destructiveness of nuclear weapons is not well suited to being confined to a so-called battlefield. And if the battlefield occupies the town and country of another nation, a nation which we are seeking to preserve by our nuclear defense, the whole idea of fighting a tactical nuclear war becomes subject to ridicule. But if we made the explosive power of these weapons smaller, and strove for the technology that would all but eliminate the radiation, wouldn't that take care of the problem? Perhaps, perhaps not, since perceptions and prejudices rather than technicalities play the key role in answering, or failing to answer, this question. (How many nuclear wars has your battlefield-country survived?) Conversely, if we limit the power of these weapons, don't we begin to lose the very capability that

a tactical nuclear arsenal should provide: warfighting? After all, the nuclear weapons that are available to a potential adversary are in no way of low explosive yield or restricted radiation. This is the paradox of warfighting capability: if it is circumscribed to allay the fear that it will be too destructive to use, it enhances the credibility of deterrence. If instead it is structured to bring the greatest losses to an attacking force, it enhances the warfighting capability, with an added measure of credibility thrown in. But how can we obtain the one without losing the other? There may well be a best answer, and it may lie somewhere in between, but it is this debate which has led us into the realm of claims and counter claims which denigrate the capability of the existing stockpile of tactical nuclear weapons, and which consequently degrade both its deterrent and its warfighting value. Let us put off for the moment a discussion of how the stockpile might be configured to achieve these conflicting ends, and consider two things: it is entirely possible that the great power which tactical nuclear weapons provide is there, or perceived to be there, regardless of the configuration; but the possession of these weapons has caused us doubts that we would ever use them because they may be too destructive, even though we are facing a nuclear threat that must be considered at least equally so. The subtle dangers inherent in this situation could well lead us to forfeit capabilities which we have already achieved without firing a shot or obtaining a single concession, and all with the expenditure of resources which should be carefully husbanded.

Finally, the unresolved and unresolvable question of whether tactical nuclear war will lead to a strategic nuclear war is the sword of Damocles which nuclear planners encounter whenever they raise their heads from conventional military map boards. From our earlier parable, we might draw two conclusions: if we face an opponent who has no nuclear capability and none which might conceivably come to his defense, we can use our own with impunity; if our opponent has this capability or a reasonable expectation of such support, we must recognize that use of nuclear weapons on our part will have to be based on what are sometimes called "vital national interests," because we will be embarking on a path that may not allow for turning back. It is in the second conclusion that the "bad side" lies: the possession of tactical nuclear weapons provides a toehold for those who would argue that these weapons can be used without undesirable escalation, but since no one can really say for sure that this is so, the credibility of all military planning concerned with conventional-to-nuclear war is called into question. And then the idea that with relative ease our tactical nuclear capability might become embroiled in an initially conventional war whether we want it to or not, pushes incredulity into a hardened stance of opposition. The result is much the same as the "lock and double lock" syndrome just mentioned. Either the power to use these weapons is greatly curtailed, or the ability to maintain a warfighting capability is reduced by any number of limitations imposed from fear of escalation.

It is worth mentioning again that I intend to avoid the quicksand of scenario building, so none of the drawbacks which have just been rather broadly stated stands or falls with a given set of circumstances. In fact, I feel that these general, derogatory aspects of a tactical nuclear weapons capability can be traced to the misleading idea that weapons must be tied to specific uses or targets. In the case of tactical nuclear weapons, this is indeed a Gordian knot, but by ignoring it, if not unravelling it, we may be able to see more clearly that these have been useful weapons, and we can keep them so.

WHAT TO DO ABOUT IT

Now let's turn to the things which we do and the things that perhaps we ought to be doing to obtain, maintain, and exploit the power which is represented by our tactical nuclear arsenal. When we started the "good side-bad side" discussion, it was with the idea that we could at least gain an awareness of the strengths and weaknesses which tactical nuclear weapons project. These we can summarize in this very brief way:

Tactical nuclear weapons are a real deterrent to attack by conventional forces, and they provide warfighting capability which can be used to advantage if deterrence fails. This capability is only real if used to complement conventional forces, even though it can be misconstrued to justify replacement, which it should not. But by deploying this warfighting capability, the problem of weapon

security begins to mount to the point where the capability can become degraded by the security controls imposed upon it. Furthermore, the immense destructive power contained in these weapons is such that there are serious doubts about using them to protect something which would thereby be destroyed. And finally, the spectre of escalation is omnipresent, impelling further the controls which hamper warfighting capability, and reducing further the credibility of a stance which propounds the use of tactical nuclear weapons.

Perhaps another way of stating the weakness that stems from a tactical nuclear capability is to say that there is an influential element of opinion which doubts that we ever could or would use them. Thus, we find ourselves in an endless debate over how many weapons should we have, what should they be able to do, where should they be, and when should we be allowed to use them. Unfortunately, there is nothing that has been said so far that would indicate that an end can be constructed for that debate. We appear doomed to continuous argument over the pros and cons of tactical nuclear weapons, because it revolves around insoluble doubts and questions. And what is so bad about it is the concomitant degradation which our credibility suffers when we have deployed our tactical nuclear capability only to argue about whether we should have done it that way, or whether we should have done it at all.

The military, however, should be able to answer at least some of the doubters, because in the final analysis they are the best

judge of what warfighting capability really is. Of course, they haven't fought any tactical nuclear wars lately, but they do have a wealth of experience with the conventional force that exploits the tactical nuclear capability. Why then should there be any question, when we come to the subject of warfighting capability, over what configuration the military believes is best for our tactical nuclear forces? By "configuration" I mean the types, warhead yields, operational characteristics, numbers, and the myriad other detailed specifications which describe tactical nuclear forces and their weapons, and which together define warfighting capability.

When earlier we talked about this capability as having a bad side, a rather interesting idea began to take shape: the power which tactical nuclear weapons provide is there, or perceived to be there, regardless of the configuration. Does this mean that these weapons can serve their primary purpose (deterrence) even if they are not very good? Disregarding the absurd case of weapons that everyone knows are no good; yes, it does, with one important caveat: Their credibility must be real to anyone who might do battle with them. (And the most effective way that I can think of to degrade credibility is for the users themselves to be undecided over whether these weapons can do the job assigned to them). Serving the purpose of warfighting, should deterrence fail, is rather a different matter. No one wants to be stuck with a gun that can't shoot, and, given the chance, the soldier should always

opt for a better weapon since his own life depends on it. But tactical nuclear weapons, no matter how good they are, don't present a picture that is all strength. If they are easily used, the danger that they will be, with all its strategic implications, is upon us. If they contain very large yields, there is the danger that they can't be used without decimating what it is they are to defend. If they contain very small yields, they might not do the job, and besides they would still be nuclear weapons subject to being opposed by what would surely be much larger ones. If their capability should somehow be perceived to approach omnipotence, the case for conventional forces may be unjustifiably undermined. We are back at the beginning of the circle, or back at the same phase of the cycle, arguing endlessly over the pros and cons because the questions don't have any answers. So how can we ever build an unassailable case for a configuration that will provide warfighting capability? The answer is: we can't, really. No one configuration can be argued to be better than another. The important point, again, is that by arguing we may actually be destroying the credibility that is fundamental to our purpose.

This is not the first time that we have found ourselves thinking this thought, and it forces us to conclude that the tactical nuclear weapons which we have on the ground, right now, are the ones that should be there. Their presence has at least been effective to date. It even implies that we should brook no debate over which configuration might be better, because we are

then creating a false perception that none of them may be any good. But that simple and succinct conclusion cannot stand forever, unfortunately, because like everything else weapons systems are susceptible to age and obsolescence. This is the point where the military should occupy center stage, with a well-reasoned program for maintaining the warfighting capability, defined by any configuration which the military supports. And it really shouldn't matter whether the configuration leans toward weapons with large and "dirty" yields, or small and "clean" ones. Neither should there be anything sacrosanct about the numbers of weapons deployed or the types of delivery systems used. It is quite rational to say that we can improve the arsenal by eliminating without replacement a weapon system that by dint of age or obsolescence is seen to be degrading the credibility of the entire nuclear stockpile. What is important is that the military speak for their tactical nuclear programs with one voice, and that this voice be tempered (as best it can be) to gain the support of the nation's civilian leadership, policymakers, and opinion formers.

The preceding remarks boil down to a plea that the military recommendations for our tactical nuclear stockpile be heeded. But this implies that these recommendations <u>can</u> be heeded. There are some recommendations that <u>cannot</u> be heeded, and these are the ones that conflict with resource limitations or political ramifications which obviously restrict the capability to improve or add to the existing arsenal. If the military chooses to recommend more and

better tactical nuclear weapons beyond what resources can support, there is little doubt the recommendation will go unheeded. And if the political ramifications of these recommendations present difficulties which the nation's leadership cannot or will not overcome, it can be expected that such advice will again be ignored. This is the point about tempering the military voice to gain the requisite support. If we can recognize that <u>any</u> configuration of tactical nuclear weapons, other than an absurdity, can credibly serve the dual purpose of deterrence and warfighting, we are halfway there. The rest of the problem lies in recognizing what recommendations can be heeded.

