

# Nullifying the Effectiveness of Weapons of Mass Destruction (NBC)— with Integrated Land-, Air-, and Space-Based Sensors and Analysis

By Major William E. King, IV

*"Weapons of mass destruction, nuclear, biological, and chemical, along with their associated delivery systems, pose a major threat to our security and that of our allies and other friendly nations. Thus, a key part of our National Security Strategy is to seek to stem the proliferation of such weapons and to develop an effective capability to deal with these threats."*<sup>1</sup>

The National Security Strategy, 1998

Despite the best combined efforts of the world's five major powers (United States, China, Great Britain, Russia, and France), Third World countries, rogue radical groups, and potential terrorist organizations continue their alarming proliferation of weapons-of-mass-destruction (WMD) technologies. According to Secretary of State Madeleine Albright, the proliferation of WMD is "the most overriding security interest of our time."<sup>2</sup> Supporting her statement, in recent testimony before the Senate Intelligence Committee, the directors of the Central Intelligence Agency and the Defense Intelligence Agency agreed that the proliferation of WMD is the biggest threat to national security. LTG Patrick M. Hughes, Director of the Defense Intelligence Agency, explained "because chemical and biological weapons are generally easier to develop, hide, and employ than nuclear weapons," they will be "more widely proliferated and have a higher probability of being used over the next two decades."<sup>3</sup>

This article presents a concept for a near-future application of an integrated land-, air-, and space-based system of sensors, detectors, and analysis to provide critical immediate warning, reporting, and situational updates of nuclear, biological, and chemical (NBC) attacks. It shows how much more efficient and effective this concept could be compared to the United States' current system of independent detectors and sensors operating separately at the various levels of command and

control. Ultimately, this article describes a concept that has a greater potential to achieve the United States' objective of convincing potential enemies that NBC weapons will be ineffective. Its underlying assumption is that when the United States and its coalition partners develop the capability to deny or limit the effects of an enemy NBC attack and can promise a devastatingly disproportional retaliation, then enemy WMD will be ineffective and the threat of its use will proportionately decline.

The five major world powers created and spearheaded international agreements with the intent of controlling the spread of WMD including the material, equipment, and technologies used in making them. Although the Nuclear Nonproliferation Treaty, SALT treaties, Chemical Weapons Convention, and the Biological and Toxin Weapons Convention encapsulate the best intentions of their creators, enforcing them has proven difficult, if not impossible. The Senate Governmental Affairs Committee concedes that export control agreements "can only slow the spread of WMD technology."<sup>4</sup>

Nations and private companies have violated the treaties with the knowledge that they cannot be enforced. Exporters, motivated by extremely high profits with very little associated risk, endeavor to evade economic sanctions. However, covert smuggling often is not necessary. That is especially true of the materials, equipment, and

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technologies that are widely available commercially. Many of the technologies associated with the development of NBC weapons, especially chemical and biological, are classified as dual-use compounds because they also have legitimate civil applications. These technologies, relatively easy to obtain and convert into weapons, are very attractive to terrorist groups who want the power of WMD without the expense. According to Ashton Carter, former Assistant Secretary of Defense for International Security Policy, "export controls alone cannot prevent proliferation," because determined leaders like Saddam Hussein can "home grow their WMD or get them from other countries."<sup>5</sup>

As the proliferation and availability of WMD continue to expand, so do the threats and the expectation of their use. Aggressive Third World countries and rogue radical groups cannot compete directly with the superpowers. The resources required for supporting a large military force, or even conducting research and development for innovative weapons systems, are beyond their capabilities. Thus, as they compete for strategic positioning, power, and international recognition, they use the most destructive devices already within their grasp. Even the weakest terrorist group believes that large numbers of casualties and the ensuing panic inflicted by their insidious assaults will promote their political objectives.

