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U.S. MILITARY ROLE IN COUNTERING THE BIOLOGICAL AND CHEMICAL
WARFARE THREAT: ATTACKING THE ENEMY'S WILL

by

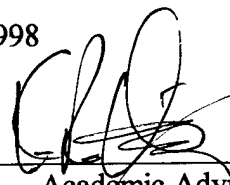
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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of

U.S. MILITARY ROLE IN COUNTERING THE BIOLOGICAL AND CHEMICAL
WARFARE THREAT: ATTACKING THE ENEMY'S WILL

One of the greatest challenges facing the U.S. military today in the post-Cold War Era is countering the proliferation of biological and chemical weapons (BCW). These weapons of mass destruction (WMD) not only pose a significant threat to our military forces but to global security as well. Known adversaries of the United States currently possess such weapons and will most likely employ them in future conflicts based on the perceived attractiveness associated with BCW. The U.S. military can and must play an active role in deterring the proliferation and potential employment of these horrific weapons. Attacking the adversary's *will* to possess or employ them is the singular, long lasting solution to a growing global crisis.

The U.S. military's principal means of attacking this *will* is to negate the attractiveness of obtaining or already possessing a biological and chemical warfare capability. This can and must be accomplished in order to ensure global security and the protection of our forces today and into the future. Focusing our efforts otherwise is a recipe for disaster.

U.S. Military Role in Countering the Biological and Chemical Warfare Threat:

Attacking the Enemy's *Will*

Introduction

*"One of our most urgent priorities must be attacking the proliferation of weapons of mass destruction...If we do not stem the proliferation of the world's deadliest weapons, no democracy can feel secure."*¹

President Clinton, September 27, 1997

When tackling the increasing challenge of biological and chemical weapons (BCW) proliferation, all military counterproliferation activities must focus on attacking the adversary's *will* to acquire, develop, enhance, proliferate, or employ these horrid weapons. The tactical solution of destroying BCW, facilities, or critical nodes along the proliferation highway is not enough and, in all likelihood, impossible to accomplish. If the adversary's *will* remains strong and it believes that a biological and/or chemical warfare capability will provide political or military leverage, it will assuredly find ways to rebuild it.

As with any major operation or campaign, the Geographic Combatant Commander (CINC) must correctly identify the enemy's center of gravity. Without this knowledge, one cannot focus his or her thoughts on how to achieve operational success. "If you want to overcome your enemy, you must match your effort against his power of resistance, which is expressed as the product of two inseparable factors, viz. The total means at his disposal and the strength of his will."²

Clearly, counterproliferation of WMD is an interagency calling as well as a military one. Interagency efforts must continue to exert pressure on known or potential proliferators

through nonproliferation agreements, export controls, political persuasion, conventional arms sales, regional security agreements, economic aid, alliances, and nuclear deterrence options.³

This paper, however, will solely concentrate on military efforts necessary for defeating the enemy's *will* by negating the perceived attractiveness of possessing or employing BCW. This can be accomplished by ensuring that: our forces are trained and confident to fight and win our Nation's wars in a biologically or chemically contaminated environment; they and key facilities are protected against BCW effects; our intelligence assets can and will locate BCW and facilities; our forces and munitions can destroy them; and, as a last resort, our forces can limit the effects of BCW through a robust consequence management plan. The focused execution of these tasks will serve to undermine the adversary's desire to possess or employ BCW, with the caveat that there are no absolute assurances for deterring irrational actors.

Current BCW Threat

BCW have become the most accessible WMD to both industrialized and developing countries. Basic versions of these relatively low technology weapons can be produced in almost any country with moderately developed chemical or pharmaceutical industries.⁴ Known adversaries currently possessing BCW programs are Iran, Iraq, Libya, Syria, China, and Cuba. The breakup of the Former Soviet Union adds another dimension to the threat. Although no longer considered an adversary to the United States, the Former Soviet Union did possess the largest BCW capability in the world.⁵ Various national agencies are working diligently to prevent WMD from getting into the wrong hands; albeit, the likelihood exists that some BCW or technology will find its way into the hands of a rogue state or developing country.

