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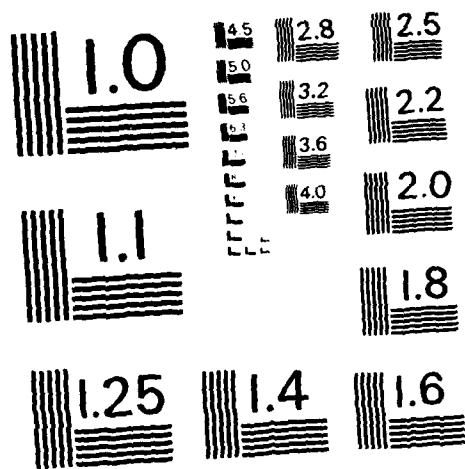
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IMPROVING US THEATER NUCLEAR DOCTRINE

A Critical Analysis

JERRY M. SOLLINGER

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**IMPROVING US THEATER NUCLEAR
DOCTRINE: A Critical Analysis**

by

**Lieutenant Colonel Jerry M. Sollinger, USA
Senior Research Fellow**

National Security Affairs Monograph Series 83-3

1983

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FOREWORD

Current deterrence strategy calls for the United States to be prepared to fight and win a tactical nuclear war. Are US forces in fact capable of waging such a war? Through analysis of the doctrine, equipment, and training policies now in effect in the US Army and Air Force, this research suggests problems that could lead to a US defeat in limited nuclear warfare.

The author, Lieutenant Colonel Jerry M. Sollinger, US Army, a National Defense University Senior Research Fellow, captures our attention with a depiction of a hypothetical but all-too-realistic battle in Europe between NATO and Warsaw Pact forces. As the battle escalates to a nuclear conflict, confusion, lack of information, disrupted command and control procedures, and unanticipated personnel problems all contribute to a potential NATO defeat. The author isolates what he sees as the problem areas, and suggests improvements to each: more realistic and flexible theater nuclear doctrine; more survivable equipment with adequate backup; and relevant and more universal training of individuals and units to cope with the unique challenges of a nuclear battle and its aftermath.

This provocative analysis of an important aspect of nuclear readiness stimulates the reader to think through the implications of US nuclear warfighting policy. The National Defense University is pleased to offer this research in our continuing effort to foster thoughtful discussion of defense issues.



JOHN S. PUSTAY
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Lieutenant Colonel Jerry M. Sollinger, US Army, currently serves in Germany in the V Corps Artillery. He researched and wrote this monograph while he was assigned as a Senior Research Fellow, National Defense University, in 1981-82. At the same time Colonel Sollinger was a student at the National War College. He previously served in the Pentagon as Executive Assistant, US Army Element, Defense Nuclear Agency and also as Deputy to the Director of the Army Staff, Office of the Chief of Staff, Army Staff. He also served at Fort Campbell, Kentucky, as Battalion Commander, 1st Battalion, 321st Field Artillery, 101st Airborne Division; in Korea as Operations Officer, 6th Battalion, 37th Field Artillery, 2nd Infantry Division; and at the US Military Academy, West Point, as Instructor. He earned his B.A. and Ph.D. degrees in English from the University of Pittsburgh.



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EXECUTIVE SUMMARY

This monograph argues that the doctrine, equipment, and training of US forces do not meet the demands of fighting a theater nuclear war.

Current doctrine rests upon questionable assumptions, lacks the flexibility required to fight a tactical nuclear battle, and limits itself by concentrating on defense. Recommended improvements include increased flexibility and decentralized execution, emphasizing maneuver and dispersion. Service doctrinal writings should also focus on enemy forces rather than terrain. Because the nuclear battlefield promises chaos and confusion, US forces need redundant command and control. In short, the senior military leadership needs to reawaken interest in the problems of fighting on the nuclear battlefield.

The equipment of US forces also needs improving. The services must field equipment capable of withstanding the effects of nuclear weapons. In most cases, this requirement simply means making existing procedures work and the hardening of equipment. Some new items of equipment, such as monitoring devices, are needed.

Training requires improvement at both the individual and unit levels. Individual enlisted training tends to concentrate specialized knowledge at too high a level. With the substantial casualties expected in a nuclear battle, US forces cannot afford to confine specialized knowledge to a limited number of individuals. Service schools need to force officers to contend with the practical problems of operating on the nuclear battlefield. These same requirements carry over into units, which must also train under conditions resembling those of the nuclear battlefield. These conditions include decentralized operations, reconstitution of units which have suffered heavy

casualties, and conducting operations when command lines have been cut.

The problems of fighting on a nuclear battlefield are legion, but the services can, and must, overcome them. In so doing, US forces will not only be more effective, their deterrence will increase.

HOW THE WAR WENT: A SCENARIO

The most remarkable thing about the Soviets' crossing of the nuclear threshold was that it went virtually unnoticed. The first recorded sign of something unusual occurred when a division logistics center reported a total failure of the commercial computer that processed all the requisitions for spare parts for the division, a failure blamed at the time on an "unexplained power surge." Had anyone been in a position to gather the data, a survey would have shown that almost every piece of data processing equipment in the corps area—and considerably beyond—had failed. But commanders had fixed their attention elsewhere, and disruption of spare parts resupply ranked low in priority. Of more immediate concern was the widespread, sudden, and infuriating loss of communications coupled with the indications, gained mostly from satellite resources, that the Warsaw Pact's predicted renewed attack was about to take place. The detonation of several nuclear weapons across the corps front some hours later removed all doubt and made the analysis of the effect of the first two high-altitude nuclear bursts on equipment a matter of interest mainly to historians and technicians.

The war in Europe had been going on for less than a week, with successes and failures on both sides. The Warsaw Pact was unable to push through Germany at its planned pace, but the Allies had been forced to give more ground than they wished, or could afford, to lose. In fact, they had lost so much ground at the junction of Northern and Central Army Groups' boundaries that they had requested release of sufficient nuclear weapons to reduce the penetration and to attack installations in the enemy's rear to slow the arrival of troops and supplies at the front. Whether it was the Allied preparations for the nuclear strike or the Soviets' desire to restore momentum that prompted the Russians to fire their

own nuclear weapons remains unclear to this day. Much less ambiguous are the results of that attack.

The unseen, unheard high-altitude nuclear bursts that preceded the barrage of tactical weapons had a catastrophic effect on Allied command and control systems. In addition to losing computers and stored data, all radio sets using sizable antennas, normally at corps and division headquarters, received major damage. Also lost were numerous FM radios, radars, and receivers used primarily to support the intelligence gathering effort. Loss of these latter two assets severely hampered detection of the renewed Pact assault. Even telephones and switchboards were casualties of the electromagnetic pulse (EMP) generated by the high-altitude bursts. Pact forces, enjoying the advantage of advanced warning as well as more robust and redundant equipment, suffered almost no decline in command and control capabilities.

The loss of Allied intelligence and communications assets allowed Pact forces to fire their tactical nuclear strike with considerable effect. In terms of actual numbers of missiles or projectiles, it was small, but it paid dividends larger than even the enemy expected. Command posts, primary targets, were struck with good effect. Bad communications worsened, and the Allies' ability to shift forces around the battlefield to counter the new enemy thrust virtually disappeared for many hours. Destruction of command elements and the severing of intelligence links denied subordinate commanders information and guidance necessary to react in time. Although many units had taken heavy casualties, considerable combat power remained. But disrupted communications and lack of standard unit procedures made reconstitution of units virtually impossible. As a result, they engaged attacking forces piecemeal, with predictable losses.

The one action that might have decisively altered the course of the battle—an answering nuclear strike—strangled in its own procedures. SACEUR had already requested release of some Selective Employment Plans (SEPs) before the

Pact attack. But, while the political leaders agonized, the tactical situation altered dramatically, rendering the requested SEPs outmoded. The subsequent loss of communications and intelligence assets made updating of nuclear strike plans impossible. The fog of events left SACEUR in the position of requesting release for air-delivered weapons to be fired on targets of opportunity, an option that ultimately had minimal effect on the battle's outcome.

At the unit level, commanders faced numerous other problems. Attempts to determine areas of significant radioactive contamination moved slowly. The lack of prompt information about contamination made commanders reluctant to move across unsurveyed terrain, and the slowness of enroute monitoring and limited teams further delayed efforts at reconstitution, defense, and counterattack. Unanticipated psychological consequences further reduced unit effectiveness. Almost no one knew who had fallen victim to radiation sickness. Few soldiers had dose measuring instruments, and every soldier on the frontlines thought he might be a radiation casualty. Lack of training on symptoms sent droves to various medical treatment facilities under the impression they might be suffering from radiation sickness. Rumors and misinformation passed among individuals and further affected unit effectiveness.

As a result, the Warsaw Pact attack at the spear of the two Army groups succeeded, allowing the enemy to wedge them apart and push deeper into Germany. The Pact then succeeded in exploiting the assault phase with second-echelon units. With forces divided and flanks menaced, Allied leaders found themselves facing an intolerable dilemma: escalate the nuclear battle and possibly trigger a strategic war, or open negotiations with the Warsaw Pact while in a weak bargaining position.

The preceding account of a NATO-Warsaw Pact conflict is, at this writing, fictional. Although the scenario is set in a NATO context, it is applicable to US doctrine, equipment, and training as they pertain to the tactical nuclear battle fought at the corps level in Europe, the most likely locale of such a conflict. Because the study focuses on the corps battle in Central Europe it includes neither the Navy nor the Marine Corps in the discussion. This monograph investigates each of these three areas and suggests improvements. Current US Army and Air Force doctrine inadequately addresses the fighting of a tactical nuclear war. Improvements of doctrine are required in release procedures and employment plans, as are changes in philosophies of command and control patterns for disposition of forces. Equipment requires hardening to withstand nuclear detonations, and US forces need selected items of specialized equipment. Training programs, at both the individual and unit level, must address fighting a nuclear battle. Individual training programs must take into account the nature of the battlefield following a nuclear strike, and units must practice how to fight the nuclear battle. None of the recommended changes will prove easy. Most, however, lie within the power of the services to implement. Adopting them will produce a force more capable both of fighting the nuclear battle and of surviving on the nuclear battlefield.

1. DOCTRINE

The scenario that begins this monograph depicts NATO losing a tactical nuclear war with the Warsaw Pact. The reasons for that loss lie in doctrinal, equipment, and training deficiencies. This chapter analyzes doctrinal shortcomings and suggests some improvements for US applications. It argues that current tactical nuclear war doctrine inadequately addresses the nuclear battlefield, rests on doubtful assumptions, lacks flexibility, and has a defensive orientation. Furthermore, doctrinal revisions now in progress fail to rectify many of the shortcomings. Recommended improvements include increased decentralization, dispersion, and maneuver as well as added command and control, reconstitution plans, increased air logistics, and a shift to offensive focus.

