

# Nonlethal Capabilities: Realizing the Opportunities

by *E. R. Bedard*

## Overview

The use of lethal force has not always been appropriate to handle situations that the U.S. military has faced in the post-Cold War world. Nonlethal weapons offer a precision, accuracy, and effective duration that can help save military and civilian lives, break the cycle of violence by offering a more graduated response, and even prevent violence from occurring if the opportunity for early or preclusionary engagement arises.

Fully exploiting nonlethal capabilities will require the refinement of existing technologies and the creation of new technologies. The effectiveness of the capabilities must be sufficiently reliable and predictable to give commanders confidence in their employment. Because nonlethal capabilities are a fairly new concept to domestic and international publics, military and civilian decisionmakers must be educated about them.

As we step forward into the 21<sup>st</sup> century, we must look for new opportunities to leverage developing and emerging technologies that enable warfighting commanders to capitalize on the full spectrum of nonlethal capabilities. The value added will best be realized when we ensure that technology, operations, and policy are in balance, and the education of the American leadership, warfighters, and public is complete. These capabilities must become part of our daily lexicon.

Every warfighter eventually realizes that nonlethal weapons are vital in creating the effects needed to defeat an adversary. For me, that realization came one night in Somalia. I had a company of marines (approximately 175 troops) facing a mob of 8,000 to 10,000 Somali demonstrators. Rocks thrown by the mob and ash from burning tires and cars filled the air. Given the size of the mob, its open hostility, our relative vulnerability, and the applicable rules of engagement, resort to lethal force was not the best option. Several marines took serious injuries ranging from lacerations to broken jaws. As I stood with them, I thought, "How can we deal with this more effectively?"

The answer came a year later, when Lieutenant General Anthony Zinni and his marines returned to Somalia with nonlethal capabilities—short-ranged, blunt impact munitions that were not sophisticated but were effective. The weapons were shown to members of the Somali press, who publicized them. Despite intelligence reports indicating that warlords were planning to use mobs again, no more appeared. The warlord reluctance to test these nonlethal weapons was clear.

## Nonlethal Capabilities as Warfighting Tools

These experiences and the insight that I have gained as the chairman of the Joint Nonlethal Weapons Program Integrated Product Team have made me a firm believer in nonlethal capabilities as warfighting tools. Their utility lies in what they can provide

### Center for Technology and National Security Policy

The National Defense University (NDU) established the Center for Technology and National Security Policy in June 2001 to study the implications of technological innovation for U.S. national security policy and military planning. The center combines scientific and technical assessments with analyses of current strategic and defense policy issues. Its major initial areas of focus include: (1) technologies and concepts that encourage and/or enable the transformation of the Armed Forces, (2) developments by defense laboratories, (3) investments in research, development, and acquisition and improvements to their processes, (4) relationships among the Department of Defense, the industrial sector, and academe, and (5) social science techniques that enhance the detection and prevention of conflict. The staff is led by two senior analysts who hold the Roosevelt Chair of National Security Policy and the Edison Chair of Science and Technology and who can call on the expertise of the NDU community and colleagues at institutions nationwide. The papers published in the *Defense Horizons* series present key research and analysis conducted by the center and its associate members.

commanders. They can help save the lives of all service members. They can break the cycle of violence by offering a more graduated response. They may even prevent violence from occurring if the opportunity for early or preclusionary engagement arises. Realizing the full potential of nonlethal capabilities means harnessing and directing existing technologies as well as developing future ones. It means educating policymakers about the best use of these technologies. It also means creating and sustaining a balance among the operational, technical, and policy tenets of these new battlespace effects.

Tremendous misperceptions exist about nonlethal capabilities. Some view them as substitutes for lethality. Others see them as symptoms of a softer military. However, nothing could be further from the truth.

Nonlethal capabilities were designed to alleviate operational deficiencies. American forces found themselves inadequately equipped to handle the situations of the chaotic post-Cold War world. Armed only with lethal options, U.S. troops were limited in what they could do to stop masses of refugees from storming food supplies, interrupting military operations, or intermingling with hostile threats. In such situations, lethal force alone has not been—nor will it ever be—the best option.