The United States cannot stand by idly while such danger grows. The only way this emerging threat can be contained is by a clear and forceful U.S. policy that will lead the international community in a concerted effort to prevent; deter; and, if necessary, respond to acquisition, threats, and prospective use of WMD.<sup>6</sup>

*"America's military superiority cannot shield us completely from this (nuclear, biological, and chemical) threat. Indeed, a paradox of the new strategic environment is that American military superiority actually increases the threat of nuclear, biological, and chemical attack against us by creating incentives for adversaries to challenge us asymmetrically."*<sup>7</sup>

William Cohen, U.S. Secretary of Defense

America's unrivaled military superiority means that potential enemies—whether nations, terrorist groups, or individuals—who chose to attack us more likely will

resort to terror instead of conventional military assault. Moreover, easier access to NBC weapons technology means that the destructive power available to terrorists is greater than ever. Thus, adversaries may be tempted to use unconventional tools, such as WMD, to target our cities and disrupt the operations of our government.<sup>8</sup>

If it is not feasible for hostile states to counter the United States in conventional combat, it is even more daunting for smaller groups such as terrorists. Fortunately, few terrorist groups have shown interest in inflicting true mass destruction. Bombing or hostage seizures have generally threatened no more than a few hundred lives. Let us hope that this limitation has been because of a powerful underlying ethical reason, rather than a simple lack of capability, and that the few exceptions do not become more typical.<sup>9</sup>

There is no sure reason to rely on such restraint. Indeed, some have tried to use WMD, only to see their attacks fizzle. Eventually such groups will prove less incompetent. If terrorists decide that they want to stun American policy makers by inflicting enormous damage, WMD become more attractive while at the same time more accessible.<sup>10</sup>

The use of these weapons could also be a threat for blackmail and extortion purposes. Even if the weapons are not used, the threat to use them could cause panic and terror in the United States or elsewhere. An accident involving a proliferant's weapons could have significant international repercussions and may be the most likely scenario for an actual incident.<sup>11</sup>

Based on the continuing spread of WMD, no region or level of involvement is exempt from the potential use of such weapons. Delivery systems range from inter-continental and ballistic missiles through standard battlefield weapons such as artillery and bombs, to terrorist or special operations forces selective employment methods such as rented trucks or boats to small packages. This is particularly significant when the use of NBC weapons during initial period of early-entry operations could have devastating effects. It is reasonable to assume that our potential enemies learned lessons from our recent operations in the Gulf War.

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intelligence are critical components. Units must train to protect themselves and to operate under NBC conditions. Just getting the troops into MOPP gear is not enough. The protective equipment, NBC-reconnaissance systems, detectors and alarms, decontamination capability, and other critical items must be available and ready to use. Tactics, techniques, and procedures must be thoroughly understood and practiced. Understanding the enemy's threat, capabilities, and intentions is a continuous task. We cannot afford any surprises.<sup>12</sup>

Not to be overlooked is a more subtle, indirect threat: the possibility that some seemingly inoffensive Third World state would provide chemical, biological, or radiological weapons (one of the forms of nuclear weapons) to terrorists. It could covertly contribute to the struggle without fear of direct retaliation from the United States. There is a strong possibility that several Third World nations may be politically motivated to aid and abet the struggle against the stronger nations. The problem is still growing.

Renegade proliferation of WMD promotes regional instability with potentially global consequences and, as a result, challenges the interests of the United States. In response, the United States Counterproliferation Initiative (CPI) focuses on prevention of the proliferation of WMD, deterrence of their use, and defense measures (active and passive) countering their use. This program's primary objective is to prevent NBC-weapons proliferation. Secondly, if the enemy has an offensive NBC capability, then the goal is to deter its use. Thirdly, if deterrence fails and an attack ensues, the mission evolves to defend against the NBC attack with minimal casualties and degradation. While these three arms of the CPI currently exist in separate operational bodies, they have yet to be linked in a way that combines and, consequently, strengthens their efforts. They lack, but sorely need, a system that allows all three elements of this initiative to operate simultaneously and synergistically to nullify the effects of a WMD threat.

