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Implications of Reduced NATO Nuclear Stockpiles

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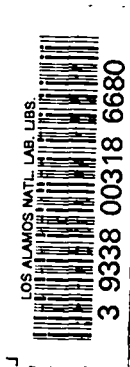
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Richard R. Sandoval



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IMPLICATIONS OF REDUCED NATO NUCLEAR STOCKPILES

by

Richard R. Sandoval

ABSTRACT

After completing the initial deployment of nuclear weapons in Europe in the early 1960s, the United States maintained for the next 20 years a stockpile advertised at 7000 weapons in the support of NATO. This number was not explained by any official statement of the roles of the weapons, which made the stockpile vulnerable to politically motivated decisions to reduce its size. Ensuing reductions have brought the number to a nominal 6000 weapons, with an announced further reduction to 4600 planned. The reduction of NATO's nuclear weapons stockpile reflects a weakening of the long-standing Alliance consensus supporting reliance on nuclear weapons as a key feature of NATO's military posture.

The adequacy of the number of NATO's nuclear weapons is probably best judged by its likely effect on Soviet calculations for starting a war in Europe. It has been judged that 4600 weapons will dissuade the Soviets if they are convinced that NATO would resort to nuclear weapons to forestall a military defeat. Smaller numbers might also dissuade the Soviets, but at some point substantive improvements in NATO's nuclear target-engagement systems would be required to preserve that dissuasiveness. Improvements could be made in both technology and in organizational methods of incorporating nuclear capability into NATO's forces.

I. INTRODUCTION

Reductions in the number of nuclear weapons in the NATO stockpile are among the latest episodes in the erratic history of American deployment of nuclear weapons. The US has deployed nuclear weapons in Europe since the early 1950s, and the question of why the US maintains nuclear weapons in Europe has been debated ever since. The question is answered officially in MC 14/3, a NATO Military Committee document subscribed to unanimously by the members of the Alliance. The question is answered unofficially in ways that are not unanimous,

a fact also reflected in MC 14/3. The original reasons for the deployment are difficult to reconstruct and in any case are now of little consequence. The birth of the flexible-response strategy in the 1960s has accounted since for the inclusion of nuclear weapons in NATO's military posture. The approval of MC 14/3 in 1967 marked the official adoption of flexible response as accepted NATO strategy for defending Western Europe. Since then it has seemed all but inconceivable that an MC 14/4 embracing a different strategy could ever be approved. However, in present circumstances, which include a great amount of antinuclear agitation, that possibility does not seem so far-fetched.

A principal feature of flexible response is its deliberate ambiguity. It claims for NATO's forces the capability to engage the enemy at every level of conflict intensity by using either conventional or nuclear weapons, or by calling on strategic nuclear forces. Although British and French nuclear forces have not been explicitly committed to NATO, they are not likely to be discounted by the Soviets. This spectrum of NATO's military capability is said to give NATO options for raising the level of intensity of any conflict that was not proceeding satisfactorily, while at the same time inexplicably deterring the exercise of similar Soviet options. The primary objective of the strategy is said to be to discourage conflict in the first place, and, if it fails to do so, to achieve NATO's conflict objective (the preservation of its territorial integrity) at the lowest possible level of conflict intensity. However, the strategy does not commit NATO beforehand to any particular level of initial response to an aggressive move, nor does it specify subsequent responses. This ambiguity is evidently intended to enhance deterrence of an attack by reflecting the purported flexibility of the options available to NATO's political and military leaders.

Recent controversies over enhanced-radiation weapons and intermediate-range systems have eroded public support for NATO's nuclear forces. It is implied in flexible response that NATO's nuclear weapons will be used to affect unfavorable military situations. However, what those uses would be has not been made explicit, presumably out of deference to the sensibilities of NATO publics. One result of this silence has been that political opposition to the threat of using nuclear weapons, and even to their continued deployment, has been growing. Widespread public misgivings (produced by considerations of the possible ultimate consequences of a failure of deterrence) have served to blur the

distinction between strategic and nonstrategic nuclear weapon systems--a distinction that was never widely accepted.

The specific military roles to be played by different elements of NATO's nuclear forces in defending Europe from conventional or nuclear attack have not generated much public discussion among political leaders and electorates on either side of the Atlantic. There has not been any coherent public exposition of the roles that nuclear weapons might have to play if NATO's territorial integrity is to be maintained in the face of some of the heavier attacks the Soviets are capable of mounting. It is an open question whether that kind of public exposition would make a great difference in altering present attitudes toward nuclear weapons in general and NATO's weapons in particular. Nevertheless, in spite of this uncertainty, NATO military leaders must plan for the use of their nuclear resources, and they must base their planning on their experience of conventional wars. This experience provides the only framework for anticipating likely missions for their nuclear forces.

Political pressures have forced reductions in selected types of nuclear weapons in NATO, and the same pressures may force still further reductions. Although below some level nuclear forces lose their military significance, it is evident that little thought has been given to what that level might be. If the process of stripping NATO's forces of their nuclear capability is to be arrested, military planners must either take into account the resistance to the idea that nuclear weapons would actually be used in a European war, or they must find a way to overcome the resistance. Reversing the trend does not seem a likely possibility at present.

There are, of course, some formidable obstacles to be overcome in planning to perform the various tasks that NATO might assign nuclear weapons in order to put an acceptable end to a war. First, NATO's planners must guess how the Soviets might use their nuclear weapons, either when responding to NATO or on their own initiative. Second, it is difficult to fit traditional operational concepts for waging war into a strategy that envisages a spectrum of levels of conflict intensity. And, to further complicate this last exercise, there has been no indication that the Soviets subscribe to the concept of war fought in the successive steps that are envisioned in flexible response.

Probably, for some of the purposes called for by the strategy of flexible response, the particular characteristics of specific NATO systems and warheads do not play a crucial role. Their contribution to deterrence, for example, is

unavoidably conjectural because NATO cannot know specifically which characteristics of its nuclear stockpile figure most prominently in Soviet political or military calculations. Therefore, assessing the suitability of roles for the various components of NATO's stockpile probably has to be made solely on traditional military grounds. That military basis also has to serve to determine the preferred characteristics of any possible technological improvements and to discover alternative organizational approaches to accommodate nuclear capability in NATO forces.

There are, nevertheless, difficulties with using purely military assumptions. One is that the use of nuclear weapons systems could result in indiscriminate destruction. That potential may be just what is required for deterrence; however, it can hardly represent a military capability if it is too destructive for political permission to use it to be granted. Actually, this drawback will probably always apply to any nuclear capability just because it is nuclear. However, this does not seem an adequate reason for military planning to ignore the distinction between discriminate and indiscriminate ways of accomplishing military ends.

There are other problems with focusing exclusively on the military utility of specific nuclear weapon systems in a traditional military frame of reference. For one thing, there is a lack of precedent from which to judge the relevance of previous combat experience. Another problem is that of judging a particular system in a context that gives appropriate weight to other force components. This problem is not peculiar to nuclear systems.

Despite the difficulties, NATO's nuclear capability will have to be assessed by measuring the ability of each component weapon system to do the military jobs that might be assigned to it. Procedures for evaluating NATO's nuclear weapon stockpile that are not based on military considerations are neither sensitive to variations in the individual characteristics of the systems nor, except in the broadest terms, to the size of the stockpile. Logically, it then remains to judge the capability of the combined systems to do all of the military jobs of conventional war. There is inherently a wide area for disagreement between political and military authorities in making that kind of judgment. The use of even a few hundred nuclear weapons in any actual European war would have cumulative effects that no political leader would care to think about, and the military casualties would be on a scale that no military commander could tolerate.

In one most important sense, however, the disparity in NATO's political and military approaches to the question of roles for nonstrategic nuclear weapons should be considered irrelevant. The Soviets have deployed comparable weapons for purposes that will remain inscrutable to the West until the actual event of war. It is not entirely unreasonable, therefore, to evaluate NATO's stock of nonstrategic weapons from the point of view of the Soviet marshals who would be, by hypothesis, charged with the successful invasion of Western Europe without destroying those features that would afterwards be useful to the Soviets. Although it is evident that utter devastation would be the result of an extensive use of nuclear weapons by both sides, it is cant to profess that no other result would be possible if there was any use of the weapons. At some level of use, it is at least conceivable that nuclear weapons would serve finite military and political purposes.

