

LA 4467 MS

UNCLASSIFIED

07

REPRODUCTION COLLECTION

REPRODUCTION

COPY

LOS ALAMOS SCIENTIFIC LABORATORY

of the

University of California

RESERVATION - NEW YORK

Atomic Energy Commission

LOS ALAMOS NATL. LAB. LIBS.



3 9338 00384 6010

UNCLASSIFIED

UNCLASSIFIED

Written: June 1970

Distributed: July 1970

~~UNCLASSIFIED~~

LA-4467-MS
SPECIAL DISTRIBUTION

PUBLICLY RELEASABLE

Per Bill Palatinus, FSS-16 Date: 2/3/88

By Richard Lujan, CIC-14 Date: 2/9/95

LOS ALAMOS SCIENTIFIC LABORATORY of the University of California LOS ALAMOS • NEW MEXICO

Classification changed to CONFIDENTIAL - FRD
by authority of the Atomic Energy Commission

Per JWX att. 8 James L. M. Redman, 150-6

By REPORT LIBRARY P. M. ... 3-24-72

Tactical Nuclear Warfare

UNCLASSIFIED

CLASSIFICATION CHANGED TO UNCLASSIFIED
BY AUTHORITY OF Letter from J.L. Cucchiano, ODC, WASH

DOCUMENT IDENTITY 10/16/84
VERIFIED BY B. Palatinus, 5/12/86

V. C. V. ... 5/12/86
(SIGNATURE AND DATE)

by

R. G. Shreffler
W. S. Bennett

This material contains information affecting
the national defense of the United States
within the meaning of the Espionage
Laws, Title 18, U.S.C., and the
transmission or revelation of its
contents in any manner to an unauthorized person is pro-
hibited by law.

~~FORMERLY CONFIDENTIAL DATA
Dissemination
1954~~

~~EXCLUDED FROM AUTOMATIC
DECLASSIFICATION~~

~~UNCLASSIFIED~~



LOS ALAMOS NATIONAL LABORATORY
3 9338 00384 6010

TACTICAL NUCLEAR WARFARE

**"Not to reveal what we intend to do is a question of tactics; not to know is to mortgage the future."
-Henry A. Kissinger, 1965**

I. Summary

President Nixon's report on U.S. Foreign Policy for the 1970's calls attention to the strategic importance of our tactical nuclear weapons and asks how their contemplated use affects our forces, especially in Europe. Until now there was little enthusiasm for such force planning, largely due to a national strategy that relied on our preponderant strategic nuclear retaliatory capability. A stockpile of theater nuclear weapons was developed, but mainly as a convenient extension of our World War II capability. Yields were usually maximized within the given military characteristics, which unfortunately tended to ignore the problems of unwanted collateral damage.

During the 1960's the Soviet Union apparently achieved parity with the nuclear forces of the United States. During this same period U.S. political and military policy placed emphasis on conventional tactical forces, accepting a "firebreak" concept that maintained that nuclear weapons were unusable as tactical military tools. Yet this flexible response strategy continues to rely on the U.S. nuclear umbrella, at least in Europe, for credibility—even though the suicidal implications of such retaliation are evident. In this study we accept the fact that the U.S. and the Soviet Union have achieved a strategic standoff. Our mutual deterrents are so credible that a strategic nuclear exchange is an option open to neither side. The SALT talks have a mission of freezing this precarious stability.

But the U.S. has no credible deterrent against lower levels of aggression. Our inadequacies here, and our misguided adherence to ideas of tactical victory (contrasted with tactical deterrence and stalemate), enforce our fears of escalation. The spectre of tactical defeat invites an increase in the intensity of conflict, escalating to the use of ever more powerful weapons. It is argued here that we must develop a credible tactical deterrent, making each step up the escalatory ladder less necessary and thus less likely, reversing the present unstable escalatory gradient.

Although policy, force structure, and weaponry must evolve iteratively, with full interaction, policy should guide weaponry. Unfortunately, weaponry more frequently leads policy, and it may indeed proceed with no relationship to policy whatsoever. The study proposed here seeks to reorder this sequential influence, challenging

some of the anomalies in current U.S. doctrine for tactical use of nuclear weapons. Implicitly, we accept the assignment to prove or disprove our assertions. Explicitly, we propose a number of technological problems whose clarification is needed in any approach to a rational doctrine for tactical use of nuclear weapons.

II. Chronology and Background

- August 6, 1945 First atomic bomb ever used in war was dropped on Hiroshima, Japan.
- August 14, 1945 Japanese surrendered.
- September 2, 1945 VJ Day: formal end of World War II.
- June 5, 1947 Speech by Secretary of State George C. Marshall, launched "Marshall Plan." Three and one-half years and \$12 billion later credited with restoring economic health to free Europe and halting the march of communism in those countries cooperating in the plan.
- September 23, 1949 President Truman announced that an atomic explosion had occurred in the USSR.
-Excerpts from *The World Almanac*

In a mere four years U.S. morale passed from the exhilaration of WW II victory and possession of the "ultimate weapon," through the euphoria and self-esteem of rehabilitating our allies (and former enemies), to the stark realization that our nuclear monopoly had ended. Actually, of course, the Cold War had already started, as the Soviets supported communist forces in Greece, brought pressure on Turkey and Iran, and locked Finland, Poland, Czechoslovakia, East Germany, Hungary, Bulgaria, Romania, and the Baltic countries into the Communist bloc. From its massive demobilization at the end of WW II, the U.S. had moved to its endorsement of the Treaty of Brussels (March 1948), through the Berlin Blockade of April-September 1948, to its formal alliance

in the North Atlantic Treaty Organization (NATO) on April 4, 1949.

United States and world reaction to the horrors of Hiroshima and Nagasaki had left the U.S. decision makers reluctant to stop the above Communist advances, even with our brief monopoly on the ultimate weapon. Indeed, the USSR had fully exploited situations in which there was no plausible role for existing nuclear weapons, although some strategists were arguing for a preemptive attack to halt communism at its source.

