DETERRENCE AND DEFENSE

in a Nuclear, Biological, and Chemical Environment

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Contents

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Preface

This volume is a revised version of the same title first published in 1995. It was, and remains, a brief primer on the key security issues that emerge from the proliferation of nuclear, biological, and chemical (NBC) weapons and missiles as a means of delivery. Since its initial publication, much work has been undertaken to improve our understanding of the NBC threat and the consequences for U.S. forces should these weapons be used. While these efforts have significantly advanced the knowledge base, the judgments of this primer remain valid.

The most noteworthy change from the first edition is the addition of a separate chapter on NBC terrorism. This reflects a growing national concern about the possibility for, and consequences of, terrorist use of these weapons against the United States homeland. We judge this threat to be real, and view it as a logical extension to the threat already posed to U.S. forces deployed abroad. Given the potentially profound implications of NBC weapons, we must devote attention to the mitigation of every aspect of this threat.

I.

The NBC Security Paradox

It is a paradox of the present security environment that at a time when the United States has renounced the possession of offensive biological and chemical weapons—and is reducing fundamentally the role of nuclear weapons in its defense posture—a number of actors are actively pursuing such weapons. These include not only rogue states such as North Korea and Iran, but also nonstate actors such as the Aum Shinrikyo cult that employed sarin gas in the Tokyo subway. Moreover, as the May 1998 nuclear tests in India and Pakistan demonstrated, the value ascribed to these weapons in some regions of the world is actually increasing. In fact, as evidenced by the use of chemical weapons in recent conflicts despite the strengthening of international legal norms against the possession of NBC weapons, barriers to possession and use may actually be eroding. For these reasons, NBC proliferation represents a growing and direct threat to U.S. security strategy and to the ability of the United States to use military force as an instrument of that strategy.

The intelligence community has published various assessments of more than two dozen countries that are actively pursuing NBC weapons programs and has identified many of these states as currently possessing or seeking ballistic missiles with ever longer ranges. The Department of Defense report, *Proliferation Threat and Response,* presents an equally troubling vision of the proliferation threat. Congressional publications, including *The Proliferation Primer* released by the Senate Committee on Governmental Affairs, make clear that the profound security implications stemming from NBC and missile proliferation are shared by both the executive and legislative branches.

Most troubling is that several of the countries pursuing NBC and missile programs represent a central threat to stability in regions of

vital U.S. interest. These states, located in critically important areas in which the United States has long-standing security commitments and the forward presence of forces, appear determined to pursue aggressive policies to advance their political and ideological goals. The United States is often perceived as the major obstacle to the achievement of these goals. The motives for acquiring NBC weapons, each differing in significant ways, must be seen in this context.[1]

Prevention of proliferation through traditional measures such as diplomacy, export controls, and security assurances is an essential element in responding to the NBC and missile threat. However, given the growing availability of dual-use technology and alternative suppliers, a determined proliferator of even modest resources is likely to succeed, especially with biological and chemical weapons programs. Thus, there is a clear requirement to prepare and plan more comprehensively for the threat represented by the proliferation of NBC weapons, as well as missiles as a means of delivery.

Nuclear Weapons

Nuclear proliferation clearly receives the greatest attention from the public, as well as within the policy community. After decades of largely positive news, nuclear nonproliferation efforts faced a serious set back with the Indian and Pakistani nuclear weapons tests. These tests, along with earlier discoveries about the sophistication of the Iraqi nuclear program and the continuing concern about leakage of fissile material from the former Soviet Union, have refocused attention on nuclear weapons proliferation.[2]

While the utility and legitimacy of nuclear weapons are increasingly questioned in the West, from the perspective of countries like Iran and North Korea there appear to be many potential benefits of possessing even a small handful of crude, low-yield weapons. The perceived value of these weapons is reflected in the often cited statement attributed to former Indian Army Chief of Staff Sundarji: one principal lesson of the Gulf War is that, if a state intends to fight the United States, it should avoid doing so until and unless it possesses nuclear weapons.

Presumably, in the eyes of proliferators, nuclear weapons would serve to coerce and deter the United States from responding to aggression such

as Iraq initiated against Kuwait or, at a minimum, would complicate coalition building within and outside the region. North Korea must also perceive enormous value in possessing nuclear weapons, perhaps by threatening Japan to deny the United States access or by actually using nuclear weapons against targets such as key ports and airfields in the south or in a more "tactical" way, such as for electromagnetic pulse (EMP) effects. The potential political—and therefore military—impact of the use of even one nuclear weapon is of such magnitude as to require careful consideration in devising possible responses and defenses.[3]

Biological Weapons

Although long treated as less threatening than nuclear weapons, increased attention is being given to the biological threat. Many of the Cold War assumptions about the strategic and tactical utility of biological weapons (BW) no longer appear valid. In fact, given the diffusion of the dual-use technologies involved, the pursuit of BW is now recognized as a relatively cheap and easily available path to acquire a weapon of mass destruction—the "poor man's atomic bomb." In addition, the absence of unique signatures for BW facilities, reducing their vulnerability to attack, only adds to the attractiveness of biological weapons.[4]

It is possible for biological agents to inflict massive casualties against "soft" targets such as cities to an extent that rivals megaton yield nuclear weapons. Further, because only small quantities of these highly lethal agents are needed to achieve significant effects, an aggressor can choose among multiple delivery modes and attack options. Moreover, as the number of states engaged in BW research has grown, the sophistication of their work has also grown, leading to technical advances (e.g., micro-encapsulation to produce more stable agents for use over longer periods) that may permit biological agents and toxins to be used in a more controlled fashion to advance tactical goals. In fact, while biological weapons have most often been seen as true weapons of mass destruction, it is evident that BW can be used in a more discriminate fashion, for example against troops, agriculture, materials (such as fuel and electronics), and against other assets such as ships and naval task forces. BW use on the battlefield and against such critical targets as airfields—once considered unlikely because of the slowness for biological agents to work

and their susceptibility to meteorological and prophylactic factors—has become a significant thereat.