In the event of war, it would likely be the hard-headed Soviet marshals who would advise their equally hard-headed political masters as to the level of use of nuclear weapons to be expected and as to the prospects of Soviet success if that expectation proved accurate. It would be up to Soviet political leadership to decide whether to act on that advice. Neither the Soviets nor NATO could probably afford to exceed the level of use those marshals anticipated if preservation of Europe as a viable economic entity was a Soviet goal and if saving social and political essences, of its own members at least, was an additional NATO goal. Making that judgment of what level of use both sides could tolerate would not be easy. It would be to NATO's benefit to make the Soviets' decision as hard as possible. In circumstances compelling enough to lead Soviet leaders to accept the incalculable risks and enormous costs of invading Western Europe, it is pertinent that it would be the Soviet military who would be making the judgment as to the expected costs.

Other scenarios besides the limited nuclear one are plausible for war in Europe. Many people believe that the outcome of a deliberately initiated conventional war would be accepted by both sides even though both could have recourse to nuclear weapons if either refused to accept defeat. It is difficult in the absence of precedent to gauge the possibility that nuclear weapons could salvage an acceptable end to war when conventional defeat was imminent, and no attempt will be made here to do so. Similarly, it is certainly conceivable that a European war with nuclear weapons would be unrestrained, making the question of military utility moot.

In the end, the only role for NATO's nonstrategic nuclear weapons that can be usefully addressed is that of dissuading the Soviets from attempting an invasion of Western Europe. The likely effects of nuclear weapon use on military operations on both sides could well be a factor in Soviet calculations of their prospects of success. Presumably, those calculations would in turn be a factor among whatever incentives the Soviets might have for considering such an invasion.

II. MILITARY MISSIONS FOR NATO'S NUCLEAR FORCES

In a future war, it would presumably be NATO's objective to preserve, or restore if need be, existing political borders. The role of NATO's nuclear forces in support of this objective is conceived by NATO in conventional military terms. It is easier to think of a nuclear war that follows the same military pattern as that for a conventional war than it is to propose alternative conceptions. Westerners view conventional war in terms prefigured in World War II; the missions assigned to the available force elements in that war, then, are assumed to be the missions applicable to the available force elements in a future conflict. However, the relative emphasis placed on those missions will not be the same because the military and, even more so, the political conditions will not be the same as they were 40 years ago.

With no more pertinent experience to draw from, there is no available alternative to assuming a conventional form of conflict for assessing the military utility of NATO's nuclear forces, even though there are reasons to doubt the validity of the assumption. Accordingly, for this study, war in Europe should be thought of as a series of battles between conventional forces for custody of the local terrain, with all other military activity supporting those forces in those battles.

Besides assuming that missions for nuclear forces in a future war will be the same as the missions of conventional capabilities in wars of the past, this study will be based on three other assumptions. It is assumed that the military objectives of both sides will not change when the war turns nuclear. It is assumed that whenever nuclear weapons are introduced, NATO's military will be in a position to employ nuclear weapon systems with their inherent effectiveness unimpaired. And it is assumed that every mission for which a particular nuclear weapon could be used should be considered in evaluating the associated system's usefulness. The precedent for this approach was set in the last European war,

when every available capability was used, except that embodied in chemical weapons. No one knows the future relevance of the fact that all of the World War II participants refrained from introducing chemical agents.

When facing a Soviet attack, NATO's first task would be to prevent, stop, or slow the enemy's advance. It is not likely that NATO would turn first to its nuclear capabilities to accomplish this task; however, there are seven missions that nuclear weapons might be given to assist conventional forces in the subsequent fight. The first will be called "battlefield support." The targets attacked in carrying out this mission are primarily those developed on the battlefield by NATO's directly engaged forces. Those targets will almost always be fleeting, requiring a high degree of responsiveness of the target-engagement systems used to attack them.

A second mission that might be assigned to nuclear weapons is that of preventing the reinforcement and resupply of Warsaw Pact forces already engaged. This mission, here called "battlefield isolation," entails (1) locating and destroying reinforcing units and stores of fuel, food, ammunition, and other supplies intended for engaged Pact forces; (2) making movement in the Pact's rear areas as difficult as possible; and (3) disrupting the Pact's means of coordinating necessary activities between rear areas and the engaged forces. This mission requires nuclear systems to have a longer range than that required for battlefield support and imposes a severe burden on NATO's means of finding rear-area targets.

A third possible mission, "interdiction," would be carried out by nuclear forces against those Pact rear-area activities not directly associated with reinforcement and resupply of engaged forces. Many of the targets would be fixed, facilitating their attack with the appropriate NATO nuclear systems. The volume of rear-area activity in modern war has previously limited the effectiveness of interdiction.

NATO's nuclear forces could be involved in attacks called "counter-air operations." Most specific rear-area tasks would have to be assigned to NATO's air forces, which would also be defending against Pact aircraft employed in support of the Pact ground attack. NATO would thus need to attack a number of targets in the Pact rear area for the specific purpose of limiting the enemy's ability to use its aircraft offensively.

Another mission might be "air-defense suppression." Warsaw Pact forces would go to war under the protection of the densest system of air defense ever

deployed. The system would include a wide variety of airborne and ground-based defensive capabilities. For NATO aircraft to enter Pact air space, or even to operate close to that air space, Pact air defense would have to be substantially degraded. Accomplishing that degradation, which would be difficult for conventional means, is the mission of air-defense suppression, and nuclear weapon systems could be given this mission.

The mission of "counterfire" is universally considered by both sides to be a prime candidate for assignment to nuclear forces, even though finding the targets would be difficult. Just as NATO's nuclear weapon systems would logically be the objects of Soviet intense effort to find and neutralize them, the defense of Western Europe would presumably require considerable effort to find and destroy Soviet nuclear and conventional-weapon delivery systems supporting the ground attack.

Finally, "air and missile defense" may be a future mission of NATO's nuclear forces. Warsaw Pact forces employed by the Soviets would be assigned missions analogous to those listed here. Soviet nuclear forces comprise the same general types of systems and have capabilities comparable to those of NATO's nuclear forces. This means that an ideal spectrum of military capability for NATO would include the means of countering all of these systems. Some nuclear-capable systems for air defense now exist. Developing and deploying such systems unavoidably involves ambiguity about what is being defended, civilian value or military forces. This ambiguity has implications for Europe similar to those debated in the US over ABM systems before SALT I.

Actually using a major fraction of NATO's nonstrategic nuclear capability would have a cumulative effect transcending any rational basis for war in Europe. The nuclear responses that the Soviets would make cannot be predicted, but their effect would add to the cataclysm. It can therefore be concluded that the actual employment of NATO's nuclear forces would be subject to rules of engagement, self-imposed if necessary, that would be much more restrictive than those used in recent conventional wars. The influence of political decisions on the outcome of the Korean and Vietnam wars foreshadowed this subordination of military objectives to political purposes.

The devastation of an unlimited nuclear war leads some people to conclude that the mission of nuclear weapons can only be a demonstrative one, warning the Soviets of the possible consequences of persisting in aggression. The decision to use nuclear weapons for other than purely military purposes will not be

greatly affected by the size of the stockpile, type of weapon, or the characteristics of the delivery system. Furthermore, no one can know how many of what kind of weapons would dissuade the Soviets from using their own nuclear weapons in a European war. Thus, nonmilitary roles for NATO's nuclear weapons cannot serve as the basis of NATO nuclear force structuring decisions. Only military missions can furnish a basis for making those decisions, and in present circumstances, only experience of conventional wars can define the missions.

III. ASSESSMENT OF THE MILITARY UTILITY OF NATO'S PRESENT NUCLEAR FORCES

A. General Observations and Assumptions

In making a quantitative assessment of the military capability represented by NATO's nonstrategic nuclear weapons, a number of assumptions must be made to cover uncertainties. The size of the Warsaw Pact force that would attack Western Europe is one of these uncertainties. That size could vary from including only the forces now in place in the Eastern European countries bordering NATO's territory to including reinforcements that would probably be deployed before or during an attack. The total number of targets presented by the attackers varies with the size of the attacking force, of course, but even with no reinforcement of Pact forces now in place, that number reaches several thousand fixed and mobile targets in the arrays that are commonly projected. It is assumed that a sufficient number of these Pact targets would be located with enough timeliness and accuracy to warrant attacking them, and it is assumed that finding and designating enough appropriate targets for nuclear weapons does not place a constraint on the number of weapons that might be required for a specific purpose.