PROBLEMS WITH CURRENT DOCTRINE

Current Doctrine Inadequately Addresses Theater Nuclear War. The United States Army and Air Force publish their doctrine in a variety of manuals, most of which address specific and technical areas. But each service has a manual that outlines the broad guidelines for fighting. The Army looks to *Field Manual 100-5 Operations* and the Air Force to *Air Force Manual 1-1, Functions and Basic Doctrine of the United States Air Force*. Because all else hinges on these documents, neither service can afford to change them lightly or frequently. Yet change is now necessary, for neither service's doctrine adequately addresses fighting a tactical nuclear war.

The Army does have a doctrine for employing its tactical nuclear weapons, but what exists addresses inadequately the issue of fighting a nuclear battle. Numerous publications

address in detail such questions as preparation of nuclear fire plans, methods for targeting, reduction of collateral damage, and target analysis. But, as the Army itself acknowledges, "plans for [tactical nuclear weapons] use consider no broad doctrinal implications beyond those necessary to acquire appropriate targets, supply reliable nuclear projectiles and launch or fire them as accurately as possible."¹ Certain elements of the Army routinely deal with matters related to nuclear weapons. Artillerymen study weapons effects with an eye to targeting and fire planning. Both they and the Engineers practice weapons assembly and security. But those matters remain largely technical and are so viewed by other combat-arms officers. Other aspects of nuclear war receive extensive treatment in a variety of field manuals, but because each addresses only an aspect of the problem—for example, decontamination or intelligence—only those immediately concerned become familiar with them. The Army needs to address the broader questions of doctrine and publish the results in a single document.

If the Army's tactical nuclear doctrine can be viewed as unhealthy, the Air Force's must be seen as terminally ill. Observers both in and out of the Air Force have noted the virtual absence of doctrinal writing on this topic. A study group, commissioned in 1978 to examine tactical nuclear war, characterized the situation more bluntly: "This study was unable to find an official published statement of Air Force battlefield nuclear employment doctrine."² The strategic role absorbs a considerable amount of the Air Force's attention, yet its doctrinal manual views both air interdiction and close air support as basic to its mission and on a par with its strategic role. Neither mission indicates that delivery of nuclear weapons could play a key role, or indeed any role at all. A reasonable argument might hold that a manual with such a broad focus need not descend into detailed discussion, but it ought to mention tactical nuclear warfare. Indeed, the only discussion at all of tactical nuclear warfare takes place within the context of the contribution of the "dual trend" (strategic and theater defense) to deterrence. The fact that *Air Force Manual 2-3 Tactical Air Opera-*

tions—*Employment of Nuclear Weapons* is 15 years old gives further evidence of the diminished vigor of Air Force tactical nuclear doctrine.

Some Questionable Assumptions Underpin Tactical Nuclear Doctrine. American doctrine, even in the most current revisions, assumes a transition period between conventional and nuclear phases of a war. Such a view has numerous attractions as well as a certain plausibility. The Warsaw Pact would probably wish to gain its objectives without resort to nuclear weapons. Also, operations on a nuclear battlefield pose many more challenges and complicated planning. Additionally, if a battle began conventionally, the subsequent introduction of nuclear weapons would demand time for positioning, command decision, and troop warning. Yet arguments for a transition period collapse if the enemy decides to open combat with a surprise nuclear strike, or, if he has planned the contingent use of nuclear weapons, the transition might be too short to allow reaction.

But US doctrine still clings to the notion of a transition to nuclear war. The Army's *Field Manual 100-5* speaks of a "new phase" in operations brought about by the use of nuclear weapons and states that US first use would probably be defensive, thus implying an earlier phase. *Field Manual 101-31-1 Nuclear Weapons Employment Doctrine and Procedures* predicts an initial conventional phase followed by nuclear release once the situation turned sufficiently grave. *Field Manual 6-20 Fire Support in Combat Operations* outlines four indicators that might warrant nuclear weapons: sustained attack by superior forces, full commitment of friendly forces, inadequate support, and questionable survivability of the force. Such criteria clearly suggest an earlier conventional phase.

The US view of nuclear weapons first as a deterrent and second as a means of controlling escalation really makes any other view difficult. Nonetheless, that may not be the best view. Russians tend to view atomic weapons as another type of firepower. Their doctrinal statements do not seem freighted

with political baggage as do those of NATO and the United States. Granted, such considerations cannot be ignored, but recognizing them does not necessarily mean that they must shape doctrine. An opening nuclear salvo is at least a possibility; thus, doctrine should take it into account.

The view of nuclear weapons as a means to control the escalation of the battle implies another assumption: that the enemy will view the employment of nuclear weapons as an action of restraint. The governing concept for Army employment of nuclear weapons is the Selective Employment Plan (SEP), which rests on the notion that this manner of use will "convey to the enemy that we are using nuclear weapons in a limited manner."³ To assume that the enemy will view a barrage of nuclear weapons as an indication of restraint appears risky if not stupid. It seems equally likely that he will interpret even limited use as an abandoning of restraint. These weapons could, after all, be the first of a series. Too much confusion reigns on the battlefield to allow for such refined reasoning. A return nuclear salvo would be a more logical expectation.

A final assumption underpinning nuclear doctrine relates to the implied duration of the nuclear phase. A close reading of doctrinal statements leads to the conclusion that they envision a relatively short duration. Admittedly, munition constraints alone impose certain limits on any theater nuclear war. The United States publicly acknowledges approximately 6,000 weapons in NATO. Yet expending even this small number could take considerable time. Current doctrinal writings, however, look for a cessation relatively soon after first use. *Army Field Manual 101-31-1*, for example, speaks of nuclear employment in terms of altering force ratios sufficiently to allow conventional means to control the battle "throughout a sufficient pause" to allow political channels to terminate the conflict.⁴ In discussing SEPs, *Field Manual 6-20* states they should be planned prior to and refined during hostilities. The examples depict the SEPs as being "continually reviewed, revised, and exercised in corps and division FTXs [Field Training Exercises] and CPXs [Command Post Exercises]."⁵ Obviously, such meticulous preparation cannot occur during

the fast-paced battles all expect in the next war. This procedure implies that SEP employment will decisively affect the outcome. All of this suggests no need for subsequent use of nuclear weapons. While the doctrine does contain procedures to continue nuclear fires, the burden of the writings implies that the initial employment will decisively affect the outcome and preclude the need for subsequent use.

Current doctrine, then, rests upon at least three questionable assumptions: a transition period, the enemy's reading of restraint into selective use of nuclear weapons, and a relatively short period of nuclear use. All of these stem from the view of nuclear weapons as a device to control escalation of violence. The first assumption—a transition period—has a reasonable basis, but it makes more sense to plan on no transition period and simply enjoy the benefits if one occurs. The remaining two appear purely conjectural, and thus offer only the shakiest foundation for doctrine.

Lack of Flexibility. Other problems afflict current doctrine. All battlefields tend toward chaos, none more so than the nuclear. Thus, one side retaining flexibility preserves a significant advantage. Our nuclear doctrine, however, tends toward inflexibility. It requires a cumbersome release system and rigid employment plans, and it focuses at too high a level of command.

Tremendous complexity encumbers the approval process for firing nuclear weapons. Authority rests with the National Command Authorities (NCA)—ultimately, with the President. Nor should it descend any lower. No matter how much commanders would like to free their weapons from political restraint, perceptions of nuclear weapons make their use a political matter. But the high level of approval required does not in itself make the system complex. It is, rather, the combination of the level and the process. Requests flow up from field commanders through various intermediate commands to the NCA and back down again. US doctrine expects this process to consume 24 hours. Other processes such as weapons movements, warning friendly troops, and computation of firing

data cause an additional lapse of 6 hours, for a total of 30. The request, from firing element to the NCA, passes through 10 levels of command, with major decisions at 4.

Much of the complexity in the nuclear release process occurs because the system was designed with an eye to positive control over the weapons rather than a responsive capability to use them. Two hours of consultation are planned at the NATO Military Committee and three at the NCA. All release and request messages require encrypted format and double authentication. The complexity of the system imbues it with an inertia that resists change and is inherently inflexible. Should the tactical situation alter dramatically 12 hours after the corps commander has requested nuclear weapons release, it would require an entirely new request. The present system can tolerate refinements but not major changes. It does not seem to fit well with the fluid and chaotic battlefield many analysts and planners expect. Another difficulty arises if the enemy divines our intent prior to the corps commander's receiving release. Russian doctrine provides for preemption. Their more streamlined release system could allow them to wait until they detected our preparation for a nuclear strike and still shoot first.

Several aspects of Soviet organization and doctrine contribute to their more rapid release system. First, the Soviets organize their nuclear forces separately and do not assign them other support tasks. The nuclear forces also have dedicated communications assets, to which the front commander has direct access. Also, by doctrine, Soviet forces plan for use of nuclear weapons from the outset of conflict. These factors offer several advantages. Should the political authorities decide to use nuclear weapons, the release authority must travel through far fewer echelons before it arrives at the unit that fires the weapon. Having only a single mission, nuclear forces require no transition time. Furthermore, some guidance suggests that the front commander may have authority to release nuclear weapons if the Allies take certain actions. All these aspects combine to form a more responsive release system.⁶

The manner of US tactical nuclear employment further contributes to inflexibility. As mentioned above, current doctrine plans nuclear fires by SEPs, or "a group of nuclear weapons of *specific yields* for employment in a *specified area* within a *limited timeframe* to support a *tactical contingency*." (Emphasis added) This concept imposes four limits: time, space, yield, and tactical situation. That is, the nuclear weapons that the NCA approves must conform within narrow limits to the parameters stipulated in the SEP. The corps commander does not have the authority to alter them. Should the tactical situation change radically, he would be forced to prepare a new SEP and forward it for approval. Conceivably, he could make a small change—say, substitution of one yield for another—and gain approval relatively rapidly, but gain approval he must. And he must accurately predict locations 24 hours in advance.

The high level from which the request must originate also contributes to the inflexibility. By doctrine, the corps commander requests nuclear release by submitting a SEP for approval. Some arguments favor this level of control. The corps commander has adequate staff and communications to prepare the complicated fire plans, request their release, and disseminate the firing orders. He also has the best access to the intelligence vitally necessary for successful planning. Additionally, US doctrine visualizes the battle as being fought at the corps level, and the force structure supports this expectation. But the lack of responsiveness to the tactical situation weighs against these considerations. Viewed simplistically, the corps commander can best control deep nuclear strikes because he has the best intelligence of the rear areas. As the enemy gets closer to the front line of troops (FLOT), more and more of the information at corps headquarters comes from subordinate units, who really occupy a better position to estimate the tactical situation. Thus, for that segment of the battlefield the corps commander receives his information at secondhand or thirdhand. He then lacks responsiveness to deal with changes there.