By the year 2000, more than 30 countries are expected to possess BCW.⁶ What makes this potentially more dangerous is that technological advances in proliferated ballistic missiles, such as the Scud, have increased the efficiency of BCW delivery against a somewhat porous U.S. ballistic missile defense system. When addressing chemical warfare capability alone, the number of states possessing such a capability has increased from seven in 1970 to 20 in 1990, irrespective of international treaties.⁷ As for states possessing a biological warfare capability, none have formally declared offensive programs. It is known, however, that since the signing of the Biological Weapons Convention in 1972, the number has tripled to 14 and will most likely increase to 20 by the year 2000.⁸

The threat of biological or chemical warfare exists not only in conventional warfare but in terrorism as well. The Tokyo subway attack in 1995 emphasizes this fact. While nerve agent casualties were relatively low (12 fatalities), if the Aum Shinrikyo cult had more time to plan the operation, increase the purity of the Sarin agent, and employ an aerosol delivery system, the number of fatalities would have increased to 1,000.⁹ To exacerbate this act of terrorism, Western intelligence agencies had no knowledge that the Aum Shinrikyo even possessed such a capability. Based on the risk of retaliatory measures associated with employing BCW, either by conventional or terrorist means, one must ask what makes having such a capability so enticing.

Attractiveness of Possessing BCW

Since 1970, technological and engineering advances in the production of BCW have made these weapons increasingly available to developing nations through the assistance from industrial nations. Additionally, those states or countries currently possessing BCW

programs, as well as those developing countries desiring to initiate such programs, realize their potential strategic value.¹⁰

Advances in the commercial industry, particularly in chemical engineering, have greatly facilitated chemical weapon proliferation. Chemical weapons programs have become more and more alluring because they can often be concealed within routine chemical industry operating procedures. The trend toward more stringent environmental controls adds to this problem. Waste products and effluents stemming from chemical production facilities make it nearly impossible, with current technology, to distinguish between commercial and military facilities based on chemical waste signatures.¹¹ Plausible deniability, therefore, makes it extremely difficult to prove that chemical agents are being manufactured for military use. Determining the intent of this production therefore becomes essential and will require significant intelligence activities.

Similarly, biological weapon production offers the same attractiveness. All biological production equipment is dual-use. That is to say that the equipment required to produce legitimate biological agents, such as vaccines, can be used to produce biological agents for military purposes. As with chemical agent production, determining one's production intent is critical.

In addition to effectively concealing biological and chemical agent production, adversaries find BCW attractive due to the lethality these weapons can induce for relatively little economic cost. Chemical weapons can quickly produce a significant number of casualties in and around the point of detonation or dispersal. Biological weapons also produce numerous casualties; however, they have lethal effects over much larger areas based on the biological agent spreading from one infected individual to another.

Adversaries perceive BCW as offering them regional power through political and military leverage. Because U.S. forces are the best-trained and most technically advanced military in the world, adversaries will continue to find ways to balance the playing field. From both tactical and operational perspectives, employing BCW to defend against U.S. power projection, such as targeting port facilities, littorals, staging areas, or other footholds and key terrain, is one way to achieve this balance. BCW can also serve to harass U.S. and coalition forces by causing attrition and degradation in performance. Decontamination efforts are logistically intensive and currently require a large number of forces to execute--forces that could be used elsewhere to support the main effort. The employment or threatened employment of BCW can cause large-scale shifts in strategic and operational objectives, phases, and courses of action.¹² Additionally, one cannot underestimate the tremendous psychological effect BCW poses on the men and women of our armed forces and coalition partners as demonstrated in the Persian Gulf War.

At the strategic level, BCW are enticing because of their deterrent qualities. An adversary can threaten the use of these weapons in an attempt to deter the United States from entering into a war. Modern history has shown that the American public and politicians will not tolerate significant casualties in a war. The threat of mass casualties, therefore, can provide a strong deterrent. One could argue that BCW are not a credible deterrent because of the U.S. military's victory in the Persian Gulf War, even with the looming threat of biological or chemical warfare. Nevertheless, adversaries could threaten coalition partners with BCW in an effort to cause a rift in the coalition. With few exceptions, the United States is technologically advancing at a much faster rate than any other military in the world. These advances may conflict with the probability that future contingencies may often involve coalitions.¹³ If

potential coalition partners do not keep pace with the United States in biological and chemical defense, the enemy can exploit this exposed vulnerability and potentially discourage the coalition from entering into a conflict.