What I have just described may sound like the easy way out: don't ask for anything if you don't think you can get it, even if you need it. But do you need it if (1) <u>any</u> configuration will do, and (2) your whole posture is going to be hurt if you have to argue over the merits of it? By this last remark, I do not mean that we must avoid honest debate over what is going into our tactical nuclear posture. But I do mean that once a weapon is there, it only makes the problem worse if we continue to argue over whether we should have gotten it in the first place. To formulate a simple equation, the tactical nuclear weapons which are in the stockpile are the ones that should be there; the military program for maintaining a tactical nuclear warfighting capability is the one which should be implemented; and the recommendations contained in the military program must conform to

resources and political realities. If one part of that equation is changed, and particularly the last one, then the other parts become invalid as well.

FINAL THOUGHTS

Considering the sum total of this brief treatise, we cannot escape the facts that a tactical nuclear stockpile exists, and that there are very real pressures to change the stockpile exerted by arguments that have already been aired over its credibility and capability. We might be able to do something with that equation we just reviewed, but how can we get around those two inescapable facts? We can't, of course, so we are forced to accept the idea that changes will have to be made in the stockpile by some sort of consensus; the situation is too far out of focus to simply say, as we would under what could be called ideal conditions, that military recommendations, properly grounded, are the ones which should be implemented. Our goal in working out this consensus should be to restore the situation to something like the ideal conditions where the stockpile configuration is generally agreed to, the military program for maintaining the stockpile is supported, and the military recommendations are tempered for acceptability.

This means, of course, that there should be changes in the tactical nuclear stockpile. It is too late to go back and seek to restore credibility which past criticisms have already eroded. Changes will take time, and in fact they should take time, because

the present stockpile can be perceived as a very weighty armament in the scales which balance the Soviet and US ground forces. Surely this weaponry has played some role in preventing conflicts between NATO and Warsaw Pact nations. So for this reason, the changes which do evolve should come about incrementally, with ample time for the reverberations of one to dampen before the next is introduced.

The power contained in tactical nuclear weapons is such as to defy its application to the practical circumstances of war, yet because these weapons exist we must seek to fit them to a practical role. The solution to this dilemma lies not in technology but in our own attitudes. Tactical nuclear weapons are as good, or as bad, as we perceive them to be. Unfortunately, their existence eliminates a choice; we must, and we can, perceive them to be good.

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ABSTRACT

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TITLE: Inevitable: A Comprehensive Test Ban Treaty

The "inevitable" nature of an eventual test ban ~~has been~~ codified in the Limited Test Ban Treaty and Nuclear Non-Proliferation Treaty. Pressures ~~are increasing~~ throughout the ~~world~~ for the nuclear nations to stop testing. To date the deadlock over verification has been cited as the reason why the US and USSR cannot come to terms on a comprehensive test ban treaty. Within the US, attempts to address the question of whether or not there should be a CTB have not been worthwhile, and have obscured the more important question of what the US should be doing to prepare for a CTB. Eventually, the problems of nuclear proliferation ~~will lead the US and USSR to agree to~~ a ban on nuclear testing ~~since this will be seen as~~ a step to prevent or at least limit proliferation. The advantages of a CTB must then be considered with a view to exploiting them, while at the same time the disadvantages must be offset. The asymmetries between the nuclear programs, ~~as well as the societies~~, of the US and USSR lead to conclusions as to what the US should be doing to avoid the problems and recognize the benefits of a CTB. Accepting the inevitability of CTB Treaty is the key to finding the correct posture to implement these conclusions.

INEVITABLE: A COMPREHENSIVE TEST BAN TREATY

CURRENT PERCEPTIONS.

A comprehensive ban on nuclear weapons testing is coming. Pressures for a CTB treaty are increasing in political and technological arenas all over the world. Nonnuclear countries are berating the major powers for failing to live up to their commitments to end weapons testing. Environmental groups are increasing their agitation for elimination of all nuclear weapon detonations. The Senate is considering resolutions to end US testing unilaterally. Scientists are saying that a ban on weapons testing could be adequately verified, and strategy experts are claiming that a test ban treaty would not threaten US security.

The "inevitable" nature of an eventual test ban was set out in the language of the Limited Test Ban Treaty in 1963, and again by the Nuclear Non-Proliferation Treaty in 1968. Some 100 countries, including the US and USSR, have ratified or acceded to these treaties. The preamble to both documents commits the signatories to negotiate toward the cessation of all nuclear testing. The present Administration has reaffirmed the validity of the US commitment, and public statements by the Soviet leadership have been very positive in supporting "cessation of nuclear weapons tests...everywhere and by all."[1] France and the PRC, however, remain outside the treaties and in fact are still conducting atmospheric testing. Even so, these documents, particularly the Non-Proliferation Treaty, are providing an effective springboard for the advocates of a CTB who are assailing the US and USSR, from within and without, for not reaching an agreement on a

CTB treaty.

The Geneva Conference of the Committee on Disarmament has been the principal forum for multilateral CTB proposals, and as such has served as the medium through which the arguments supporting and opposing nuclear test bans have been pursued. These arguments have undergone some evolution since the early days when nuclear testing went underground, but the initial intransigence of the major powers on how to implement a CTB has had an enduring quality which has preserved a sort of status quo ever since the Limited Test Ban Treaty was signed. The publically agreed-upon disagreement now centers on verification of a comprehensive test ban, with the US favoring mandatory on-site inspections and the USSR opposing such an invasion of privacy.

In the last few years there have been some major advances in methods of detecting underground nuclear tests, and this has led many prominent scientists to relegate on-site inspection to a secondary role in verification. Henry R. Myers presents a very complete and up-to-date discussion of the arguments on this subject in the January 1972 issue of Scientific American (Ref. 11). The effect of these recent disclosures has been to generate added impetus for the pro-CTB forces. The impression is now growing that they are closing in for the kill, and the major powers had best be ready to accede to a test ban, or else to shift the grounds for disagreement to something more defensible than verification issues. There are indications that the US government has responded by quietly undertaking a major review of its CTB policies, but with no published

conclusions to date.[2]

WHAT HAS BEEN OVERLOOKED?

Attempts to address the question of whether or not there should be a CTB have always produced something of an emotional impasse within the competing bureaucracies of the US government. The Department of Defense and the Arms Control and Disarmament Agency are almost sure to wind up on opposite sides of any question which deals with eliminating a military capability that has served a demonstrably useful purpose. Compounding the difficulty of coping with CTB issues is the separately-chartered Atomic Energy Commission, which must view a CTB as threatening the loss of a unique national resource, as well as loss of a bureaucratic responsibility. It is quite possible that the Soviets experience similar conflicts in their own attempts to resolve the question.

There have been any number of books, articles, and hearings devoted to the US policy on issues concerning a nuclear test ban treaty. Historically, these approaches have resulted in a litany of advantages versus disadvantages, with heavy emphasis on the likelihood of cheating and the attendant possibilities for clandestine gains. Unfortunately, there seems to have been no effective consideration of the "inevitable" nature of a test ban. This has prevented the debate from coming to grips with the conditions which should prevail <u>subsequent</u> to a CTB, conditions which would either be negotiated into a test ban treaty or established unilaterally as prerequisites to US participation in the treaty.

It should be quite possible to make a CTB work to the advantage of the US. This does not mean that a CTB would have to work to the disadvantage of the Soviets; certainly they would not enter into an agreement perceived to be detrimental to their own interests. In fact, a greater number of advantages may well accrue to the USSR than to the US from a CTB. But a comparison of advantages or disadvantages of a CTB is not really meaningful unless this question is addressed first: is the comparison made to determine whether a CTB should be negotiated at all, or to decide which advantages ought to be exploited and which disadvantages offset? If in fact a test ban is coming, then all the past attempts which have answered "yes" only to the first part of that question have indeed been barren.

What has been overlooked, and what is proposed here, is a comparison which answers "yes" to the second part of the question. As a prelude, the reasoning behind the "inevitability" of a test ban will first be explored; then it should be possible to draw some useful conclusions from an analysis of the coming CTB, comparing the advantages which should be exploited and the disadvantages which have to be offset. These are really conclusions concerning the conditions which should prevail subsequent to a CTB, conditions which the US would have to assure through treaty negotiations and unilateral actions.

Any attempt to build a case for the "inevitability" of a test ban is bound to invoke some counter-argument because it must necessarily deal with political perceptions. Nevertheless, it is very useful to recognize that there is a plausible case, and thereby to

avoid a distracting debate over whether there should be a CTB. An alternative would be simply to assume that a CTB is inevitable. In either event, the most important part of the ensuing discussion concerns the exploitable advantages and avoidable disadvantages which a CTB will produce. These are the problems which must be faced if the US is to make a reasoned approach to test ban negotiations in the future.

HOW INEVITABLE IS "INEVITABLE?"

Generally speaking, when two nations perceive an act to be in their mutual interest, they will move together to accomplish the act. The inevitability of a test ban springs from the mutual interest of the parties involved. Both the US and the USSR have publicly committed themselves to an eventual cessation of nuclear weapons tests. Both nations have, therefore, perceived this commitment to be consistent with their interests, and to this date have not repudiated their public position. A significant alteration of the strategic situation is the single factor which might cause one or the other of the major powers to consider renouncing its commitment to cease testing. The most recent alteration was the rather successful round of strategic arms limitation talks with more to come. The nature of the agreements reached tends to support the conclusion that the future strategic situation will not alter the public commitment of either nation to a CTB.