US Doctrine Has a Defensive Bias. The defensive bias of US nuclear doctrine creates further difficulties. To be sure, provisions exist for offensive use. *Army Field Manual 6-20* cites destruction of enemy forces and regarding of lost territory as goals of offensive employment and provides a list of appropriate target categories. But careful reading of US doctrine clearly reveals its defensive orientation. *Field Manual 100-5* describes the initial request for use in the following terms:

At the time authorized commanders request the use of nuclear weapons, they must be able to foresee a situation ... *sufficiently grave* to require their use. ... The *overall defensive capability must not be allowed to deteriorate* to the point where available forces cannot conduct effective conventional-nuclear follow-on operations.⁹ (Emphasis added)

This passage conveys a sense of using nuclear weapons to salvage a deteriorating situation. Another Army manual, *Field Manual 100-15*, declares that nuclear weapons will not be fired before conventional defenses have been severely tested and found inadequate. To be fair, it should be acknowledged that these comments pertain to initial use, but as was indicated above, first and last use are much the same thing. The strong focus on defensive application denies a commander much of the potential benefit of nuclear weapons. A sound capability to fight a prolonged tactical nuclear war requires a doctrine of more balanced emphasis.

Revisions Underway Fail To Correct Many Shortcomings. Because service doctrine rarely stands still, any fair analysis must address pending changes as well as current positions. The Army, in fact, is currently revising its doctrine. It published a final draft of a new *Field Manual 100-5* in the fall of 1981. Even in the revised version, however, many of the problems of present doctrine remain. The release system, beyond the control of a single service, stands intact. Requests still go from the corps commander to the NCA and back. The SEPs are still the only manner of employment mentioned. Nor has theater nuclear doctrine become any more complete. The

draft *Field Manual 100-5* no longer confines nuclear guidelines to a single chapter, but instead intersperses them throughout the text, thus reinforcing the theme that planners must *always* consider nuclear weapons. The sum of the nuclear doctrine, however, amounts to no more than the current version contains, and, in fact, it appears less because dispersed.

SUGGESTED IMPROVEMENTS FOR CURRENT DOCTRINE

Providing solutions proves considerably more difficult than identifying weaknesses. Many recommendations have been made over the years. Some solutions, such as those proposed by the authors of the classified study *Oregon Trail*, proved too revolutionary for implementation.⁹ Other more modest recommendations have simply failed to win acceptance. The list of recommended doctrinal changes that follows probably offers nothing new or revolutionary. But the suggestions here and in the next two chapters can considerably enhance the ability of the United States to fight a prolonged tactical nuclear war.

Decentralize Execution and Add Flexibility. The first doctrinal change pertains to the level of control of the nuclear battle. Currently, control of execution lies with the corps commander. Ideally, it should be lower. Brigade level offers the best compromise because enough staff and communications exist there to support the use of nuclear weapons. Battalion staffs tend to be too meager. Division staffs have more capability but less responsiveness. Interestingly enough, current doctrine recommends the decentralization of *chemical* weapons release to division and brigade level after initial use to take advantage of the lower echelons' responsiveness to the tactical situation and improved control. The same arguments hold for nuclear weapons. Also, similar political sensitivities pertain to both chemical and nuclear weapons. And employment of either category of weapon requires consideration of collateral damage.

Still it may not make sense to move the *entire* nuclear battle to the brigade level. Instead, each tactical level should control its own nuclear delivery systems, much in the way it now controls its conventional systems.

This proposal places minimal stress on existing command and control structures. At most, brigade command posts might require minor augmentation of personnel and equipment, primarily to solve the targeting tasks. Mechanisms to control the delivery systems already exist. Air-delivered weapons would require the most decisions because aircraft would have to support each level and have the deepest strike capability. Under the proposed scheme, the corps commander could reserve all air-delivered nuclear weapons to himself. Inasmuch as he has responsibility for the deepest targets, such a decision would be reasonable. Divisions and brigades would have some nuclear firepower to influence the battle in their respective areas.

Nuclear doctrine, however, resembles a child's game of "pick-up-sticks" in that changing one element often forces movement in several others. In this case, decentralization links inextricably with methods of employment and release procedures. Increased flexibility and responsiveness are the goals of decentralization. It makes little sense to decentralize while retaining an inherently inflexible release system and employment plan. To take the most easily achievable first, the concept of the SEP requires revision. Instead of limiting commanders to specific yields (and thus specific weapon systems) and relatively precise geographic areas, it makes better sense to define a *range* of yields and general locations, always meeting the collateral damage guidelines. Time limitations could remain as long as they permitted adjustment to the tactical situation. Thus they should span days rather than hours stipulated in present doctrine.

In terms of release, this system would remove the NCA from the business of approving the firing of every nuclear weapon. This recommendation does not argue that the only decision of concern to the NCA is whether to use nuclear

weapons. Size and location do matter. But the fine-grain detail of specific yields and aiming points do not. Granting release under more general constraints would change our system from "bottom-up" to "top-down" and make it far more responsive to the tactical situation. Ideally, conditional release could be granted in advance of hostilities. Commanders could then match their plans to the situation and modify them as required, waiting only for approval to fire. They would not have to have approval for every change. This system would streamline the request process and allow the commander to have up-to-the-minute fire plans. Such a change would require NATO concurrence, but in essence, agreement in principle already exists. The next step should not prove insurmountable.

Emphasize Dispersion. Numerous other changes to doctrine would benefit the US nuclear warfighting posture and do not face the same difficulty that confronts attempts to modify the release system. US doctrine should stress dispersion and maneuver: the need for one drives the demand for the other. If commanders disperse their forces across the battlefield, they must maneuver to concentrate them for specific purposes. The amount of dispersion depends primarily on terrain and tactical situation. Rough terrain dictates less dispersion, both because it affords more cover and because it inhibits concentration. Smoother terrain demands more dispersion. Some general principles do apply to both. First, dispersion takes place between rather than within units. Internal dispersion need only take account of conventional weapons. Dispersion between units pertains to battalions. Simply put, commanders should disperse battalions so one nuclear weapon will not eliminate two units. The precise distances vary as a function of the yield of the weapon and the height of the burst, and thus depend upon the specific threat facing a commander. A reasonable rule of thumb would assume a 100-kiloton standard and vary it up or down depending upon current battlefield intelligence.

Stress Maneuver. Doctrine should also emphasize maneuver, both as a concomitant of dispersion and as an inherent element of combat. All plans, offensive and defensive,

must contain a maneuver scheme. Fortunately, stressing maneuver complements both the nuclear battlefield and the peculiar nature of the threat posed by the Warsaw Pact. In most cases, US forces will find themselves outnumbered. They will have to maneuver to force reasonably favorable odds. Maneuver has the additional and equal benefit of reducing vulnerability to nuclear attack. Some tacticians might argue that movement itself will provoke nuclear attack and that cover and concealment offer a better chance of survival. Although that solution might hold for a special type of unit—a single nuclear-capable element, for example—that could maintain radio silence for a long period, it will not work for combat units, which have a constant requirement for communication. This does not say that they should not make full use of such techniques when not moving, but it does argue that reliance on them as a way of avoiding detection and targeting holds less promise than frequent movement. In practical terms, this recommendation really means that commanders must, if possible, avoid static defensive plans because offensive plans do incorporate maneuver. In these latter, the commander must concentrate his forces as late as possible and disperse them quickly.

Focus on Forces Rather Than Terrain. The stress on maneuver, particularly in defense, goes hand-in-hand with another recommended change: the need to concentrate on enemy forces rather than terrain. US commanders must make it an article of faith that terrain is fought *over*, not *for*. Terrain, *per se*, has no value. The US Army adopts an ambivalent stance toward this precept. On the one hand, it acknowledges that combat has as its goal the destruction of enemy forces. On the other hand, it counsels that winning requires seizure and control of terrain. To be sure, the Army differentiates between terrain and "decisive" terrain, designating only the latter as crucial to the outcome. But it still misses the mark, because it fails to go on and make the central point that such terrain *only* becomes decisive because it greatly enhances the ability to inflict damage on enemy forces. General Lee might have been guilty of bad tactics at Gettysburg, but he

had the right goal in mind when he focused on Grant's forces. Furthermore, this principle has particular relevance to any conflict involving Russian forces. The Red Army holds a special place in the Russian psyche and the Russians can absorb, physically and psychologically, considerable losses of territory and resources as long as the military force endures.

The need to focus on forces has several implications. First, it calls into question any doctrine that employs nuclear weapons against fixed targets. This point does not reject such attacks categorically. But it does mean that targets require the most careful evaluation to ensure that the benefits exceed the cost. Quick Reaction Aircraft (QRA) provide a case in point. These serve primarily a deterrent role and aim at fixed targets. Before hostilities begin, the commander needs to analyze carefully each aircraft and target to determine if, in the overall battle scheme, that mission most effectively should use nuclear weapons. It may be that greater benefit accrues from targeting troop movements deep behind enemy lines. Although associated targeting problems would be great, they would not be insurmountable. Announced, such a policy might even have greater deterrent value. Secondly, a commander should never use nuclear weapons in a terrain-denial role. This use probably would prove fruitless because armored troops could cross or rapidly bypass a contaminated area, and few or no casualties would result. Finally, this practice demands that the commander have the capability to locate enemy troop units throughout the depth of the battlefield.

Provide Redundant Command and Control. The need for dispersion, maneuver, and a focus on enemy forces requires excellent command and control. And US forces do have good command and control. But good as it is, the current command and control does not measure up to the demands of the nuclear battlefield. The United States requires a redundancy of command and control not now present, because Soviet doctrine targets command facilities. The United States cannot afford to stop or slow operations because of the loss of key command links. Redundancy offers a partial solution.

This redundancy must become doctrine, for if it does not, the redundancy will not automatically occur. Current force structure probably has sufficient personnel for the additional communications nets but lacks equipment, primarily radios. Wire lines would provide an acceptable redundancy were it not for the requirements of dispersion and maneuver. These demands militate against wire lines because dispersion means that lines take too long to establish, and maneuver gives the lines too short a period of utility. Not every station in a given net needs a duplicate, but the critical ones do. In general, this requirement would pertain to command posts at the battalion level and above and to those key lines that feed into other services, such as tactical air. The Air Force needs redundancy in those nets that control aircraft.

For the Army in particular, the requirement for redundant command and control has somewhat broader implications than simply adding some radios to the table of organization and equipment. Primarily, it means creating a dual command structure. Conceptually, this modification should not prove too difficult to implement because all units practice some version of *dual command* as they leapfrog forward (or back), usually splitting the command post and designating the lighter and more mobile element the "jump" or "tactical" command post. The only difference under a nuclear scenario is that the two halves never reintegrate. The light element continues to operate, at a distance from the main element sufficient to enhance its chances for survival, and stands ready to assume control in the event of the loss of the main command post.