While the U.S. Army recognizes that a potential enemy might employ NBC weapons at any time,<sup>13</sup> planning remains focused on the obvious military threat. The Army usually plans for an NBC attack during a desperate moment in the height of battle, but NBC weapons would actually be most effective during entry or deployment operations.<sup>14</sup> These early, preparatory stages of a tactical operation are the most vulnerable. An enemy's goal would be to quickly inflict a

large number of U.S. casualties and either slow U.S. military forces deployment or swing public opinion against further involvement.

We must abandon the Cold War thought that NBC weapons are a last desperate resort after a period of conventional conflict. In recent conflicts, 80 percent of internationally verified cases of chemical warfare occurred early in the conflict, even though other effective military options were still available. Chemical weapons were used to seize the psychological offensive—to terrorize, intimidate, and ultimately achieve victory over the adversary.

However, if these attacks were anticipated at least an hour before, they could have significantly reduced or completely avoided their catastrophic outcomes.

But, tragically, no one anticipated these heinous attacks, and the passive defense measures were not in place, thus no warning, no time, no defense, no escape, no survival.

NBC defense training at all levels is essential for providing a force capable of projection to regional conflicts. While units may not expect to deploy to a theater where there is an NBC threat, it can occur. We can assume that an NBC-capable enemy will not allow us to mass

our combat power and conduct a lengthy preparation period that includes extensive NBC defense training.<sup>15</sup>

During force-projection operations, commanders must look at the impact of WMD by stage of the operation. Intelligence concerning the enemy's capability to employ NBC weapons is critical. Types of weapons, delivery means, production and storage facilities, and employment doctrine are examples of the intelligence required long before deployment begins. The ability of the enemy to use WMD will affect the planning process used to determine a unit's mission, course of action, and force structure.<sup>16</sup>

Existing capabilities and new integrated programs in development, especially in the areas of sensor and information technologies and threat assessment, should play a leading role in technical intelligence relating to proliferation.<sup>17</sup> The security of the U.S. armed forces' future requires a system that integrates a full array of land-, air-, and space-based sensors that can detect and identify biological and chemical agents. These sensors must be able to detect production, storage, movement, and environmental releases. This automated, real-time, joint hazard-collection system must also be capable of maintaining situational awareness, analyzing input data from the various sensors, leveraging digitized satellite communications,

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providing immediate warning and reporting to those affected military and civilian populations, and updating the situational-awareness database for all other forces and population centers. This system must operate from both land-based sites as well as space-based platforms—a necessary redundancy if it is to provide sufficient coverage to operate the triad of prevention, deterrence, and defense.

This concept is not totally unique. A similar missile defense system is already developed as an integrated array of sensors transmitting to a central point of analysis, warning, and reporting and is referred to as the Theater Ballistic Missile Defense (TBMD) concept. TBMD is built upon three pillars: attack operations, active defense, and passive defense.

- The attack-operations pillar focuses on the U.S. armed forces' ability to prevent the launch of theater missiles by attacking all elements of the enemy's overall ballistic missile system.
- The active-defense pillar focuses on the U.S. armed forces' ability to intercept and destroy theater missiles in flight.
- The passive-defense pillar includes all those individual and collective measures taken to reduce the probability and effects of theater-missile attack by reducing the vulnerability of critical forces and infrastructure and improving the potential to survive and resume operations after an attack.<sup>18</sup>

This article proposes a comparable system for a global WMD defense. Obviously, the U.S. Army has already erected similar pillars for NBC-attack operations as well as active defense. The third pillar, WMD passive defense, also is beginning to rise above its original cornerstone of individual soldier protection. We need to examine the networking of these three pillars and find a way to closely integrate and therefore unify and strengthen them. But before they can be linked, the most essential pillar, passive defense, must be more thoroughly developed.

Passive defense is the essential individual and collective protection measures taken for friendly forces, population centers, and other critical assets. Not only must passive defense be conducted during all operational phases from predeployment through postconflict operations, but it also must be ongoing during peacetime. It is the critical foundation that alerts standby assets to implement the attack and active defense pillars.