The inability to detect and identify biological agents at a distance, and therefore to defend effectively against BW attack, further compounds the challenge. While gas masks can be effective against most agents with warning, and while progress has been made in such areas as vaccine research, current defenses cannot reliably protect U.S. forces or civilians. Planned improvements, such as the ongoing vaccination of U.S. forces against anthrax, will reduce the scope of the problem but not eliminate it. Moreover, the United States has only begun the process of developing strategic and policy responses to the BW threat, and only recently has it begun to address vulnerabilities to the biological terrorist threat.

Chemical Weapons

There are significant differences between chemical weapons (CW) on the one hand and biological and nuclear weapons on the other. For example, the relative lethality of CW is substantially less; a considerably greater quantity of chemical agent is needed to inflict a given level of casualties than for biological agents or, of course, for nuclear weapons. Likewise, significant differences exist in the feasibility of defenses. Although exceptions exist (such as chemical agents developed by the former Soviet Union capable of penetrating gas masks), it is possible to provide high-quality CW defenses, even for civilian populations, at relatively low cost.

Because of these differences, some experts tend to minimize the potential consequences of CW use, arguing that CW does not merit consideration as a weapon of mass destruction. In fact, as is clear from in-depth analyses of chemical play in European and Korean exercise scenarios, CW use against U.S. and allied forces and critical infrastructure facilities can have a major impact on the course of the conflict, particularly in increasing the number of casualties. Even with early warning, well-equipped and trained forces are likely to take some losses from CW attacks and, unarguably, such use—or even the threat of use—would have a dramatic effect on performance, particularly if use were prolonged.[5] Finally, the introduction of CW in a conflict will most likely have

profound political consequences that will, in turn, have a direct impact on the operation and outcome of the war, raising issues from war aims to—in the event of large-scale CW use—the possible use of nuclear weapons in response.

Missiles

The majority of NBC proliferators appear to view missiles, and specifically ballistic missiles, as the delivery system of choice. More than a dozen of these countries have operational ballistic missile programs. Although the ballistic missiles in the arsenals of these proliferators today are, for the most part, limited in range to about 600 kilometers, missiles capable of much longer ranges are being aggressively pursued. For example, Iraq, on its own, was able to increase significantly the range of its Soviet-supplied Scuds. North Korea is actively exporting longer range Scuds, has deployed the 1,000+ kilometer No Dong, and in August 1998 launched the Taepo Dong three-stage missile with an estimated range capability sufficient to strike Alaska and Hawaii. Potential buyers for these North Korean missiles are numerous. Similarly, as cruise missile technology becomes widely available (e.g., with the availability of global positioning system technology), cruise missiles will almost certainly become more attractive, offering a low-cost but highly effective means of NBC delivery.

II.

Key Security Challenges

One of the most fundamental implications of NBC and missile proliferation is its effect on deterrence and defense in the formulation and execution of U.S. national security policy. For example, Cold War models such as Mutual Assured Destruction have little relevance to the contemporary dynamics that establish the conditions for U.S. defense planning. As a result, it is imperative to conceptualize deterrence and defense differently, moving away from the grand strategies of the earlier East-West rivalry toward a regional focus.

The appendix includes a set of matrices that depicts various regional proliferation and policy issues, across the spectrum from acquisition of NBC capabilities to use. For purposes of this analysis, which concentrates more narrowly on the challenges that the U.S. military faces as a consequence of continuing NBC and missile proliferation, it is essential to come to grips with three central operational questions:

- How can the United States deter the use of NBC weapons against U.S. forces and those of its allies?
- What can the United States do to protect its forces if NBC weapons are used?
- How can the United States prevent further use once such weapons are used?

It is evident that there are no simple answers to these complex questions. As a possible guide for framing the issues involved, it may be useful to begin by asking how can the United States deter war. To the extent that NBC weapons are viewed by proliferators as undermining the capability and credibility of U.S. conventional forces, the very possession of NBC weapons could make these states more likely to engage in war,

and the very decision to go to war may be a function of the willingness to use NBC weapons. That is, there may now be situations—Korea is a likely case—where the only way to deter the use of NBC may be to deter the outbreak of war. Nevertheless, should deterrence of war fail, it is still essential to understand the requirements to deter NBC use in conflict.

As a first step, one can consider a number of "lessons learned" from case studies where deterrence has succeeded, as well as where it has failed.[6] In this regard, several observations are relevant:

- Given the right conditions, deterrence can work. U.S. security policy should be designed to strengthen and make more effective deterrence in the face of regional NBC proliferation.
- Deterrence is inherently complicated. Numerous factors shape its success or failure; some are difficult to know and some are impossible to affect reliably. At a minimum, for deterrence to work, a number of specific conditions usually must be met. These include, but are not limited to: a “rational” cost-benefit calculation on both sides, mutual understandings, effective communications, and control of forces. The problems with meeting these conditions are likely to be more significant in the current strategic environment than they were during the Cold War.
- The United States needs to include new factors in thinking about deterrence, factors that are likely to vary substantially region by region and even country by country. These include cultural/religious differences that influence value hierarchies, risk tolerances and communications.
- Countries will seek to use their NBC capabilities to deter the United States from intervening into their region. In this sense, deterrence is more of a two-way street than in the East-West relationship.
- Especially when regime survival is at stake, rogue countries will likely assume that the asymmetry of interests will favor them over the United States.

- Given that the necessary conditions for deterrence to succeed are less likely to pertain, the United States must be prepared for the possibility that deterrence will fail.

From these "lessons," it is also evident that fundamental to the concept of deterrence is the requirement to possess—and be seen as possessing—the capability and will to inflict a greater amount of pain in relation to the potential gain that would result from the action being contemplated. In short, to deter conflict, as well as to avoid being deterred, the United States must be prepared for war. This includes both the ability to retaliate with overwhelming force (deterrence by threat of punishment) as well as the ability to overcome the effects of NBC use and continue to prosecute effective operations and prevail in the conflict (deterrence by denial).