A vulnerability gap also exists between military presence and lethal force—a gap that has been readily exploited in unconscionable ways throughout the past decade. In Somalia, for example, armed clansmen used women and children for cover as they maneuvered against U.S. troops. Iraq often placed human shields at key facilities to deter air attacks. In Kosovo, Serbian forces herded Albanian refugees around military targets and then blamed allied air strikes for their deaths. The perception in the United States is that the American people have long been averse to unnecessary casualties in conflict. Within a crisis region, sole reliance on lethal force may do more to strengthen resistance than weaken it, and thus harm our strategic interests. The new precision, accuracy, and duration of effect offered by nonlethal capabilities will aid future commanders in such complex and highly charged political environments.

This growing interest in nonlethal weapons is a logical response to the changing global security environment. The world population is expected to exceed 8 billion within 3 decades. Most of the growth is expected to occur in less developed regions, with the greatest growth concentrations in urban areas. Given this change in demographics, America and its allies could find themselves in volatile situations, confronting seemingly faceless enemies who operate in the midst of vulnerable groups of noncombatants. Nonlethal capabilities are certain to become increasingly relevant in this nascent environment.

**Lieutenant General E. R. Bedard, USMC, is currently the Deputy Commandant, Plans, Policies, and Operations, of the United States Marine Corps. Additionally, he serves as Chairman of the Joint Nonlethal Weapons Program Integrated Product Team of the Department of Defense.**

## Policy and Technologies

The Joint Nonlethal Weapons Program (JNLWP) has grown out of the need to address emerging threats. In the aftermath of Somalia, Congress mandated a nonlethal weapons program with “improved budgetary focus and management direction.” In July 1996, the Department of Defense (DOD) issued its policy on nonlethal weapons, designating the Commandant of the Marine Corps as the executive agent for the DOD program.

The DOD policy provided the initial program framework. First, it defines *nonlethal weapons* as being designed and primarily employed so as to incapacitate personnel and materiel while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. It also states that nonlethal weapons are intended to have relatively reversible effects on personnel and equipment.

Furthermore, the DOD policy addresses many misperceptions about nonlethal weapons. Specifically, it states that these weapons do not guarantee zero probability of fatality or permanent injury prevention. They are designed to minimize fatalities and permanent injuries. The policy also emphasizes that nonlethal weapons do not preclude the first use of lethal force when appropriate. It highlights that the weapons may be used in conjunction with lethal force. Additionally, the policy states that nonlethal weapons do not limit authority to use all necessary means of self-defense.

Since its establishment in 1997, JNLWP has sought to meet commanders’ needs with respect to the new reality of asymmetric warfighting. Initially, JNLWP assessed the many existing technologies that have become nonlethal capabilities. These *capability sets* as fielded by the services are characterized by relatively low-end technologies—pepper spray, blunt impact rounds, and protective riot control equipment. Most munitions in the present capability sets are based upon current law enforcement needs—all of which are principally designed for close-in (5–15 meters) engagement.

The current capability sets are intended to provide U.S. forces with an initial, albeit interim, nonlethal capability. Although they are considered interim capabilities, they have nonetheless proven effective. The U.S. Army 709<sup>th</sup> Military Police (MP) Battalion used them near Sevece, Kosovo, in April 2000, when faced with large crowds throwing rocks and sticks, blocking the only egress road. The MPs seized the initiative, using nonlethal 40-millimeter sting balls and sponge grenades. The crowds dispersed, and the MPs departed. In February 2001, another incident in Kosovo resulted in the use of items from nonlethal capability sets. The incident was resolved without casualties after several volleys of nonlethal munitions.

Of particular interest in this engagement were the tactical adaptations made by young leaders on the ground. Limited by short range, they intuitively adjusted their movement and fire techniques. Employing volley fires and rushing tactics, the initiative was gained and maintained, forcing the hostile agitators to disperse. These engagements are clear examples of how nonlethal capabilities can

**this growing interest in nonlethal weapons is a logical response to the changing global security environment**

## A Taxonomy of Nonlethal Capabilities Technology

Electromagnetic					
Electrical	Radio Frequency	Microwave Frequency	Infrared	Visible Light	Ultraviolet
Direct current Pulsed current	RF devices Wide/ultrawide band	High power microwave Millimeter wave	Chemical oxygen iodine lasers Hydrogen/deuterium fluoride lasers Solid state lasers	Argon lasers Isotropic radiators Flashes, flares, and strobes	Laser ionizer

  

Mechanical and Kinetic	Acoustic	Ancillary	Chemical
Blunt impact devices Barriers Entanglements	Audible/optical Audible Ultrasound	Markers Encapsulants Nonlethal casing	Riot control agents Foams Antitraction Malodorants Obscurants Nanoparticles Thermobarics Reactants

break the cycle of violence with minimal casualties and collateral damage. At this tactical level of war, JNLWP is exploring how best to get greater range—not only to 100 meters but also to several hundreds of meters, well beyond effective enemy small arms range. At the operational level of war, the required ranges are far greater.