But redundant command and control apply to people as well as equipment. This requirement further means that the Army will have to alter its manner of using deputies and executive officers. Commanders habitually assign them specific areas of responsibility not directly connected with the conduct of combat operations. This system works well in garrison or during training, but it will not do for sustained nuclear combat. The deputies must keep abreast of current operations and future plans, fully prepared to assume command without a sub-

stantial break in the pace of operations. The scant staff of the alternate command post, of course, can match neither the capability nor the staying power of the main element. At some point, it will have to expand into a full command post and then create its own alternate. Most important, however, is the need to keep operations moving. In a fast-paced nuclear environment, delay equals defeat.

The composition of the alternate command post also requires some comment. It must, of course, mirror in function the main element. Most importantly, however, it must maintain its joint character. That is, the Air Force-Army interface must exist at both locations. Maintaining this capability at two locations will prove difficult. Around-the-clock operations tax Air Force elements now, and diversion of capability to an alternate command site will stretch thin assets further. Additional manpower provides the best answer, but, in the interim, cross-training of Army personnel may suffice. The ability to orchestrate or synchronize a battle distinguishes the good commander from the mediocre. It is usually one of the last skills perfected and the first to go as unit proficiency slips. But joint cooperation lies at the heart of the ability to balance fires and maneuver most effectively. Therefore, each command post location must have a joint capability in place and operating. In point of fact, the nuclear battle demands even closer coordination than presently exists.

Combat elements have a requirement similar to command posts. They do not need a dual capability, but by doctrine they must plan for reconstitution. In any nuclear battle, casualties will be high. Some losses will be so high that companies and battalions will be incapable of further operations. But remnants can join together and form a fighting force, although one of reduced capability. The Warsaw Pact's doctrine of echeloned forces largely relieves them of this need because, in the short term at least, they can replace rather than reconstitute. But with its smaller force structure, the United States does not have that luxury. There is, therefore, a need to incorporate reconstitution into service doctrine. It must also receive sufficient emphasis to cause it to appear in unit standard operating

procedures, operations orders, and field exercises. In short, it must become a routine part of peacetime preparation for war-time practice. If not, reconstitution will still occur as needed, but it will take much longer. Again, the extra time may cost victory.

Preserve Nuclear Delivery Systems. Two final doctrinal changes deserve comment. The first pertains to nuclear delivery systems. These occupy a high priority in Warsaw Pact target lists. Because these systems represent a significant combat capability, it makes sense to take steps to ensure their survivability. The recognition of this need has led to some fairly radical proposals.¹⁰ Any solution must compromise between survival and effectiveness. That is, it does no good to ensure that the system survives if this makes it unable to perform its mission effectively. Systems having only a nuclear capability—in this case, the Pershing missile—should simply hide until needed and then move immediately after firing. “Hiding” entails both physical and electronic concealment. Terrain in Europe offers numerous possibilities for the former, and remaining in listening silence and communicating by wire accomplishes the latter. Dual-capable (nuclear and conventional) systems such as the Lance missile, cannon artillery, and aircraft pose a more complex problem. For the Lance and artillery, commanders should designate a single firing element as the nuclear system and separate it from the main conventional unit. This approach entails numerous operational, administrative, and logistical difficulties. It is, in fact, the worst solution—except for every alternative. In any case, it has the prime benefit of ensuring the availability of a nuclear delivery system when one is wanted.

Survivability of aircraft becomes difficult to ensure because they require airfields. Put another way, aircraft have as much survivability as the airfields. A constant airborne alert aircraft does little to alleviate the problem. This approach directly conflicts with the need for close and careful coordination with ground elements because the commander has to accept whatever munition the aircraft happens to have on board. Also, the cost of keeping enough aircraft aloft to provide a real

capability becomes prohibitive. A better approach would be to construct relatively durable aircraft shelters—perhaps underground—that can also store nuclear weapons. This scheme would both deny the enemy the knowledge of which aircraft had nuclear weapons and achieve some degree of survivability, particularly if airfields received high air-defense priority.

Improve Air Logistics. The final item for consideration concerns battlefield logistics. Dispersed and fast-moving units place staggering demands on the logistical system, particularly in terms of ammunition for Army units. A nuclear war promises difficult or impassable terrain because of downed trees, wreckage, radioactivity, or craters. As it is now, the Army lacks adequate vehicles to meet the demands imposed by the intense combat expected. No completely satisfactory solution exists, but clearly, air logistics must play a greater role in future planning. Cargo helicopters can overfly the ground obstacles and minimize the effects of dispersion. Because they do have limited carrying capacity and face competing demands (e.g., transport of mass casualties), they really serve to complement the normal distribution system. But commanders must plan for them and simultaneously structure priorities clearly so that only the most critical items move by air. Only they can decide if the need for additional antitank rounds outweighs that for artillery ammunition. But decide they must, and they should make priorities clear from the outset.

Reawaken Interest in the Study of Nuclear Warfare. A final point does not pertain directly to tactical nuclear doctrine but addresses the services' attitude toward it. The services need to revitalize interest in tactical nuclear doctrine. In the late 1950s the atomic battlefield attracted widespread interest. In the Army, for example, the staff college at Leavenworth devoted half its curriculum to the Nuclear Battlefield.¹¹ The professional attention of the officer corps focused on things nuclear, and that interest was reflected in their writings. From 1955 to 1959, *Military Review*, the Army's foremost professional journal, published 132 articles about nuclear war.¹² But the Atmospheric Test Ban and high-level interest in unconventional warfare in the early 1960s relegated study of the nucle-

ar battlefield to a small group of technically-oriented officers. Again using *Military Review* as a gauge of professional interest, the 1960s saw only 31 articles therein on the nuclear battlefield.¹³

Numerous ways exist to stimulate this interest: hours added to service school curriculums, articles by senior leaders, symposiums, to name but a few. The goal, however, is to get those who will have to fight on the nuclear battlefield thinking seriously about the problems they will confront there. A vital dialog among professionals will go a long way toward resolving some of the knotty problems of the nuclear battlefield.

The problems with US theater nuclear doctrine are real but tractable. A relatively few changes would provide a much more flexible, useful, and credible body of principles to guide our forces in nuclear combat. Some of these modifications—primarily those pertaining to the release of weapons—would require decisions at the national and international level. But difficult does not equal impossible; the alternative leaves US forces saddled with an unwieldy doctrine that calls into question the true efficacy of our nuclear forces. Changing doctrine, however, invokes a military equivalent of Newton's law: Each change will cause a number of other reactions. The next chapter investigates the equipment changes that must occur to complement the doctrinal modifications.

2. EQUIPMENT

The preceding chapter outlined doctrinal changes designed to improve the United States' ability to fight a tactical nuclear war. These changes, however, require concomitant modifications elsewhere, most notably in equipment and training. Addressing the first, equipment changes must accomplish two goals. On the one hand, US forces must field equipment capable of functioning on the nuclear battlefield. On the other, they must acquire those items now lacking that will enhance successful combat operations in a nuclear environment.

HARDENING EQUIPMENT TO THE EFFECTS OF NUCLEAR WEAPONS

Services Must Field Hardened Equipment. "Hardening" describes the process of ensuring that equipment will work after exposure to the effects of nuclear weapons. Simply stated, a piece of equipment is "hard" when it can function during and after exposure to defined limits of any or all of the four primary effects of a nuclear weapon: blast, heat, radiation, and electromagnetic pulse (EMP). A clear need exists for hardened equipment. Its absence lays our forces open to a crushing blow by our adversary and tempts him to use nuclear weapons. The opportunity to snarl our command and control with a relatively small number of nuclear strikes might prove an irresistible temptation. Also, a lack of hardened equipment limits our own use of nuclear weapons.

Much Currently-Fielded Equipment Vulnerable. In spite of the obvious need for hardened equipment, both the Army and Air Force have fielded important tactical systems that are vulnerable to the effects of nuclear weapons. Radiation or

EMP could sever crucial command and control links of both services. Electronic components of major weapon systems remain vulnerable to the same effects. Automated data processing equipment, vital to rapid processing and dissemination of intelligence, has virtually no protection. The Army, to protect radios from EMP, advises "reduced remoting of radios, removal of antennas and cables when radios are nonoperational, and storage of nonoperational radios inside 'buttoned-up' armored vehicles."¹ Unfortunately, radios do not work well without antennas or locked inside armored vehicles, and the Army offers no advice about radios that must remain operational (and no tactical unit has "extra" radios). The clear implication is that without these measures, the radios lack inherent hardness to avoid damage from EMP.

The situation is bad for electronic equipment, and the prognosis is worse. The dim future results from the fact that the technological direction of electronics is toward increasing miniaturization. The smaller integrated circuits offer advantages of increased capability and reduced weight, but they also are far more sensitive to nuclear weapons effects.² The attraction of reduced weight and power requirements proves irresistible, and the search for even smaller integrated circuits continues.

These weaknesses represent a serious lapse for a country that would have the world believe that the nuclear component provides an essential element to the defense of NATO.

Army and Air Force Have Substantial Hardening Programs. Yet both the Army and the Air Force have substantial nuclear hardening programs. The Army's program, organized under the provisions of Army Regulation 70-60, has as its primary agent a Nuclear Survivability Committee manned by representatives of all the major Army staff agencies concerned with the procurement of equipment, the intelligence community, and the doctrine and training agency. The process also requires a review and approval by the heads of the agencies involved in equipment procurement. A separate laboratory, Harry Diamond Laboratories, has testing and research re-

sponsibilities. And still another separate agency, US Army Nuclear and Chemical Agency, bears responsibility for review of criteria and providing analysis to members of the Nuclear Survivability Committee.

In structure, the Air Force program resembles the Army's. Air Force Regulation 80-38 establishes a nuclear criteria group located at the Air Staff, and it directs representation from relevant staff sections. The Air Force Weapons Laboratory has the charter to maintain hardening technology. And, like the Army program, the regulation imposes several hardening requirements that the project managers must meet. Clearly, both services have in place adequate bureaucratic machinery to ensure the fielding of equipment capable of operating in a nuclear environment. Yet, as the preceding discussion points out, each service has in place equipment vulnerable to the effects of nuclear detonations. One might reasonably ask how such a situation could occur, particularly when high-level organizations exist precisely to ensure procurement of hardened equipment.