As long as countries, rogue states, or terrorists find BCW programs attractive, they will continue to find ways of acquiring or maintaining them. The U.S. military must focus on nullifying this attraction.

U.S. Military Role in Countering Biological and Chemical Warfare

U.S. military actions, combined with interagency and coalition efforts, must concentrate on attacking the adversary's *will* to possess or employ BCW. This is the only long-lasting solution for eliminating the threat that currently haunts the world. The U.S. military can deter further BCW aggression through force protection measures, robust intelligence, trained and confident forces, preemptive capabilities, and consequence management activities. These deterrent means cannot be mutually exclusive. The campaign against BCW must include all of these factors, for if one is missing, an adversary may still be able to retain some strategic or military leverage and will continue to find a BCW program inviting. When addressing deterrence, it is credible only when it meets three requirements: the United States must be able to respond effectively; the adversary must believe that the United States intends to respond; and the United States must be able to defend itself and forces against a biological or chemical attack.¹⁴

Force Protection

Force Protection, along with protection of key facilities and terrain, are critical links in defeating the enemy's center of gravity through the elimination of its perceived value of employing BCW. It must be planned for in great detail at both the tactical and operational

levels of war. If the U.S. military can adequately protect its forces, key facilities, and key terrain, the BCW effects that an adversary desires will not come to fruition. The CINCs are aware of this fact and are pursuing this criticality. Their number one priority in the counterproliferation arena is to acquire improved equipment to detect and characterize BCW threats, particularly at long ranges.¹⁵

Currently, our military is equipped with limited detection and early warning equipment. In particular, biological agent detectors used in the Persian Gulf War were built and tested in 1972.¹⁶ What the U.S. military needs is lightweight, universal, and automatic detectors that can provide adequate early warning, detect and characterize biological and chemical agents, and provide a reliable "all clear" indicator.¹⁷ Adequate early warning systems, in particular, are imperative to allow commanders adequate time to protect forces, key facilities, and terrain. The Department of Defense (DoD) has recognized this detection deficiency and is working on a biological agent detection system designed to detect and characterize agents specifically at air bases and port facilities which are critical for preconflict buildup, sustainment operations, and force projection. This system is to be fielded for testing in fiscal year 1998.¹⁸ While the potential of these sensors is promising, one must take into account that our adversaries will most assuredly be pursuing countermeasures to these developments to include biological manipulation designed to fool detectors.¹⁹

The CINCs' second priority is to control the ability to intercept cruise missiles capable of delivering deadly biological and chemical agents. Emphasis is and must continue to be placed on ballistic missile defense--particularly since they are proliferating at an astonishing rate.²⁰ Active ballistic defense encompasses the effective interception and destruction of missiles in the act of delivery.²¹ Based on the large doses of biological or chemical agents that can be

released from a sizable warhead placed on a ballistic missile, U.S. forces must develop a reliable and effective boost phase intercept capability. This would result in contamination of the adversary's territory vice friendly territory. Consequences otherwise are completely unacceptable. Had the U.S. military not been able to destroy Scuds launched at Israel during the Persian Gulf War, Israel would have, in all probability, entered the war and fractured the coalition.

Efficient decontamination capabilities are another critical link in force protection. Without it, an adversary can severely hamper U.S. military and coalition forces' freedom of maneuver and agility on the battlefield. Currently, however, decontamination capabilities of the U.S. military are archaic and present a significant burden to logistics functions.²²

The requirement to develop rapid and effective decontamination processes for equipment and terrain at port facilities, air bases, supply points, and points of significant troop concentration is crucial. Failure to do so will significantly affect our warfighting strategy of mobility. In addition to facilities and key terrain, efforts must also focus on rapidly and effectively decontaminating and treating contaminated casualties, as well as procedures for safely disposing of biologically or chemically contaminated dead.²³ Particularly in reference to a biological attack, an adversary wants to inflict significant casualties through individual-to-individual contamination. If the U.S. military cannot adequately perform decontamination, the enemy will maintain military leverage and will continue to find advantages in having a BCW program.