To a great degree, the need for nonlethal capabilities has drawn existing technologies into the field. In laboratories across the country, state-of-the-art technologies look promising. These technologies cut across the spectrum of science and interact with targets in much different ways than traditional blast, fragmentation, and ballistic technologies.

High-energy laser technology can be used for countermateriel applications. *Precision strike* previously referred to munitions that could produce blast and fragmentation effects within a few meters of a target. With high-energy laser technology, we are on the verge of being able to strike specific points on a target within a few centimeters. Mounted on an airborne platform, high-energy lasers can destroy key components within an enemy system without causing unnecessary collateral damage.

Another promising directed energy technology is the Active Denial System (ADS) for counterpersonnel applications, which is being field-tested at Kirtland Air Force Base in Albuquerque, New Mexico. Its effects are more uniform and universal than the older nonlethal technologies, such as kinetic energy systems. ADS projects

a millimeter-wave energy band at operational ranges. When applied to the target, it quickly penetrates less than 1/4-inch of skin and affects the pain receptors, resulting in an effect similar to touching a hot light bulb. The resulting reaction is very effective.

One of the most advanced technological pursuits of JNLWP is a directed energy system called a *pulsed energy projectile*. This counterpersonnel capability projects a beam that creates a plasma pulse at the target. When the plasma pulse strikes an individual, it results in a flash-bang effect that startles and distracts, and it also has a kinetic effect on the individual's nerve sensors.

### Opportunities

Nonlethal weapons allow commanders to select appropriate levels of force for a given situation as well as to tailor them for more fluid ones. Ultimately, these additional options can be used to achieve desired effects earlier and with greater precision than with lethal force alone. These options include:

- *Enhanced Negotiations*: Drawing upon his experience in Somalia, General Zinni has recommended that commanders consider negotiations as an alternative to violence. Law enforcement officers echo this advice with regard to crowd control. Crowds are one of the biggest challenges U.S. forces can face in humanitarian operations.
- *Credible Deterrence*: Nonlethal capabilities allow commanders to use the most effective means of force based upon the perceived threat. For example, a commander confronting an angry mob has the tactical flexibility to employ nonlethal force in those cases where tactical

judgment dictates the use of force. Adversary awareness of this new tactical option may readily deter all but the most motivated and well-prepared opponents from aggressive, antagonistic, and injurious actions.

- *Seizing the Initiative*: At Sevece, Kosovo, the Army's adaptive use of nonlethal capabilities produced a shock effect within the opposing crowd. Rapid successions of volleys and advances by the military police clearly dismantled crowd cohesion. Nonlethal capabilities allow a commander to gain the initiative without incurring the consequences of lethal force. Moreover, they permit commanders to address a threat that may not warrant a lethal response.
- *Controlling Violence Escalation*: Nonlethal capabilities may disrupt the cycle of violence. Implied use of nonlethal force may even deter violence before it starts. Because nonlethal capabilities can be used more proactively than lethal force, they can also be used earlier in a crisis. The lesson learned in past crises is that positively influencing the actions early is preferable. Actions taken too late can mean loss of life, unnecessary suffering, and unintended property damage.
- *Shaping the Outcome*: Force continuum options give commanders more precise tools to shape the outcome. If the intended result mandates minimum casualties and collateral damage, a commander might rely heavily on nonlethal capabilities and use precise lethal options against specific targets. For example, when facing a hostile crowd, a commander might use nonlethal capabilities to separate noncombatants from a gunman prior to employing lethal force against the threat.