Hardening Equipment Faces Many Obstacles. Part of the answer lies in the inherent nature of hardening. It is a quality both invisible and difficult to demonstrate. Nor does hardening add anything to a piece of equipment's basic operating characteristics. Hardening a radio, for example, does not allow it to communicate any farther, add any additional frequencies, or make it less susceptible to jamming. It would take an expert to determine if the radio had been hardened. The tests to verify hardness always involve a simulation of weapons effects because of the prohibition against atmospheric tests. Also, each test normally measures only one effect and tends to interest only the specialists involved. Some tests consist of exposing the equipment to various invisible rays, which generally have no immediately observable effect. Also, hardening represents a separate branch of nuclear science—an esoteric branch of knowledge itself. Even an expert on the basic system being considered may have no knowledge of the science of hardening. Thus, the hardening

process both has little visibility and is difficult to understand. These qualities tend to limit interest in the process.

A more significant part of the answer, however, lies in the issue of cost. A statement from *Army Regulation 70-60* illuminates the problem: "Although nuclear survivability criteria have been provided for many new developmental items for a number of years, a major problem has been the unwarranted waiver or modification of those criteria during development."³ Those individuals involved with the programs agree that dollars cause most waivers. The services simply decide to buy something other than nuclear hardening. One general officer who participated in several Army Systems Acquisition Review Councils (ASARCs) states that meeting schedules and performance criteria within existing resources was challenge enough without taking on problems of nuclear survivability.⁴

A final part of the answer stems from efforts to circumvent the long procurement process. Frequently, the services will attempt to reduce procurement time by purchasing commercial items. While these purchases offer savings both in time and money, the equipment design and development takes place outside of government channels and does not have to meet the many requirements for nuclear hardness. Thus, the services find themselves with equipment totally vulnerable to nuclear weapons effects. The Army, for example, has equipped a large number of its field artillery units with Texas Instruments calculators for use in solving survey and gunnery problems. These calculators can lose information stored in the memory during an electrical storm. One can imagine what will happen to them during an atomic attack. Even more serious is the fact that much of an Army division's logistical operation depends upon IBM computers, procured commercially and unhardened. The danger here is more serious because manual back-up systems simply do not exist.

Suggested Improvements for Hardening Equipment. Clearly an unsatisfactory situation exists with respect to equipment hardening. The issue becomes one of rectification. The solution does not lie in creating additional bureaucratic

structure to ensure hardening of equipment. Enough structure exists now. It simply needs to work more effectively. Three relatively minor changes could substantially improve the procurement system's performance in terms of nuclear hardening.

A first step would be to measure the project manager's performance against his success in meeting hardening criteria. Currently, project managers and system project officers have a fair amount of flexibility in overseeing their projects. While beneficial in many respects, the flexibility allows the attention paid to nuclear hardening to vary from manager to manager. A requirement for superiors to comment about the success of project managers in meeting hardening guidelines would tend to sharpen the interest of both project managers and superiors. The managers would be interested because of the effect of such a rating on their careers. It would gain the attention of the supervisors because they would have to find out how successful the project managers had been in meeting hardening criteria before they could make an evaluation. Increased interest on the part of both groups can only improve the program.

A second step relates to the source of funds for testing. Current practice holds the project manager responsible for funding the validation testing of hardness. The problem with this practice is that opinion can vary widely, even among conscientious and dedicated professionals, as to what constitutes a valid test. An actual test involving the B-52 bomber illustrates the point. The Air Force agreed to test the B-52 to determine its resistance to electromagnetic pulse. A B-52 was sent to the Trestle Test Facility at Kirtland Air Force Base and exposed to pulses of electromagnetic energy. The operators declared themselves totally satisfied with the test. But some scientists labeled the results inconclusive, claiming that the diagnostic instrumentation was insufficient for complete results. The additional instrumentation would have raised the test cost significantly. To make the project manager, who must pay for many things, bear the costs of validation testing tempts him to skimp on test costs. It makes better sense to include such money in the budget of the service laboratory, which has the

primary interest in validating efforts at hardening. This funding arrangement would remove the temptation from the project manager to cut corners and probably ensure more thorough testing.

As a third and final step, the services must endorse design hardening. As mentioned above, cost imposes most of the barriers to a successful hardening program. The key to an economical hardening program lies in including hardness in the equipment design. Precisely how much nuclear hardening adds to the cost of a system remains a topic of debate. One scientist estimates a maximum of 15 percent.⁵ Another expert, drawing upon actual costs incurred from hardening several items of British equipment, places the cost at a maximum of 2 to 5 percent and generally much lower.⁶ Although opinions may vary as to the cost of design hardening, no one disputes that it costs considerably less to include hardening in the initial design than to add it after manufacture.

The three steps outlined above would improve nuclear hardening as it relates to the equipment procurement process. Two additional points, however, deserve consideration. The first relates to one of the assumptions underlying both of the services' hardening programs. Both the Army and the Air Force generally use the tolerance of the crew to nuclear weapons effects to define the limits of hardening. Stated another way, they make equipment no more resistant to nuclear weapons effects than the crew. So far as the effects of blast and heat go, the policy seems sound because equipment can generally withstand more of either effect than people. But with respect to radiation, some of the following exceptions suggest themselves.

Critical command and control equipment and electronic components of major weapon systems should have radiation hardness at least equal to the blast hardness even if that level far exceeds what the crew could tolerate. The need for reconstitution provides the rationale for this requirement. Reconstitution means that certain key items of equipment must survive even if crews do not. In the chaotic period following a nuclear

strike, communications will be a first priority. For commanders to make basic decisions, they will quickly need to know the location and number of survivors. They will also need to pass on orders, but without electronic links, they will be reduced to the slowest means. Weapons systems are a second priority. A commander might very well wish to have operational fighter aircraft, attack helicopters, or tanks even if the pilots or crews have not survived. At that point in the battle, reconstitution of crews might prove less difficult than replacement of major systems.

Also, any successful hardening program must focus both on the complete life cycle of equipment and the entire system itself. It does no good to harden a system without taking adequate precautions to ensure that protective measures survive the routine maintenance and potentially heavy use it will receive after reaching the field. These precautions must include, as a minimum, adequate guidance in the maintenance publications to ensure that normal maintenance does not degrade nuclear hardness. Additionally, adequate diagnostic equipment must exist in the field to verify continued functioning of nuclear hardening.

As important as ensuring life-cycle hardness is the need to harden complete systems. For example, it makes little sense to harden a tactical computer and not ensure that the portable generator that powers the computer has equal hardness. This requirement also means that tests for hardness must deal with equipment in its operating configuration. A radio may appear invulnerable to EMP or transient radiation effects on electronics (TREE) until connected to its power source and antenna.

SERVICES NEED TO ADD SELECTED ITEMS OF EQUIPMENT

The services, however, have more to do than improve their respective programs for hardening equipment to the effects of nuclear weapons. Each needs to add selective items to its own inventory. Possible additions include certain weap-

ons, improved targeting equipment, redundant command and control systems, and some specialized equipment for monitoring the nuclear environment.

Enhanced Radiation Warhead (ERW). The enhanced radiation warheads issue has spurred an enormous amount of debate. The many critics of the so-called "neutron bomb" advance numerous objections.⁷ They claim that, because the enhanced radiation warhead limits collateral damage, the warhead has a higher probability of use. Use will lead to escalation and, inevitably, the nuclear holocaust. Furthermore, the Soviets might perceive their larger and more powerful weapons as an advantage in a tactical nuclear exchange. Also, Soviet allies might be more willing to support an attack on the West if they knew their homelands would escape widespread physical damage.

The ERW offers substantial advantages to the user. The larger weapons currently in the field use blast as the primary mechanism to inflict casualties. That is, most of the energy of the explosion goes into producing blast. The drawback here is that the collateral damage extends far beyond the range of the military effect. The ERW is a fusion weapon that puts most of its energy into producing radiation with the simultaneous effect of increasing the radius of military effectiveness while reducing the collateral damage from blast.

The ERW also dovetails nicely with the principle of focusing on enemy forces. Because the ERW has a reduced radius of effect on structures, troops make the only suitable target. The fact that the weapon uses radiation as its primary effect uniquely suits it for use against armored troops and offers a dramatic increase in effectiveness.⁸ This increased effectiveness means that commanders can employ ERWs against more dispersed formations and attack enemy columns before they concentrate for the assault.

Deployment of the weapon has an equally potent political rationale in that it enhances deterrence. The critics are correct when they point out that reduced collateral damage makes

use of the ERW more attractive and thus more likely. But this precise quality contributes to deterrence. The fact that the ERW proves most effective against armored forces makes the deterrent effect that much greater.

Redundant and Survivable C³. Chapter 1 advanced the argument that the principle of redundant command and control had to be incorporated into US doctrine. But a redundant command and control network serves little purpose unless it can survive the environment of the nuclear battlefield. The beginning section of this chapter pointed out the need for hardened equipment, the fact that much fielded equipment lacks adequate hardening, and that design hardening offers the best solution to the problem. With respect to command and control, the question becomes what steps make sense to improve the redundancy and survivability of command and control links.

Creating adequate redundancy amounts to little more than adding equipment to established parallel communications nets. Currently, units must borrow radio equipment for alternate command posts from operating nets. For example, a 155-mm direct-support howitzer battalion has a requirement to operate on seven nets. Establishment of an alternate command post with redundancy on any one net means the disestablishment of another at the main command post. This approach works reasonably well for short periods, but it does not answer the need for true redundancy. The alternate command post must have sufficient equipment to monitor key nets and still not affect the capabilities of the main element. The alternate command post need not monitor all nets. It could forego the administrative and logistic channels. But it must monitor, as a minimum, the intelligence and operations nets.

Gaining survivability with command and control equipment presently fielded proves more difficult than achieving redundancy. Two approaches suggest themselves: retrofit and shelters. Simple systems lend themselves to the retrofit approach. Time and cost prohibit changing the design of the thousands of frequency-modulated radios that carry the bulk of US ground forces command and control traffic. But a rela-

tively simple addition such as a switch on the antenna lead that opens when subjected to a pulse of EMP may harden the system sufficiently. Each battlefield command and control system requires an analysis to determine the precise technique.

More complex systems such as computers, radar, and large, complex radios do not lend themselves to retrofit. For these, the services must look to improving the shelters around the equipment. The advantage here is that the services could develop one shelter to house several different items of equipment. They would not have to worry about charting and blocking by means of switches and filters the many pathways along which radiation or EMP could travel. They still face considerable problems, because if survivable shelters were easy to build, everyone would have them. But hardening complex electrical equipment after the fact has no hope of success. Shelters are expensive, but offer the only viable solution in the immediate future. Even though shelters are expensive, they offer an additional benefit in that they could house different models of equipment as the services decide to modernize.