Currently, attack warnings are both general (missile launch is imminent or has occurred) and specific (specific units or areas of the battlefield or theater are in danger of attack by a missile system). Early warning is limited to a certain geographical area or to specific units. Lacking immediate warning capability, large numbers of forces often are forced into full protection as a precautionary

measure. All units threatened by the hazard are warned to take immediate protective measures. This stresses soldiers. The logistical burdens (unnecessary use of protective equipment) and both physiological and psychological effects (physical degradation and heat stress) are significant.<sup>19</sup>

As mentioned earlier, the foundation for passive defense should be the integration of land, air, and space sensors to provide an immediate, near-real-time warning and reporting response. These sensors must be networked, real-time, all-source, detector, and sensor arrays. Integration of these elements will allow the detectors and sensors to achieve agreement and counterbalance weaknesses or technical limitations in any single detector or sensor. It also will filter out or minimize false alarms, while maximizing responsiveness to residual and downwind warning of NBC effects. This capability could realize incredible effects on soldier and unit morale.

Detection through the use of an array of sensors and detectors is just one part of passive defense. Immediate warning and reporting to joint forces and population centers affected is another critical part. Currently, an integrated space-based NBC-analysis system does not exist. The existing ground-based analysis systems that may give the U.S. armed forces limited NBC analysis are the joint, tactical, air-ground station (JTAGS) and attack and launch early reporting to theater (ALERT).

However, as a result of recent ongoing Force XXI initiatives, advances have been made in the development and testing of a ground-based NBC Battle Management System. This new United States Marine Corps system, currently called Joint Warning and Reporting (JWARN), integrates digitized terrain data, meteorological and micrometeorological data, and information from intelligence systems. With data produced by unit detectors and sensors, the JWARN system can determine where the hazard is, where it has been, and where it is going. This integrated array of sensors and analysis may someday be transposed onto an array of satellites in a constellation to provide global coverage as well as an in-theater redundant ground capability.

The technology exists to identify launched ballistic missiles, to predict impact points, and to warn units within affected areas. If NBC applications are integrated into this nexus, this becomes the foundation for the U.S. armed forces' WMD passive defense. Future operations battle command will leverage this and other new technologies integrated with NBC monitoring to achieve a near-real-time, common, relevant picture of the battlefield with NBC hazards and missile-attack warnings scaled to levels of interest and tailored to special needs. This common, relevant picture will greatly enhance force dominance through situational awareness and rapid, clear,

nonhierarchical communication of hazards and warnings. Operations tempo (OPTEMPO) will be greatly improved with situational awareness, selective response, and standardized unit reactions to maximize available time to react before exposure to a WMD hazard.

The United States must actively monitor its adversaries and provide a vigilant watch over changing threat conditions. We must also support threat-reduction programs and seek to eliminate stockpiles of NBC weapons from the world's arsenal. When asked to deploy, we must, in conjunction with joint and coalition partners, aggressively attack the adversary's ability to employ NBC weapons on the battlefield. When required, as part of a joint and combined team, we must fight and win under NBC conditions.<sup>20</sup>

Counterproliferation actions, coupled with the overall increase in OPTEMPO capabilities, will deter future actual and potential proliferants from using NBC weapons because of their "lack of value" or nullification. The United States and its allies will deny or limit NBC weapons' political and military use by their NBC defense readiness.

MAJ King is currently assigned as the G3 Plans Officer, Eighth U.S. Army in Yongsan, Korea. Upon departure from Korea in June, he will be assigned as Chief of Warfighter Division in Directorate of Training Development, Fort Leonard Wood, Missouri. His previous assignments include Battalion Chemical Officer, 1st Bn, 3d FA, 2AD; Smoke Platoon Leader and Company Executive Officer, 46th Chemical Company (SG)(M); Battalion S1, 2d Chemical Battalion; Aide-de-Camp, DCG, III Corps; Division Chemical Training Officer, DISCOM Chemical Officer, Company Commander, 91st Chemical Company, 24th ID, and Battalion S3, 703d MSB, 3d ID. MAJ King is a graduate of the Chemical Officers Basic and Advanced Courses, CAS<sup>3</sup>, U.S. Army Command and General Staff College, U.S. Army School of Advanced Military Studies, and Airborne and Air Assault Schools. He holds a bachelor of science degree in chemistry from the University of Richmond, Richmond, Virginia, and master's degrees in military arts and science from the Command and General Staff College in General Military Studies and Military Space Applications and from the School of Advanced Military Studies in Theater Operations and Planning.