It is appropriate at this juncture to consider the very fundamental concern of national security under a CTB. In the November 1972

issue of Scientific American, Herbert York (Ref. 33) has separated the questions involved into two types: those which deal with monitoring a test ban to assure compliance, and those which deal with national security itself. The former are discussed at length in Henry Myers' article (Ref. 11), (previously referred to). The latter are dealt with by York's article. It can, of course, be argued that adequate monitoring is also a question of national security, and in this regard the national security implications of clandestine test achievements will be considered later in this paper. York's treatment is very lucid; he reviews the objections raised to the Limited Test Ban Treaty on the basis of national security risks and in the light of the decade of experience since that time. He concludes that there have been no ominous developments or surprises, but that substantial progress has been made in weapon characteristics (yield-to-weight ratios, hardening against nuclear effects, etc.).. He also sees no real brake on the arms race due to the treaty, but acknowledges that several important objectives were accomplished (cleaner air, additional progress in arms control). Calling the limited test ban a success, he too says that it must now be made comprehensive.

York spells out in some detail the problems which were predicted under the LTB treaty for ABM, MIRV, nuclear effects, and other weapon developments, and shows that, with both the US and USSR participating in the treaty, no compromise to national security has occurred. He feels that the issue of unknowns has been resolved: weapons have been refined and greater understanding of nuclear effects obtained.

He makes the point that "the degree of 'overkill' in the nuclear capabilities of both countries is such that further technological advances would make little political or military difference." This point, however, does not lend itself easily to quantitative analysis. There are no unclassified sources which address the subject of how the strategic posture of the US, vis-a-vis the Soviet Union, would be degraded by a CTB. It is reasonable to postulate that there would be an impact on the nuclear weapons system improvements which the US could undertake, and that this impact might be greater for the US than for the USSR because of the traditionally greater reliance of US systems on advanced technology. It is only possible to speculate, however, on the effect this disparity might have on the deterrent role of our strategic posture.

In this regard, in testimony on the ABM during Senate hearings in 1968, Secretary McNamara released previously sensitive calculations of the number of fatalities in an all-out nuclear exchange.[3] The figures showed that, after absorbing a first strike, the US could expect to inflict over 120 million fatalities on the population of the USSR from blast and fallout alone. The US would suffer anywhere from a like number to significantly fewer casualties, depending upon the degree of civil defense and ABM deployments. Secretary McNamara's figures also showed that the US would inflict only about 70 million fatalities in a first strike, because targeting would be changed to attack more military, as opposed to civilian second-strike, targets. Particularly in view of the current treaty restrictions on ABM deployments, it seems fair to say that differences in nuclear

weapon improvements between the US and USSR under a CTB could hardly effect these numbers to the point where the assured destruction capabilities of the US strategic posture would be degraded. The figures on US first strike do not, however, consider the effectiveness of nuclear warheads in attacking hard targets, where the impact of a CTB would certainly be much greater. Nor does the concept of assured destruction include the other aspects of deterrence involved with these first strike capabilities and perceived intentions. But there is nothing to indicate that the nature of the restrictions imposed by a CTB could have a significant effect on the perception by either side of the other's capability to inflict unacceptable damage in an all-out nuclear exchange, whether a first or second-strike strategy were employed. In combination with York's analysis, it is reasonable to say that the national security impact of a CTB is acceptable to both the US and the USSR. What is still arguable, however, is the advantage, or the disadvantage, which such a treaty would impose on either or both nations.

But even with this in mind, there may still be a very real threat to national security or both sides, which arises from the related effects of a CTB, or the lack of one. York is correct when he says:

> Probably the most important result of the limited test ban has been its contribution to inhibiting the further proliferation of nuclear weapons...indeed, the most important reason for moving now toward a comprehensive ban on testing nuclear weapons is that it would strengthen and reinforce the Non-Proliferation Treaty.

After all, part of the Non-Proliferation Treaty of 1968 involved a commitment to end nuclear weapons testing by all signatories.

But there is a very real difference between a commitment to act and the act itself. An impartial observer could easily conclude that the US commitment has been far less than sincere, because the US has been conducting a more active test program, albeit all underground, since the signing of the Limited Test Ban Treaty. The level of Soviet activity has been lower than that of the US, but this is thin evidence of any greater commitment to a CTB.[4] The facts rather support the view that the commitment of the major powers has been only superficial. It has even been argued that the public disagreement over verification is a ruse to avoid a CTB, which accounts for the remark earlier that the major powers had best be ready to shift the grounds for disagreement to something more defensible.

Since the signing of the Limited Test Ban Treaty in 1963 there have been opposing pressures from political, military, and technological quarters sufficient to persuade the US to be very cautious in its approach to a CTB. Again, the Soviets may have had a similar experience. In 1968, the Nuclear Non-Proliferation Treaty codified a new mutual interest: restricting the spread of nuclear weapons to as few nations as possible. While the Non-Proliferation Treaty is still being debated at length, one thing is clear: if nuclear proliferation is inimical to the perceived interests of the US and USSR, they will move to prevent it. Furthermore, if cessation of nuclear weapons testing is perceived as part of that move, both nations will accede to a CTB and press all other states to do the same.

PROLIFERATION VERSUS NATIONAL INTEREST.

The existence of lengthy discussions on the pros and cons of nuclear proliferation has already been noted.[5] From these debates it can be recognized that the effect of nuclear proliferation does not lend itself to quantitative analysis or definitive assessment. There is instead an uncertainty associated with the effect of proliferation that creates a perception, almost a nuance, that non-proliferation is a good thing. On the other hand, it cannot be ruled out that there are certain forces which could operate to encourage nations to acquire nuclear arms; that proliferation would be, if not good, at least not a bad thing. Strong incentives which drive the major powers to oppose proliferation may also lead nonnuclear states to do likewise, but it is well to recognize that these other factors exist. The need for active support for non-proliferation by the two major powers cannot be discounted if proliferation is to be avoided or at least confined.

Turning first to the two major powers, it is a fact that the US and USSR have attained a strategic eminence that deters the aggressive intentions of either against what can be defined only imprecisely as the other's "vital national interests." These interests certainly include protection of territorial homelands, and perhaps other, not necessarily contiguous areas, which might be identified as "vital." For example, the Communist States of Eastern Europe probably fall into this category for the Soviet Union, but attempts to define "vital interests" here are really not germane, and would

only be argumentative and distracting in this context. Instead, it can be said that the two major powers exercise a restraining effect on each other by dint of their capability for mutual destruction.

But there are other nuclear nations to reckon with. Britain and France, on the one hand, have attained a strategic nuclear capability far below the major powers, and no one is seriously predicting that either could attain co-eminence. As strategic nuclear powers, neither Britain nor France exercise influence sufficient to cause the major powers to debate the threat to their individual national survival. Furthermore, they are part of a predictable consortium, the Western Alliance, and as such can be counted upon to act accordingly. As the eminent power in an opposing alliance, the USSR must look to its own strategic capabilities compared to its adversaries, of course, but the French and British arsenals add only marginally to the overwhelming threat already imposed by the other side. In fact, the same thing could be said if the French and British weapons were added to those of the USSR instead of the US.

Despite the relatively small strategic power which French and British nuclear weapons possess, there remains the fact that these weapons could inflict considerable damage on either the US or the USSR, and neither of the major powers could physically prevent it, the purpose and any subsequent reactions not withstanding. The dominance of the two major powers certainly restrains any use of

nuclear weapons by the French or the British, but there is still the unavoidable conclusion that neither the US nor the USSR is invulnerable to this nuclear capability, whether exercised by design or accident.

Communist China, on the other hand, presents a less predictable quantity. As with France and Britain, China's capability today is no threat to the national survival of either of the major powers, and could add only marginally to the strategic threat which either imposes on the other. But although the industrial capability of China is far below that of Britain or France, it is generally accorded the somewhat contradictory characteristic of being able eventually to develop an even greater nuclear capability than either of these two. The magnitude of the investment required to achieve a nuclear potential on a par with the US or the USSR, however, almost certainly assures that China's capability will remain in the marginal category.

More important, though, is the fact that the Chinese cannot be counted upon to add their nuclear capability to that of either great power, and therefore the predictability of China's use or non-use of nuclear weapons begins to fade as their capability grows. Despite all the discussion over the years, it is still difficult to say how China's leaders view a nuclear war; clearly, their actual behavior is cooler than their rhetoric. But the conclusion is again inescapable that the US and USSR are vulnerable to the considerable damage which the Chinese could inflict, despite the overwhelming strategic advantage which both will retain in the years to come.

Turning to the nonnuclear states, there is of course no current strategic nuclear capability which affects the dominant position of either the US or the USSR. But there is the very real possibility that some of these states might develop their own weapons and delivery systems in very limited amounts. What then? It would seem most likely that one of the two situations just described will pertain, depending on which nation goes nuclear; some would join or associate their capability with either the US or USSR, and some would try to remain independent. Although the allegiances and purposes of these potential nuclear powers could not be predicted, it is almost certain that this new-found capability would not change the overall dominance of the two major powers, nor their relationship to each other. But again both the US and the USSR would perceive themselves vulnerable to an additional threat of considerable damage. And again neither power could physically prevent the damage from occurring, regardless of the purpose, the intent, or the subsequent reactions.

So far, proliferation and national interests have been addressed from the point of view of the US and the USSR. Simplistically, of course, it is consistent with any nation's interests to avoid being threatened by nuclear weapons. But nuclear weapons are already in the possession of five nations. The threat already exists, and particularly so for the nonnuclear nations, mitigated perhaps by the fact that the US, USSR, and Britain pledged in 1968, as part of the UN Security Council action on the Non-Proliferation Treaty, to come to the defense of any nonnuclear country attacked by nuclear weapons.