A final link in BCW force protection is the absolute requirement for individual protection. Today, our military's individual BCW protective systems are burdensome and cause serious degradation of normal battlefield functions. This provides the adversary a marked advantage

on the modern battlefield.²⁴ Improvements to the existing protective systems or technological developments must occur to ensure the safety of our troops. Lightweight protective gear that is not cumbersome is quintessential for our soldiers to maintain the warfighting skills they currently possess in a non-biologically or chemically contaminated environment. These systems must permit normal functioning in a myriad of climates, ensuring that hot or cold weather related casualties do not occur and limit the forces available for mission accomplishment.

Biological vaccines are being developed and refined by DoD in an effort to nullify the effects of biological agents. The problem exists; nevertheless, that U.S. forces remain vulnerable to biological effects because DoD has yet to adequately address many shortcomings identified during the Persian Gulf War. One of these shortcomings is the critical shortage of vaccine stocks.²⁵ Although vaccines appear to part of the solution, one percent of a population that receives them does not build up sufficient immunity.²⁶ The development of vaccines, therefore, requires substantial improvements in order to be effective. In light of recent advances in biotechnology, it is not likely that an adversary can develop a biological agent for which only he or she possesses the antidote?

In addition to U.S. military protection, the presence of civilians in a theater of war continues to emerge as demonstrated in the Persian Gulf War. Critical for victory, CINCs must ensure that these civilians are equipped with and trained on individual protective equipment. Additionally, CINCs must protect family members assigned to theaters in which there exists a biological or chemical threat.²⁷

BCW force protection, to include civilians participating in military operations, is paramount not only in reducing battlefield casualties but in ensuring that our forces are trained

and confident to operate in these adverse environments. Without it, an adversary is likely to continue pursuing a BCW capability.

Trained and Confident Forces

U.S. forces must be prepared to conduct operations in a biological or chemical environment with minimal degradation.²⁸ The adage "train as you fight" certainly applies with respect to conducting such operations. Our forces must be trained and confident to perform the offensive and defensive skills necessary for victory in a contaminated environment. Confidence will assist in eliminating current fears associated with BCW. Fear, a perceived causal effect of BCW, inhibits combat operations and provides an adversary with a distinct psychological advantage that produces military leverage. To make an analogy, prior to the Vietnam War, the U.S. military rarely conducted operations at night because of inadequate night vision capability and training. Today, however, our forces often prefer to operate at night and are extremely confident in their ability to do so because that is how they train. The same thing must hold true with fighting in a biological or chemical environment. Potential coalition forces and allies must become proficient as well. Failure to do so could result in an exposed vulnerability, since future contingencies involving the U.S. military will likely involve coalition participation. As important as the training and confidence of our forces are, it is equally important that our potential adversaries believe that our military can operate in such an environment and can do so decisively with little to no degradation. This will aid in depreciating the attractiveness of possessing BCW.

Currently, this is not the case. In preparation for the Persian Gulf War, U.S. forces had to undergo significant biological and chemical preparedness training during the six month build up. In the event that Saddam Hussein ordered a chemical or biological attack during the initial

phase of this build up, casualties would have certainly occurred based on the relatively low level of training our forces had prior to deployment. To add to this deficiency, approximately 75 % of U.S. chemical capability (primarily decontamination units) resides in the reserve components. Presidential Reserve Call-Up is critical prior to the crisis occurring in order for critical decontamination units to be prepositioned in port facilities, air bases, and other troop build-up locations.²⁹

Given the likelihood that future ground operations involving U.S. and coalition forces will encounter biological or chemical warfare, it is imperative that CINCs integrate joint biological and chemical defense training in peacetime exercises as well as pre-conflict operations.³⁰ Additionally, the scope of this training must be expanded and fused into Joint and coalition wargames and exercises.³¹

Robust Intelligence

The ability to obtain and process information regarding biological or chemical warfare is another fundamental factor in attacking the adversary's center of gravity. If a rogue state or country believes that it can successfully conceal and protect its BCW program, it will most likely continue the development and storage of these weapons with little fear of U.S. political or military response.