#### Endnotes

<sup>1</sup> A National Security Strategy for a New Century, The White House, October 1998, pp.11-12.

<sup>2</sup> Senate Committee on Governmental Affairs, "Proliferation Primer: A Majority Report of the Subcommittee on International Security, Proliferation, and Federal Services," Washington, DC, Government Printing Office, January 1998, p.70.

<sup>3</sup> Quoted by Walter Pincus, "CIA Chief Calls Spread of Weapons Technology Top Threat to National Security," Washington Post, 29 January 1998, p.A7.

<sup>4</sup> Senate Committee on Governmental Affairs, p. 69.

<sup>5</sup> Senate Committee on Governmental Affairs, Summary and p. 69.

<sup>6</sup> Pete V. Domenici, "Countering Weapons of Mass Destruction," The Washington Quarterly, Center for Strategic and International Studies, Winter 1995, pp. 145-152.

<sup>7</sup> US Army Chemical School, TRADOC Pam 525-20, US Army Operations Concept for Nuclear, Biological, and Chemical (NBC) Defense (Draft), Washington, DC, Department of the Army, 31 March 1998, p.1.

<sup>8</sup> Fact Sheet, "Combating Terrorism: Presidential Decision Directive 62," May 22, 1998, p.1.

<sup>9</sup> Richard K. Betts, "The New Threat of Mass Destruction," Foreign Affairs, January-February 1998, p. 3.

<sup>10</sup> Betts, p.3.

<sup>11</sup> Domenici, pp.145-146.

<sup>12</sup> Robert D. Orton and Robert C. Neumann, "The Impacts of Weapons of Mass Destruction on Battlefield Operations," Military Review, December 1993, p.70.

<sup>13</sup> Richard A. Jackson and Ralph G. Wooten, "Protecting the Force: 21st Century Chemical Corps," Military Review, September-October 1996, 75. Now, more than 20 nations are known to possess WMD. WMD proliferation is occurring exactly where the U.S. does not want it to occur—in regional flash points throughout the world.

<sup>14</sup> Booz Allen and Hamilton, "Assessment of the Impact of Chemical and Biological Weapons on Joint Operations in 2010 (The CB 2010 Study)," U.S. Department of Defense Study, McLean, VA: Booz Allen and Hamilton, Inc, November 1997, pp.1-3.

<sup>15</sup> Robert D. Orton and Robert C. Neumann, "The Impacts of Weapons of Mass Destruction on Battlefield Operations," Military Review, December 1993, p.70.

<sup>16</sup> Robert D. Orton and Robert C. Neumann, "The Impacts of Weapons of Mass Destruction on Battlefield Operations," Military Review, December 1993, p.70.

<sup>17</sup> Pete V. Domenici, "Countering Weapons of Mass Destruction," The Washington Quarterly, Center for Strategic and International Studies, Winter 1995, p. 150.

<sup>18</sup> US Army Chemical School, "Theater Missile Defense (TMD) Passive Defense Strategy," Washington, DC, Department of the Army, May 1997, pp.2-5.

<sup>19</sup> U.S. Army Chemical School, "Summary Evaluation Report for Combined Arms in a Nuclear/Chemical Environment Force Development Test and Experimentation -Close Combat Light," Washington, DC, Department of the Army, May 1993, pp.2-4.

<sup>20</sup> Richard A. Jackson and Ralph G. Wooten, "Protecting the Force: The TwentyFirst Century Chemical Corps," Military Review, September-October 1996, p.76.

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