In looking for ways to meet the threat, the nonnuclear states might decide to obtain their own nuclear capability, and thereby to effect an independent deterrent posture. It can even be argued that nuclear weapons should be proliferated to all countries in order to provide a worldwide deterrent against nuclear war and, incidentally, a pretty fair deterrent against conventional infringement upon national interests as well.[6]

The underlying assumption in the foregoing argument, and in most of the related theoretical literature, however, is that nations will act rationally, and will thus not engage in a conflict which could bring ultimate disaster to themselves as well as their enemies. While the validity of this assumption is by no means certain, the pertinent factor which emerges from considerations of this sort is the unpredictable effect which these additional nuclear states would have on the international scene, no matter which ones were involved. And again, there is the complete vulnerability to the considerable damage which nuclear weapons could inflict from these additional unpredictable quarters. Thus while a nuclear capability might answer certain individual security needs, there will be an opposing, collective interest in avoiding proliferation of nuclear weapons, because if one of the present nonnuclear states goes nuclear, it increases the possibility that others will do the same, and thereby the unpredictability of, and vulnerability to, nuclear attack will increase.

There are other incentives, besides the independent deterrent, that could lead nations to the decision to pursue a nuclear capability.

First of all, although the possession of nuclear weapons does not eliminate the need for other conventional forces, it presents the owner with the opportunity to rationalize the size of these forces and, possibly, to offset some defense costs after initial expenses are made. Along with the nuclear status goes the increased prestige, influence, and independence which is an underlying purpose of the foreign policy pursuits of many nonnuclear states. Even if the monetary savings proved illusory, this benefit might well be perceived to be worth the cost. But then there is the possibility that, by becoming a nuclear nation, one also becomes a nuclear target, much in the way Herbert York phrases his "ultimate absurdity:" increasing armament decreases security.[7]

These latter comments do not impinge directly on the national interests of the US and USSR versus nuclear proliferation. Rather, they briefly reflect considerations and reservations from the point of view of the other states. Coupled with the earlier arguments, it would seem that proliferation is unlikely because it holds little or no attraction for a nonnuclear state. But in fact these other states do have some incentives to go nuclear. The decision to do so will hinge on many factors, including the persuasions which the major powers may bring to bear.

One further note is in order: the quantitative and qualitative dominance of the major powers in nuclear weapons cannot be seriously challenged by any other states. Therefore, the pervasive influence of a nuclear "umbrella" will continue to color the attitudes of Britain and France, as well as the nonnuclear states. The effect

will be to reinforce the perceptions that show non-proliferation to be in their national interest. As France has already found out, an independent nuclear striking force that shields the possessor from the nuclear threat of the US or the USSR (or, said another way, changes significantly the strategic nuclear situation), is far beyond the grasp of any but those two major powers, and the chances are it almost certainly will remain so. It is the dominance of these two powers which goes a long way toward making the entire concept of non-proliferation work. Even if this bipolar arrangement should shift into a tripolar world dominance, as some would project for the growing power of China's nuclear forces, the same deterrent rationale will continue to obtain. In fact, the greater China's nuclear power becomes, the more likely will she be to support the objectives of non-proliferation.

The foregoing arguments recognize perceptions within the US and the USSR to the effect the proliferation could have highly undesirable results. The relationship of nuclear proliferation to their national interest sums up this way:

-Any nuclear capabilities, current or projected, which are not controlled by the US or the USSR will not threaten the dominance of either of the major powers, nor will they affect the mutual destruction capability which controls the relationship between these powers.

-Any nuclear capabilities, current or projected, which are not controlled by the US or the USSR, represent a threat to which not only the major powers, but all other nations as well, are com-

pletely vulnerable; the more unpredictable the capability, the greater the threat.

Since the possibility of proliferation cannot be denied, and may even become fact for any one of several nations, the US and the USSR will inevitably be drawn to firmer support for the objectives of the Non-Proliferation Treaty. Even if more nations should go nuclear in the years to come, perceptions which favor non-proliferation will persist, not only in the US and USSR, but in all other nations as well, nuclear or nonnuclear. It must be remembered that there were already five nuclear nations when the Non-Proliferation Treaty was signed. Two of these nations did not even sign the treaty, and there were then several other nations able to go nuclear at any time. Only 70 countries have ratified or acceded to the treaty to date, and some nuclear-capable nations are conspicuously absent from the list. Significantly, however, there have been no new members of the nuclear club during the four plus years since the treaty was signed. Maintaining this record by actively supporting the Non-Proliferation Treaty will receive increasing attention as the US and USSR are forced to focus on the relationship of their national interests to nuclear proliferation.

TESTING VERSUS PROLIFERATION.

While the US and the USSR have been pursuing their own underground test programs since 1963, France and Communist China have remained outside the Limited Test Ban Treaty, conducted nuclear

weapons tests in the atmosphere, and developed a strategic nuclear arsenal of their own. Britain has taken a course largely dependent upon the US for nuclear technology (she last tested in 1966), but has also retained its own strategic nuclear capability. As mentioned earlier, no other countries have engaged in nuclear testing or independently obtained nuclear weapons, but during the intervening years some countries have developed a technological capability to the point where producing nuclear weapons, though limited in numbers and means of delivery, would not present a difficult problem, with or without testing.[8]

This latter fact is significant. There can never be complete assurance that a nation which does not test will not be able to produce its own nuclear weapons. Furthermore, the list of incentives which might persuade a nation to forego a nuclear capability is seen to be short. It consists mainly of economic and political factors, and the former can be easily offset when the numbers and means of delivery are limited. The latter are equally frail, and operative only when perceived to be in consonance with a nation's "vital interests."

Digressing for a moment, it is necessary to consider the difference between producing nuclear weapons and obtaining nuclear weapons. Incentives to possess a nuclear capability should lead a state to consider either of these two possibilities, but it has already been argued that the nuclear powers would not perceive it to be in their own interest to provide nuclear weapons to a nonnuclear

state. It thus seems more likely that the nonnuclear states would have to produce, rather than obtain, a nuclear capability. Internal political incentives can therefore be considered in terms of producing nuclear weapons; obtaining nuclear weapons remains only a distant possibility. The effect is to allow more time for these incentives to form and operate, since production is of necessity a conscious and long-term act. By the same token, persuasion and pressures to reduce these incentives will also have more time to be brought to bear.

The central question shapes up this way: What is the relationship of active nuclear testing to the incentives for the production of nuclear weapons by the nonnuclear states? The answer: Nuclear testing serves as an outside influence which reduces the political incentive for the nonnuclear states to refrain from production of their own nuclear weapons. Testing is the only action pursued by the US and the USSR which does not support their non-proliferation commitments, and it is a highly visible one at that. It must be remembered that the Non-Proliferation Treaty represents a fundamental compromise between the nonnuclear and the nuclear nations; the latter agreed to negotiate with the purpose of ending the nuclear arms race and, as a preambular commitment, nuclear testing. Even after the bargain was struck, some nonnuclear states complained that the treaty favored the nuclear states because the obligations were unbalanced. Almost one-third of the UN membership has, in fact, abjured the treaty to date. There are plenty of statements on the public record to indicate that the nonnuclear states equate

the test ban impasse, which was in being when the Non-Proliferation Treaty was signed, with insincerity on the part of the major powers towards the objectives of non-proliferation. Active testing by the nuclear powers represents, if not an incentive for proliferation, at least an excuse for the nonnuclear states to rationalize their own pursuits, which may include producing nuclear armaments.

Now certainly there are plenty of influences other than the US and USSR test programs which could serve to reduce the political incentives of the nonnuclear states to avoid proliferation. The reasons, whatever they may be, which led France to produce its own independent nuclear force come immediately to mind. It is easy to see that these other influences could even provide counter-incentives that would quickly lead to a decision to produce one's own nuclear weapons. The nuclear states could be expected to bring pressures to bear to prevent this production, but this is where the issue of nuclear testing arises. The effectiveness of any moves by the nuclear states to influence weapons production in a nonnuclear state would be impaired by the lack of consistency which nuclear testing exhibits. This is not to say that a ban on testing would assure the effectiveness of these moves. Rather, a CTB could perhaps enhance the effectiveness; whether this would be a marginal or a decisive factor is admittedly unpredictable.

What is clear, however, is the fact that participation by the major powers in a CTB would add to the leverage which they could exert in pursuing their mutual interests of non-proliferation. Such an act would provide convincing and visible evidence of the major

powers' intent to avoid proliferation. The avowed intent is already codified by the Non-Proliferation Treaty. The visible evidence of this intent, as embodied in the commitment to cease testing, is not yet forthcoming, however, and reconciliation of this criticism is becoming more difficult.

There is, therefore, sufficient evidence to support the contention that cessation of nuclear testing would tend to operate against nuclear proliferation, by offering a means whereby the major powers could exert some pressures to prevent it. It is significant in this regard that a CTB would be effective if only the major powers participated. The effectiveness would be greater, of course, but this would not be imperative, if all other nations, and particularly France and the PRC, joined the pact, or at least stopped testing. It is entirely possible that this would prove to be a weak reed if a nonnuclear state should undertake seriously to produce its own weapons. But a CTB would be a very real manifestation of international determination to limit nuclear weaponry, and as such it would reinforce the objectives of the Non-Proliferation Treaty. It would certainly be perceived as an influential factor, and it could be a key one, in the deliberations and maneuvers surrounding nuclear decisions by any state. It is a lever which both the US and USSR will come to recognize as very valuable in attempts which may have to be made to discourage proliferation among the nonnuclear nations, even if more states should join the nuclear club in the years to come.