III.

Operational Implications

To understand how best to prepare military forces for operations in an NBC environment, it is necessary to identify how NBC and missiles are likely to be employed by proliferant states and the operational implications of such use at both the strategic and tactical levels.[7]

Employment concepts of potential regional adversaries will almost certainly be much different than those assumed of the former Soviet Union by U.S. planners in the Cold War. In the regional context, NBC weapons—and especially BW and CW—are likely to be used against the United States and its coalition partners to achieve special effects, not solely as weapons of mass destruction designed to cause large numbers of indiscriminant casualties. These weapons may best be understood as instruments that weaker adversaries would use selectively against known or presumed vulnerabilities of the United States and its coalition partners, precisely because they can be tailored to achieve significant and immediate political, psychological, and military effects.

Adversaries seeking to maximize the advantages of NBC weapons to counter U.S. conventional superiority may pursue anti-access strategies that rely on these weapons to deny U.S. presence in their region. Thus, rather than being seen as weapons of last resort, for some, NBC weapons are likely to be seen as weapons of choice, to be employed early in a conflict. Such weapons could be used in a manner that creates substantial, possibly crippling, political and military problems for the United States and its allies. Large fixed facilities essential to the prosecution of the war, such as airfields and ports, or targets that must be defended for political reasons, such as population centers, are especially vulnerable. As a result, use or threat of use of NBC weapons can slow entry into theater and degrade employment of superior conventional forces by damaging or

destroying critical facilities and nodes, and by holding key force capabilities continuously at risk.

At the strategic level, one fundamental principle is that future U.S. military engagements could carry the risk of NBC use. Thus, it is essential to think about the problem in a broad political-military context, across the spectrum from policy to acquisition, to doctrine and training, to the conduct of operations. Observations at the strategic level include:

- The threat of strategic attack with NBC would most likely be designed to cause the loss of political/public support in an effort to deter the United States from acting or to force its withdrawal. In such circumstances, the national command authorities will want assurances that U.S. forces will not come under attack or, failing such assurances, that U.S. forces will have a highly effective defense, at least against biological and chemical weapons.
- Use of NBC could impact directly on the outcome of a conflict if such use or the threat of use inhibits the U.S. ability to deploy or conduct reinforcement, alters U.S. wartime objectives, disrupts coalition formation or cohesion, or causes capitulation of the country being defended. Loss of staging areas/bases in neighboring countries, because of coercive threats to (or actual attack on) those countries, could severely curtail U.S. or coalition operations, possibly compromising the overall prosecution of the campaign (e.g., although an attack may be contained, there may not be sufficient logistic support available to conduct a counterattack).
- NBC weapons could alter the military balance in the region if their use severely degrades the operational capabilities of U.S. and coalition forces.
- Uneven capabilities among various coalition elements, with regard to equipping and training for NBC operations and for defending against ballistic and cruise missile attacks, would offer an adversary opportunities to exploit.

At the operational level, it is important to think about the impact of NBC use both on individual units and on larger formations. At the unit level, a number of observations can be made:

- Once the presence of NBC capability in the hands of opposing forces has been established (or even suspected), U.S. and coalition forces will have to carry with them at all times their protective gear, and may be compelled to alter their activities in ways that decrease operational effectiveness and increase vulnerability to conventional attack. After the first use of NBC weapons, or perhaps even before, units will have to consider attacks as potentially involving NBC, and thus will need to operate for extended periods inside protective clothing/enclosures.
- The consequences of operating in protective gear designed for use in a CW environment can be severe, reducing unit effectiveness dramatically. It may be the case in the future that additional protection will be necessary in a BW environment. Moreover, troops subjected to NBC attacks may become disoriented and subject to panic, eroding unit cohesion. Use of antidotes can have adverse physiological and psychological impacts and cause antidote casualties, further decreasing unit effectiveness.
- Units required to undergo decontamination will likely be out of action for considerable time and require diversion of logistics resources (personnel, water, etc.) from other missions. There are also adverse effects on equipment exposed to certain chemical and biological agents, and major decontaminants can corrode and destroy components. Extended exposure of critical equipment can produce significant losses.

For larger formations, the following observations apply:

- U.S. and coalition forces will be most vulnerable to NBC attack when entering the theater of operations, when large numbers of forces are concentrated

at a relatively small number of airfields and ports. Therefore, plans will have to include multiple and dispersed points of entry—as well as departure—to avoid over concentration, and the adverse effects of loss, even for short periods, of critical nodes. The requirement to avoid overcrowding can lead to unacceptably long insertion, force concentration, and resupply times, jeopardizing the ability of the committed forces to carry out their missions.

- NBC weapons used to disrupt ground, air, and sea operations could have a crippling effect on the ability of forces to carry out their missions. For example, diverting aircraft and crews to alternate bases may place them in less protected facilities, and require them to fly longer routes to targets, thus stressing the surveillance, detection, and target acquisition requirements, and increasing the demand for tanker support. Because of increased operating distances, response times, mutual support, and resupply times will also be adversely affected.
- As noted, units and facilities operating under the immediate threat of NBC use, or in areas where such weapons have actually been used, will suffer serious degradation in their ability to carry out required tasks. These losses must be made up for by diversion of other combat and logistics resources from their primary tasks, thus reducing overall force effectiveness. For example, while a main operating base may be reasonably resistant to BW and CW attacks if adequate warning is provided, the resulting requirement to operate in protective gear will inevitably reduce sortie generation rates.
- There will be significant implications concerning the provision of medical assistance. Field medical activities will be difficult if not impossible to perform in contaminated environments (e.g., assessing vital signs and administering aid are next to impossible when individuals are in protective gear). Medical facilities are likely to be rapidly saturated, especially if

indigenous populations are affected, thus increasing recovery times with the result that individual battle casualties will be out of action for longer periods of time.