When our monopoly ended, in 1949, we began our move toward a policy of massive retaliation as our own blackmail to forestall Soviet use of nuclear weapons against us or our allies. The arms race was on in earnest, as we and the Soviets moved to ever-higher yields in offensive weapons and to longer-range delivery systems. In the ensuing technological race we seemingly held the lead, although our complacency was jarred by Sputnik in 1957, by the missile-gap arguments of the 1960 campaign, and by the October 1961 news that the Soviet Union had tested 25- and 50-megaton devices.

Strategic Air Command (SAC) proponents could claim in 1960—and now—that our strategic deterrent had prevented a general nuclear war. But although we could negotiate from a position of overwhelming strength throughout the 1950's, no one could claim it was an era of peace. The Army, trying to define its own role while our defense budgets were dominated by SAC, and in answer to our numerical disadvantages vis-a-vis conventional bloc forces in Europe, proposed a variety of atomic forces for limited nuclear war and graduated deterrence in the fifties. Continued reliance on the strategic deterrent and fear of escalation, however, left the ideas of limited nuclear war in limbo—a sort of “too little, too soon” dilemma—since it seemed unable to assure *victory*. The decade was marked by the Korean war, the Indo-Chinese war, the Hungarian rebellion, Suez, Lebanon, Quemoy, the pressure on Berlin, the threats over Cuba and the Congo—indicating a substantial gap in the effectiveness of our deterrent against a wide range of lower levels of conflict.

By the end of the 1950's the Navy had found its own strategic deterrent role, launching its first ballistic missile submarine in 1959. In the early 1960's U.S. citizens were encouraged to build their own nuclear shelters as civil defense entered the balance-of-terror accounting. The effectiveness of hypothetical ICBM exchanges was measured by comparing the tens of millions of casualties on both sides.

As arguments raged over the credibility of our deterrent, we continued the Cold War through the 1960's, oblivious to the Sword of Damocles hanging over our heads. In a decade dominated at the end by our involvement in Vietnam, the thrusts and parries included the Checkpoint Charlie confrontation, the Cuban missile crisis, the Dominican Republic crisis, the Pueblo incident, tensions accompanying the 1967 Arab-Israeli war, and Soviet repression in Czechoslovakia.

Although the Kennedy Administration repudiated the strategy of massive retaliation, U.S. weapons programs continued their emphasis on structuring an invulnerable strike-second strategic capability. Our forces in Europe had acquired a sizeable stockpile of “tactical nuclear weapons;” unfortunately policy was opposed to their use although capabilities and tactics were being developed. Average yields were too high—for a variety of reasons discussed later—assuring excessive collateral damage. Corrective efforts to improve this outmoded force concept and obsolete stockpile have been precluded ever since early 1962 when Kennedy's Deputy Assistant Secretary of Defense, Alain C. Enthoven, enunciated his firebreak philosophy—that *any* use of nuclear weapons would bridge the only gap that qualitatively separated us from escalating “all the way up the destructive spectrum to large-scale thermonuclear war.”* In the backwash of these events we have been left with thousands of “tactical” weapons in NATO Europe with no credible political policy or military doctrine for their use.

Throughout the sixties we pondered the problem of how to *remove* our “tactical nuclear weapons” from Europe without impairing our allies' confidence. Certainly the effectiveness of the weapons was questionable because their use threatened to destroy too much of the Europe they were supposed to defend. Their presence did give aid and comfort to our allies, because it seemed to assure a coupling between any attack on Europe and our invocation of a strategic retaliation. Our allies placed their own existence in our hands: not in our ability to win a war, but in our ability to deter it.

As that deterrent proved impotent against the Soviet nibbling tactics and “wars of liberation,” our allies became uneasily aware that they must prepare to deter more subtle aggressions—well below our trigger level for massive retaliation. In the first substantive revision of NATO strategy in nearly a decade, in late 1967, our allies moved to their own endorsement of a flexible response strategy. At its December 1969 meeting, the NATO Council further approved a document prepared by its Nuclear Planning Group (NPG) titled, “Provisional Political Guidelines for the Possible Initial Use of Nuclear Weapons by NATO.” For a political document, it is surprisingly specific. It points out the need for a modern NATO force equipped and trained to use tactical nuclear weapons in a fashion which is militarily effective but which minimizes collateral damage.

As a permanent member of the Council, the U.S. is included among those who adopted this document; in

*This statement to Congress is generally credited as the beginning of the “firebreak” concept, but actually parrots Kennedy's 1960 writings in *The Strategy of Peace*: “Inevitably, the use of small nuclear armaments will lead to larger and larger nuclear armaments on both sides, until the worldwide holocaust has begun” (p. 185).

UNCLASSIFIED

fact, Secretary of Defense Laird had a hand in its preparation, although the major effort was carried out by the British and Germans. To say that this document now reflects NATO planning is, therefore, to say that it represents our policy as well, with respect to the tactical use of nuclear weapons in Europe. For the moment, the U.S. has accommodated the situation under the pretense that a suitable force now exists. As NATO pursues its planned investigation of this subject it will be increasingly difficult for us to maintain this facade.

The nature of our future involvement may be deduced from the President's "Guam Guidelines" of July 1969. He repeated these in his November 3, 1969, report on Vietnam and again in his "State of the World" message of February 18, 1970, in which he accepted the press's label of "Nixon Doctrine."¹

We shall provide a shield if a nuclear power threatens the freedom of a nation allied with us . . .

In other types of aggression we shall furnish military and economic assistance when requested . . . but we shall look to the nation directly threatened to assume the primary responsibility of providing the manpower for its defense.

These remarks originally were confined to our commitments to our Pacific allies, but their implications now seem equally clear elsewhere. We need a credible deterrent against the entire gamut of plausible attacks against us or our allies, a deterrence in depth.

While our attention has been focused on Vietnam it has become apparent that the Soviet Union has achieved its sought-after strategic balance-of-terror with the U.S. No one can now doubt the credibility of retaliatory forces to deter a strategic nuclear exchange. Both major powers have the greatest incentives to perpetuate this balanced deterrent through the SALT talks. The credibility of this mutual deterrence arises from the fact that the unthinkable is now truly unthinkable. The consequence of this credibility is to deprive our NATO allies of our strategic nuclear umbrella.