U.S. intelligence efforts, therefore, must focus on locating biological and chemical agent production, storage, and weapons sites. Our intelligence community must send the signal worldwide that no matter how well an adversary conceals its BCW program, the United States, through robust intelligence assets, will find it. Because of the nature of BCW, it is imperative that all of these WMD be identified and ultimately destroyed via political or military means. If an adversary can successfully conceal just one BCW site from U.S.

intelligence, it can still establish political and military leverage in a given region. Hence, its BCW capability will remain attractive. In the Persian Gulf War, the Coalition mounted approximately 970 air strikes against nuclear, biological, and chemical (NBC) targets. United Nations Special Commission Teams, however, uncovered some 150,000 chemical munitions that were untouched by the bombings.³²

U.S. military intelligence assets cannot locate all BCW or critical nodes in a given theater without the assistance of the national intelligence community. In an effort to provide the CINCs with such assistance, the Director of Central Intelligence created the Nonproliferation Center whose sole focus is the counterproliferation of WMD. Similarly, the Defense Intelligence Agency identified the necessity to have a dedicated organization with the same focus and created the Office for Counterproliferation of NBC Assessments. CINCs must synergistically combine the capabilities that these organizations possess with their in-theater military intelligence assets.

Today, the intelligence community is faced with three BCW identification challenges: dual-use technologies; deep underground facilities; and the proper identification of threat warheads. These challenges must be overcome or our military will be unable to completely attack the adversary's center of gravity.

As previously noted, biological and chemical agent production for military purposes is difficult to identify because of dual-use technologies. Since there are similarities with legitimate and illegitimate biological and chemical agent production, human intelligence may be the only near term solution to identify the intent of this production. Research, nevertheless, should continue to develop technologies to differentiate between legitimate and illegitimate

processing because human intelligence is inherently time intensive and presents a great risk to collection assets.

In addition to the dilemma posed by dual-use technologies, deep underground facilities are equally troubling. Placing biological or chemical storage or production facilities deep underground masks their activities and increases survivability in case of attack.³³ These types of facilities appear to be a growing trend as demonstrated by Libya's attempt to construct an underground chemical facility at Tarhunah.³⁴ The intelligence community must continue to locate and identify these facilities to support their destruction through diplomatic or military means.

A third intelligence challenge relates to one of the CINCs' counterproliferation priorities previously addressed: intercepting cruise missiles. What complicates identifying and destroying threat missiles are the biological or chemical warheads that can be attached to them. The intelligence community must be able to properly identify the type of warhead on a missile in order for the commander to know how to best destroy it while minimizing or negating collateral effects.

The intelligence community must conquer all of these significant challenges. To do this it will have to effectively identify intangibles such as the *will* of an adversary as well as tangibles including deep underground facilities. Human intelligence, combined with advances in intelligence collection technology, are the keys to success. Without them, our diplomats and military will not be afforded the opportunity to eliminate BCW.

Preemptive Capabilities

One of the most controversial means that the U.S. military can eliminate BCW and attack the enemies' center of gravity is by preemptive strikes. The basic premise of preemption is to

attack an adversary armed with BCW before it has the opportunity to employ them against U.S. or coalition militaries. The issue of attacking another nation's sovereignty during peacetime; however, is an ongoing debate within the international legal community.

Article 51 of the United Nations Charter states that there always exists the inherent right of individual and collective self-defense. The legal controversy; however, surrounds the premise in Article 51 that this right applies if an armed attack occurs against a member of the United Nations. Preemption, in and of itself, implies that an attack has not yet occurred. Does this mean that the victim must absorb the first blow before it can respond? In the case of WMD, the first blow is likely to be fatal. Some authorities argue that there should exist the right of anticipatory self-defense. This position too has its dangers. Perhaps this position would invite preemptive strikes on the mere suspicion of an intent for an adversary to employ BCW.