After the total number of Pact targets that could be attacked in a timely fashion has been estimated, the number of nuclear weapons that would be released by political authorities as required by US law can only be guessed. It is impossible to know if a particular estimate of that number is reasonable, but it is usually assumed that the number would be one for which a valid requirement could be justified on military grounds. The following examination assumes that logistical and administrative problems that would undoubtedly arise in connection with the political release of NATO's nuclear weapons and the joining of those weapons with associated delivery units would not present significantly constraining difficulties in applying any of NATO's systems to a particular mission.

We observe that locating NATO's nonstrategic weapons in a relatively small number of peacetime storage sites, as now dictated by concerns for the security of their authorized custody, makes them somewhat vulnerable to pre-emptive action by the Soviets. This poses a highly scenario-dependent problem that cannot be treated definitively beforehand.

With the above observations and assumptions in mind, we begin an examination of the capability of the components of NATO's present stockpile to perform the missions identified in Section II.

B. Missions Against Warsaw Pact's Directly Engaged Forces

1. Battlefield Support. A major requirement for nuclear target-engagement systems in battlefield support is the ability to react quickly to fleeting targets. Such delivery systems already exist in conventional military organizations, and the appropriate Pact targets will be found by target-acquisition means integral to those organizations within a few kilometers of NATO's directly engaged forces.

Three main nuclear delivery systems provide battlefield support capability for NATO's front-line ground forces. There are atomic demolition munitions for the purpose of creating obstacles to the movement of Pact forces on and near the battlefield. There are air-delivered nuclear weapons that could conceivably be used to provide supplemental battlefield support. But the principal nuclear delivery systems are cannon and missile artillery. There are nuclear projectiles for both the 155-mm and the 8-in. howitzers. The relevant missile systems are Lance and Honest John.

Atomic demolition munitions can only be used to produce surface and subsurface explosions. Thus, along with the craters or other obstacles resulting from their use, these munitions would also produce varying amounts of fallout unless they were detonated farther below the surface than would be possible in most cases. It was once thought that prechambering at suitable depths of burial would be the solution to the fallout problem. Prechambering, however, turned out to be infeasible for political reasons that have, if anything, become stronger recently.

Because NATO's air delivery systems might have a higher priority to support other missions, NATO ground forces directly engaging Pact assault formations could not call routinely for close air support. Neither this problem nor the formidable problems of air-ground coordination for attacking fleeting targets has been solved to date for conventional weapons, let alone for nuclear ones.

NATO's cannon artillery and Lance and Honest John missile units are thus left to carry the main burden of the battlefield-support mission. Presumably, these systems with their inherent capability pose a threat to the massing of Pact forces for a concentrated attack on NATO defenses, and therefore make it easier for NATO's conventional forces to defend their assigned sectors. Certainly NATO's artillery is a self-contained target-engagement system that includes visual observation of the battlefield. Finding the appropriate targets would not be a major difficulty.

If the Soviets postulate that the artillery systems would actually be used to deliver nuclear fires and that Pact forces would need to concentrate in order to penetrate NATO's defenses locally, it can be expected that the compacted spearheading Pact forces, which would have four times the number of cannon of NATO's spread forces, would devote every effort to destroying NATO's cannon and missile launchers. Significant attrition of these delivery systems might occur during the conventional phase of the conflict and before any decision to introduce nuclear weapons. The resulting shortage of delivery systems, aggravated by the short range of the cannon and the initially small number of missile launchers, calls into question NATO's ability to use these systems for nuclear battlefield support. The number of the associated nuclear weapons in the stockpile does not necessarily reflect accurately the support that could be expected. Nevertheless, those numbers correspond to a major fraction of the number of maneuver units that would contribute weight to a Pact attack to seize territory, and thus they constitute a palpable threat inhibiting the massing of Pact units into lucrative targets. NATO is able to disperse significant numbers of these weapons across the entire front. In fact, the delivery means are already so dispersed, and the heavily urbanized areas in which the Soviets could presumably mass safely would not be conducive to a swift penetration of NATO defenses.

There are, however, some other shortcomings with NATO's cannon artillery and short-range missile systems, and with their associated nuclear weapons. The available combinations of yield and accuracy in the systems now deployed, as well as their limited ability to respond quickly, are unsuitable for attacking targets located close to NATO's forces. These targets are the ones that NATO's defending forces might most need to destroy. Nuclear cannon projectiles that have already been developed but not fielded would alleviate these problems. These new projectiles have not been deployed to Europe because of a growing political hostility toward short-range nuclear weapon delivery systems. This

hostility is evidently based on fears that their availability would cause nuclear weapons to be brought into a European conflict too early. There is thus a strong possibility that proposed reductions in NATO's nuclear capabilities will come disproportionately from the weapons associated with the battlefield-support mission. This situation may worsen if the US Army decides to eliminate its 8-in. cannon, a move it is now studying.

In the circumstances, an estimate of the number of systems and warheads needed for a minimally credible NATO capability for nuclear battlefield support would be helpful. Because of the length of the political borders NATO defends (about 1000 kilometers in the central region), any reasonable estimate of warheads is a high number for existing systems. High estimates only exacerbate what is threatening to become an irreversible antipathy toward battlefield nuclear weapons.

However, if one function of NATO's nuclear forces is to help fight a conventional battle against superior forces, there is no imminently available alternative to short-range nuclear systems for holding such attacks at high enough risk to be sure of impressing the Soviets. This is especially true if the Soviets are contemplating using Soviet nuclear weapons against NATO's front-line defenders. Without the existing short-range nuclear systems, or acceptable substitutes, NATO's response to the Soviets would have to come from systems whose use would necessarily be escalatory. That kind of response might seem appropriate when considered in peacetime; war would bring a different perspective, and escalation might not then appear to be a promising option.

Conceding initial success to the assaulting Pact echelons in the hope of preventing the exploitation of that success by the following echelons may be a politically popular alternative at the moment; however, the appropriate means of making such a strategy workable do not appear to be technically feasible for at least a decade, if at all, and the Soviets are not compelled to cooperate in such a scheme in any case.

Another consideration that may have to enter into the assessment of NATO's nuclear battlefield-support requirements is that concerned with the Scandinavian and Mediterranean flanks. It is conceivable that NATO will want to retain a capability to introduce the pertinent kinds of nuclear weapon systems into those areas if they were to come under attack, which would create a different political situation from the present one.

Finally, as will be the case with the analysis of the other missions for NATO's nuclear forces, in evaluating NATO's capability, it is necessary to distinguish between the number of weapons the Soviets will presume to be available for nuclear battlefield support and the number that military and political considerations would justify for NATO's actual use. Estimating the latter number is unavoidably a scenario-dependent exercise that will not be explicitly attempted in this study.

From the preceding discussion, we conclude that the military capability of NATO's short-range nuclear weapon delivery systems now constitutes a potent threat to Soviet prospects of a quick success in breaching NATO's defenses. The major threat inheres in the number of nuclear weapons the Soviets would assume were available to NATO's forces defending areas through which the Soviets might want to launch their heaviest attacks. This threat is more likely to be impressive to the Soviets in the central region than on the flanks. However, Soviet confidence in the ability of Pact forces to destroy a substantial number of NATO's short-range nuclear delivery systems is an unknown. This unknown argues against judging NATO's present battlefield-support capability to be excessive to the requirement for posing a credible threat to the Soviets. Present shortcomings in the pertinent systems and warheads also argue against such a judgment.

C. Missions Against Warsaw Pact Rear-Area Activity

NATO's present nuclear capability to attack targets located more than a few kilometers into the Pact rear area rests in its ability to find those targets and to deliver nuclear weapons on them. The delivery systems are its longer range missiles and its aircraft. Lance could be used at the shorter ranges, and at the longer ranges the missiles are Pershing, ground-launched cruise missile (GLCM), and Poseidon. All of these missiles, except Lance and the older Pershing, have sufficient range to be used against targets in the Soviet Union. NATO also has a variety of aircraft capable of delivering nuclear bombs in the Pact rear area and in the Soviet Union.