Our focus on Vietnam and the Cold War neglected the crises in our domestic affairs. Seeking a balance between defense requirements and domestic priorities, President Nixon reestablished the National Security Council early in his Administration. As an arm of the NSC, he also established the Defense Program Review Committee, chaired by Mr. Kissinger, to review all "major defense policy and program issues which have strategic, political, diplomatic, and economic implications in relation to overall national priorities." Leading in to the

(1965) quotation at the beginning of this paper, Kissinger wrote.¹

We need a planning focus less geared to immediate crises and more capable of developing concepts responsive to fundamental trends.

Here, then is the AEC's challenge: to respond to the political, economic, and military needs of our times with credible weapons and guidance for their deployment in a sense that truly deters conflict instead of just diverting it or exhausting our treasuries. The enthusiasm of a new Administration's new look at our defense priorities finally gives the opportunity to reexamine old constraints—especially political, and imposes new ones—mainly economic. We dare not lower our guard on our strategic deterrent; SALT has the mission of freezing our relative capabilities at a stable political and military level. Now the role of technology must be to support our diplomats and military authorities in their quest to achieve an equal status of fruitlessness for lesser forms of war.

III. Political, Economic, and Military Factors

In this paper the terms strategy, doctrine, and tactics are used in a sense which approximates their definitions by the JCS:²

national strategy – The art and science of developing and using the political, economic, and psychological powers of a nation, together with its armed forces, during peace and war, to secure national objectives.

military strategy – The art and science of employing the armed forces of a nation to secure the objectives of national policy by the application of force, or the threat of force.

doctrine – Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application. (sic)

tactics – 1. The employment of units in combat. 2. The ordered arrangement and maneuver of units in relation to each other and/or to the enemy in order to utilize their full potential.

¹"The Troubled Partnership," 1965. p. 158.

²"Dictionary of U.S. Military Terms for Joint Usage," JCS Pub 1. 1 Aug. 1968.

¹New York Times, November 4, 1969.

UNCLASSIFIED

UNCLASSIFIED

The JCS definition of "strategy" *per se* is essentially the same as that for "national strategy," except that it concludes "to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat." This definition is rejected here, because of its emphasis on victory as discussed later (Sec. III-C-1). Instead, strategy is used with emphasis on its policy-making role: the political/economic specification of goals and constraints.

The definition of tactics is extrapolated here to include tactical doctrine and associated long-range planning, i.e., placing emphasis on *creating* "the full potential" of combat units. This inevitably introduces some ambiguity since the long-range decision of whether or not to plan for tactical nuclear operations is a matter of national policy. Similarly, there is no clear dividing line between tactical and strategic weapons, but either extreme is clear and this paper addresses the lower extreme, in both radius of effect and delivery range.

Oversimplifying the problem, the hierarchy from policy to tactics implies a transition from broad guidance to specificity; from *what* and *why*, through *when* and *where*, to *how*. There is a dilemma here, since policy may be changed with relative ease and rather quickly. But the implementation, the *how* of force structure and weaponry, is difficult to change and often requires years of leadtime. This leadtime requirement has meant that weaponry had to look further into the future than did our policymakers. Decisions to develop weapons are based on extensive study, but situations and understandings can change during those leadtimes. The unfortunate consequence is that decisions about weaponry tend to guide the rest of our policy, instead of responding to it; or worse, development proceeds without relationship to the actual situation. Our strategic weapons permitted a strategy of massive retaliation, but that led to a doctrine that constrained tactical evolution. The Services themselves have dragged their feet on the tactical problem; it was easier to concentrate on strategic weaponry because this called for completely *new* doctrine, as opposed to the problems of changing existing tactical doctrine. The seemingly imponderable firebreak and weapon release problems provided a convenient rationalization for this foot dragging.

Clearly the political, economic, military, and technological factors are out of step with one another, but they are so thoroughly interrelated that it is an oversimplification to treat any one in isolation. However, for purposes of discussion, they must be treated one at a time. This is attempted below, recognizing that a thorough examination should be iterative, that to start with any one factor is to start in the middle of the problem. The political, economic, and military factors are treated in that order, leaving the technological factors last in accordance with the thesis that the role of technology should be to contribute to the solution of the problems in the other areas. Apparent repetitiveness is unavoidable when the same factors have different aspects, but is minimized as much as possible.

A. Political Factors

1. Massive Retaliation--The Strategic Deterrent

It is not the intent of this study to question our need to maintain our strategic deterrent, nor to enter the continuing debates as to the role of ABMs or MIRVs in this deterrent or the counterforce-countervalue debate. We accept the fact that mutual deterrence has been achieved and that it is now the role of SALT to stabilize this situation. Stability will be maintained by assuring that preemption remains pointless to both sides. The significant conclusion, taken as the dominant assumption for this study, is that the mutual deterrent has become so credible that general nuclear war has become incredible.

It appears that this conclusion has long been evident to the Soviet Union, who found myriad ways to achieve their ends, operating well below any retaliatory threshold we might have had while our strategic forces were superior and while they sought parity--in part for their own self-respect. This conclusion must now be apparent to our allies, although political hazards prohibit their admitting it. They do worry that they have pegged their security to a promise of protection that can have little substance--the U.S. nuclear umbrella.

Nearly every wargame, plan, and exercise since the inception of our massive retaliation strategy has progressed to the release of that retaliatory strike -- in order to practice its complicated procedures. The (unintended) effect has been to rely on that retaliation to establish the credibility of NATO defense plans. But the Soviet Union has no motive for seizing a devastated Europe, and we should not pose such a threat to them as to frighten them into a preemptive strike. Neither do our NATO allies have any motive for defense plans that destroy their homelands. Thus the older concepts for tactical nuclear warfare in Europe, with their excessively high-yield weapons and incredible destruction, can be argued to be useless. In fact, these older concepts are totally obsolete, since they were designed to be implemented *after* the strategic exchange. But our allies are still vulnerable to lower levels of provocation--a rapid and limited *fait accompli* or a nibbling attack at the flanks that isn't worth the risks and destruction of retaliation. Therefore, we find the December 1969 action of the NATO Council: to find credible nuclear defenses, with minimized collateral damage, to deter these below-the-threshold attacks.