- Headquarters and logistics facilities may be particularly at risk. Certainly a large, forward-deployed headquarters would be vulnerable. Consequently, the existence of an NBC threat will constrain options as to where a headquarters facility can be located and how it should be defended.
- If key assumptions about how quickly U.S. conventional forces would be able to destroy or render ineffective the NBC threat are proven to be optimistic, the United States may find that assumptions about its ability to operate for protracted periods in a protective posture may be proven wrong. Over time, the degradation in the ability to operate effectively may be more severe than currently anticipated.
- It is possible that over the longer term the ongoing "revolution in military affairs" will offer opportunities for reducing the vulnerability of U.S. and coalition forces to NBC attack (e.g., techniques and weapon systems that will minimize the requirement to concentrate forces). However, while U.S. advanced conventional capabilities will undoubtedly increase, the capability of adversaries to employ NBC weapons in an asymmetric fashion will also improve (e.g., increased ranges to reach beyond the region, including the ability to strike the United States homeland).

Finally, in addition to the above, the direct and psychological impact of NBC use on the civilian population of the country being defended, although not measurable, could have substantial operational and strategic consequences:

- Reactions by civilian populations could become militarily significant. For example, mass migrations could impede military movements, operations, and freedom of action.
- Activities dependent on local civilian labor may be curtailed, such as port operations, either through loss of life to NBC attack or through desertion of individuals or their refusal to participate due to NBC threats.
- The destruction of civilian assets (or, in the case of BW and CW, killing the people that operate them)—power sources, communications means, transportation infrastructure—could have fundamental consequences for the military campaign. In addition, the necessity to divert resources to reestablish these assets would be a significant drain on capabilities.
- The requirement to divert resources, ranging from active defenses against missile attack to medical resources, to protect civilian populations will severely curtail the availability of such support to the operating forces.

As a consequence of these factors, insofar as effective active defenses and a rapid medical response to NBC attacks can mitigate their effects and reassure allies and publics, these strategic assets will become increasingly important.

IV.

Protecting U.S. Forces

Given the potential strategic and operational impact of the use of NBC weapons, it is imperative to focus on protecting U.S. and coalition forces. In fact, as noted earlier, being prepared for the use of these weapons—and being able to mitigate and overcome their effects—is an essential element in deterring their use. In this context, the Counterproliferation Initiative and the Joint Warfighting Capabilities Assessment (JWCA) process have identified a number of major weaknesses and necessary enhancements to the U.S. ability to defend against the threat.

Beginning on an annual basis since 1994, the interagency Counterproliferation Program reviews have recommended increased funding to overcome high priority shortfalls in a number of operational capabilities. These recommendations have included support for:

- Real time detection and characterization of BW/CW agents, including stand-off capability
- Passive defense capabilities enabling military operations to continue in contaminated conditions, actual or threatened
- Underground structures detection, characterization and hard target defeat
- Prompt mobile target kill
- Capability to locate and disarm NBC weapons inside and outside the United States hidden by a hostile state or terrorist in a confined area
- Detection and interception of low flying/stealthy cruise missiles; and
- Rapid production of protective BW vaccine.[8]

In addition, these reviews have emphasized the critical need to improve U.S. intelligence capabilities, both collection and analysis, tailored to the NBC proliferation threat, as well as the central importance of

theater ballistic missile defense.

The problems of protecting U.S. and coalition forces from BW attack are particularly challenging. The inadequate state of existing defenses is a reflection of the difficulties inherent in creating effective BW defenses. Complicating efforts across the board is the absence of standoff BW detectors capable of providing early warning of an impending attack. The United States also lacks vaccines for many likely BW agents, and many of those that do exist may be only marginally effective. Finally, the United States does not have an adequate capability to decontaminate people, equipment, or areas exposed to BW agents. Therefore, it is possible that individuals could come into contact with BW agents for a significant period of time after an attack.

Beyond supporting improvements such as those identified above, it is essential to ensure that the emerging NBC threat is realistically incorporated into service and joint doctrine and operational planning. It is also imperative that U.S. forces train for the threat in a more realistic way and that the various acquisition communities consciously consider NBC in every aspect of their work. The U.S. military leadership must also actively promote and participate in the development of new deterrence strategies for regional conflict.[9]

V.

Deterring NBC Use

Deterrence is clearly the first and preferred line of defense. As noted, one essential element of deterrence is maintaining a credible capability across the spectrum of forces, from conventional superiority—including the ability to operate in an NBC environment—to a reliable and effective nuclear force. Ongoing efforts to improve passive and active defenses, as well as counterforce capabilities, will add to the U.S. ability to deter. However, it is necessary to go beyond capabilities to a reexamination of how to think and plan for deterrence in a regional context.

Many of the assumptions on which U.S.-Soviet deterrence was founded may not hold true today. For example, the United States ascribed a basic and shared rationality to Soviet leaders that may not always be present in regional conflicts. It was assumed that the Kremlin would act in its own best interests and could be deterred if the United States held at risk assets of value to the Soviet regime—whether population, industry, or leadership—that could be destroyed in a retaliatory strike. At its core, mutual assured destruction assumed the Soviet Union would act to reduce the probability of nuclear war and would choose the status quo before risking national suicide. Such "logic" may not apply in a regional context. In particular, regional states motivated by messianic anti-Western zealots or by regime survival may well act differently, perhaps being more willing to risk annihilation for outcomes the United States would not consider "rational."

Articulating a regional deterrence strategy (or strategies) should be assigned a high priority. The difficulties involved are substantial. To some extent these arise from the multiplicity of the potential uses of

these weapons, especially biological weapons, to include a spectrum of uses from non-lethal tactical use to indiscriminate and surreptitious use against urban centers. In addition, with the possible exception of the former Soviet Union, there is little or no information available regarding the employment doctrines of states with nuclear weapons and offensive BW programs. Therefore, it is difficult to determine how such weapons are viewed by potential users in a way that makes it possible to develop deterrent and retaliatory responses.