The number of targets in the Pact rear west of the Soviet Union is commonly assumed to be several thousand, of which a few thousand will either be identified beforehand (for example, airfields, railheads, and other fixed targets) or discovered during the course of conflict. It is reasonable to expect that NATO would depend on Lance, its older Pershing, and its aircraft for limited attacks on Pact rear-area targets, with the other available systems, possibly

including US strategic systems, threatening massive attacks and attacks on the Soviet homeland.

For all of the missile systems, the targets would have to be found and designated by external agencies, primarily aircraft which depend heavily on visual acquisition, although some aircraft are all-weather capable. NATO could use the same aircraft both to find and to attack a target, but political leaders would be reluctant to authorize pilots to be the sole judges of what were appropriate nuclear targets.

However it was done, finding and attacking targets from the air would encounter opposition of various kinds, principally in the form of active air defenses. Also, both NATO and Pact airfields would presumably be attacked from the outset and become high-priority targets after nuclear attacks on rear areas were initiated. Aircraft that survived those attacks would have to contend with additional difficulties caused by nuclear explosions. Because fallout patterns from surface and near-surface bursts are unpredictable, most explosions would probably be above the surface. This might alleviate the problems of dust and other debris obscuring targets. In any case, even at low levels of nuclear weapons use, coordination of air and missile strikes would have to be carefully done. It helps in this regard that missiles are chiefly useful for fixed targets and their trajectories are predictable.

Because it would be to the advantage of both sides in a European war to have an early end to hostilities without extensive damage to other than military targets, both sides could be expected to exercise some forms of restraint, alien as the notion of restraint would probably be, at least to the military of both sides. Evidence of restraint would be exhibited by the geographic extent of the operations. On the other hand, each side would probably be more interested in an acceptable outcome than in exhibiting restraint that precluded such an outcome. The political calculation as to how these opposing constraints should be observed in military operations would likely determine the extent and intensity of the use of nuclear weapons against rear areas. A recent study suggested that an upper limit to nuclear operations was about 3000 explosions on each side, leaving both sides with effectively no remaining military strength to continue. Military doctrine, grounded in conventional war experience, is understandably silent on the question of a lower limit to such operations, and no Western political leader is going to expose the results of his calculations until he has to.

It bears repeating that NATO will continue to be dependent on aircraft and other airborne platforms for the means of acquiring targets. Also, technological improvements in the pertinent capabilities will similarly depend on airborne means. The ability to penetrate Pact air space and to maintain airborne platforms in position to look into the Pact rear area with various kinds of sensors will largely determine, and act as a practical limit to, NATO's capability to engage in conventional or nuclear operations against the Pact rear. An analogous statement obviously applies to the Pact.

Finally, engagement in rear-area operations by either side depends on what is happening in the actual battle to attackers and defenders. If the NATO defenders were capable of denying all progress to the attacking forces, the Pact's intent against NATO's rear area would be to neutralize those NATO capabilities denying their progress. For NATO to engage in operations against the Pact rear would, in those circumstances, be gratuitously escalatory. Military experience in previous wars strongly suggests that some progress can be made by attackers if they are willing to pay the price. If the price was made very high, the burden of escalating conflict to include nuclear rear-area operations would be on the attacker. Conversely, if the attack's progress was not made very costly, that burden would fall on the defender. It is obviously to NATO's advantage to present a posture that would appear to put the burden of escalation to nuclear rear-area operations, with its incalculably heightened risks, on the Soviets. This might prevent the Soviets from attacking at all, and if war resulted nevertheless, NATO would be in a better position to fight. It is in this light that the relationship between NATO's nuclear battlefield-support capability and its deeper strike systems ought to be seen. Deeper strike nuclear systems are probably needed to discourage Soviet escalation; however, NATO's means of supporting the battlefield should be adequate to obviate the need for NATO to do the escalating. (Note that the battlefield could be either nuclear or conventional, and the choice might very well not be NATO's.)

The yield of the nuclear weapons used may affect the perception of escalation; higher yields may be more escalatory than low yields. NATO's battlefield-support nuclear weapons can be detonated at yields in the kiloton range, and excluding the older Pershing and a few aircraft bombs, NATO's longer range systems can deliver weapon bursts of similarly low yields. On the other

hand, many of NATO's nuclear weapons can produce high yields for retaliating or for whatever other purpose. The Soviets can be expected to know all of this.

The degree to which Soviet military literature reflects the thinking of Soviet political leaders can only be a subject for speculation. That literature does not indicate that the Soviet military anticipates levels of conflict intensity succeeding each other in a pattern of escalation. However, there is an evident awareness that military operations would have a political purpose that would not be served by indiscriminate devastation.

1. Battlefield Isolation. Because of warranted doubts about NATO's ability to deny substantive initial success to the leading echelon of a determined Soviet attack, there has been in recent years an increasing emphasis on evaluating and improving NATO's capabilities for interdicting Soviet ability to reinforce that success with succeeding echelons. To this end, a plan that the Soviets are assumed to be constrained to follow in invading Western Europe has been devised by Western analysts, and members of the NATO political and military community have been busily studying ways of disrupting the execution of that plan with conventional means. There is no doubt that a major motivation for this effort comes from a desire to circumvent all the problems associated with the prospect of nuclear war in Europe. However, no one involved in the present effort denies that, for some time to come, NATO will have to rely on nuclear weapon systems for a genuine capability to attack those elements of Pact combat power intended for the exploitation of initial Pact successes.

The question of interest now is what can be said of NATO's present nuclear capability to do that mission, previously identified as battlefield isolation. The mission involves attacking both fixed targets, in the form of potential obstacles to the coordinated movement of those reinforcing Pact elements; and mobile and moving targets, which those elements constitute. There are two associated difficulties that today limit NATO's pertinent capability. The first is the sheer number of fixed targets that would have to be attacked effectively in order to affect significantly the Pact's ability to move around in its rear area. The other is the difficulty of finding mobile and moving targets in all conditions of visibility and in the face of active Pact countermeasures, even assuming that Pact force elements and supplies were aggregated in identifiable targets.

A recent Rand Corporation study estimated that NATO would have to make 400 road cuts every night to deny Pact forces the ability to reinforce and resupply

their assaulting echelons. NATO could not hope to approach that requirement with its present capabilities. Those capabilities would, however, be effective in destroying the mobile and moving targets presented by that resupply and reinforcement once they had been located, assuming that the attacking aircraft could penetrate to those targets at acceptable cost. (NATO would use aircraft because its missile guidance schemes are unsuited for attacking targets within minutes after they are found.)

If an attack by NATO's aircraft was considered feasible, there remains the question of how many weapons would be required to prevent the exploitation of the initial Pact success. More than likely, that number would be greater than the number of appropriate targets that would be located in time, as NATO has limited ability to find targets at night and in bad weather.

2. Interdiction, Counter-Air Operations, and Air-Defense Suppression. The missions of interdiction, counter-air operations, and air-defense suppression would benefit from the fact that the great majority of targets involved would be fixed or semimobile, and many would be radiating electromagnetic energy making them much easier to find than passive mobile targets. The primary difficulty in accomplishing any of these missions would be in getting authorization for the use of nuclear weapons. The political authorities and the NATO commanders would have to consider the extent of unwanted damage that might result and whether or not they wished to signal restraint to the Soviets. To fit the weapon to the political and military need is not a problem as there are sufficient weapons available, and they are available in a wide range of yields. The Soviets would be well aware of the above factors and would have to consider them in making their own plans.

3. Counterfire. NATO's military forces in Europe and much more besides could be destroyed if the Soviets used their nuclear capability without restraint and if that capability were uncountered. The part of that capability that NATO could neutralize probably does not exceed what the Soviets would withhold anyhow in the interest of winning a relatively intact prize. As with NATO, the Soviet delivery systems are cannon, missiles, and aircraft. NATO's problem would be in locating these systems. Cannon would be especially hard to pinpoint if the Soviets dedicated some of them to nuclear missions exclusively. Missile systems are mobile, hard to detect before a launch, and are likely to be moved directly after launch. Pact aircraft, like NATO's, would be based on airfields

that would be easy to locate, but timing an attack so that a significant number of planes were caught on the ground might be difficult.