NET ASSESSMENT: CTB IS COMING.

The US and the USSR recognize that non-proliferation is in their mutual interest; neither wishes to promote its own vulnerability to an unpredictable threat. Both nations are moving toward the conclusion that as proliferation becomes more likely, more effective steps will have to be taken, unilaterally and in concert, to prevent it, or at least to slow it down and confine it. A CTB will provide a means, possibly a decisive one, to influence the decisions of nonnuclear states against the acquisition of a nuclear capability. The US and the USSR will inevitably come to agreement on this point as the possibility of proliferation increases.

The timing of a CTB deserves brief mention. Current developments have created the impression that an agreement is imminent, but the foregoing arguments suggest otherwise. In order to break the test ban negotiation impasse, the US and USSR will first have to conclude that proliferation is indeed an imminent threat. A CTB will follow as one logical step to combat the threat. A conference to review the Non-Proliferation Treaty is scheduled for 1975. The current agreements on strategic arms limitations will undoubtedly go a long way toward ameliorating all the other arguments and objections which nations have raised against this treaty, but a CTB will undoubtedly come up as a major item for resolution. It is not beyond the realm of possibility that final negotiations on a test ban agreement would proceed from the conference. Also, the interim SAL agreement on offensive weapons expires in five years, and the

continuing interest in a CTB will almost certainly be heightened as expiration approaches. Three to four years is thus a reasonable period in which to expect a CTB, although it could come much sooner if a spate of nuclear proliferation should burst unexpectedly on the international scene in the form of one or several nations initiating their own nuclear test programs. This forecast should be kept in mind as conclusions concerning advantages and disadvantages of a CTB are drawn during the succeeding discussions.

The "inevitability" of a CTB cannot be proven conclusively, but there is a plausible case to support the view that eventually nuclear weapons testing will be banned. Accepting this argument serves a very basic purpose: the debate over whether there should be a test ban is bypassed. This is the key point to keep in mind as the discussion now turns to the advantages and disadvantages of a CTB, and to the conditions which should obtain after a CTB is reached.

WHAT GOOD IS A CTB?

Supporters of a nuclear test ban will always find themselves beleaguered when the time comes to draw up their list of arguments favoring a CTB. Predictably, there is no way to formulate a list of advantages which can escape the attenuating effects of rational counter argument, partly because these benefits accrue not only to the US, but also to the USSR. Why should we do something that helps them? This question is simply a strawman which serves to illustrate the point that advantages gained by the US do not have to be at the expense of the USSR.

The fundamental consideration of security and US-USSR relative strategic posture has been purposely separated from discussions of advantages and disadvantages. As has already been pointed out, if there were an advantage to be gained by either side in this regard, there would be no CTB. A threat to national security is by itself a driving force: The possibilities of nuclear weapon proliferation have been shown to affect both the US and the USSR in their perceptions of threats to national security interests; proliferation is thus becoming a driving force in their outlook. None of the advantages or disadvantages which are singled out here enjoy this particular status; while germane, none by itself would impel either the US or the Soviets to forego nuclear testing. The idea of reinforcing the political incentives for non-proliferation of nuclear weapons is an overriding consideration which the US must also be prepared to exploit when a CTB is agreed to by the US and USSR.

A second advantage of a CTB lies in the perception of other nations that continued nuclear testing by the major powers poses a threat to stability and peace. The current agreements on strategic arms limitations will allay some of these concerns, but without a CTB there will still be some fear and discontent arising from the postulated dangers of nuclear testing, real or not. An agreement between the US and the USSR would remove the source of much of this concern. With a stronger, codified international political sentiment as a result, there would be some effect, possibly decisive, on the continuing test programs of France and the

PRC. This is not meant to suggest that these two countries would immediately cease testing, but their perception of how much more testing they need, for whatever purpose, would almost certainly be foreshortened. The impact of this second advantage is largely emotional; emotion does, however, form a part of the argument that nations must, in a nuclear world, resort to means other than actual use of force in resolving international differences.

Restraint in the use of force is quite different, however, from restraint in the possession of force. In this regard, a ban on nuclear testing would have some effect on the arms race. Coupled with the quantitative limitations imposed by the current SAL agreements, there appears to be a good case for saying that it would be a restraining effect. Neither the US nor the USSR could be displeased by prospects of some relief from the political, psychological, and fiscal pressures of a spiralling arms race. The advantage would have some emotional aspects as well, in the way it would achieve the mutual perception that another step had been taken away from the possibility of nuclear war. There is, however, sufficient historical evidence to support the contention that, even if its course is restricted, the arms race will find some form of perpetuation. In fact, the arguments which support the relationship between non-proliferation and national interest contain a discernible thread of logic to the effect that the US and USSR must stay in the arms race, to some degree, in order to retain the relative position of military strength that guarantees mutual deterrence, as opposed to a less secure multilateral deterrence,

at least on the strategic nuclear level. Therefore, the benefit which the US and USSR can achieve in this regard is the mutual understanding, formalized by a CTB, that the arms race will be restricted to channels other than improved nuclear warheads.

There is a large amount of evidence to indicate that the US possesses nuclear weapons technology superior to that of the Soviets, due in part to the more active US test program. Do the Soviets perceive this, and are they actively pressing to catch up with their current test program? If the answer is yes, then any US test ban initiatives will be faced with the dilemma of trying to end nuclear testing before the Soviets close the gap, while recognizing that the initiatives would be bound to frustration until the Soviets had reached the level of technology which they perceived to be necessary to protect their interests. But by then the advantage of a test ban in freezing the US lead, or at least guaranteeing it for some time, would seem to disappear. Furthermore, the very sketchy intelligence available on Soviet nuclear technology, particularly weapons technology, prevents an accurate assessment of the US lead, if there is one. The advantage becomes even more diluted when it is considered that the USSR may not even want or need the advanced technology reflected in US strategic weapons systems. Nonetheless, it must be conceded that the US does not need to continue underground testing in order to catch up to the USSR, and in this respect a CTB is not disadvantageous when comparing nuclear postures.

To digress for a moment on this last thought, there is a school which argues that the Soviets may have gained significant knowledge

about high-yield nuclear detonations, particularly at very great altitudes, during the last series of atmospheric tests in 1961-1962. Mr. York's article (Ref. 33), (previously described) contains a good discussion of this subject as well. The US, being caught largely unprepared when the Soviets initiated this series after a three-year lapse which stemmed from a moratorium declared in 1958, did not achieve such a comprehensive program before testing was halted pursuant to the negotiations which led to the 1963 Limited Test Ban Treaty. The knowledge gap has certainly been narrowed, if it did exist, by the more active US underground test program; but in the final analysis, there is just no way of reproducing high altitude effects from underground explosions. A CTB therefore could hardly be considered risky from the standpoint of lack of information from high altitude research, although there may still be some information that could be extrapolated from the underground to the high altitude environment.

An additional point concerns tactical nuclear weapons. The US has a large stockpile. The Soviets are not known to be similarly equipped, although they do possess a tactical nuclear capability with their mobile rocket launcher systems. This situation tends to support the contention that the US does not need to catch up to the USSR in tactical nuclear weapons, so a CTB would not degrade the US position in this regard either. It could affect plans to improve on the existing stockpile, but the necessity for these improvements might be debatable if the Soviets were prevented by a CTB from improving their own, admittedly less comprehensive, stockpile of tactical nuclear weapons.

Summing up so far, if technological differences do play a role in assessing the CTB issue, it appears that some slight advantages may accrue to the US. The chances are the reverse is not true. The question of technological improvement by clandestine testing under a CTB is taken up a bit later when disadvantages of a CTB are considered.

To continue, as a domestic political move, a CTB would have to be considered a net advantage. There is general awareness and support for the longstanding commitment of the US to a test ban. Historically, the arrangement would be unique: never before have nations agreed to forego the testing of weapons without a concomitant agreement to eliminate the weapons as well. This aspect of a CTB will undoubtedly cause some political anxieties by itself. Environmental groups, which are becoming increasingly vocal and well-organized, would surely be satisfied by a cessation of weapons testing; their reaction to continued peaceful nuclear explosions (a subject which will also be taken up later) is less predictable. The PNE program has certain beneficial environmental effects, but there is still a large reservoir of emotional opposition within many environmental groups to any sort of nuclear detonation. All things considered, a successfully concluded US initiative to ban nuclear testing would be a very definite political advantage even if PNE's were continued. If the initiative came from elsewhere, the advantage would still accrue, albeit a bit muted. This latter point can be turned around for the USSR; they will enjoy the same political advantage as the US by participating in a successful test ban initiative.

A final consideration is the budget impact. Nuclear testing currently consumes around $300 million annually. But projecting this sum as a saving, or as a fund to be put to other uses, is risky indeed. Budget cuts have a propensity for finding their way into allied programs to ease the impact of the initial reduction, rather than serving the purpose of a worthwhile but unrelated cause. The nuclear testing budget will be particularly susceptible to this syndrome if a CTB is imposed. Immediate concern will be generated for various safeguards which a test ban treaty would impute. To cite just one example, verfication means such as seismic detection and satellite observation would be emphasized. If some form of on-site inspection were adopted, organizations would have to be created to handle the chore. Three hundred million dollars would melt rather substantially under the heat and pressure mustered by the funding requirements for these allied programs. If there were any initial savings, the prospects of their remaining would have to stand a rigorous test with time. The possibility of savings might even be called a disadvantage, since a failure to retrieve them would bring down the same sort of criticism which the present administration is weathering over Defense budget levels in the wake of the SAL agreements. Overall, it can be said that, as an advantage, the monetary savings from a CTB will probably be employed in programs which may be considered more constructive than weapons testing, even though these other programs do not make a direct contribution to national security in the way the weapons test program does. This ability to reallocate resources, even so slight as

$300 million annually, is bound to be a welcome feature of any proposal, even if it is not construed as an advantage.