Yoram Dinstein, an eminent Israeli publicist has found some middle ground between the two previous positions. He suggests that an attack occurs when one party "embarks upon an irreversible course of action, thereby crossing the Rubicon."³⁵

Regardless of which legal position one takes, in order to attack the *will* of an adversary, the U.S. military must possess the capability to conduct effective preemptive strikes. The enemy must believe that not only can the U.S. military find a BCW production or storage site, but that our forces and technology can destroy it in a precise manner. The threat of destruction of such facilities psychologically impacts enemy courses of action, and the physical destruction of them will cripple their BCW capability as well as damage their economic well being.

Preemptive strikes should exclusively be employed as a last result if the full range of political and military means have been exhausted. Decision-makers should consider the following questions prior to authorizing a preemptive attack:

- Is the enemy undeterrable, violent, and a risk-taker?
- Is the enemy on the WMD threshold or beyond it?
- Are vital U.S. interests threatened?
- Are key enemy targets precisely located and vulnerable?
- Is surprise achievable?
- Does the United States have a first strike capability?
- Is the United States homeland safe from enemy WMD?
- Would the United States and its allies be safe from retaliation from the WMD of third parties?
- Have all non-military options been exhausted before considering preemption?
- Does the United States have clear objectives achievable by appropriate means?
- Is the United States committing enough resources and is it taking all necessary steps to ensure victory?³⁶

If preemptive strikes do not work completely, the United States and its allies could suffer from a retaliatory response. In order to achieve the best chance of success, the U.S. military must possess the forces and weapons to destroy these WMD. This destruction must outweigh the potential gains of possessing a BCW program. The United States Special Operations Command has a principal mission to train and provide forces capable of BCW defeat. Based on the complexity and level of training required to master the skills necessary to perform such operations, it is best to have an extremely qualified force within the Special Operations

community rather than numerous "somewhat" qualified forces throughout the Services. The ramifications of an unsuccessful preemptive attack will most assuredly have grave consequences.

In the event that a BCW or critical node can be targeted and destroyed via conventional means, it is imperative that the U.S. military possess the weapons necessary to accomplish it with little or no collateral damage. Today, munitions must not merely penetrate great distances below the earth's surface but must be able to destroy the target with high confidence. BCW facilities on land present equally challenging targets. As seen during the Persian Gulf War, BCW sites and critical nodes were often placed in large built-up areas. Saddam Hussein purposefully placed them there in an effort to deter the U.S. military strikes. Massive noncombatant casualties are unacceptable to our military and the American public. Technology, therefore, must continue to focus on precision munitions that will destroy the target while negating the effects of biological and chemical agent release.

Consequence Management

In the event that the U.S. military roles already discussed in this paper fail, and an adversary successfully employs BCW, CINCs must retain a well-planned and rehearsed consequence management plan. As with force protection, if the U.S. military can nullify the desired effects of biological or chemical warfare it will directly attack the enemy's will to obtain or employ such a capability.

CINCs have access to DoD assets that can assist in mitigating the effects of discharged biological or chemical agents. Although somewhat limited, the U.S. military is better equipped than any military in the world. Within a given theater, the CINC must coordinate with both the American embassy and host nation officials to contain the attack and reduce the

number of casualties to the greatest extent possible. Principal tasks will include among others: reinforcing host nation medical capabilities; casualty evacuation; providing prophylaxis; public affairs; psychological operations; biological or chemical agent detection and identification; and decontamination.

Consequence management must be well planned and integrated into joint and combined training exercises and wargames. Although limited in numbers, specific biological and chemical response units from all of the Services must actively participate. This planning, along with lessons learned, will assist the geographic combatant commander in properly allocating key units and equipment to host nations requiring military consequence management assistance.

Conclusion

The threat of biological and chemical warfare is global in nature and is one of the greatest challenges the U.S. military faces in the post-Cold War Era. BCW have become the most accessible WMD to industrialized and developing countries. Our military can and must play a critical role in its defeat. Every counterproliferation activity must focus on attacking the enemy's center of gravity – its *will* to possess or employ these ghastly WMD. Taking away the perceived attractiveness of BCW is the singular, long-term solution to a global crisis.