Because the NATO military can be expected to evaluate the counterfire mission in terms of their experience, it appears likely that the mission will remain one of high priority. Soviet nuclear weapon delivery capability, which NATO is not likely to attack pre-emptively, will probably remain equal to any task it might be given, unless NATO unexpectedly acquires a much stronger capability to find and destroy Soviet component systems or weapons.

4. Air and Missile Defense. NATO's present nuclear capability in air and missile defense lies in the Nike-Hercules surface-to-air missile. Nike-Hercules is scheduled for early replacement by Patriot, an air-defense system using conventional warheads. At one stage of its development, Patriot was considered a candidate system for defense against tactical missiles, but the option of retaining a nominal capability in this role did not survive the development process.

D. Additional Considerations

The size of NATO's present stockpile of nuclear weapons is adequate to ensure the defeat of any Soviet ground attack against Western Europe. However, the unavoidable costs of both sides resorting to nuclear weapons will act as a disincentive to NATO's political and military leaders. Of course, the decision to introduce nuclear weapons could be taken out of NATO's hands by a Soviet nuclear attack, which need not be indiscriminately destructive.

In deciding whether to go to war at all, both sides would first need to assess the strength of opposing conventional forces and judge their own prospects of winning without nuclear weapons. If nuclear weapons would be necessary for any purpose, each side might decide that it would be better to accept conventional defeat. If NATO's decision beforehand was to accept conventional defeat, then its nuclear stockpile could be configured solely on political considerations. As neither side can make that decision for the other, neither can at this time rid itself altogether of its nonstrategic nuclear capability.

It is deliberate Soviet military aggression that NATO's military posture is ostensibly designed to prevent or defeat. It would take an overwhelmingly compelling incentive for the Soviets to justify the risks of invading Western Europe, which would include jeopardizing the survival of the Soviet state. Soviet leaders could hardly fail to take their prospects of success into consideration in deciding how to respond to such an incentive. With NATO

continuing to deploy nuclear weapons in militarily significant numbers, the Soviets must either persuade themselves that those weapons would not be used, or they must plan an invasion that would succeed against nuclear responses.

If NATO regards its nuclear stockpile as being of military rather than purely political significance, then the question of the use of the weapons presents difficult problems for decision makers, who have no precedents to guide them. It seems likely that the Soviets would presume that NATO is willing to use nuclear weapons from the fact of their deployment. However, it is possible that political pressures could force NATO to take steps that would convince the Soviets that NATO could not use the weapons under any circumstances. Some people would argue that some such steps have already been taken with the adoption of complex procedures for ensuring that only authorized political leaders can release the weapons. It seems true that actual use would be considerably constrained by these procedures, as was intended; it further appears that the use of some systems would be virtually impossible.

The availability of the weapons also affects their military significance: Will the nuclear weapons be in the right place, in sufficient numbers, at the right time? And will they be accessible to their associated delivery systems? The current concern for the security of the weapons inhibits plans for their dispersal and adds to the already difficult task of obtaining political release.

There is also the threat of a direct Soviet attack on peacetime weapon storage sites. If such an attack should find virtually all of NATO's weapons still in the sites, it would definitively settle the question of the availability of those nuclear weapons in favor of the Soviets. With such large rewards at stake, such an attack cannot be ruled out. However, if this surprise nuclear disarming attack on NATO would not achieve the Soviet's entire objective, they would have to make the difficult choice of forgoing preparations for a follow-on attack or of sacrificing surprise.

It is unreasonable to conclude either that all or none of NATO's nuclear weapons would be available and likely to be used. Therefore, the Soviets must attribute military significance to any configuration of NATO's nuclear weapon deployment. Regardless of how fervently Soviet leaders may share NATO's aversion to nuclear weapons, in considering starting a war in Europe, they will be forced to weigh the potential military effect of the use of nuclear weapons by both sides.

IV. MILITARY UTILITY OF REDUCED NATO NUCLEAR FORCES

A. A Stockpile of 4600 Nuclear Weapons

NATO's present stockpile is a serious threat to the success of a Soviet invasion of Western Europe. Moreover, NATO's political leaders evidently believe that the stockpile contains nuclear weapons that can safely be sacrificed to political considerations. The Alliance Defense Ministers, in their collective identity as the Nuclear Planning Group (NPG), have accordingly publicly directed a reduction of 1400 weapons over the period of the next 5 or 6 years, presumably bringing the number of remaining weapons to 4600. It was left for NATO military authorities to decide what types of weapons to remove from the stockpile. In announcing its decision, the NPG alluded to its previous decision in 1979 to remove 1000 nuclear weapons from Europe, which was duly carried out. It further pointed out that deployment of new Pershing and GLCM warheads would concurrently be matched by removal of an equal number of nuclear weapons from the current NATO stockpile.

In the context of working out a reduction program to be implemented over 5 to 6 years, the NATO Ministers instructed the military that "...appropriate consideration will be given to short-range systems." It is interesting that the announcement referred to "this minimum-level stockpile," presumably meaning the weapons remaining after the projected changes are made, and called for a range of improvements in survivability, responsiveness, and effectiveness over the next decade. The announcement noted further that "The Alliance must, however, take account at all times of changes to Soviet capabilities during this period." There was also, of course, the compulsory ritual reference to flexible response.

Although it may be premature to attempt an assessment of the military utility of a NATO stockpile nominally reduced to 4600 weapons without knowing which types of systems will be most affected, the considerations discussed in the preceding chapters of this study can be usefully reviewed in the new context of reduced numbers of nuclear weapons. In doing so, it should be recognized that the review can be conducted in a number of different contexts. The context that the NATO Defense Ministers had in mind includes strengthening conventional forces, although perhaps not to the extent that some influential Americans would apparently favor.

There is no doubt that there is a growing trend among those influential within NATO toward treating conventional and nuclear elements of military power as interchangeable, at least for the purpose of replacing nuclear capability

with conventional improvements. There are probably three tests that conventional weapons will have to pass when their development reaches the point that the movement to interchange conventional and nuclear weapons can be regarded as validly based. The first, of course, is that the candidate replacement conventional weapons demonstrate comparable lethality against area targets. NATO does not have enough space for its defense to allow for the time that might be required, for example, to kill enough Pact tanks one at a time. Nuclear weapons will likely remain for some time the only means available to NATO with which to kill several tanks at once or to neutralize other area targets, even assuming the necessary improvements in target-acquisition capability.

The last two tests, although not so frequently mentioned, might be of at least equal importance. One is that forces depending exclusively on these presently hypothetical conventional capabilities be able to operate effectively under Soviet nuclear attack. The electronic sophistication of much modern weaponry does not lend itself to performing well on a nuclear battlefield. NATO's policy will likely remain one of threatening disproportionate retaliation for any Soviet use of nuclear weapons. Clearly, however, the advantages of being able to respond in kind should not be lightly relinquished.

The last of the three tests is whether NATO's forces, whose nuclear capability had largely been replaced by conventional technology, could command the respect from the Soviet military that the replaced nuclear forces did. Because the uncertainties that unavoidably surround the question of operating on a nuclear battlefield cannot be duplicated in any conventional environment, their place in dissuading the Soviets would have to be taken by certainty as to the effectiveness of conventionally armed forces. There is a related question as to how much conventional NATO weaponry would inhibit Soviet use of chemical agents. Chemical weapons would hardly be decisive in a war that could turn nuclear.

If a reduction of NATO's nuclear weapon stockpile to 4600 weapons is believed to be politically attractive, two considerations seem immediately pertinent. First, NATO's reliance on nuclear weapons will not be substantially altered at the end of the 5 to 6 years devoted to that reduction. Conventional weapon technology capable of making any significant military difference does not now exist, nor can it be expected to be in place within 6 years.