HOW BAD IS A CTB?

There is no doubt that a CTB would place decided disadvantages on the US in continuing developments of nuclear weapons systems. To some degree, these disadvantages would penalize the USSR as well. If the penalties are greater for us than for them, shouldn't we avoid a CTB? It has already been pointed out that this is really the wrong question. A simple comparison of disadvantages, or advantages versus disadvantages, is just not a fruitful undertaking for the CTB issue. There is no relative strategic loss or gain; rather, there is a driving force which is leading the US and the USSR into a CTB. Therefore, a searching look is needed at the disadvantages that will accrue to the US under a test ban, so that compensatory steps can be formulated. Proponents of a CTB must be especially mindful of this point. Despite the inevitability of a CTB, the drawbacks which need to be offset demand recognition from all quarters. Otherwise, the US will find itself drawn into a treaty before it can provide the foundation for coping with the problems which the CTB will present. The debate over on-site inspections has been particularly dangerous, because it has obscured some other and much more important difficulties which current programs will not resolve.

In considering disadvantages, it is first necessary to look at the objectives of the US test program, to gain some idea of how

these might be degraded. According to the Department of Defense, the goals of the US nuclear weapons test program are:[9]

-Develop new warheads to meet established requirements.

-Identify new options.

-Advance nuclear weapons technology.

-Contribute to stockpile viability.

-Aid in understanding nuclear effects.

-Assist in threat evaluation.

The impact of a CTB on each of these goals will vary. It is reasonable to expect that similar assessments would apply to the Soviet test program, but with one significant difference: the Soviets could attempt to counter the effects of a CTB by conducting a clandestine test program. Speculation on Soviet motives for such an activity, recognizing that the risk of exposure would not be insignificant, would only be a distraction here. The fact is that they could conduct one. The US would be at a disadvantage in this respect, because the relative openness of US government operations pretty well eliminates the possibility that the US could conduct a clandestine test program of its own. Just how significant is this point? It could be over-riding if it could change the relative security and strategic posture of the US vis-a-vis the USSR. But in fact subsequent arguments will show that although the Soviets could attempt to gain a strategic advantage from such covert activity, their chances of doing so would really hinge on the attitude and actions of the US, rather than any absolute technological superiority that might be lurking somewhere beyond a series of clandestine nuclear tests.

First of all, in considering clandestine testing, it must be recognized that, for the Soviets to gain anything, their needs would have to be focused in rather low yield ranges of the order of a few kilotons at most, in order to avoid detection. The US has demonstrated a capability to improve seismic detection and identification of nuclear tests which suggests that clandestine tests might have to be even smaller if the risk of detection were to be kept quite low. Followers of the test ban debate are aware of the improved detection capabilities which were publicized in 1971 and led to renewed interest in the CTB because of the much lower level explosions which can now be detected. It might do well to digress here for a moment on this point. Again, the article by Henry R. Myers in the Scientific American of January 1972(Ref 11), is a useful reference. This article cites the reasons for improved detection and goes into some detail on possible ways in which detection might be avoided. Mr. Myers postulates a degree of risk associated with clandestine testing that depends on the frequency as well as the magnitude of tests, but anticipates that there will always be some inescapable ambiguous seismic signals which make any quantitative analysis a bit suspect, although not significantly so. Another source of information is the testimony before a subcommittee of the Senate Foreign Relations Committee on 22 and 23 July 1971 (Ref 27), wherein several expert witnesses quoted yield levels in the range of 5-10 kilotons above which clandestine testing would almost certainly be detectable and identifiable. This is as opposed to yields of 100 kilotons or larger which were considered

the threshold of detection in 1963. The Administration position was presented at these hearings by several witnesses to the effect that, even with these increased capabilities, more work would be required before on-site inspections could be considered superfluous to adequate treaty verification.[10]

The net result of the foregoing considerations is that any clandestine warhead development or stockpile reliability tests could be made only for weapons in the low yield range, which probably contains none of the Soviet's strategic arsenal. As far as identifying new options and evaluating future threats, such low-yield clandestine tests would almost certainly have little strategic value. The strategic impact of a CTB, assessed in terms of a clandestine Soviet test program so far appears ot hold no reason for concern.

The possibility of obtaining new technology and nuclear effects data through clandestine testing is not as easily dismissed, however. Nuclear effects tests might be feasible in the low yield ranges of a clandestine program. The information from such tests is used to decrease the vulnerability of strategic weapons to the nuclear environment. Major importance attaches to this data particularly in designing weapons to resist ABM engagements, but also in considering the possible environments which may be encountered by missiles launched and arriving during a strategic exchange. The vulnerability of Soviet missiles could possibly be improved from a clandestine test program. Furthermore, the information on vulnerability might allow Soviet ABM defenses to be improved. Would either situation cause the strategic posture of the US to be degraded? This question was

addressed earlier where it was noted that the lack of any quantitative analysis to support an answer makes this a rather difficult question. But considering the recent SAL treaty restricting ABM launchers to 100 apiece, and the overwhelming numbers of deliverable warheads available to both sides under the interim SAL agreement, there is really no basis for arguing that the strategic balance could be altered by clandestine testing which improved understanding of weapons effects.

In the case of new technology, an additional point arises. Not only could the Soviets, by clandestine testing, pursue some new ideas in the low yield ranges, but by so doing they would retain an organized cadre of nuclear weapons experts, and an operating laboratory capability, that the US would find hard to match under the restrictions of a CTB. It can also be postulated that the US would become susceptible to "technological surprise," as the clandestine achievements of the USSR mounted, although the prospect of any such occurrence has been pretty well discounted by Mr. York in his description of experience subsequent to the Limited Test Ban Treaty.[11] But the former is perhaps the most serious drawback which the US would face under a CTB: Soviet nuclear capabilities could be retained, and Soviet nuclear technology advanced, while the US nuclear programs would be under pressures to reduce, and would in all likelihood atrophy with time. Significantly, the nature of Soviet society would probably allow some degree of this imbalance to exist even if clandestine testing were not undertaken by the Soviets. But this is one area where clandestine testing

could provide a definite Soviet advantage if the US were not inclined to recognize and compensate for the imbalance.

With this it is appropriate to turn back to the US test program. It is evident that the objectives enunciated earlier would have to be pursued by other means, if not completely compromised. New warheads would not be available; new requirements would have to be met with existing designs. Even then there would be a certain amount of unease associated with putting a proven design into a new configuration without even one proof test. Furthermore, the yield-to-weight ratios would be frozen at the level of today's technology. The cost-effectiveness of weapons testing is very evident in this regard; if the nuclear submarine fleet of today were to be deployed with missile warheads from ten years ago, at least twice as many submarines would be required to provide the nuclear striking power of today's fleet. That there have been multi-billion dollar savings in hardware costs from the relatively inexpensive test program is indisputable. The US would lose the opportunity to exploit this capability under a CTB. The only other measure available which could improve on-target weapon effectiveness, besides increasing yield, is increased accuracy through better guidance. While accuracies have certainly improved with the modern missile systems, this continues to be a difficult concept to approach due to the implications of first-strike capability which better accuracy involves. It thus appears that the on-target effectiveness of strategic nuclear weapons will not be able to advance much beyond existing levels if a CTB is imposed.

As far as identifying new options and evaluating the Soviet threat, the US would almost certainly be at a disadvantage because of the paucity of intellignece on Soviet nuclear capabilities. Options are needed to counter threats, but the threat itself begins as uncertain, and regresses with the passing of time when no testing is done, except possible clandestine testing. To begin with, before a CTB arrives, the US must ascertain that the situation today is acceptable. Are there any postulated new options or Soviet threats which can be confirmed or discarded by nuclear testing now? The activity of US testing to date suggests not. The question of the future goes back to the possibility of "technological surprise," suggested earlier. Testimony delivered in 1963, in connection with hearings and debates over the Limited Test Ban Treaty, contained references to this possibility from numerous and highly qualified experts.[12] Their concern was based mainly on the experience of the preceding two decades, when nuclear fission emerged from a laboratory phenomenon to a weapon of unimaginable power. But despite the accelerating pace of technological developments, the products of a near decade of testing subsequent to 1963 have not borne out the earlier predictions of undreamed of knowledge or "technological surprise." The size and capability inherent in the nuclear arsenals of the US and USSR tends to diminish further the idea that "technological surprise" could be a significant factor in the future strategic equation, even if one side were performing clandestine tests. Therefore, although these two test program objectives would be unattainable under a CTB, the disadvantage does not appear to be an overwhelming

one, particularly since the USSR would be similarly restricted.