2. Fear of Escalation

a. *Political and Military Goals.* The conviction that one must negotiate from strength has negated efforts at preventive diplomacy. Our only incontrovertible strength has been our strategic deterrent, which we have no desire to use. Since our lack of strength at lower levels of conflict could not assure victory, we were led to the conclusion that escalation to general nuclear war was inevitable. But military victory, like concepts of "unconditional surrender," has been recognized as obsolete since WW II. We must structure our policies accordingly, seeking military strength only to defend and deter, repelling aggressors, but not threatening to destroy them. In his

UNCLASSIFIED

June 3, 1970, television report on the Cambodian campaign, President Nixon said we seek "an era of reconciliation, not recrimination." The day is long past when active military power should be used to back up failures in diplomacy; now the only role of military power should be to prolong and renew diplomatic opportunities for negotiation. Our military goals should not be victory, but deliberate statemate. Our limited war failures since WW II have been characterized as ill-advised engagements by us in a "contestant" concept of war,¹ wherein we fight within vague but agreed-upon rules—usually to our own disadvantage. In a better application of preventive diplomacy (Read's "coercive diplomacy") we declare and demonstrate our determination to follow a policing concept, defining our borders and defending them with whatever force and in whatever depth is necessary, without artificial contestant-type constraints. Throughout this paper "our borders" are assumed to have been defined in this way; they include our allies' territory when we have made this clear.

b. *Horror and Firebreak Suppositions.* These chimeras must be reexamined if this new interpretation of our military goals is accepted. The announced, deliberate, and prompt use of low-yield weapons (e.g., ADMs) to defend against aggression should be managed in such a manner that it is clearly not escalatory. For this reason, the tactical nuclear yields visualized throughout this paper are predominantly in the tens of *tons*, rather than kilotons, though higher yield weapons with improved fuzing are by no means excluded. Unwanted collateral damage is thereby reduced by even greater factors, yet military effectiveness can be *increased*. Our self-imposed confusion about a firebreak has denied us this credible deterrent and blocked the kinds of research needed to validate these assertions.

A series of ADM tests is suggested in Sec. IV, under Technological Factors, but a major facet of such tests includes active participation by political decision-makers, both ours and our allies'. The purpose would be to demonstrate that when ADMs are buried at the proper depth to optimize military effects that collateral damage is negligible. Only conclusive evidence of this nature seems likely to disprove the horror syndrome that has forestalled realistic consideration of tactical use of nuclear weapons.

c. *Fallacy of Symmetry.* The firebreak fixation has forced our military planners into the untenable position of trying to counter each threat in kind, whether or not this was economically or militarily feasible. Actually, there are great asymmetries between the U.S. and the Soviet Union: in value systems, force postures, and attitudes *vis-a-vis* aggression and defense. Our strategists and tacticians should be free to capitalize on these asymmetries instead of being forced to act as they didn't

¹ "Problems of Strategy and Tactics," unpublished draft by Thornton Read (BTL), August 1969. Cited with permission of the author.

exist. Specifically, the U.S.-imposed reversal of the NATO sword and shield roles, which now decrees that conventional attack must be met by a conventional defense, arbitrarily places us at a severe disadvantage. Vietnamization and the Nixon Doctrine can both be interpreted as our recognition that symmetry with our enemies is unattainable by U.S. forces, and undesirable in many instances.

d. *Lessons from SALT.* Considering the escalatory ladder from the lowest rung to the highest, the SALT logic makes it evident that neither we nor the Soviets intend ever to reach that top rung. There is disagreement as to whether we should try to strengthen the deterrent credibility of the other rungs on that ladder by starting down from the top or up from the bottom. But it is clear that the philosophy of deterrence must be that the attainment of *any* rung makes the upward transition to the next *less* probable, rather than more probable. Our whole approach so far has been to deny ourselves this philosophy, but it is claimed here that this resulted from our confusion regarding diplomatic and military goals.

Although SALT is not supposed to address tactical weapons *per se*, and we have assured our allies on this point, it is inevitable that these talks will enter that area, since there are asymmetries even in our definitions. For example, we classify our fighter-bombers stationed in NATO as tactical weapons, whereas the Soviet Union considers them to be strategic weapons. The exposure of these asymmetries, in SALT, may be one of the greatest benefits to the U.S.: helping us to clear away the ambiguities and obfuscation in our own policies and strategies.

e. *U.S. Custodianship.* Our fear of unauthorized use, of escalation, and our concern to protect our weapons design "secrets" have locked up our tactical nuclear weapons so tightly that they could never be used to stop aggression at a low level, at the borders we have elected to defend. We could only use them in an (incredible) retaliatory spasm after a minor Soviet *fait accompli*, or after our forces were decimated—a fruitless gesture which nevertheless often seems to dominate our military planning in Europe. This distorted result of our doctrine has naturally reenforced our fears of escalation. Present interpretation of our laws requires Presidential release not just of strategic weapons, but of *all* nuclear weapons. Short of an incredible general release, the command and control requirements are horrendous, and our "custodial" forces are burdened with protecting our weapons against friend and foe alike.

At least in the case of defensive tactical nuclear weapons visualized for use by our allies, we should consider ways to simplify this custodial problem. One logistic simplification is discussed later under Technological Factors. More sweeping policy changes should not be ruled out. In any such consideration one factor to be acknowledged is that we hold no leash on French or British use of their own weapons.

Our preoccupation with custodianship and security continues in blissful disregard of the fact that nuclear weapons technology is now possessed by the Soviet

UNCLASSIFIED

Union, the British and French, and the Chinese. As chronicled at the beginning of this paper, the Soviet Union had a fission device 49 months after Hiroshima. Lest we take comfort from this apparent lead of four years in a weapons race, it should be noted that they closed this gap so quickly that their first test of a fusion device followed ours by a mere nine months. That portion of our custodial program which is justified under the heading of protecting weapons design secrets seems subject to sharp challenge. Our custodial procedures are so involved that they make a mockery of our tactical stockpile in Europe: neither our own troops nor our allies' place any credence in the value of those weapons to protect their own lives. Their presence in Europe is a burden rather than an asset; the troops charged with their care and supposed delivery are enacting a farce which is costly in dollars, in morale, and in preparedness.

f. *NATO Planning.* It is inferred that the NATO Council's political guidelines of December 1969 indicate some appreciation of all of the political factors mentioned here. As they continue their study they will discover our lack of planning and the unsuitability of our weapons. Rather than taking the defensive, or wrapping ourselves in a no-need-to-know security blanket, we should seek NATO participation (and thus confidence) in facing up to these problems and inadequacies.