The second consideration is that giving up air-defense weapons that are on their way out of the stockpile anyway and giving up atomic demolition munitions

of highly questionable value would not necessarily invalidate the stockpile assessment previously presented. On the other hand, a further substantial reduction in the number of weapons for short-range systems would leave a gap in NATO's capability to deal with directly engaged Pact forces, which the Soviets could find encouraging. That gap might be filled in the future, a possibility that will be examined in Section V, but it would be a serious defect in NATO's posture for a few years at least, and perhaps for much longer. Similarly, relieving NATO's air force of a nuclear role would remove the existing capability to engage moving or mobile targets in the Pact rear with nuclear weapons in anything like real time. Such a deficiency might be remedied in time, but again that time would be measured in years. In the meantime, Soviet chances of a successful invasion would not have been impaired.

In a certain sense, the political purposes of stripping NATO of any feature of its nuclear capability can be thought of as transcending conjectural military consequences. If the impending reduction in NATO's nuclear stockpile helps to restore the political cohesiveness in the Alliance that seems to have been lost in arguments over neutron bombs and Pershing and cruise missiles, the effect on Soviet calculations will be greatly to NATO's advantage. The chances of a determined Soviet effort to take and occupy Western Europe are immeasurably better against a NATO in disarray than against a unified Alliance. NATO's leaders have recognized that the degree of unity possible is limited by the disparities in national interests of the Alliance members. Recent public controversies over American nuclear weapons in Europe have served to emphasize these inevitable disparities.

B. Reductions of Nuclear Stockpiles Below 4600 Weapons

Many observers believe that NATO is now undergoing, not one of the recurring crises that have marked its history, but rather an unavoidable and long-delayed reaction to fundamental changes in both the internal and external political and military conditions that led to the formation of the Alliance 35 years ago. If that is the case, the present role of American nuclear weapons in NATO's forces, which was never widely understood by NATO publics, may no longer provide a valid basis for projecting the future. At this point, that observation can only be introduced as a cautionary note, although it seems clear that NATO is in some sort of transition.

It certainly appears that future decisions about NATO's nuclear weapons will be taken in a different context from that which produced the present

stockpile. The ostensible NATO unanimity that must be a prominent feature of public announcements will evidently be harder to achieve in the future. Furthermore, it seems unavoidable that those decisions will be influenced by a wider range of highly vocal constituencies in all NATO countries than used to be the case. The best evidence of this lies in the fact that it was political pressure, signified in public protests, that has twice led the NPG to announce publicly a reduction of the NATO stockpile.

The NPG has probably reached decisions to reduce the number of nuclear weapons by probing the basis of the original decisions that gave NATO its long-lived stockpile of 7000 weapons. Because the political and military bases for those original decisions had changed, the NPG had little difficulty in 1979 in finding 1000 weapons whose presence could no longer be justified. We do not know the reasoning that convinced the NPG that NATO could safely give up another 1400 weapons and accommodate the introduction of new intermediate-range systems without increasing the total number of weapons. It is instructive, however, that the Ministers directed the NATO military to give appropriate consideration to short-range systems. This directive can only be interpreted as a move away from credibly usable nuclear capability. NATO's political leadership has in effect demoted NATO's nuclear posture as a complicating factor in the calculations of the Soviet military. Still, NATO's nuclear capability may play the key role in any Soviet decision to start a war in Europe.

It may be significant that NATO's military authorities were given the task of choosing the weapons to be removed from the stockpile and that a very generous period was allotted for carrying out the reduction. A sizable part of NATO seems to want nuclear weapons to have even less than an ill-defined symbolic value. However, if the weapons are to be more than symbolic, they must have some recognizable relation to military missions. It appears that the current reduction in stockpile numbers, and any future tampering with the composition of the stockpile, will be the result of compromises, the specifics of which will only become clear in the details of the reduction.

The NATO stockpile that will exist 6 years from now will probably take one of two forms. It may be that short- and intermediate-range capabilities will continue to be represented in roughly their present proportions or that short-range systems will be cut disproportionately. A disproportionate reduction could signify either a decision to forgo the battlefield-support mission as a task for nuclear weapons entirely or a disenchantment with the present delivery

systems. The reception given to proposals to replace the current systems will likely be the first indication of the correct explanation.

A proportionate reduction would provide a firmer basis for assuming that NATO continues to value the military relevance of the stockpile. It would not necessarily mean, however, that agreement had been reached as to the minimums of each type of capability required to dissuade the Soviets from attacking. It is the outcome of debates over the required minimums that will dictate whether there will be further reductions in the NATO stockpile. Again, in the final analysis, the size of the stockpile should be based on the assessment of what is needed to prevent a Soviet invasion.

It seems reasonable, if not defensible in detail, to believe that Soviet military perceptions would not change substantially until NATO's nuclear stockpile dropped below the range of 1000 to 1500 weapons, assuming that reducing the number were the only change made and that the survivability of the remaining weapons and systems were not perceptibly compromised. Below the 1000-1500 range, it seems likely that substantive improvements in existing capabilities would be needed for nuclear weapons to retain their dissuasiveness.

V. IMPROVING NATO'S NUCLEAR FORCES

The last round of proposals to improve NATO's nonstrategic nuclear capabilities began when the deployment of Lance was completed about a decade ago. After that came suggestions for new artillery shells featuring enhanced-radiation options; a proliferation of gravity-bomb modifications; a modernized version of Pershing with significantly increased range, improved accuracy, and a new warhead to match; a new kind of capability represented by GLCM; and, more recently, a Lance follow-on. The reasons given for these improvement proposals did not include compensating for reductions in the size of NATO's nuclear weapon stockpile. The Pershing II and the GLCM will not improve the military significance of any projectable NATO nonstrategic stockpile, not least because their status as nonstrategic systems is ambiguous at best. Most of the other proposals were rejected. These rejections, together with the weapon reductions, characterize the recent history of attempts to add to the military significance of NATO's stockpile.

Nevertheless, a good case can be made for improving individual elements of NATO's nuclear posture, especially in consideration of the likely effect of the reductions in the number of weapons. Whether making the case for strengthening

nuclear capabilities would counteract the trend away from reliance on a nuclear posture is probably moot in present circumstances. However, those circumstances will change, and identifying promising opportunities for stockpile improvements could turn out to be worthwhile. Improvements can be separated into those affecting each of the two broad military missions addressed in the assessments of the preceding sections--battlefield support and operations against the Pact rear. Viewed from a different perspective, they can be divided into stockpile improvements and management improvements. These four different categories will be discussed here.

A. Possible Technological Improvements in Nuclear Battlefield Support

The weaknesses in nuclear battlefield support have been identified by this study, and it is clear that new technology cannot cure all of these weaknesses. The NPG has expressed its interest in enhancing the survivability, responsiveness, and effectiveness of stockpiled weapons and some improvements may follow the upcoming reductions. However, there are strong indications that the NPG's interest in improvements for the stockpile does not extend to nuclear battlefield-support capability.

One of those indications is the NPG's reference to the term "responsiveness." In military terms applicable to the mission of battlefield support, responsiveness means the ability of the NATO force to identify a fleeting target and to deliver a nuclear weapon on that target before it disappears. However, the NPG is probably using the word in political terms where responsiveness refers to the degree to which nuclear weapons can be directly controlled by political authorities responding to political considerations. The Soviets would probably weigh NATO's responsiveness in the military sense and view it as a threat to their ability to mass their forces.

The point is that improvements in political responsiveness could result in persuading the Soviets that they had little to fear from NATO's nuclear weapons in planning an attack. This misapprehension might not tempt them irresistibly to launch an attack; however, in circumstances that already included a full-blown crisis, it might be a deciding factor in their decision.

In any case, whereas responsiveness in a military sense is necessary to provide direct nuclear support to engaged NATO forces, the only requirement responsiveness imposes on the nuclear weapon delivery units is that the preparation of the weapon for launch not add appreciably to the time required to

complete the target-engagement sequence. The weapon's design will have some effect on the time required for weapon preparation.

In present NATO forces, the only target-engagement system capable of reacting with the necessary speed to prevent the massing of Soviet troops is cannon artillery. At least, if cannon artillery in a nuclear engagement were used as in conventional combat, it could react with the necessary speed. Short-range cannon are essential to support NATO's forces in conventional engagements, but will they survive in sufficient numbers? It would help to be able to position delivery units out of range of the Soviet systems that most directly threaten them, which would also give them a larger area for concealment. However, positioning those units that far back would take them out of the responsive target-engagement system in which the cannon are now found. It would be possible to arm the units with appropriate longer range delivery systems and weapons, but the problem of placing those units within the combat organization would remain.