Improved Intelligence and Targeting Capability. The decentralization of control recommended in chapter 1 has implications for equipment involved in the intelligence and targeting process. Lower levels of control mean that division, brigade, and possibly even battalion staffs must have the capability to process rapidly large amounts of intelligence information. This need further dictates equipment capable of linking with computers at higher command levels.

Today the intelligence analyst's problem is the deluge rather than the dearth of information. Collection resources for tactical intelligence have multiplied dramatically in the past 10 years. In addition to such traditional sources as long-range patrols, reconnaissance aircraft and observation posts, the analyst now receives information from national technical sources, communications and electronic intercepts, remote sensors, and other sophisticated devices such as radars and infrared detectors. The task becomes one of piecing information into a complete picture of the battlefield, a process known

as "fusion." The services have approached this problem at the corps and tactical air force level by testing a system known as battlefield exploitation and target acquisition (BETA), an automated system capable of rapid sorting and display of intelligence from multiple sources. Unfortunately, no similar capability exists at the lower echelons.

The lower echelons must develop a capability to receive and process the intelligence information from the multiple-source centers. Presently no rapid means of data transmission between the two echelons exists. In a fast-paced tactical situation, timely intelligence is important, and for targeting purposes, it is all-important. So the first challenge becomes getting the intelligence from those who have it to those who need it. The second hurdle entails providing those who need intelligence with the proper equipment to allow efficient processing. An automated capability answers both problems. Data links capable of operating through FM radios exist now. After some preliminary screening at the multiple-source centers, information could be sent automatically to appropriate division and brigade tactical operations centers. Once it is there, small computers could sort through the mass of information, making in minutes the thousands of comparisons and cross-references that would take days to do using manual procedures. Additionally, the computer could be programmed to deal with the complexities of nuclear fire planning, a process that involves time-consuming mathematical calculations.

Some might argue that fielding of the Army's TACFIRE system answers these needs. But TACFIRE is an artillery system designed primarily for fire direction and will not be located with the operations center of the maneuver forces. Therefore, the commander will have only indirect access to it. Furthermore, the TACFIRE program addresses artillery concerns, and it does not necessarily lend itself to processing and displaying intelligence in a manner useful to the commander of the maneuver forces. Finally, the Air Force-Army interface occurs at the maneuver and not the artillery operations center. The major targeting decisions must occur there. Thus, that is where the information must be.

Additional Specialized Equipment. The nuclear battlefield not only places unusual demands on common equipment but also demands unusual equipment. That is, the environment created by exploding nuclear weapons creates a need for specialized equipment. And, indeed, the services have on hand a great number of specialized items. But the items that address three areas—detection, decontamination, and dosage—need fundamental improvements. Equally important, however, is the need for solutions that are relatively inexpensive and rapidly achievable.

Particularly for the Army, the equipment used for detection of radiation requires substantial improvement. Current practice calls for equipping units down to company size with radiometers, hand held instruments used to detect the presence of radiation. These instruments, however, have two undesirable characteristics. First, they do not lend themselves to rapid surveys. They must be used by a person on foot, who has to place the instrument within a few feet of the object or area measured. Even placing the instruments in vehicles or helicopters does not speed up the surveys appreciably. The devices work rather well for determining radiation levels on vehicles or in a small area, such as a company perimeter. But they are ill-suited for rapid surveys of large areas or route reconnaissance. A second problem is that the operator has no protection. The operator receives approximately the same radiation the instrument measures. Clearly soldiers will be reluctant to make careful measurements of the boundaries of areas of high radioactivity knowing they may be receiving significant or even lethal doses.

The two problems suggest the solutions. Instead of unshielded and immobile instruments, the Army needs a shielded and mobile system. Such equipment lies well within the state of the art. The Soviets presently have such equipment in their units.⁹ In the United States, the Department of Energy has developed a tracked vehicle to assist in charting radioactivity at old nuclear-test sites. Modification of an existing vehicle such as an M-113 armored personnel carrier of-

fers a cost-effective solution for units without armored vehicles. For armored units, it should not prove difficult to add a radiation detection capability to existing vehicles. The improvements in terms of speed, accuracy, and crew protection would justify the cost.

Decontamination does not pose as many difficulties as the detection problem. The scope rather than the nature of the decontamination process causes the difficulties. Radiation from nuclear weapons takes two forms: initial and residual. For purposes of decontamination, interest centers on the latter. Residual radiation appears as fallout, radioactive particles dispersed by the wind. A simple washing is normally all that is required to decontaminate personnel and equipment. In an intense nuclear environment, however, current mass decontamination procedures would not be able to cope with the large volume of personnel and equipment that would require treatment. Present doctrine calls for units to determine the extent of contamination, submit reports through channels, and for the commanders to decide "whether to withdraw those units and conduct decontamination operations or continue the mission."¹⁰ The Army has one company per division devoted entirely to the nuclear and chemical decontamination mission. Widespread contamination would mean rapidly overloaded facilities.

The obvious solution is to increase the washing capability. But centralized facilities will not do. A more promising approach would be to equip units down to the company level with portable pumps. Each unit could then establish its own decontamination operation.

This approach to decontamination offers several advantages. First, decontamination occurs earlier because units do not have to vie with one another for position at centralized facilities. Therefore, unit capabilities do not suffer as much disruption from temporarily unavailable equipment. Secondly, units can remain dispersed. And, finally, less high-level command attention has to focus on decontamination. Battalion operation sections do not have to plan for rotation of units

through washing facilities, conduct route reconnaissances, or any of the other actions involved in planning and conducting major unit-level activities.

The final area of equipment concerns determining the dose of radiation an individual has absorbed. Dose critically interests the battlefield commander because it indicates the extent and nature of casualties from radiation. Radiation poses a difficult assessment and triage problem because the extent of the injury varies with the amount of exposure but, at least initially, the external symptoms for lethal and nonlethal doses are about the same. If a commander knew exposure levels, however, he could make rapid decisions about such things as medical evacuation, reinforcements, and replacements.

The services, having long recognized this problem, have equipped their personnel with instruments to measure dose, normally an instrument called the IM-93 dosimeter. Unfortunately, not everyone has a dosimeter. They are issued on a representative basis on the assumption that members of a unit would receive similar doses. That assumption has no basis in fact. Two soldiers within a few feet of each other could receive very different doses if one, for example, were standing behind or in an armored vehicle when the nuclear burst occurred. The IM-93 has other problems in that it does not measure radiation from neutrons and is very directional in its measurements. Recognizing these technical problems, the services have developed a replacement, the IM-185, but the technology is over 20 years old. The new instrument, moreover, still has the same problems of basis of issue and sensitivity of direction. It also fails to detect certain types of radiation.¹¹

The services badly need a dosimeter that will accurately detect all types of radiation, is cheap enough to issue to everyone, is simple enough to allow readings at the unit level, and allows immediate readings. The IM-185, which is not yet fielded, does not meet these requirements. Nor can the services wait another 22 years for a replacement. The research and development community is pursuing two lines of research

that appear fruitful: biological dosimeters and radiochromic dye. The former has considerable appeal because it determines dose by the body's reaction to radiation. But even the simplest reading requires a urinalysis, which is not always easy for units on the battlefield to conduct. Better from the tactical unit point of view is the radiochromic dye, which can be incorporated into a device like a film badge and issued individually. The services should pursue both avenues, but they must find a solution they can field within 2 or 3 years.

3. TRAINING

Chapter 1 pointed out shortcomings in US theater nuclear war doctrine. Because doctrine shapes training, it follows that US training practices probably reflect similar failings. And, indeed, a close look at the training of US forces discloses several weaknesses with respect to preparing for the nuclear battlefield. W. R. Van Cleave and S. T. Cohen describe US forces as "ill-prepared and fundamentally untrained for nuclear combat. Serious training of U.S. forces in Europe for a nuclear conflict environment ranges from no less than comical to nonexistent."¹ Jeffrey Record has described all NATO forces as lacking "even the most rudimentary preparation for combat on a nuclear battlefield."² None of these critics offers much in the way of remedying the situation. This chapter will examine US training practices, identify weaknesses, and recommend improvements.

Any analysis of military training must view it from two perspectives: individual and unit. Analyzing US training in this fashion shows that two general problems afflict training for the nuclear battle. On the individual level, enlisted training properly focuses on defensive measures but concentrates specialized skills at too high a level. Officer training simply does not address fighting the nuclear battle in any meaningful way. Unit training does not consider offensive action involving nuclear weapons, and, even worse, no mechanism exists to focus unit training on the deficiencies.

INDIVIDUAL TRAINING INADEQUATELY ADDRESSES NUCLEAR WAR

All military training begins with the individual, normally with some sort of formal schooling upon entry into the services. A review of the various individual training programs gives

an indication as to what the services view as important. The limited training time available is normally scheduled fully. It therefore stands to reason that only subjects viewed as important will receive attention.

At first glance it appears that the services devote a fair amount of time to training for the "integrated battle," a term referring to a conflict involving both conventional and unconventional weapons. A full one-quarter of the tasks—a total of 20—an Army enlisted man must master in basic training relate to this type of conflict.³ A closer look, however, leads to the discovery that the services lump all chemical, nuclear, and biological instruction under one rubric: NBC training. For the nuclear battlefield this practice is misleading because it makes it appear as though more training in nuclear warfare has gone on than actually has. Returning to the example of the Army enlisted man at the end of basic training, one finds that only 1 of the 20 tasks pertains to the *nuclear* battlefield. Similarly, an officer attending the Infantry Officer Advanced Course will receive 25 hours of NBC instruction, but only 6 address nuclear considerations.⁴

Similar scant attention applies to the program of instruction for the Armor Officer Advanced Course. This course trains young captains, who, upon completion, will go on to command tank companies and serve on staffs of armored battalions. Armored forces would figure prominently on any nuclear battlefield. The 26-week program includes a total of 37 hours devoted to NBC subjects—less than 4 percent.⁵ But even that figure inflates the true amount because 12 hours of the 37 are examination, thus reducing the real total to 25, or about 2 percent of the total program. The 25 hours comprise all NBC instruction. Somewhat less than half deals with nuclear subjects.

But these classes are not the only exposure that Armor Advanced Course students receive. The syllabus lists 92 hours of instruction that also integrate NBC considerations. Those periods are normally major student problems that direct participants to address NBC considerations as part of the ex-

ercise. An example is "Task Force Offensive Planning," a 14-hour planning exercise that, among other things, dictates that "planning must include considerations for operations in an NBC environment."⁶ Four other exercises contain a similar notation. The effectiveness of integrated instruction stands open to question. The primary objective of the exercise cited is to produce a brigade operations order for an attack. Along the way, the students must pay some attention to NBC considerations. One suspects that the order for this exercise would differ substantially from one directing the students to plan either a nuclear or a chemical attack. This sort of direction forces the students to come to grips with the issue and make the hard tactical and operational decisions. As it now stands, it is an ancillary task and will receive a proportionate amount of interest and attention.