Our forces must perform a myriad of tasks in support this effort which are: training our Soldiers, Sailors, Airmen, and Marines to fight and win in a biological or chemical contaminated environment; protecting key facilities and terrain from BCW effects; locating BCW and related facilities; possessing the capability to destroy these facilities preemptively or post-launch; and maintaining a well planned and rehearsed consequence management plan. These critical tasks are not mutually exclusive. They all must be accomplished to effectively

attack the adversary's center of gravity. Failure to accomplish even one of these tasks will continue to make BCW programs enticing based on the perceived political or military leverage an adversary desires.

Advanced technology combined with individual and unit training are quintessential in accomplishing these tasks. Our military is the most technologically advanced and best trained in the world, but it has to quickly move forward in this venue. Caution; nevertheless, must be exercised so that our military capabilities do not significantly exceed those of potential coalition militaries. If they do, an adversary may be able to exploit this critical vulnerability and still find BCW attractive.

NOTES

¹ Address by the President of the United States, William J. Clinton, to the 48th Session of the United Nations General Assembly (New York City, New York, September 27, 1993). As quoted by Les Aspin (then Secretary of Defense), Speech presented to the National Academy of Sciences Committee on International Security and Arms Control, Washington, D.C., December 7, 1993.

² Carl Von Clausewitz, On War, edited and translated by Michael Howard and Peter Paret, (Princeton, New Jersey: Princeton University Press 1976), 77.

³ Barry R. Schneider. "McNair Paper Number 41." Radical Responses to Radical Regimes: Evaluating Preemptive Counter-Proliferation. May 1995.
<<http://www.ndu.edu/ndu/nss/macnair/mcnair41/m41cont.html>> (08 January 1998).

⁴ Defense Nuclear Agency, Preventing Proliferation, (Alexandria, VA: 1996), 27.

⁵ Office of the Secretary of Defense, Proliferation: Threat and Response (Washington: 1996), 3-34.

⁶ Defense Nuclear Agency, Preventing Proliferation (Alexandria, VA: 1996), 30.

⁷ Ibid., 28.

⁸ Ibid., 30.

⁹ Kyle Olsen, interview by author, telephone conversation, Newport, R.I., 06 February 1998.

¹⁰ Defense Nuclear Agency, Preventing Proliferation (Alexandria, VA: 1996), 29.

¹¹ Ibid, p.29

¹² Joint Chiefs of Staff, Doctrine for Joint Operations (Joint Pub 3-0) (Washington, D.C.: February 1, 1995), IV-18.

¹³ Ibid., I-6.

¹⁴ COL Kenneth Steinweg and others, Weapons of Mass Destruction (Center for Strategic Leadership, U.S. Army War College, Carlisle Barracks, PA., 1994), 6-7.

¹⁵ Office of the Secretary of Defense, Proliferation: Threat and Response (Washington: 1996), 49.

¹⁶ Sandra I. Meadows, "U.S. Forces Prepare for Future Chemical, Biological Blitzkrieg," National Defense, September 1997, 41.

¹⁷ COL Kenneth Steinweg and others, Weapons of Mass Destruction (Center for Strategic Leadership, U.S. Army War College, Carlisle Barracks, PA., 1994), 35.

¹⁸ Sandra I. Meadows, "U.S. Forces Prepare for Future Chemical, Biological Blitzkrieg," National Defense, September 1997, 42.

¹⁹ Robert K. Ackerman, "Sensor Development Races Biological Warfare Threat," Signal, December 1997, 34.

²⁰ Office of the Secretary of Defense, Proliferation: Threat and Response (Washington: 1996), 49.

²¹ The recognition of theater ballistic and cruise missiles as the premier threat is well articulated in, LTC Robert F. Mathis Jr., DAMO-SSP Talking Paper, April 4, 1994.

²² MG (Ret) John K. Stoner Jr., "Chemical, Biological Warfare Defense under the Chemical Weapons Convention," AUSA Land Power SA Series #93-3, April 1993.

²³ COL Kenneth Steinweg and others, Weapons of Mass Destruction (Center for Strategic Leadership, U.S. Army War College, Carlisle Barracks, PA., 1994), 37.

²⁴ MG (Ret) John K. Stoner Jr., "Chemical, Biological Warfare Defense under the Chemical Weapons Convention," AUSA Land Power SA Series #93-3, April 1993.

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