Available technology could provide new longer range weapon systems, incorporating both the delivery accuracy and weapon yield needed to make them suitable for attacking close targets. Warheads with nuclear submunitions would be more efficient, and this efficiency would contribute further to the flexibility of the new systems. The new systems could be made more survivable by giving them greater range and mobility. Helicopter or vertical take-off and landing aircraft could transport them. Also, the transportation feature could argue for small missile systems that emphasize small-diameter warheads.

Improved air defense, including larger numbers of surface-to-air systems, would benefit NATO's nuclear delivery systems and all of NATO's forces. The development of surface-to-air technology has not reached its attainable peak, either in the Patriot system or in the shorter range systems. Surface-to-air missiles would not only better protect forces from direct attack, but they would also serve to inhibit Soviet airborne surveillance and target-acquisition efforts.

No straightforward method of calculating how many nuclear weapons would be required to defeat the attack of a Soviet assault echelon is likely to be developed. If enough weapons were used, the more maneuver units the Soviets committed the more they would lose without commensurate gain of ground. The number of nuclear weapons required to insure that result, if the Soviet tolerance for losses were known, would surely be the maximum of any calculation.

There is also a relationship between the number of weapons required and the range of the delivery systems, because longer range systems can each cover a wider sector of the defense. Longer range, however, might also militate against the responsiveness in the military sense that would be essential to the credibility of the systems in the battlefield-support role. In the end, the ability to deliver one nuclear weapon per kilometer of front in the areas most suitable for a Soviet attack might reasonably be said to constitute a minimum if the principal object is to impress the Soviets and not to give high confidence to the defenders.

Not much more can be said about improving nuclear battlefield-support capability until it becomes clear whether improvements to conventional weapons will yield a capability comparable to that of nuclear weapons.

B. Possible Technological Improvements for Nuclear Operations Against Pact Rear-Area Activity

The small number of NATO airfields and their vulnerability, the difficulty of NATO's aircraft in penetrating Pact air space, and the dependence of NATO's intermediate-range missile systems on those aircraft for target acquisition (effectively limiting the missile system's usefulness against mobile targets) are the principal problems that NATO would face in conducting either conventional or nuclear operations in the Pact rear. To these problems must be added the unavoidable uncertainties associated with nuclear operations and with the unprecedented environmental conditions they would create.

The NATO airfields are vulnerable to conventional, chemical, or nuclear attack by Pact systems that might have an easy time penetrating NATO air defenses. It is commonly believed that the Soviets would be able to disperse Pact aircraft to a large number of airfields. NATO's options for dispersing aircraft are next to nonexistent, which might argue for vertical take-off and landing aircraft whose dispersal would be relatively simple. As it is, the survival at its bases of NATO's air capability against the Pact rear area must remain a matter for assumptions.

Assuming that Pact attacks on NATO's airfields did not settle the issue beforehand, penetrating Pact air space with sufficient numbers of aircraft and missiles to do significant damage to the Pact rear-area target complex may hinge on the success of NATO's air-defense suppression program. That success may in turn depend on the ability to locate enough targets, and that would have to be

done mostly from airborne platforms, which would themselves be subject to interference by the Pact air-defense system. It is noteworthy that reports indicate that Israel was successful in acquiring targets in Lebanon with remotely piloted vehicles (RPVs); therefore, NATO should investigate thoroughly the potential of RPVs.

Predictably, many NATO analysts are optimistic about the ability of American R&D to produce target-acquisition systems and conventional weaponry capable of effectively hampering Pact rear-area activities, particularly through attacking moving and mobile targets. If they are right, this technology could be used to field nuclear surface-to-surface missile systems with a better chance of penetrating Pact defenses than aircraft. Intermediate-range missiles could be designed with guidance systems capable of providing the responsiveness required of battlefield-support systems. As already noted, present intermediate-range missiles have little utility against mobile or moving targets.

There is a valid concern that new technologies would not continue to function effectively in either the environment created by nuclear explosions or in the face of Soviet countermeasures. The vulnerability of components to nuclear effects is, in fact, predictable. Furthermore, Pact countermeasures might be able to degrade the effectiveness of the new systems beyond what NATO proponents now estimate.

If new technology does provide NATO in the future with a substantive capability to operate with conventional systems against Pact rear-area activity and if NATO retains a respectable nuclear battlefield-support capability, the Soviets might view NATO's intermediate-range nuclear capability as primarily a retaliatory threat to Soviet nuclear operations. NATO would then be placing the burden of escalation on the Soviets. The chief requirement of those intermediate-range NATO systems would then be survivability, and military utility would not have to be strictly judged. Survivability would be a powerful argument to have NATO rely on submarines to provide the necessary capability. Submarine-based systems would need to have credible capability to retaliate without their use appearing to be a further escalation.

The required number of intermediate-range nuclear systems and weapons is even more difficult to calculate than that of battlefield-support systems. The effectiveness of conventional capability with the same roles would clearly be a factor. Whether the systems were to be thought of in terms of military utility or in terms of retaliation, or perhaps both, would also be pertinent. A minimum

estimate of the number of weapons required would most likely be in the hundreds rather than in the thousands.

C. Possible Stockpile Improvements

1. Vulnerability. Even those who do not want NATO's nuclear capability abolished nevertheless criticize its vulnerability. Some think the primary threat is from a surprise Soviet attack on the storage sites; some fear an attempt by politically irresponsible groups to seize weapons from these sites in peacetime. Dispersal to protect the NATO stockpile from the first of those threats would only increase its exposure to the second.

The most sensible defense against both of these threats is to store the fissile material and the chemical high explosive separately and to plan to reassemble them again only just before launch. More elaborate schemes have been suggested, for obscure reasons, but a simple physical separation would permit provisions for adequate protection for the fissile material and a wide dispersal of the weapon components for survivability. Full implementation of this solution would require replacement of all of the weapons in the NATO stockpile, which could only be a long-term goal. Failing this, the next best solution, albeit an expensive one, seems to be to store existing weapons in PAL-protected underground silos during peacetime. A combination of the two solutions would also represent a considerable improvement over the present situation. Separating the fissile and chemical explosive components of nuclear weapons would also relieve political and military authorities of their perennial concern over an unwanted nuclear explosion in peacetime.

2. New Weapon Options. The NPG, in its instructions to the military, refers to improvements in the effectiveness of the NATO stockpile, but no information is available from which to infer what the NPG had in mind. References to stockpile effectiveness usually apply to technological options of which enhanced-radiation weapons are an example. Continued R&D to provide those kinds of options is probably indicated.

D. Command and Control of Nuclear Forces

1. Historical Background. Related to the problem of vulnerability/survivability is the problem of providing for responsiveness of nuclear weapon systems in both the political and military sense. It is worth looking into the precise nature of this problem of responsiveness. Historically, NATO, taking its cue from the US, has incorporated its nuclear capability into a military force structure modeled on the forces that won World

War II. This is a structure designed for conventional operations on the offensive. Soviet forces and those of the other Pact countries are similarly organized.

In present NATO forces, directing the use of nuclear firepower for affecting conventional battles is assumed to be reserved to commanders of corps. Because of the size of corps, their commanders normally expect several hours to elapse before they see the effects of their decisions, and information on which to base those decisions retains its relevance for at least a few hours. This situation with regard to nuclear weapons is not one that is dictated by military considerations but rather responds directly to the requirement of responsiveness in the political sense. Commanders at lower levels than corps would be in a better position to make decisions to use nuclear weapons when that use was urgently required by a rapidly developing military situation.

A corps commander's grasp of current battlefield events could normally be expected to include those signaling acute danger to his mission. With the introduction of nuclear weapons, however, the nature of operations would change and the effects of the weapons would quickly become dominant. A corps commander's view of his situation might fall behind the reality. The disruption of communications caused by nuclear explosions could only aggravate this condition. The ability of military forces to react appropriately in such a situation is the essence of responsiveness in the military sense.

The command and control system directing military forces with nuclear weapons is not likely to change substantially until war with nuclear weapons is better understood than it is now. This condition has obvious implications for the degree of military responsiveness that can be allowed for in the present command and control system. However, procedural changes could be made quickly to provide a greater degree of that responsiveness, and the Soviets might be more impressed by what is physically possible.