The cumulative effect of these political factors makes it apparent that our strategic deterrent is already decoupled, in *spirit*, from the defense of Europe: it is decoupled from reality. Our military planning needs to be reexamined to ensure this decoupling in *fact*, if we are ever to resolve the dilemma in which we have placed ourselves. The implications for weapons development must similarly be acknowledged if the AEC Laboratories are to help resolve this dilemma instead of compounding it.

3. Nixon Administration/Doctrine

Most of the lamentations listed above, and which this study intends to address, have existed for years, but could not be resolved under the Kennedy/Johnson Administrations' belief in the firebreak concept. Some of the political constraints (such as custodianship and Presidential release) cannot be lifted without changes in the interpretation of our laws, but the new Administration has invited reappraisal of our past assumptions. Broadened application of the Nixon Doctrine will require some of these changes. [This discussion tends to be dominated by NATO considerations, but the principles apply equally in all theaters of potential confrontation, especially Korea and Southeast Asia, where our resolve may continue to be tested.]

B. Economic Factors

1. SALT Motivation/Impact

Although the SALT talks have the primary goal of stabilizing the present strategic balance of terror, it must be recognized that these efforts to halt that portion of the arms race are motivated as much by our mutual desires to conserve dollars and rubles as by our mutual horror. It

seems likely that any agreements reached will restrain quantities of weapons more than qualities, but the economic impact on AEC effort is not clear.

2. Defense Program Review Committee (DPRC)

The paranoiac or nationalistic fervor of the arms race nearly caused bankruptcy for our British and French allies—and probably Red China. The costs to the U.S. and the Soviet Union are becoming intolerable. The DPRC will certainly reexamine existing assumptions, constraints, and guidelines, and have the opportunity to discard those which are manifestly obsolete. The economic responsibilities of the DPRC are unmistakable: among the six original committee members were Budget Director Robert P. Mayo and Council of Economic Advisors Chairman Paul W. McCracken.

Equally unmistakable are the domestic pressures to reduce our expenses in maintaining our NATO commitment. At the present time there are some 300,000 U.S. troops with 200,000 dependents in Europe, costing us over \$12 billion each year. The Senate Majority Leader, Mike Mansfield (D-Mont), is gathering strength for his "Mansfield Amendment" to cut our troops in Europe to perhaps 50,000 men. Such a troop withdrawal may force us to abandon our symmetry strategy of meeting a conventional assault with a conventional defense. If U.S. NATO forces were cut to 50,000 men the question "Why do we need (our present) 60,000-plus troops in Korea?" is inevitable.* Clearly our whole military policy and posture is being challenged on economic grounds; it is imperative that we evaluate the ability of tactical nuclear weapons to replace military manpower. This may offer one way to achieve a credible deterrent short of our hoary blackmail of massive retaliation.

3. Cost-Effectiveness Considerations

Many of our current problems, in finding ourselves with an irrational weapons mix, can be traced to ineptly used cost-effectiveness studies. Such studies inevitably suboptimize; i.e., they find the "best" mix of allocating resources, but only for the part of the problem being considered. The suboptimizations, for example, independently satisfied criteria: (a) to conserve critical material; (b) to minimize weight or volume; (c) to compensate for poor delivery or fuzing accuracy; (d) to assure reliability; or, (e) to be compatible with a conventional round so as to produce a "dual-capable" weapon or force. The results gave us complex and expensive weapons with excessive average yields, assuring excessive collateral damage. The "sophistication" of our weaponry seems to have worshipped complexity instead of simplicity, ignoring the human-factors aspects of battlefield conditions because they could not be quantified as elegantly as the physical parameters of the environment (e.g., "g" loads, temperature, humidity). New cost-effectiveness studies

*Indeed, the New York Times (June 12, 1970) reported, "A top Defense Department official said the Administration had been forced by budgetary pressures to seek an agreement with South Korea for the withdrawal of many of the 64,000 American troops in that country over the coming two or three years."

UNCLASSIFIED

are needed, but their conclusions must not be blindly applied to the total problem (of which they are but a part) without complete awareness of the dangers of imposing more suboptimizations. Thus it is encouraging that the DPRC membership is no more pure economist in composition than it is pure military, or pure State Department. With this caveat, the following tradeoffs are among those that need study.

a. *Conventional Weapons' (In)-Effectiveness in Vietnam.* Hindsight does not let us undo what we have already done, but it does let us learn from what we recognize as mistakes. Current tallies measure the expenditure of our high explosives in Vietnam in excess of ten megatons. This is in an area less than one-third that of France but with a population density 10% greater. With a different diplomacy, strategy, and force posture, it is reasonable to ask if a successful defense might not have been mounted with discriminating use of nuclear weapons and far less collateral damage than Vietnam has already suffered. The cost-effectiveness analysis should not rest on the economic advantages which might be shown, but should extend to the "firebreak" and "horror" effects. It seems these phobias might be revealed as fallacious when compared to the tensions and despairs that "conventional limited war" can produce.

b. *Reliability Fallacies.* The enormous cost of our first few nuclear weapons, in both dollars and severely limited critical materials, gave rise to fantastic reliability requirements—which have never been lifted. In spite of an arsenal now measured in thousands, instead of tens of weapons, this "gold-plated" philosophy continues, and is locked into our doctrine in a "one target-one weapon" decree that keeps cost illogically high. The cost-effectiveness of pushing nuclear weapons reliability far beyond that required for conventional weapons calls for searching analysis. While it can be traced to the one target-one weapon philosophy, it is also a distorted result of concerns for safety. But fail-safe designs can be cheaper than assured-yield designs. Further, it would seem that the safety requirements themselves should be less demanding for 20-ton weapons than for megaton weapons. It is within the realm of political and military reality that our tactical arsenal reach 50 to 100,000 low-yield weapons. For economic reality, the cost per unit must be reduced substantially. This would be easier if reliability criteria were relaxed.

c. *Yield Tradeoffs.* The yields now in our stockpile were selected for a variety of reasons, but often dominated by some principle of maximization: the most yield per dollar or per gram of critical material, or simply the highest yield attainable within weight, center of gravity, environmental, and volume constraints when designing a dual-capable round. These criteria need continuing challenge if we are to provide useful tactical nuclear weapons to support a credible tactical force. There is no greater waste than producing a stockpile which is unusable, even as a deterrent. The influence of collateral damage criteria, in particular, must be assessed when considering the economics of an optimum stockpile mix. The surest way to reduce collateral damage, of course, is to reduce yield.