Deterrence of CW use, especially given the much greater capability to protect against the CW threat, may be easier to establish than deterrence of nuclear and BW use against U.S. forces. A robust defense capability against CW use strengthens deterrence by denying an adversary the ability to achieve his objectives through the use of CW. This conclusion is supported by the Persian Gulf War experience during which Iraq did not use its considerable CW capabilities, in part (at least according to reports of POW interviews) because of the perceived advantages in passive defenses possessed by U.S. forces relative to Iraqi forces. On the other hand, if U.S. forces are not able to protect themselves from CW attacks, and if those attacks are seen as having a significant impact on the military situation (which large-scale use is likely to have), deterrence would be undermined.

It is a necessary, though not sufficient condition that, to deter NBC use, the United States will need to be perceived as capable of and committed to responding to such use with force and decisiveness. Under the Biological Weapons Convention and the Chemical Weapons Convention, the United States has given up the right to respond in kind to BW and CW use. Therefore, the United States is limited to conventional and nuclear response options and must think about the interrelationship of these two capabilities so that they work together to strengthen deterrence. For example, the United States will want to maintain the ability to redeploy nuclear weapons of an appropriate type on ships and aircraft that could be sent to a region under certain crisis or conflict conditions.[10]

Conventional superiority may well be able to deter NBC use in most cases, particularly as conventional weapons become capable of extracting destruction of military capabilities comparable to weapons of mass destruction. However, it is not certain that U.S. conventional forces will be successful in deterring an adversary under all circumstances.

War-winning capabilities do not always translate into war-deterring capabilities. It will be a challenge to make visible to an adversary the conventional capabilities the United States possesses so they become part of the deterrent calculation without compromising operational considerations.

Under some circumstances, U.S. nuclear weapons will play an important role in deterrence. For example, nuclear weapons are likely to play a central role in deterring nuclear use—as well as large-scale chemical and biological weapons use—against the United States and our coalition partners, and especially against the U.S. homeland. The key is to understand how nuclear and conventional forces together can best provide an effective deterrent.

One consideration regarding the role of nuclear weapons in deterring NBC use is proportionality. If a nuclear response is perceived as totally disproportionate, it could lack credibility. While a nuclear response may be seen as credible in retaliation for use of nuclear and/or biological weapons against urban populations, such a response might be seen as less credible if initial use is confined to the battlefield. However, even at the lower end of the spectrum, nuclear weapons play a role in deterring NBC use. In fact, the United States may want to be seen as considering a disproportionate response to NBC use against U.S. forces or coalition partners in order to enhance deterrence.

The Gulf War experience may be instructive in this regard. In this real world case, Iraq—after having taken measures to fill bombs and Scud warheads with BW and CW agents—did not employ these weapons, even as it was being overwhelmed on the battlefield. Although it is impossible to know with confidence why Iraq did not use its CW and BW, revelations in late 1995 by the Iraqi leadership indicate that Iraq's decision was based in part on the fear that the United States would retaliate with nuclear weapons in the event of a BW or CW attack. This Iraqi concern stemmed from a direct U.S. warning that Iraq would suffer catastrophic consequences if it used BW or CW against the coalition. Baghdad interpreted this to mean nuclear retaliation. The warnings from Israel almost certainly reinforced this interpretation.

The success of deterrence in *Desert Storm* resulted not only from the extent of U.S. capabilities to retaliate, but also the seriousness with which

U.S. leadership responded to the potential threat. Both elements—ensuring the efficient marshaling of capabilities and effectively communicating resolve—will need to be present in the future if NBC use is to be deterred in regional contexts.

How the United States can best deter NBC use will differ region by region and country by country. In developing regional deterrent and defense strategies, understanding the regional and national military/political/cultural dynamics is critical to identifying those assets that should be held at risk for deterrent purposes. It is also essential to determine how best to communicate intentions, both with regard to public declaratory policy as well as private communications and nonverbal messages to demonstrate resolve.[11] Most important, it is imperative that the defense community undertake detailed contingency planning and be prepared to execute military options to deter the use of, to defend against, and to destroy NBC assets that threaten U.S. and coalition interests. To improve the prospects for deterring NBC use, the United States must think through the complex problems, case by case, before the conflict starts.

VI.

Responding to and Preventing Further NBC Use

The failure of deterrence, and the use of NBC weapons against U.S. and/or coalition forces, will fundamentally alter the character of the conflict. U.S. responses—conventional and nuclear—are likely to be tailored to the type and consequences of the NBC use that has occurred. For example, a demonstrative use or an EMP nuclear burst would elicit a different response than use against a city. Small-scale CW use on the battlefield could provoke a different response than BW use causing a large number of civilian casualties. Other factors will also shape the U.S. response. For example, if the use is an act of desperation before imminent collapse, the United States may choose simply to push forward without changing objectives or the method of fighting. On the other hand, if enemy use is early or has a major impact on the campaign, the United States may be forced to alter its method of warfare.

NBC use against the United States and/or its coalition partners would, in almost every case, result in an even greater effort to destroy the adversary's ability to conduct follow-on use and perhaps lead to a change in war aims. The United States would most likely redouble its efforts to destroy the NBC capabilities of the enemy, at a minimum expanding the target list for conventional strikes and, perhaps, resorting to the use of nuclear weapons against such targets as deep underground facilities which are invulnerable to conventional attack. Conversely, U.S retaliatory options could be constrained or curtailed by the politics of the coalition.