The situation at the Infantry Officer Advanced Course resembles that of the Armor School. Out of 1,040 hours of instruction, students receive 22 hours of pure NBC instruction, 79 hours of instruction that fully integrates NBC considerations, and 171 hours of partial integration.⁷ "Partial" integration requires introduction to enemy NBC capabilities and consideration of possible US counters, but "the problem requires no execution of action in the NBC area."⁸ A problem that requires no action will elicit none. "Full integration," however, forces the students to "react to, or conduct counter strikes using chemical or nuclear weapons."⁹ This type of instruction holds considerably more promise. Again, however, nuclear and chemical considerations receive simultaneous treatment. Precisely how much attention nuclear considerations receive is difficult to determine. One problem—Fundamentals of Airmobile Operations—lists 12 training objectives, one of which addresses chemical and nuclear considerations.¹⁰ All considerations are defensive (i.e., survivability afforded by air mobility, survey data to avoid contaminated areas, and determination of effects of chemical and nuclear weapons on airmobile operations). Not required, in spite of the definition of full integration, are offensive planning or actions.

Higher-level enlisted training is also relatively skimpy in terms of nuclear war. At skill level 2, soldiers have a requirement to know only one additional nuclear task.¹¹ This means that all of the lower grade enlisted men, E-3 and E-4, have to know only two things about the nuclear battle: immediate reaction to a nuclear blast and how to read a dosimeter. Not until skill level 3, the noncommissioned officer level, do soldiers face the requirement of knowing how to read radiological monitoring instruments, cross a contaminated area, or decontaminate equipment. In the period following a nuclear attack, units may have high casualties and need a capability of decentralized operations. In this sort of environment, it makes little sense to concentrate critical skills in the noncommissioned officer ranks, particularly when practice and precept vary widely. By this is meant that although all noncommissioned officers have a requirement for proficiency in certain radiological skills, unit practice normally relegates them to the one or two individuals who supervise the specialized teams such as radiological survey or decontamination. In fact, the *Army Field Manual 21-40 NBC Defense* explicitly recognizes this practice, stating, "Normally, company-sized units maintain a minimum of two trained monitors for each unit dose rate meter."¹²

What does all this mean? It means, primarily, that the Army's training inadequately prepares individual soldiers for nuclear battle. Both officer and enlisted individual training devote too little time to the nuclear battle, particularly offensive actions. This situation occurs partially because all training for nuclear, chemical, and biological warfare takes place under one heading. Also, the training given tends to orient on defensive considerations, which are important but represent only half the equation.

The data above pertain to the Army. What of the Air Force? The Air Force takes a somewhat different approach, but the same problems appear in their individual training programs, if anything, to a higher degree. Centralization characterizes the Air Force perspective. Because Air Force combat assets remain centralized—that is, located at an air-

field—such an approach makes sense. Like the Army, the Air Force treats nuclear training in conjunction with chemical and biological training, but they go one step further and include natural and manmade disasters. *Air Force Regulation 355-1, Disaster Preparedness* governs NBC training. It directs establishment of a base organization consisting of specialized teams such as decontamination and shelter management. Unlike the Army's, the Air Force's basic training does not develop a fundamental NBC expertise in individuals.¹³ Training given to a member of the "base populace," that is, someone not on a specialty team, amounts to only 1 hour annually.¹⁴ Team member training ranges from a high of 20 hours for entry training to 4 hours. Each has a requirement for periodic refresher training. The number of teams trained remains a decision for each base commander. These training requirements pertain to disasters as well as chemical or nuclear attack.

The Air Force shows the same bias towards chemical training. An individual assigned to a high threat area (Europe and Korea) has a requirement for additional training, but the material pertains only to chemical subjects.¹⁵ Similarly, decontamination team training focuses primarily on chemical problems, requiring only a recognition of radiological materials and hazards.

UNIT TRAINING INADEQUATELY ADDRESSES NUCLEAR WAR

Individual training stands in need of some improvement, but it at least addresses the problem on the nuclear battlefield. Unit training compares very unfavorably with individual instruction. The Army Training and Evaluating Program (ARTEP) is "the principal tool for evaluating unit training."¹⁶ An examination of the ARTEPs for two combat units—a mechanized infantry task force and a self-propelled field artillery battalion—shows some serious deficiencies with respect to fighting the nuclear battle. These units would be some of the types most likely to be involved in a theater nuclear conflict.

The mechanized infantry task force ARTEP 71-2 contains a preface describing the modern battlefield. The description contains no reference to the nuclear battlefield. The preface concentrates on the lethal nature of the modern battlefield, but attributes that lethality to long-range cannons and antiarmor missile systems. The requirements listed for success on the battlefield include early detection of enemy forces, rapid execution, and sound logistics. Nowhere does there appear mention of the nuclear threat or the need for planning and executing nuclear fires in support of offensive action.¹⁷ From the description of the battlefield, one assumes that the units will fight only conventional wars.

Of greater significance, however, is the absence of nuclear considerations in the various evaluation scenarios. ARTEP 71-2 has numerous scenarios ranging from task force to section. Nineteen of these pertain to the battalion task force and company and company team.¹⁸ Not a single scenario sets conditions including nuclear environment. In fact, the entire ARTEP has only a single reference to nuclear considerations, and then it requires a demonstration only of defensive skills.¹⁹ It evaluates such items as taking defensive actions, measuring and reporting contamination, and decontamination. Absent are any offensive uses of nuclear weapons and the planning associated with their employment. Even the discussions of considerations of the combined arms teams do not address the nuclear battle.

The ARTEP for the self-propelled artillery battalion closely resembles that of the mechanized infantry battalion in its lack of consideration of nuclear activities. It has the same requirements for defensive actions.²⁰ Surprisingly, however, the observer parties, which in wartime would travel with the maneuver elements and transmit requests for fire back to the artillery battalion, have no requirement to demonstrate even defensive skills. The only offensive action required is the technical one of computing firing data for a nuclear artillery shell. Tactical fire direction for nuclear operations (as opposed to technical fire direction) has no criteria for evaluation. There is,

for instance, no requirement to prepare a selective employment plan (SEP) or follow the request for release. Nor is the unit required to consult with the maneuver commander and advise him on the use of nuclear weapons. Even the medical section has no requirement to deal with injuries peculiar to the nuclear battlefield.

The problem inherent in unit training parallels that of individual officer training: both concentrate on the defensive and do not address *fighting* the nuclear battle. The ARTEP rests on the concept of identifying unit weaknesses by comparing performance against a standard. Performance that fails to meet the standard then becomes an area of focus for future training. If, however, the ARTEP lacks a performance standard, as it does for offensive use of nuclear weapons, then units will never identify the weakness and never add the standard to the training program. Thus, they will never develop the skills. In essence, US Army units train to fight conventionally while defending themselves against the enemy's use of unconventional weapons.

A second problem reflected in unit training is that it makes minor attempts to replicate the probable conditions of the nuclear battlefield. Most ARTEPs, for example, require a unit to cross a radiologically contaminated area. But they do not require any reconstitution exercises or make units communicate through alternate command lines. Yet, these conditions will almost certainly occur. The best way of preparing units to deal with these conditions is to force the units to confront such situations in training. Unit commanders will then think through the procedures required to make one company from the remnants of three. Equally important, units will accustom themselves to the possibility of reacting to nuclear war.

IMPROVEMENTS REQUIRED

Individual Training Must Stress Operations on the Nuclear Battlefield. Improvements in individual training must move in two directions. For enlisted personnel, the present defensive orientation should remain, but training programs must

concentrate on broadening the base of nuclear expertise. For officers, training must emphasize the offensive, the actual fighting of the nuclear battle. Primary areas of emphasis include planning and coordination for the use of nuclear weapons, and command and control procedures associated with request and employment of nuclear weapons.

One step the services ought to take immediately: identify nuclear training separately from chemical training. Some will argue that because the battlefield will be "integrated," training should be the same. In principle, this idea has much to recommend it. In practice, however, units conduct either chemical or nuclear training, not both simultaneously. As discussed above, chemical training claims the majority of the attention. Characterizing all such training as "NBC" leads to the impression that each receives proportionate and, worse, sufficient attention. Separating the categories would at least allow commanders to know precisely how much attention each receives.

Service training programs must also work toward broadening the base of nuclear expertise among enlisted men. The defensive orientation remains sound because the vast majority of enlisted personnel do not participate directly in offensive nuclear operations. Those who do have primarily technical tasks such as weapon assembly, which the training system addresses adequately now. As pointed out above, however, the cursory training given the bulk of the enlisted force does not meet the needs of an environment in which key members or entire specialized teams may be missing. The Army needs to add requirements at skill levels 1 and 2 and the Air Force has to increase greatly the amount of individual training under the disaster preparedness program.

The question then becomes one of which skills to teach and how to practice them. Both services must strive for an enlisted man who, in addition to the skills already learned, can operate monitoring equipment, decontaminate equipment, recognize and treat radiation casualties, and understand and know how to deal with radiation hazards. Providing the majority of the enlisted force with this knowledge overcomes the

problem of having key skills limited to specialized teams. In the event of a nuclear attack, virtually any soldier or airman could perform the necessary tasks: tending to wounded, determining what had been contaminated, decontaminating equipment, and moving out of or across a contaminated area if necessary.

The primary difficulty with realistically schooling individuals in the four tasks listed above is the absence of a good method of simulating radioactivity. The services depend now upon such devices as a radio frequency transmitter, the receivers for which duplicate in appearance the standard radiological monitoring instruments (namely the AN/PDR-27).²¹ The closer the receiver moves to the transmitter, the higher reading it records, thus approximating increasing dose rate.

This system has several obvious drawbacks. First, it has limited availability. Fort Campbell, Kentucky, for example, has one unit to serve an entire division. Fort Bragg has three to spread among a division, a corps artillery, a corps headquarters, and the Special Warfare Center. At each post, the NBC School keeps one unit permanently.²² This limited availability means that the average company-sized unit will have access less than once a year. Second, a unit cannot use its own equipment, thus losing an opportunity for familiarization and operational checks. Also, the techniques in preparation and instrument use vary somewhat. Furthermore, the receivers only mirror one type of radiological monitor. Most units have at least two types. Finally, soldiers know the equipment measures RF energy and not radiation, and they simply do not take the same attitude toward the two. Other problems include an omnidirectional field, not at all typical of fallout, and numerous equipment problems. Marine Corps tests of nearly identical sets led it to reject them as training devices.²³

A simple solution to this problem exists, but it will not prove simple to effect. The best approach would be for the services to procure a standard radioactive contaminant of relatively short half-life, say a matter of a few days. The

contaminant could then be used in restricted training areas, and soldiers could place their own equipment in operation and chart an actual fallout pattern. Subsequent cleanup of personnel and equipment would provide actual decontamination experience. Furthermore, participants would gain actual experience in moving about a contaminated area. The short half-life ensures that the isotope would decay below background levels quickly. A host of substantial problems confront this proposal, including questions about an adequate and economical supply of a contaminant, need for environmental impact statements, concern for personnel exposure, possible vehement public reaction, and many more. Yet this method is currently in use. The last two Department of Defense Nuclear Weapons Accident Exercises have employed a live contaminant, as has the interservice Nuclear Weapons School at Kirtland AFB, New Mexico.²⁴ Some locations might not be able to accommodate the use of a radioactive contaminant, but others could. The benefits in terms of realistic training make it worth the effort.