One excuse for justifying high yields has been to compensate for errors in target acquisition or for delivery errors (the CEP of the delivery system including the effect of fuzing accuracy). Greatly reduced CEPs now appear feasible; their costs should be assessed in a tradeoff analysis against weapon yield. Of course, a zero CEP is achieved with ADMs, and optimum burial reduces collateral damage by orders of magnitude.

d. *Symmetry Constraints.* The appropriateness of a changed U.S. force posture and its needed tactical weapons stockpile must be evaluated with proper concern for all relevant factors, but free of arbitrary constraints such as those imposed by the fallacy of symmetry or by firebreak dogmatism. These were defined under the heading of Political Factors. To impose such constraints without questioning their relevance bars any possibility of achieving a cost-effective solution and guarantees blind suboptimization.

4. Our Costs of Custodianship

Our dollar and gold-flow costs of maintaining custody over our NATO stockpile are far from trivial. Current secure container technology may have a potential in using hardware to reduce the numbers of troops who now serve only a guard role. Modifications of weapons design might change the custodial problem from that of protecting the entire weapon to a much lesser problem of protecting only a critical part. Potential savings should be measured not just in dollars, but even more so in terms of tactical time saved in being able to achieve timely weapons usage. Advantages lie in the possibility of making a tactical deterrent credible to our enemies, to our own forces, and to our allies.

Surely a major cost of our present custodianship program is this lack of confidence that tactical weapons can now be released and readied in time to be useful—a doubt engendered by the ambiguities surrounding our policies regarding defensive use of tactical weapons. In the case of very low yield ADMs, whose use might be restricted to a defensive role on host-country soil, a modification of the present U.S.-release procedures should be investigated. This seems a rational extension of the Nixon Doctrine, especially with respect to the political factors discussed earlier.

C. Military Factors

Except for a number of implications regarding technological feasibility, which have been asserted thus far but whose proofs to be treated below remain as our major tasks, this treatment of the interrelated political, economic, and military factors comes full circle at this point of the discussion. The military factors—which themselves imply restatements of strategy, required force postures, and derived weaponry requirements—are all recapitulations of the points already made.

1. "Victory" Is An Obsolete Goal

The role of our military services must be to support a national strategy of diplomatic deterrence; failing that, they must merely seek an early stalemate, not defeat of enemy forces. We need noninflammatory semantics; we

UNCLASSIFIED

need not "defeat" aggression at any and every level, nor need we prevail; we seek to deter, to defend and police our borders, and to stalemate. Our goal is not to threaten an aggressor with punishment, but merely with frustration. We must achieve this by being certain that our determination is completely understood and credible, not by hoping to dissuade a potential aggressor because he is uncertain of the form and magnitude of our response.

2. "Symmetric" Response May Be Irrational

Our present tactical nuclear armaments were conceived and weaponized in the 1950's under assumptions that are ill-advised for the 1970's. Escalation was equated with desperation in an extension of a contestant concept of war.¹ Ten or twenty kilotons was regarded as a "small, tactical" yield, to be used in a European ground battle for real estate *after* a strategic exchange. In the aftermath of that holocaust, reducing "tactical" collateral damage was only of academic interest. A new strategy—policing our boundaries with individual yields reduced by factors of 100 to 1000, and burst predominantly in the air or underground—could reduce the integrated collateral damage by factors of thousands, even if the *number* of uses were greatly increased.

Throughout the 1960's the firebreak constraint stifled any effort to implement this concept or to reconfigure our forces for a credible tactical nuclear role. At the same time, in NATO, we were endorsing a border defense strategy, albeit one which would involve only conventional forces in its initial phase. This acknowledges our views of the asymmetry in NATO vs Soviet Union objectives: we claim we only wish to defend ourselves, and label the Soviet Union as the potential aggressor. We need defensive tactical weapons that support this concept, and better data to assure our allies that collateral damage can really be made insignificant—literally preferable to the devastation that accompanies conventional warfare.

3. The Escalation Gradient Must Be Reversed

Inability to deter at low levels gives us an inherent instability; because our graduated deterrents are inadequate, each escalatory step is unstable, so that the next increment of destructive power appears more necessary and thus more likely. Our deterrents must be structured so that each step up the escalatory ladder makes the next step *less* likely.

a. *Decoupling.* Our present military posture still calls for a conventional defense under our nuclear umbrella—an attempt to force our enemies to fight within the rules in a contestant-type war. In NATO-Europe our dual-capable forces support this pressure, as do our organic fighter-bombers which can be used against either short-range or medium-range ("homeland") targets. This posture deliberately adds to the uncertainty—and instability—of any potential confrontation. In this Cold War deployment we should consider decoupling our global forces from our theater forces, at least organizationally and perhaps physically. Some decoupling of more

obvious strategic forces has been accomplished already, albeit involuntarily, by our cutbacks in SAC forces in Europe and North Africa. Our conventional screen in Europe is too often regarded as a mere tripwire for a strategic retaliation, a recognition of a very close coupling. From this aspect it seems that decoupling our global strike forces from our theater forces would be a major step towards reversing the escalatory gradient. In the same vein, we need to find ways to erase the ambiguities surrounding our intermediate-range strike capabilities.

b. *Policing Our Borders.* If we cannot repel an invasion conventionally (and there seems to be much doubt that we can), then our defensive tactical nuclear response must be our most credible capability, freed of the constraints which now make its prompt use impossible. Deployment, command/control, and release procedures must be adapted to the political, economic, and military requirements for credibility to us, to the Soviet Union, and to our allies. In a border-defense strategy the intent to use nuclear weapons is neither blackmail nor retaliation; it is the constructive use of force to repel invasion, and escalation is not an issue in the classical sense. The tactical commander should be constrained only by basic considerations; e.g., limits on the areas and intensities of collateral damage. He should be free to choose his best mix of weapons for force application within these broad constraints, instead of being limited weapon-by-weapon.