In addition to the expansion of counterforce strikes, the United States would also likely consider retaliatory measures to restore deterrence

and/or to punish the enemy. Presumably, before NBC had been used, the United States would have warned of dire consequences if NBC weapons were to be employed—as was done in the Gulf War. It is likely, for example, that the survival of the regime would have been threatened in order to deter initial use. Once deterrence had failed, the United States could well be faced with the dilemma of either backing down from this threat or actually carrying it out by attempting to eliminate the regime. If the latter course were pursued, the enemy might have little incentive not to employ whatever capabilities it retained to better ensure its continued survival, including follow-on use of NBC weapons. Strikes to punish the enemy could also present a dilemma by risking an expansion of NBC use against U.S. cities, including unconventional delivery.

How the United States responds will depend on the unique characteristics of the NBC attack. What is clear, however, is the need to begin to think about response options in a comprehensive and systematic way. Many facets of U.S. capabilities will be involved—from medical, public diplomacy, and public affairs, through the full range of offensive and defensive military capabilities. Each of these responses must be seen both in their "tactical" as well as their strategic contexts. Rapid medical and other consequence management capabilities may, in certain circumstances, contribute as much to victory as successful attack operations.

VII.

NBC Terrorism

The terrorist use of sarin nerve agent in March 1995 by the Japanese cult Aum Shinrikyo, coupled with the subsequent discovery that the same group tried to develop and use biological weapons, demonstrate that the threat from NBC weapons is not restricted to military use. A growing number of analysts also have come to recognize that some countries, either through employing terrorists or their own covert operatives, might be tempted to threaten or use NBC weapons against military and civilian targets on the territory of the United States.[12] Many terrorism experts have long argued that moral and political constraints inhibit terrorist groups from employment of weapons for the purpose of mass killing. In this view, terrorists are rational actors in pursuit of specific political objectives, and mass murder is counterproductive to the achievement of their aims. More recently, however, there has been a growing recognition that this model of rational constraint does not apply to all terrorist groups. Specifically, many terrorism experts now argue that some groups find mass murder perfectly consistent with their objectives. The World Trade Center bombers reportedly hoped to kill most of the 250,000 people who worked in the twin towers complex.[13] The Aum's original goal was to kill millions.

There is considerable evidence that terrorists have shown an interest in nuclear, biological, and chemical weapons, although there is less evidence of actual intent to use them.[14] Under what circumstances might a terrorist group seek to deal in mass death? The prevailing view, and it appears to be supported by the available evidence, is that groups with apocalyptic visions are most likely to consider use of weapons of mass killing. There has been a substantial increase in the number of religiously motivated terrorist groups in the past 30 years, and these organizations are often associated with incidents that involve large-scale death and destruction. Essentially, such groups may operate on the basis of their own conceived moral and political

imperatives that eliminate the inhibitions that generally constrain more traditional terrorist groups. They may have millenarian visions and may rely on the support of groups that share those perspectives.

An additional concern is that a hostile state might execute covert NBC attacks on the territory of the United States, using its own forces or relying on a terrorist group. The Department of State has identified seven countries as state supporters of terrorism: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria. Significantly, all of these countries are suspected of possessing a biological weapons programs, six possess chemical weapons programs, and four have nuclear weapons programs (see table).

Concerns that terrorists might employ NBC weapons against U.S. military forces have made defenses against such attacks an important force protection consideration. Similarly, because of the recognition that it may not be possible to deter or stop covert NBC attacks, consequence management, which involves dealing with the effects of NBC use, has been given increasing attention.

State Supporters of Terrorism and NBC Programs

State Supporters of Terrorism	*Nuclear Program*	*CW Program*	*BW Program*
Cuba	None	None	Confirmed
Iraq	Confirmed	Confirmed	Confirmed
Iran	Confirmed	Confirmed	Confirmed
Libya	Confirmed	Confirmed	Confirmed
North Korea	Confirmed	Confirmed	Confirmed
Sudan	None	Confirmed	Confirmed
Syria	None	Confirmed	Confirmed

Sources: U.S. Department of State, *1997 Patterns of Global Terrorism Report,* April 1998. Except for Cuba and Sudan, assessments are based on Arms Control and Disarmament Agency, *Adherence To and Compliance With Arms Control Agreements, 1997,* and Office of the Secretary of Defense, *Proliferation: Threat and Response,* November 1997. On Cuba, see DIA, "The Cuban Threat to U.S. National Security," May 6, 1998, found at *http://www.defenselink.mil*. On Sudan's chemical weapons activities, see the background briefing by U.S. intelligence officials, "Terrorist Camp Strikes," August 20, 1998, as found at *http://www.defenselink.mil,* and comments by the British Minister of State for Defence, George Robertson, "Britain Has Bin Laden Evidence," *Associated Press,* August 23, 1998.

VIII.

Observations and Conclusions

It is difficult to derive general propositions concerning deterrence and defense against NBC in a regional context. Nonetheless, a number of observations and conclusions can be made which may help to frame the central issues.

Increased Threat of NBC Proliferation

- Proliferation of NBC weapons and increasingly longer-range missiles represents a real threat to stability in regions of vital interest to the United States, regions in which U.S. national strategy requires the capability to engage militarily, most likely with coalition partners.
- NBC weapons in the hands of hostile states raise the risks involved in engaging in these regions, undermine deterrence based on conventional superiority, and threaten the U.S. ability to conduct military operations. It is necessary to consider how these weapons could be used against the United States and coalition partners in a regional context and what must be done to deter and defend against them.
- The use of NBC against U.S. and coalition forces, unless confined to small-scale tactical employment such as CW on the battlefield, could have major strategic and operational effects on military missions and objectives. Any use would, almost certainly, fundamentally alter the political nature of the conflict. Even the threat of NBC use could lead to new pressures (e.g., wedge driving within the coalition), as well as reassessments of U.S. war aims and resolve.