The technological improvements now being commonly advocated for command and control are mostly aimed at further centralization of these functions--the ideal is apparently to exercise them from the equivalent of the Oval Office. However, improvements to the control of NATO's nuclear forces that would increase their dissuasiveness in Soviet eyes would include provisions for the decentralization of command and control when circumstances required it. Decentralization, particularly as to the gathering of information and the communication of instructions, would be forced by the disruption resulting from nuclear

explosions. In present circumstances, improving the responsiveness of nuclear weapons to political authority will probably govern, which may mean increasing the complexity of release mechanisms and procedures. It is not clear how this can be done while leaving intact the military responsiveness of NATO's present nuclear target-engagement systems, much less while improving it. There may be a challenge to technology here.

2. Possible Improvements in Command and Control. Evidently, there are concerns over the responsiveness of NATO's nuclear stockpile to political authorities, and the responsiveness of the nuclear stockpile to military exigencies can also be questioned. It is probably not feasible to change present features of the planning for the use of nuclear weapons while those features remain imbedded in NATO's conventional command and control system. The upcoming reduction in numbers of weapons in the stockpile may afford an opportunity to consider alternative approaches to command and control of nuclear forces and, in fact, to the whole question of the role those forces play in dissuading the Soviets from starting a war in which nuclear weapons could be used. Alternative approaches might better use the advantages that improved technology could bring.

Perhaps the time has come to reconstitute NATO's nuclear capabilities in forces that would lie outside the present command and control system and below some existing level of authority. Especially when the use of NATO's nuclear capability was being actively considered, those reconstituted forces could be made immediately responsive to whatever political and military authorities were considered appropriate. It follows that those authorities could then more easily assess the effects of that employment and whether the desired effect had been attained.

In principle, this kind of separate reconstitution of nuclear capability could apply to some or all of NATO's nuclear weapon systems. For example, the mission of nuclear battlefield support could be given to a separate force element appropriately organized and equipped exclusively for that mission. The mission could be the support that applied to the entire NATO central region, for example, or it could be assigned to separate force elements in each of the constituent regions. Similarly, nuclear weapons suitable for attacking targets in the Pact rear could be incorporated in a theater-wide nuclear force, in a force explicitly designed for disrupting Pact rear-area activity, or in a force for retaliating against Soviet escalation.

However it was done, a separate command and control system dedicated to the direction of associated nuclear forces and to the gathering and disseminating of information required by both the forces and their political and military masters would be needed. Clearly, the higher the authority directing those forces, the broader the range of suitable missions would be, the more complex their structure, and the easier the coordination of their activities among themselves and with outside agencies.

For example, a force could be designed specifically to provide nuclear battlefield support to both of the US corps that are now part of NATO. That force would consist of a closed and wholly self-contained target-engagement system especially configured for nuclear weapon delivery. The force would be closed in the sense that the target-engagement sequence would not end in the nuclear explosion but with an assessment and report of the effect of that explosion. This report would set the stage for the next planned event in the sequence. The system would be self-contained in that every element needed for the entire target engagement sequence would be included in the force. The force could be armed with the technologically improved nuclear weapon delivery systems described previously. The systems would have longer range, greater delivery accuracy, and higher mobility than any of the systems deployed at the present time. System design would not have to be constrained by any requirement for compatibility with conventional force elements.

The Soviets would be aware that, should a war turn nuclear, the NATO forces engaging attacking Soviet units had been trained expressly for nuclear attacks. Soviet military commanders would not be likely to underestimate the effect that nuclear attacks on their assault units would have. For the Soviets to find and eliminate the NATO nuclear systems conducting those attacks would be more difficult because those systems would be separate from the engaged NATO conventional forces of which the Soviets had accumulated knowledge in the earlier conventional phase of conflict.

Unwanted escalation would then be less to be feared by NATO's political authorities. They would be assured that employment of that nuclear force would be limited to the attack on leading Soviet elements because, although the force's weapons might be deliverable on deeper targets, the force would be given no means of finding those targets. The nature of NATO's action in employing that nuclear force would be unmistakably clear to both sides, regardless of

which had initiated nuclear use. Control of escalation could be no tighter than that.

It is easy to find disadvantages to adopting that kind of proposal. The duplication called for could be expensive, especially in manpower, the scarcest resource. The duplication in a dedicated command and control system would also offend against the military principle of unity of command at all levels. It would undoubtedly cause some additional problems of coordination when nuclear weapons were actually delivered close to NATO's own forces. Additional disadvantages and compensating advantages would come to light when each proposal for separate nuclear forces was studied.

In evaluating any of these proposals, the principal criterion would be their likely effect on Soviet calculations of the success of the heaviest attack they could mount without unduly risking the devastation of Europe. Whether those calculations could ignore the possibility that NATO would actually use nuclear weapons to forestall a military defeat is the essential question. Whether an unequivocal answer is needed is more of an ideological question than one for analysis. Still, if NATO is to retain any nuclear forces at all, their most sensible purpose would be to make a Soviet decision to invade Western Europe as difficult as possible. If deterrence by strategic nuclear forces does not suffice, it is hard to believe that conventional forces could make a crucial difference, but some would say that assertion also borders on the ideological.

VI. CONCLUSIONS

There is little reason to believe that the latest decision by the NPG to reduce the size of NATO's nuclear weapon stockpile will, after the decision is implemented, result in a significantly changed NATO nuclear posture. Nor, unless conventional technology attains the promise that some hold out for it, will NATO's dependence on its nuclear posture be lessened thereby. In the final analysis, it is the dissuasion of a Soviet attack on Western Europe that is the essential point of any NATO military posture, and whatever else may be said of them, NATO's nuclear weapons constitute a major obstacle to any Soviet expectation of extending hegemony over Europe by force. Again, a nominal NATO stockpile of 4600 nuclear weapons cannot be practically distinguished from the long-sacrosanct 7000 such weapons of a few years ago.

The reduction of the NATO stockpile that is now planned, as were the reductions that have already taken place, has evidently been motivated by the need to

alleviate the effects of widespread disenchantment with NATO's security arrangements. The working consensus that sustained NATO's reliance on nuclear deterrence as the primary strategy for dealing with a postulated threat of Soviet invasion, itself under increasing doubt, appears to be intact at official levels. However, even at those levels there is growing support for strengthened hedges to that strategy in the form of improved conventional military capabilities. That support is evidently based on the assumption that NATO can buy protection from conventional weaponry, especially of advanced kinds, equivalent to that afforded by its nuclear weapons. That assumption has yet to be seriously examined, probably because it is politically attractive, and thus at the moment indispensable in any public stance taken by officials. More and more, nuclear weapons are seen by Western electorates, not as a means of avoiding war, but as the means of making war intolerably destructive and therefore unacceptable in a military posture.

It does not seem likely that those political pressures will ease soon, which may mean that further reductions in the NATO nuclear weapon stockpile will be decided upon in the future. These future reductions may likewise have little practical effect unless they seriously weaken NATO's nuclear battlefield-support forces. Without substantive capability to attack Soviet assaulting formations discriminately with nuclear weapons, NATO would be forced to escalate in response to the heaviest attacks the Soviets are capable of mounting. Because the latter could include the discriminate Soviet use of nuclear weapons, conventional improvements of whatever nature could hardly serve as adequate substitutes for battlefield nuclear systems. These considerations would not be lost on the Soviets during their contemplation of an attack in circumstances providing them with the necessary incentive to accept the appalling risks accompanying a war in Europe.

Finally, stockpile reductions may have contributed, albeit inadvertently, to a present opportunity to take full advantage of technological options for improving NATO's nuclear forces materially. This opportunity arises principally from the misgivings of some political authorities in NATO about nuclear weapons incorporated in military organizations and subject to physical control of the same military commanders who would be directing the conventional phase that would presumably open European war. Divesting those commanders of any responsibility for the employment of nuclear weapons and entrusting that responsibility to forces constituted specifically for that purpose would ensure

whatever degree of political control was considered necessary in the actual use of the weapons for whatever purposes. Nuclear weapon systems could then be designed independently of the constraining requirement for compatibility with conventional force elements. This would permit the application of all appropriate technology.

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