4. Wargaming

Our strategy, force posture, and tactics must be an amalgam satisfying our political and economic needs in a cost-effective sense, free of the errors of suboptimization. Wargaming is a powerful tool used by our military services to reveal gaps in their tactics and planning, and for training in accepted tactics. (When used for problem *solution* it usually fails, because it suboptimizes within the rules of the game.) A great number of higher-level games are used by agencies seeking the interactions among the complex variables treated throughout this paper, especially the political and economic interactions with military problems. Gaming is most efficient here, in revealing deficiencies in assumptions by exposing political analysts, economists, and military planners to each others' assumptions. Such politico-military gaming is performed, for example, by IDA, RAND, and RAC. The AEC Laboratories should familiarize themselves thoroughly with these activities and contribute their specialized knowledge to the inputs of these games and the play of the games. This might increase the validity of those exercises, but most important, it would expose our own assumptions to critique and reveal areas in which the Laboratories need to develop better effects information or more appropriate weapons.

¹Thornton Read, *op. cit.*

UNCLASSIFIED

UNCLASSIFIED

IV. Implications and Technological Factors

In the preceding section current political, economic, and military factors have been considered to establish a basis for investigating our defense strategies, doctrines, and tactics.*

A. Strategy and Doctrine

From the previous discussion the following points relative to strategy and doctrine are summarized. These points, along with cited NATO documents, will permit the development of hypothetical but realistic strategies and doctrine from which one can deduce tactics. Fortunately, the NATO documents and the summarized points are consistent, and the totality of documents is reasonably specific.

1. Deterrent

Our primary objective is to deter conflict. This must be based upon enlightened preventive diplomacy as well as effective fighting forces trained and equipped to fight with nuclear weapons. Deterrence is measured by the impression communicated to the enemy; a vital component of this is our own morale and that of our allies, and the confidence we exhibit in our capability to frustrate aggression.

2. Well-Defined Strategy

A well-defined, credible strategy must be defined in concert with our allies. In detail it may be different in each theater and change in time.

3. Forward Defense and Timely Response

A strategy which is consistent with our NATO commitment and expressed in MC 14/3, and the one which seems to make the most sense, is a strategy which preserves the sanctity of established boundaries. This strategy does not recognize "firebreaks" or other artificial constraints.

4. Communication of Strategy

This strategy should be disseminated widely and in particular to the enemy. At present our detailed NATO strategy is classified NATO SECRET but its fundamentals should be an unclassified document. The principal cause for war since World War II can be traced to misunderstandings by our enemies of our intentions.**

5. Collateral Damage

Political requirements should impose constraints on the area and permissible levels of damage within which military operations may take place. The establishment of these constraints is an essential task. Results will be a compromise imposed in large part by the kinds of weapons available and will indicate the kinds of weapons which would be preferred, providing essential development guidance.

*Reference is made to the definitions and explanations of these items on p. 3 of this report.

**See, e.g., Read, *op. cit.*

6. Cost

The strategy and doctrine must be capable of effective implementation within reasonable cost limits; thus cost considerations will continue to influence our choice of strategy.

B. Tactics

The definition of tactics has been extrapolated here to include military plans for tailoring force structures and weapons. But a clear-cut definition of our force structures and weapons stockpiles can hardly be resolved without the guidance of well-defined strategies and doctrines. Based upon the previous discussions, the following comments are set forth.

1. Force Structure

Our present military posture in all our Services has been promoted along the lines that carried us to victory in WW II, augmented by the strategic force, which we set aside in this discussion. In fact, one might cynically argue that the perpetuation of this WW II force structure is a major objective of the Services. This status quo attitude has been an easy one to support in light of the strategy put forth by the Kennedy and Johnson Administrations. As a consequence, we have today a force structure which is highly unresponsive to the threats which face us.

Attempts at change must be made in the light of realities, e.g., military training cycles are characterized by large momentum, which means that postures and attitudes cannot be changed quickly. As with most other aspects of the nuclear problem, entrenched ideas must be challenged by erosion, while new ideas can be injected only through evolution. One cannot expect Air Force personnel to surrender their preoccupation with their strategic mission overnight. However, they must learn to take seriously such new weapons systems as Walleye and Condor. They must meet their responsibility to supply close nuclear support to the Army or else surrender this responsibility to the Army.

The Army, in turn, must take seriously the notion that it will have to prepare to fight a theater nuclear war. However, one must seek out methods which allow a gradual transition from its present massive conventional posture. For example, the Army should assume that ADMs will be available in the formation of a defensive barrier. It should put the political decision makers on notice that this ADM use is intended (and is supported by well thought out plans, which do not seem to exist at the present time). The Army's task is now complicated by its responsibility to reply in kind to both conventional and nuclear threats. The Nixon Doctrine and our probable reduction of NATO forces impose further problems: the contribution of nuclear forces to the solution of these problems merits immediate investigation.

Some doctrinal elements in the Armed Forces appreciate the dilemma in our current situation. It is to be hoped that, in light of the threat that is facing us, the centroid of national position will shift sufficiently to allow these elements to pull the Services out of their conservative rut.

UNCLASSIFIED

2. Weapon Stockpile

Our theater weapon stockpile has been developed around existing delivery systems. Although there are superficial advantages in this philosophy of dual capability, one can argue that it is not the way to maximize the deterrent. To be specific, a weapon which can be delivered only in the nuclear mode adds much more to the deterrent than a dual-capable weapon, since there can be no misunderstanding of the intended role. Admittedly such an argument begs the question of what strategy/doctrine/force structure one has chosen. We are faced with a classic example in a comparison of U.S. and Soviet Union ground forces in Europe. The U.S. Army, structured to fight a conventional war, is predominantly dependent on the use of dual-capable artillery tubes for its nuclear punch. The Soviet Union, with its light mobile nuclearly deployed force, may have no nuclear artillery.