Disadvantages concerning the retardation of nuclear weapons technology overlap the disadvantages just presented for new options and developments. But there is another and more important feature which must be brought up again in this context: retention of a technological capability to design and produce nuclear weapons. Experience under the Limited Test Ban Treaty suggests that, as nuclear testing moves into the past, the priority of maintaining a technological base in nuclear weaponry will recede as well. There is no sure way to predict what effect this will have as years go by, but the experienced individuals and viable laboratories of the US represent a unique national resource that has made irreplaceable contributions to the current effectiveness of the US nuclear arsenal. The eventual loss of this expertise, juxtaposed with the previous considerations which show the USSR as more able to compensate under a CTB, is a disadvantage which, although not directly related to the current strategic balance, could have far-reaching impact in the unpredictable years to come. This is a serious concern that should command a great deal of thought and effort in order to offset the effects which a CTB will inevitably bring.

A discussion of nuclear effects was set forth earlier when the possibilities of Soviet clandestine testing were considered. There is no need to repeat, since the same conclusions apply whether for the Soviet or the US programs. It will be recalled that even if one side should obtain an improved understanding of these effect,

there would be no basis for arguing that significant alteration of the strategic situation could occur. No doubt research will go forward in this area, but it is doubtful that changes to deployed weapons will take place as a result: the risk from depending upon an advanced but untested weapon most certainly outweighs that of relying upon a proven, though perhaps more vulnerable, system. Particularly would this be true in the rather esoteric realm of nuclear effects. Compromise of this objective, by elimination of the weapons test program, does not appear to offer significant disadvantages, nor unfortunately, opportunities to offset them.

The last objective of the test program concerns stockpile viability, and this raises a most complex issue: what will happen in 10 or 20 years when the stockpile of nuclear weapons has lain untested, and probably largely unchanged, for a decade or two? Neither the US nor the USSR can escape this question. The reliability of the stockpile has in the past been verified by non-nuclear testing. Validation tests are not conducted once a weapon enters the stockpile unless a defect is suspected from the non-nuclear reliability tests. There are currently about 25 basic nuclear devices represented in US weapons systems, and many of these are re-validated or their performance otherwise assured each time the basic model is used in the on-going nuclear test program. The real loss to stockpile viability is represented by this latter consideration, and there is no way to compensate for it. It means that the US, and the USSR as well, would have to rely on a

system of vigorous inspections and component tests to assure that defects were not growing into their aging nuclear systems. It is not beyond reason to postulate that the major powers could live hospitably under this arrangement, provided no other nation was pursuing advanced testing to the extent that the uneasy relationship would be disturbed.[13] But it goes against the very nature of the men charged with the security of the nation through arms that they keep their weapons at the ready but not test them, or anything like then, for time unforecast. The disadvantage of reduced stockpile viability is very real under a CTB, and the long-range effects are not amenable to prediction.

Finally, the question of peaceful nuclear explosions arises. It is here, under disadvantages, because the USSR is generally conceded to be much more active than the US in this field and thus under a treaty banning weapons testing the Soviets would have greater opportunity to pursue nuclear technology, or even disguised weapons tests, under their PNE programs. Of course the US could require elimination of PNE's as part of a CTB, but the chances are neither the Soviets nor many of the nations which the major powers are attempting to dissuade from proliferation would accept it. In fact, the Non-Proliferation Treaty, which proposes the weapons test ban, provides that the nuclear states will carry out PNE programs at the request of the non-nuclear states, subject to appropriate restrictions, requirements, and reciprocations. There have been some proposals for accomodating PNE's under a CTB in order to restrict their use for clandestine weapon testing, but

they mainly involve international controls and release of classified information that would probably be all but impossible to negotiate into a completely usable and meaningful form. On the other hand, any restrictions would be better than none. Therefore, some assurance that PNE's could be restricted to their stated purpose, and emphasis on a PNE program of its own, would help the US to offset disadvantages, embodied in the active PNE program of the USSR, under a test ban. And as before, when considering the possible gains which a clandestine program could foster, it should be recognized that the strategic balance lies in the numbers and destructive capability of the stockpile, rather than the sophistication of the warhead design which might be achieved by testing weapons in the guise of PNE's. Advanced technology and other advantages obtained in this fashion are another matter, but the next section of this paper will show that the problem is not insurmountable. It is, as will be repeated again, a matter of attitude and action on the part of the US as to whether this or any disadvantage will be truly significant under the restrictions of a CTB.

WHAT SHOULD WE DO ABOUT IT?

With a bit of reflection it becomes apparent that the advantages of a ban on nuclear testing are largely of a political nature, which tends to soften their impact when they are compared with the harsher drawbacks foreseen from the military and technological point of view. And yet the two major powers have for years been committed to negotiating a CTB, hestitating only over the question of whether

or not they will open their test sites for a few on-the-ground inspections each year.

The value of on-site inspection has itself assumed a political cast, demonstrating the goodwill inherent in the agreement and adding an additional deterrent against those who might support a clandestine test program. In fact, the technical contribution of on-site inspection is rather marginal after a suspected violation is detected, and is essentially zero in the detection itself. This will pose a dilemma for the US and the USSR sometime in the next few years, because there will be a mounting awareness that a CTB must be adopted, and the disagreement over on-site inspection can no longer be allowed to block the way. Both sides may compromise a bit, but for the US there will be a need to recognize that it is really the national means of inspection, such as seismic detection and satellite observation, that must be depended upon for adequate verification of a CTB treaty. Whatever on-site inspections or other means are available, but not directly under US control, will really not be reliable sources for verifying the treaty.

The first consideration then becomes obvious. The US must recognize that verification of a CTB treaty will be adequate with means under its own control which can detect and identify nuclear explosions of the order of a few kilotons or less, in consonance with the magnitude of detectable explosions which has been previously described. This presumes, of course, that the US will continue to pursue an active and advanced program to monitor for possible clandestine test activity in these ranges. There is no doubt that

verification, and particularly advanced research and development in verification, will require proper attention and emphasis under a CTB treaty, because the assessment of disadvantages due to clandestine test opportunities is seen to be dependent upon the size of tests which can be carried out. Adequate verification, to include reduced ambiquity and low identification thresholds, will have to be a paramount consideration under a CTB. The US has this now, or close to it at any rate, but the passing of years subsequent to a CTB treaty, with no violations detected, could lead to a clamor to reduce the cost of such things as satellite and seismic monitoring. Concurrently, the need to think ahead of what to do if clandestine tests are suspected could also be forgotten. The disadvantages of a CTB will thus be, as stated earlier, dependent upon US attitudes and actions, rather than absolute achievements which successful clandestine tests might bring.

Consider next the political advantages which can accrue from a CTB treaty. The US should be in a position to exploit each of these, obtaining maximum enhancement of its international image by taking the lead in removing the source of fear and concern represented by continued testing. Domestic political benefits to an incumbent Administration can also be derived from a CTB. The successful negotiation of a treaty might easily be as popular as the SAL achievements, but the impression would have to be that the Administration led the way for, rather than being pushed into, a CTB. As a political benefit, a CTB is certainly available as a popular issue to be used by the government's representative, rather

than seeing it used against them as is increasingly the case. And finally, the political lever which a CTB provides against nuclear proliferation must be exploited to the fullest. The case for this has already been argued.

There is an important caveat to these political benefits which must be raised here. Although there have been several advocates of a CTB who see it as a step which will allow nuclear disarmament, the relationship is by no means certain. While recognizing and exploiting the psychological aspects of this relationship, there is no basis to be anything but conservative in maintaining a strong military with an overwhelming strategic nuclear capability. Although the perceived effects on the arms race can be postulated as an advantage of a CTB, this should not be misconstrued to mean that disarmament will follow logically after. There is no discernible thread raised here to this effect, and the US should be prepared to guard against these pressures when CTB is finally achieved. In fact, a CTB treaty should be used as a lever to keep SAL negotiations at a properly cautious level, rather than as the panacea for all SAL ills and to accelerate disarmament, as some would now have it.

As has already been pointed out, there is no easy solution to the problem of reliability when the nuclear weapons stockpile lies untested for decades. The most obvious step to offset this disadvantage is to increase the emphasis on non-nuclear quality assurance and reliability testing. The question of whether to replace an old but tested weapon with a newer version which cannot be tested is really not part of this problem. It would be distracting to consider

it as such, or even to try to discuss it here. Suppose, however, that investigations should show the possibility that a defect may be arising in some of the stockpiled weapons. What could be done if a CTB were in force? If the need were established to test the suspect weapons, then the only avenue would be withdrawal from the treaty, an avenue which would probably be codified in some form such as is found in the Limited Test Ban Treaty and the Non-Proliferation Treaty. This is not to say that one reason to enter the CTB treaty is because the US can always withdraw, but as a speculative measure there may eventually be some sort of periodic withdrawal from the treaty, whether codified or not, (perhaps by mutual consent?) for reliability testing. Withdrawal from the treaty would also have to be an alternative if, as previously mentioned, other nations continued to advance their testing programs to the extent that the US and USSR would see their relationship disturbed. Although this may not appear to be a completely desirable solution, it may be the only one and it is, in fact, a solution. A CTB does not foreclose the capability to meet these problems, although it does make it more difficult. The US must be ready to emphasize non-nuclear testing and be willing to accept an unpopular solution (withdrawal) to problems which a CTB might create.