- The utility and effects of NBC weapons differ by type of weapon and scale of use. While nuclear weapons have certain attributes that make them useful tools for political intimidation, chemical and especially biological weapons pose particularly challenging problems in other ways. Compared to nuclear weapons, both are relatively easy and cheap to acquire and, because the required supporting facilities lack unique signatures, both are much less vulnerable to attack. Moreover, the diffusion of dual-use technologies, particularly in advanced biotechnologies, makes more feasible the use of BW against both military (e.g., airfields and ports) and civilian targets. The possible covert nature of BW attacks and the limited ability to defend against them have serious implications for deterrence and warfighting.

Deterring NBC Use

- Deterrence works in two directions. Just as the United States will seek to deter an adversary from using NBC against U.S. and coalition forces, an NBC-armed adversary will seek to deter the United States and its partners from intervening and bringing to bear their overwhelming conventional superiority. In order not to be deterred, the United States must demonstrate—to the enemy and to itself—that the use of NBC will not produce military and political benefits that outweigh the associated risks. In this context, the requirement for mitigating the effects of NBC use can extend, particularly in a coalition effort, to the protection of civilians, both those essential to the war effort as well as more broadly (as evidenced by the deployment of Patriots in *Desert Storm* to protect cities).
- At a minimum, for deterrence to succeed, the United States must have—and be perceived as having—the capability and will to retaliate against an enemy by holding at risk assets of value that can be attacked and destroyed if the enemy undertakes the action that was to be deterred. Given the importance of creating

and maintaining coalitions in regional conflicts, the U.S. deterrent posture must also be credible to prospective partners.

- To be credible, the U.S. deterrent posture requires the demonstration of consistency of purpose and resolve over the long term. The U.S. reputation for resolve is affected by U.S. actions over time and across the spectrum of security policy.
- Deterrence remains the first line of defense against NBC, and the basic elements of deterrence must be maintained and strengthened. However, traditional approaches to deterring NBC use in unstable regions are inherently uncertain. Many of the conditions necessary for deterrence to work may not be present. For example, the adversary may not employ "rational" cost-benefit calculations (as the United States might define them), and mutual understandings of the implications of NBC use may not exist. In the final analysis, deterrence requires an understanding of the strategic personality of the adversary. This requires an understanding of the region, of the culture and of the leadership itself. Working to achieve this depth of understanding is essential, but one must recognize the inherent limitations in this approach.
- For these reasons, the United States must reexamine the assumptions of, and requirements for, deterrence in a regional context, taking into account cultural and "value" differences. The United States must also develop more effective ways to communicate both resolve and capabilities, through declaratory policy and private channels. The credibility of U.S. deterrent forces can also be enhanced through such measures as deployments and exercises.
- U.S. superiority in conventional forces cannot be expected in all circumstances to deter war, or the use of NBC weapons after war has begun. Thus, although the role of U.S. nuclear weapons in a regional context has not been precisely defined, nuclear weapons remain the ultimate sanction and a vital element of deterring NBC use. For this reason, it is necessary to resist further attempts to delegitimize U.S. possession and potential use of nuclear weapons.

- While deterrence must remain the first line of defense, the United States must undertake prudent defense measures based on the likelihood that deterrence will fail. In this context, defenses against increasingly longer range ballistic missiles have become critical. As evident with North Korea, it would be unwise to accept (either by neglect or by policy design) new mutual vulnerability relationships with other nations.

Protecting Against Use and Preventing Follow-on Use

- Should deterrence fail, and NBC weapons are used against U.S. and coalition forces, the military and political implications could be profound, both at the strategic and operational levels. Given the potential impact of such use on individual units and larger formations, as well as on civilian infrastructure, the United States must have sufficient capability both to render an adversary's NBC use less effective and to prevail on the battlefield.
- Once use has occurred, the United States would seek to reestablish deterrence and, perhaps, to eliminate the enemy's ability to continue use and/or the regime itself. These are complex goals that involve a number of difficult choices that need to be examined thoroughly.
- Therefore, the United States must have the ability—in terms of doctrine, training and equipment—to protect its forces and ensure that they can operate effectively in an NBC environment. This requires the maintenance of effective conventional and nuclear forces, as well as detailed contingency planning for deterrence and defense in a regional context. It also requires that defense, both active and passive, be given high priority. Without these tools, deterrence will be undermined and the likelihood of NBC use against the United States will increase.

Endnotes

[1] In particular, a number of proliferant states perceive NBC and missiles as the best means to counter overwhelming U.S. conventional superiority. For a review of this and related issues see: Patrick J. Garrity, *Why the Gulf War Still Matters: Foreign Perspectives on the War and the Future of International Security,* Report No. 16 (Los Alamos, NM: Center for National Security Studies, Los Alamos National Laboratory, July 1993,), esp., 109–115.

[2] See, *Tracking Nuclear Proliferation, A Guide in Maps and Charts, 1998,* Rodney W. Jones, Mark G. McDonough with Toby F. Dalton and Gregory D. Koblentz, Carnegie Endowment for International Peace.

[3] For a treatment of why regional states might want to acquire nuclear weapons, see Dean Wilkening and Kenneth Watman, *Nuclear Deterrence in a Regional Context* (Santa Monica, CA: RAND, 1995), esp. 31–38.

[4] See Seth Carus, "The Proliferation of Biological Weapons," in Brad Roberts, ed., *Biological Weapons: Weapons of the Future?* (Washington: Center for Strategic and International Studies, 1993).

[5] See, for example, *The Effects of Chemical and Biological Weapons on Operations: What We Know and Don't Know* (Washington: Center for Counterproliferation Research, National Defense University, February 1997).

[6] See Keith B. Payne, *Deterrence in the Second Nuclear Age* (The University Press of Kentucky, 1996). In addition, for an informative recent case study with extensive bibliographical notes on the relationship between capability and deterrence, see: Elli Liberman, *Deterrence Theory: Success or Failure in Arab-Israeli Wars?* McNair Paper 45 (Washington: National Defense University Press, October 1995).