Correcting the officer individual training program presents considerably more difficulties than improving the enlisted program. The latter program already contains the training needed; it simply requires spreading it more widely through the enlisted ranks. As the discussion of school programs of instruction shows, training required of them is more complex and numerous.

The first necessary step entails emphasizing the offensive use of nuclear weapons. This requirement means that a certain number of the problems and exercises in schools must be nuclear attacks. Attacks requiring only considerations of an NBC environment will not suffice. Only making the requirement to plan use of nuclear fires explicit will get students to do the hard thinking necessary. This requirement also focuses instructor critiques on the nuclear dimension with the concomitant benefits of the ensuing instructor-student dialogs.

Simply adding the requirement for offensive use of nuclear weapons, however, will not in itself adequately address all

the issues of fighting the nuclear battle unless the exercise has the proper context. That context includes intelligence that presents realistic targets for students to select and rank in a close approximation of the system for requesting the release of weapons. All three functions—intelligence, planning, and release—must be present for the students to gain a real appreciation for the complexities of nuclear war.

The method for developing these skills should mirror the tactical environment as closely as possible. In this case, students should occupy a simulated division or brigade operations center to include an intelligence element that receives targeting information from a variety of sources. The intelligence operation should develop a picture of the enemy troop dispositions and forward it to the operations section. There, other students use the intelligence as a basis both for planning the operation and revising nuclear fire plans. Important here is a need for the exercise to emphasize a review from both Air Force and Army perspectives to ensure attack of targets by the most appropriate means. Students would also revise or initiate requests for release of nuclear fires allowing for the time required for release. That is, if release procedures normally take, say, 22 hours, students must request release sufficiently in advance to ensure approval prior to use. Unless they have planned properly, student commanders could easily find themselves ready to execute a nuclear attack but lacking release. Exercise play should also call for denial of use of some weapons. Forcing students to operate in this fully integrated environment will expose them to most of the planning problems involved in fighting the nuclear battle.

These exercises must also include an evaluation of the student operational plans. Students need to know if they correctly considered the manifold restrictions and employment concerns for nuclear weapons: collateral damage, friendly troop safety, fratricide, damage achieved, and many more. A realistic exercise would take a student fire plan and determine if the yields, uses, and locations fired at would produce the desired damage while still following the commander's guidelines for avoiding collateral damage. The evaluation

would also assess the scheduling of the fires to determine if one weapon might not have inadvertently caused the premature detonation of another. Plans would also require evaluation to determine if they endangered friendly troops. A small computer could easily be programmed to provide rapid evaluation of student plans.

Schools must ensure that students become familiar with all major aspects of the planning and execution process. This requirement suggests multiple repetitions of exercises. Multiple exercises exact a high price in terms of time, and programs of instruction already are full if not overcrowded. Still, most schools already have some repetition built in (company attack, battalion task force attack, etc.), and most of these exercises could be modified to include a nuclear phase. The only remaining requirement would be to ensure that students rotate among the various duties.

Unit Training Must Stress Operation on the Nuclear Battlefield. Unit training must build on the skills developed in individual training and must practice those things that can only be done at unit level. The ARTEP offers a convenient method to effect these necessary changes. To infuse preparation for the nuclear battlefield into unit training programs simply requires addition of appropriate tasks to extant ARTEPs and continued development of programs for those headquarters lacking them. This method has the benefit of drawing the Air Force into the training process, particularly for units such as brigade and division artillery headquarters. Adding joint tasks to ARTEPs will force units to practice them in peacetime.

Just as individual training does, unit ARTEPs require addition of offensive nuclear operations. Fortunately, this requirement will not cause wholesale rewriting of extant publications. A few changes will create the right focus. The tasks for the brigade fire support section of an artillery battalion, for example, could be increased by the requirement to plan nuclear fires to support an attack by the maneuver element. This requirement would produce a nuclear fire plan for the artillery battalion operations center, which would then

have to prepare firing data and verify such considerations as troop safety and collateral damage. The point is that a relatively few changes can bring about a great improvement in unit training for nuclear operations.

The Army must continue development of ARTEPs for all units involved in the nuclear battle and ensure that the training programs address nuclear considerations explicitly. The Army has developed formal training evaluations for maneuver brigade and division artillery staffs. These evaluations, however, remain far too general and make no reference to the nuclear (or, for that matter, the chemical) battlefield. The maneuver brigade evaluation, for example, describes fire support requirements in only the most general terms: "compatibility of weapons to target, timely, accurate, maximum assets at the critical point."²⁵ Nowhere does it ask the unit to plan nuclear fires or initiate the release request or effect required coordination. At this time the Army lacks a training and evaluation program for division or corps headquarters. Because both figure prominently in any battle, a clear need exists to develop training programs that deal with both conventional and nuclear conflicts.

Chapter 1 suggested that the nuclear battlefield would require *decentralized operations*. Unit training programs must include practice of the various techniques these kinds of operations require. Training for this type of operation should focus on units at the brigade and battalion level. This level is the lowest decentralization can go without unacceptable loss of control. The primary burden will fall on the operations and intelligence sections as they assume the functions normally exercised by higher headquarters. Artillery battalions, for example, would have to take over the counterfire mission, normally a task allocated to the division artillery headquarters. Similarly, commanders and operations officers would have to modify their procedures to account for diminished guidance, support, and increased latitude. Functions of other staff sections must be reviewed to determine what additional burdens decentralization imposes. The important thing is to create

situations that require units to think their way through the various problems.

Reassembling units after a nuclear attack will pose one of the battlefield's most difficult challenges. For this reason, unit ARTEPs need to include requirements for *reconstitution drills* that force units to reconstitute themselves from remaining assets. The basic process is relatively simple. It requires only a casualty and damage assessment of, for example, 30 to 40 percent. Care must be taken, however, to ensure that the casualty assessments eliminate key functions such as battalion operations and intelligence centers. In a nuclear war, it is unlikely that casualties will be limited within sections. Also, the enemy will very likely target command and control functions. Restoring these will pose for commanders the greatest challenges. The difficulty for commanders will be creating new sections out of whole cloth, not simply running them with reduced manning. Normal cross-training gives a unit that capability. Total replacement is a different case entirely.

Requiring units to exercise command and control through *alternate command lines* goes hand-in-hand with reconstitution drills. Each unit ARTEP, battalion-level and higher, must be required to exercise command through an alternate means. The requirement must be written so as to preclude augmenting the alternate command post with either equipment or personnel from the primary command element. Forcing units to operate their subordinate elements through alternate command channels for a substantial period—at least 48 hours—without reinforcement will cause them to establish a serious secondary command and control capability. Requiring a shorter period or permitting cross-reinforcement of personnel or equipment will preclude a sound evaluation and also give units a false sense of security about the resilience of their command and control. Equally important, the requirements must also direct the units to perform their normal range of functions while under the control of the alternate command post. *Infantry and armor* units, for instance, would conduct attacks or defenses utilizing external support. Also, the requirement for alternative command and control must apply to

representatives from joint forces. As a practical matter, this need will normally affect only Air Force personnel.

CONCLUSIONS

The conclusions of the preceding chapters stand in clear relief. US theater nuclear doctrine badly needs revision if it is to answer the needs of the integrated battlefield. Current doctrinal writings simply fail to address many of the real problems that will confront commanders of forces engaged in nuclear conflict. Furthermore, some of the assumptions that underpin doctrine require close scrutiny to ensure that they accurately characterize the nuclear battle. Some do not. Additionally, an institutional rigidity has overlain service doctrine, making it ill-suited for the fluid, decentralized, and even chaotic battlefield. This rigidity particularly affects release procedures. Finally, doctrine tends to emphasize the defensive aspects of employing nuclear weapons. Although a defensive bias flows logically from national policy, offensive use must receive equal attention.

Fortunately, the power to solve most of these problems lies within the services. Some modest decentralization coupled with an increased emphasis on dispersion and maneuver would go a long way toward shaping US forces into a configuration more compatible with the nuclear battlefield. Other equally salutary actions include a clear focus on enemy forces, a doctrinal commitment to redundant command and control, and conscious steps to preserve nuclear delivery systems. Lastly, the services must spur professional interest in nuclear conflict. Too easily have they allowed this vital branch of professional knowledge to atrophy. Tactical nuclear war will pose the greatest challenge US forces have ever faced. To do less than have the best minds available attempting to anticipate and solve its formidable problems invites disaster and defeat.

Doctrine, however, is not the only element requiring improvement for the nuclear battle. Equipment also stands in need of betterment. A commitment from service leaders to support the various programs that make equipment resistant to the effects of nuclear weapons would make a good first step. Limited budget dollars have many legitimate claimants. But when facing a potential enemy whose equipment, doctrine, and training all point to an ability to prosecute nuclear war, we must field equipment capable of functioning in that environment. It also makes good budgetary sense, because it costs less to acquire hardness through equipment design than by retrofit. Additionally, the services require some new items of equipment. Key among these are the enhanced radiation warhead and redundant command and control equipment. Equally important is an improved intelligence and targeting capability.

Like doctrine and equipment, training for the nuclear battle requires decided improvement. Individual training programs for Army and Air Force enlisted men must broaden the base of knowledge about the nuclear battle. Too many enlisted men know too little about nuclear weapons and their effects. Appropriate skills are taught, but not to enough soldiers. The officer corps must devote more time to planning nuclear battles. Unit training must orient itself to stressing operations on the nuclear battlefield. Command post exercises and field training must confront those situations likely to occur during a nuclear conflict: extensive casualties, disrupted communications, and loss of command elements. Only through rigorous attempts to overcome such obstacles in training will units build the capability to defeat them in war.

Theater nuclear war poses many complex challenges. Ignoring them will reduce neither their number nor complexity. Progress in this most difficult area will take time, money, and the stubborn commitment of our military leadership. The United States has control of the resources and leadership. In the final analysis, however, it may be our potential enemy who decides how much time we have.

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