The last general area where something must be done to offset the consequences of a CTB is nuclear technology. As previously presented, this encompasses one advantage as well as all disadvantages. The advantage, if it exists, is the technological lead which the US would be able to maintain for at least some years. But with

or without a CTB, a technological lead is not a static thing. The dependence of the US strategic posture on advanced technology dictates that active R & D programs are essential to maintenance of deterrent force. Even if the force does not change as a result of the programs, the knowledge gained is necessary to determine how adequate is the existing force. A CTB treaty would reinforce the need for R & D in fields other than nuclear for future force development, and at the same time would demand continued nuclear research reoriented to the handicap of a test ban. Whether there is a technological advantage to the US now, or whether it can be maintained, is really independent of a CTB. The message to the US is the need to continue its R & D programs and not be lulled into the idea that a test ban treaty is also the prelude to reductions in all the other programs which serve the nation's security interests.

As has already been pointed out, the loss of the nuclear weapons test program will almost certainly cause a loss in the laboratory and personnel capabilities which are now a very unique and contributing national resource. Research programs designed to retain this expertise will suffer from the sterile nature of pursuing an essentially unprovable objective. But there is an avenue open to the US which offers an excellent opportunity to compensate in part for the loss of weapons testing expertise: the peaceful nuclear explosions program. This is not to advocate that weapons testing be carried out under the guise of a PNE, but rather that the capability to research, design, develop, test, and utilize PNE's

has a direct translation into similar capabilities for nuclear weapons. No doubt any emphasis on the PNE program will be deplored by environmentalists and similar groups opposed to all nuclear explosions as a mere disguise for continued arms testing, but such is not really the case. The Non-Proliferation Treaty specifically enjoins the nuclear states to ensure that "potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear weapon states." By revitalizing its PNE programs, the US would be pursuing a commitment of the most important treaty which the CTB is designed to support, and would at the same time be partially compensating for perhaps the most serious disadvantage which the CTB imposes. In the face of this, it seems unconscionable that the PNE program of the US should languish so badly as it now does. Perhaps the recognition of an inevitable test ban will galvanize this program into a more responsive attitude, and such is to be hoped for if the US is to offset this disadvantage of the coming CTB.

A working PNE program, however, under a CTB, will require some assurance that clandestine weapons testing, while not impossible, will not be without risk of detection. The systems proposed for control of these programs have already been pointed to in uncomplimentary terms, although it bears repeating that any system is better than no system at all. Some sort of international control would probably serve most usefully, since it would have the best chance of convincing the non-nuclear states, that is, the potential proliferators, that the PNE programs of the major powers were not

in fact a guise to circumvent the purpose of a CTB. PNE's would probably have to remain largely underground to satisfy partially the environmentalists' demands, and instrumentation connected with the explosion might also be placed under international inspection. The possible gains to a clandestine weapons test program in this case would seem rather small, compared to the maintenance of a nuclear expertise which a PNE program would provide. The US should accept the fact that there can never be a 100 percent verification scheme for PNE's, while pressing for international supervision and control of these programs as part of a CTB treaty, thereby extending the obligations already asserted by the Non-Proliferation Treaty. One side benefit of continuing PNE's, under supervision which provided knowledge of even a few basic items such as yield and burial medium, would be the check and calibration of US national verification means, seismic in particular, for the CTB Treaty itself.

Finally, there is the subject of the budget. From the foregoing discussion there is little room for optimism over any significant capability to recoup funds from the weapons test program. Verification, R & D in other areas or in non-testing nuclear areas, and PNE programs will surely soak up whatever runs out of weapons testing. In fact it might not be a bad idea to start reprogramming now against those items which are bound to assume major importance when the CTB arrives. There is some possibility that consolidation of facilities could take place, but unique resources should not be forfeited. This is particularly true of the Nevada Test Site itself, which could still come in handy for testing PNE devices. In any event, there will be a public education program required, just as

there was for the SAL Treaty, to prevent general disaffection for the so-called military-industrial complex when an erroneously-perceived savings fails to materialize from a CTB.

A LAST WORD.

The whole point of this paper is that a CTB is coming, and the US should begin now to deal with the problems which a test ban will bring. The advantages and disadvantages can be debated into the next decade. The merits of the Limited Test Ban Treaty of the last decade are still being debated in this one. Failure to recognize that there will be problems with a CTB, or distorted recognition of the benefits, could lead to a bleak future for the US.

The preceding pages do not pretend to be definitive in recommending actions to be taken; there is omitted a great deal of important detail which can be much better worked out by planning documents than by a policy proposal such as this. But acceptance of an inevitable CTB Treaty is certainly a key to finding the correct posture for today; maintaining a vigilant attitude and vigorous action is the key to making the CTB a treaty which will work for the US in the future.

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FOOTNOTES

1. The US position has been reviewed during two recent Hearings before the Senate Foreign Relations Committee. (Ref. 26, pp. 215, and Ref. 22, pp. 181). The quotation is taken from a statement by USSR Delegate Roschin before the 1972 Geneva Conference of the Committee on Disarmament. (Final Record of the Five Hundred and Sixty-First Meeting, CCD/PV. 561, 20 June 1972, English, pp. 7-14.)

2. On 4 February 1972 the Washington Post published an article entitled "Nixon to Review Stance on Underground Tests." (Page A2, col. 1-3). The article indicated that an extensive analysis had been put together by the Department of Defense for White House discussions, with Secretary of Defense Laird opposed to a ban on underground tests.

3. The relevant portion of Secretary McNamara's testimony is contained in Ref. 20, pp. 235-239.

4. Two recent Scientific American articles (Ref. 10 and 32) contain a comparison of test activity (US and Soviet, with Britain, France, and China taken together) before and after the Limited Test Ban Treaty.

5. The diversity of opinions on proliferation ranges from those who believe it would seriously affect stability and security throughout the world to those who feel it would not. The Senate Hearings concerning the Limited Test Ban Treaty (Ref. 26) and the Non-Proliferation Treaty (Refs. 24 and 25) contain testimony which supports non-proliferation, most notably from the Secretary of State Dean Rusk. Comments which weigh against the Non-Proliferation Treaty are reflected in some of the questions put to the witnesses, and in Refs. 9, 10, and 30. A very well done presentation was published by the United Nations in 1968 (Ref. 18) arguing in favor of the Non-Proliferation Treaty and extensive discussions of the pros and cons in theoretical terms can be found in Refs. 35-41.

6. This is the line of reasoning pursued by Mr. Wildavsky in "Nuclear Clubs or Nuclear Wars," (Ref. 40), where he proposes that weaknesses in the American defense posture should lead to proliferation of weapons to US allies. This he contends would decrease the probability of nuclear war and increase the ability of the smaller nations to maintain their independence. It is interesting that Mr. Wildavsky's thoughts were expressed in early 1962, which means they were probably generated by the "missile gap" that appeared during the early part of the Kennedy administration. There is nothing in the article to indicate that today's "parity" would affect his position, however.

7. This thought is the theme of Mr. York's book, Race to Oblivion, (Ref. 32).

8. A current discussion of the potential on nuclear aspirants is contained in William Bader's book, The United States and the Spread of Nuclear Weapons, (Ref. 1) pages 63-97. Stanford Research Institute has published a very detailed analysis of the capability of selected nations to achieve nuclear status (Ref. 15).

9. The discussion which follows draws in part upon the 1971 Hearings before the Senate Committee on Foreign Relations (Ref. 27). The Hearings contain testimony and statements from public officials of the Department of Defense, the Atomic Energy Commission, the Arms Control and Disarmament Agency, and several private individuals prominent in fields related to nuclear testing. The objectives of the test program are spelled out in a Defense Department statement on page 130 of the published Hearings.

10. The yield levels quoted here are in the statement of Dr. James N. Brune, Professor of Geophysics at the University of California, on pp. 139-145, (Ref. 27). Dr. Brune's statement identifies and draws upon several other expert opinions as well. The administration position was elucidated by the testimony of Mr. Phillip Farley, who was then Acting Director of the Arms Control and Disarmament Agency. Mr. Farley's remarks appear on page 12 ff, (Ref. 27). The same position was reiterated in early 1972 during unrelated hearings on the Arms Control and Disarmament Act (Ref. 23).

11. Mr. York had raised and dismissed this point in his earlier book, Race to Oblivion (Ref. 32), and in his recent Scientific American article (Ref. 33) he points to the fact that, since 1963, ". . . no new knowledge or surprises remotely similar in kind or importance to those of the first two nuclear decades have been reported or claimed." In testimony before the Senate Committee on Foreign Relations in 1971 (Ref. 27), however, the possible military significance of a series of clandestine tests, rather than any single test, was pointed out by Administration representatives on pp. 35-36. The idea of "technological surprise" had always been a factor in deliberations on a test ban treaty, and is found in several places during the early hearings on the Limited Test Ban Treaty in 1963 (Refs. 22 and 26).

12. These are Refs. 22 and 26, as previously noted. Two principal witnesses involved were Dr. John S. Foster, Jr., then Director of Lawrence Radiation Laboratory, whose statement and testimony begin on pg. 613 ff (Ref. 26), and Dr. Edward Teller, University of California, testifying on pg. 417 ff (Ref. 26). The same sentiments are reflected in their statements in Ref. 22 (pgs. 393 ff and 542 ff, respectively), and can also be found in the testimonies of General Maxwell D. Taylor, Chairman of the Joint Chiefs of Staff (pg. 587 ff, Ref. 23, and pg. 272 ff, Ref. 26), General Curtis E. LeMay, Air Force

Chief of Staff (pg. 352 ff, Ref. 22, and pg. 345 ff, Ref. 26), and Dr. Harold Brown, then Director of Defense Research and Engineering (pg. 846 ff, Ref. 22, and pg. 528 ff, Ref. 26).

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