As a consequence of this vacuum in our strategy/doctrine/force structure, it is difficult to propose what a theater stockpile of nuclear weapons should be. However, from the previous discussion one is led to the conclusion that a future stockpile should be predicated upon accurate weapon delivery, appropriate fuzing, improved release methods, knowledge of ADM technology, weapon effects, weapon cost, values of special effect weapons, and relative advantages of various delivery systems under a wide range of force structure parameters.

C. Technological Factors

In support of a strong tactical nuclear program we need to undertake a number of primarily technical tasks. Up to now NATO has shown little interest in nuclear force posture planning. As observed earlier, however, NATO is accelerating its nuclear awareness. It is most important that the military and political decision makers receive firsthand information on the crucial operational aspects of tactical nuclear weapons and their effects. Since the theme in this approach emphasizes low collateral damage, our continued interest in clean weapons technology is an implicit task. Other tasks of obvious relevance, where the Laboratories possess unique qualifications, are discussed briefly below.

1. Atomic Demolition Munition (ADM)

The ADM application is one of the oldest capabilities in the history of nuclear weapons. The ADM, as it would be used in a barrier role, is uniquely a defensive munition and, it would seem, the least escalatory of any nuclear weapon use. Oddly, however, the administrative controls on ADM deployment are more restrictive than those governing bombs and warheads.

One major obstacle to acceptance of a useful ADM plan is the lack of empirically certified knowledge of its capabilities, best use, and collateral effects. Long overdue is a deliberate test program to define the physical effects of low-yield bursts as a function of yield, burial depth, and use in multiples (several small ADMs used in place of one large one, to produce the same military effect but to

give a dramatic reduction in collateral damage). An important feature of such a test program is to demonstrate ADM use, and the primary and collateral effects, for defense planners from allied nations. A proposal for such a test series, ideally to be sponsored by the DoD, is in preparation.

2. Fallout Measurements

In conjunction with the ADM demonstration, fallout behavior—the most critical of residual effects—should be carefully investigated, particularly for multiple bursts of low-yield devices. In the past it has been military doctrine to impose conservative (almost riskless) restrictions on weapons use—planning for the eventuality of fallout from both the offensive and defensive use. This distortion, arising from the historical emphasis on high assurance of target kill by the use of high-yield weapons and on a belief in the certainty of escalation, is severely handicapping full and serious consideration of low-yield tactical weapons. Familiarity with fallout effects from low-yield weapons must be generated to test the hypothesis of this paper that fallout from the use of low-yield weapons can be treated routinely, realistically, and as a matter of secondary concern.

3. Multiple Weapon Targeting

A subtle but principal obstacle to more reasonable planning for tactical nuclear employment is the traditional concept of one target-one nuclear weapon. Conventional weapons are not designed for this mode of employment; rather, a family of convenient sizes is produced and the weapons are employed in multiples as required. A like concept is advocated in the design and employment of nuclear weapons. Drastic limitation in weapon yield is the most promising technique for the urgent problem of reducing collateral damage. Targeting with a number of low-yield weapons on a single target must be explored for possible new insights into weapons design and application.

4. High Accuracy Delivery Systems

Employment of low-yield nuclear weapons, singly or in multiples, can be feasible only with simultaneous improvement in the accuracy of tactical delivery systems. Fortunately, both the AEC and the DoD have pursued developments showing promise of the requisite accuracy in both surface missile and air-delivered weapon systems. These developments must be continued in order that discrete and accurate application of nuclear force be an option absolutely credible to defense planners.

5. Cost Considerations

Proposed multiple use of nuclear weapons must also be investigated from the viewpoint of cost, since the cost of a weapon is not a strong function of yield. It is quite possible that the stockpile required for a credible tactical capability will predominantly consist of weapons lower in individual yields by factors of 10 to 1000 from existing weapons and will contain a total number of weapons larger by a factor of 10. Clearly, it is desirable to reduce the unit cost of such weapons, including emphasis on ease of production, transport, storage, and command and control.

UNCLASSIFIED


UNCLASSIFIED

Innovative concepts in engineering and fabrication need to be sought. New and radical-seeming tradeoffs need to be explored, for example, the acceptance of lower reliability designs in exchange for decreased costs in development, component testing, quality assurance, and stockpile surveillance. Multiple use per target may make lower reliabilities militarily acceptable *if* appropriate nuclear safety standards can be met.

Cost comparisons with conventional warfare, in those situations where tactical nuclear operations provide an alternative, also need to be calculated. Joint AEC/DoD approaches to these comparisons would be most desirable.

6. Command and Control

In the past decade the AEC has developed a command and control technology directed toward the engineering solution of problems such as prevention of unauthorized use of nuclear weapons, built-in protection against use or copy following capture or expropriation, and controlled release and recall in crisis situations. This work has proceeded without doctrinal recognition of changing stockpile composition, and has emphasized restrictive control to the detriment of tactical readiness. There are many complex facets to this whole problem but one aspect should be an attempt to simplify the custodianship of those weapons earmarked for our NATO allies. Weapons designs featuring separable nuclear material, thereby casting a different light on safety and control problems, offer one technical approach to be investigated.

7. AEC Participation in Politico-Military Gaming

For a number of years the DoD and the individual military services have used wargaming techniques for evaluating proposals on strategy, tactics, force structure, weapon systems, logistics, etc. While the AEC Laboratories have received military characteristics and stockpile-to-target-sequence requirements that were undoubtedly influenced by wargame results, the Laboratories have never formally participated in politico-military gaming problems. It would be inappropriate for the AEC to develop a gaming capability of its own; however, the possibilities of joining with the DoD (or Services) in specific gaming problems ought to be assessed for the potential mutual benefits of such a move.

V. Conclusion

Technology by itself cannot bring into being an optimum tactical stockpile; that can only result from an iterative process encompassing strategy, tactics, force structure, and weapon system development. But the shortcomings of today's tactical capability have become manifest and the AEC Laboratories should participate in our nations's attempts to deter warfare across its whole spectrum. Our main contribution will be in addressing the technological problems itemized above, and some tasks have already been started; but these efforts must not proceed in isolation. We must interact with our political, strategic, economic, and military colleagues: we seek their help and offer ours.