[7] For an in-depth treatment of NBC adversary use concepts, see *The NBC Threat in 2025: Concepts and Strategies for Adversarial Use of Nuclear, Biological and Chemical Weapons* (Washington: Center for Counterproliferation Research, National Defense University, February 1997).

[8] See, for example, the 1998 Counterproliferation Program Review Committee Report to Congress, *Report on the Activities and Programs for Countering Proliferation,* May, 1998.

[9] See, *The Impact of Nuclear, Biological, and Chemical Proliferation on U.S. Armed Forces* (Washington: Center for Counterproliferation Research, National Defense University, September 1996).

[10] See, *U.S. Nuclear Policy in the 21st Century: A Fresh Look at National Strategy and Requirements* (Washington: Center for Counterproliferation Research, National Defense University, December, 1998).

[11] A number of studies suggest that deterrence is not like a switch that can be readily turned on at will. "Deterrence must be practiced early on, before an adversary commits itself to a challenge and becomes correspondenly insensitive to warnings that such a course of action is likely to result in disaster." Ned Lebow, "Deterrence Failure Revisited," *International Security* (Summer 1987): 212–231.

[12] These concerns were most forcefully articulated in the National Defense Panel, *Transforming Defense: National Security in the 21st Century,* December 1997, and the

Defense Science Board (DSB), 1997 Summer Study Task Force, *DoD Responses to Transnational Threats,* October 1997, Office of the Under Secretary of Defense for Acquisition and Technology, Washington, D.C.

[13] For competing views relating to terrorist motivation, see Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, Massachusetts: MIT Press, 1998). See also Bruce Hoffman, *Inside Terrorism* (London: Victor Gollancz, 1998).

[14] See W. Seth Carus, *Bioterrorism and Biocrimes: The Illicit Use of Biological Agents in the 20th Century* (Washington: Center for Counterproliferation Research, National Defense University, December 1998).

Appendix

Conceptualizing NBC and Missile Deterrence

When thinking about the role of deterrence in preventing and protecting against NBC and missile proliferation, it is useful to ask: *Who is to be deterred? What action is to be deterred? And what tools are best suited to achieve U.S. deterrence and defense objectives?* The series of matrices that follow—while purely illustrative—can be helpful both in visualizing the complexities involved in trying to answer these questions and in thinking about the various tools that can be used in trying to achieve desired outcomes.

Matrix 1: NBC/M Proliferation—Actors and Goals. This first matrix displays a broad conceptual picture of what it is that the United States may want to deter with regard to NBC proliferation.

The column headings depict the "whom" of deterrence, that is, those actors that the United States wants to deter from taking the actions listed in the rows. Breaking actors out in this way recognizes that there are a variety of actors whose relationship to the United States must be differentiated.

The rows depict the "what" of deterrence, that is, those activities that the United States wants to deter or prevent from happening, starting with acquisition of NBC itself and moving through a series of more threatening actions ending with preventing damage from the use of NBC against U.S. forces and/or homeland.

The scheme depicted here provides one possible basis for differentiation (other divisions could be conceived). It classifies actors from those whose proliferation activities would be the least threatening to the United States (i.e., allies) to those whose acquisition of NBC would be the most threatening (so-called rogue states and nonstate actors).

In these matrices, the term "allies" is used in the traditional sense of countries closely associated through treaty obligations with the United States. The term "neutrals" is sufficiently broad to cover states such as India and Pakistan, as well as Israel and Taiwan. The latter two, although benefiting from U.S. diplomatic and security assistance, are faced with neighbors hostile to their existence, and their formal security ties to the United States are not as firm as, for example, U.S. NATO allies. "Rogues," a term that may have little analytical value, tries to capture states whose acquisition of NBC capabilities threaten most directly U.S. interests in important regions of the world. "Nonstate actors," a cell about which relatively little is known, may become a greater focal point for analysis in the future.

Such a differentiation, while imperfect, recognizes that there are widely different consequences for proliferation "failure," depending on the state in question. For example, failure to dissuade an ally from acquiring certain capabilities—however unwelcome that may be—is likely to have far less serious consequences than the failure to deter a potential adversary from acquiring such capabilities. As such, this sort of differentiation provides one conceptual cut at the relative dangers to the United States if deterrence fails.

Matrix 2: NBC/M Proliferation—Response Tools. In this second matrix, the cells have been filled with notional judgments on the kinds of tools—diplomatic, political, economic and military—suited to deterring the unwanted action. It provides a quick overview of the range of tools available to cope with the proliferation problem.

Matrix 3: NBC/M Proliferation—Key Questions. The third matrix raises some of the key questions that remain to be resolved, for instance:

For Allies: How does the United States maintain credible

security guarantees to its Allies and thus reduce the likelihood that they pursue NBC capabilities for their own security?

For Rogues: What are the useful regional distinctions in deterring NBC acquisition and use?

For Nonstate Actors: Does the concept of deterrence have meaning with nonstate actors?

Clearly, prevention must remain the central focus of U.S. nonproliferation policy; here, if anywhere, an ounce of prevention is indeed worth a pound of cure. Nonetheless, history has demonstrated that a determined proliferator can and will be successful. Given this experience, it is important to examine in greater detail the consequences of NBC/M proliferation for U.S. forces.

Matrix 4: Regional Deterrence Objectives in Crisis and War. This matrix depicts some of the key operational goals raised earlier—deterring NBC use against U.S. forces; limiting damage if use occurs; and preventing follow-on use. Here, the columns are defined by time: prewar, war, and postwar. Again, the format allows a quick look at the kinds of strategies that can be used to begin to achieve U.S. objectives and helps identify gaps that exist.

Matrix 5: Regional Deterrence Objectives—A First Cut. This final matrix suggests elements that may be useful to pursue in thinking about how U.S. policy, strategy, and operational capabilities can contribute to deterrence and damage limitation in a regional NBC environment. Each cell raises questions that require additional research and policy consideration.