The newer, high-end technologies promise greater capabilities and even broader applications. Current nonlethal capabilities are often viewed as being limited to force protection in military operations other than war. However, many existing and emerging technologies could be used for a variety of purposes, not only in all types of military operations other than war but also in major theater war. For example, directed energy systems might be used to counter movement. The U.S. Joint Forces Command (USJFCOM) recently used simulations to evaluate the ability of nonlethal systems to interrupt lines of supply. The simulation showed that the flow of supplies could be significantly impeded without the level of collateral damage and casualties associated with conventional air strikes. Of great operational significance in the USJFCOM experiment was the availability of these lines of supply to friendly forces because their denial to the enemy was accomplished without infrastructure destruction.

Additionally, directed energy systems might be used for precision engagement. During Operation *Desert Storm*, Iraqi forces positioned MiG aircraft near one of Iraq's most significant cultural symbols, the Ziggurat Temple. They also placed anti-aircraft batteries on the roofs of hospitals. The increasing precision of lasers could destroy such targets without unnecessary collateral damage. Simulations have demonstrated the ability of precision laser systems to attack convoys carrying human shields. Such directed energy can surgically destroy electrical components within vehicles and other systems while reducing the risk of inflicting injury on nearby civilians.

Other nonlethal technologies might support precision engagement. In an effort to deter allied air strikes in the former Yugoslavia, human shields stood on the last bridge across the Danube River in Novi Sad. This tactic was also used in Belgrade. While the coalition had the legal right to attack the bridge (assuming the anticipated injury to civilians would not be excessive in relation to the military need to destroy the bridge), the political ramifications of doing so

## Nonlethal Weapons Core Capabilities

### Counterpersonnel

- Crowd control
- Incapacitate individuals
- Deny area to personnel
- Clear facilities/structures/areas

### Countermateriel

- Area denial to vehicles (land, sea, and/or air space)
- Disable/neutralize vehicles, vessels, aircraft, equipment

### Countercapability\*

- Disable/neutralize facilities and systems
- Deny use of weapons of mass destruction

\* Not viewed as core; however, recognized as complementary to counterpersonnel and countermateriel

were too great. In the future, several existing and emerging nonlethal technologies could be used to clear personnel from the bridge before attacking it with other munitions. These other munitions might include nonlethal payloads that could temporarily deny the use of the bridge, allowing for future friendly use.

## Potential

The development and subsequent employment of nonlethal capabilities necessitate a balance in technology, operations, and policy. Technologies offer new capabilities, which, when realized, offer opportunities. To maximize these operational opportunities, operational concepts must be developed that incorporate their contributions. Additionally, policymakers must be made aware of these significant opportunities and allow for their use.

New technologies require us to rethink how we develop operational concepts. Traditionally, operators state their needs and request that scientists satisfy those needs. Although this system is efficient in methodology and process, it unnecessarily restrains technological advancements. Technical research must push the envelope of feasibility. The new defense acquisition philosophy specifically directs that the technology base not be bounded by today's analyses and forecasts. The development of the radio, airplane, and helicopter utilized a similarly unbounded process, and that remains the case today with new technologies that have potential nonlethal uses. Fully achieving nonlethal capabilities requires thinking outside established norms. It means looking at the technologies and developing operational concepts that maximize employment opportunities. This represents technology-based exploration of operational uses, rather than a needs-based approach. The technology-based approach helps find new opportunities for technologies that might otherwise have been missed with the needs-based approach.



A good example of the technology-based approach is the DOD Advanced Concept Technology Demonstration (ACTD) program. Essentially, this program allows the scientist and the customer to insert a technology into an experimental operational environment and to see how it functions. These demonstrations evaluate the military utility of a particular technology to determine if it should be further developed or fielded and initiate the development of desired characteristics. This program is helping pursue several nonlethal capabilities today.

JNLWP also investigates promising technologies outside the ACTD process and helps explore new opportunities for their use. Current investigations include evaluation of previously mentioned technologies, such as the pulsed energy projectile, a nonlethal round for the new Objective Individual Combat Weapon, and a breakable mortar munition that could be used to deliver nonlethal payloads.

The central issue regarding nonlethal counterpersonnel capabilities is understanding their human effects. These capabilities must have reliable and repeatable effects. The resulting target response must also be predictable. Quantifying these two parameters—effect on target and target response—is essential so that field commanders have full confidence in calling for their use.

In addition, the real challenge for nonlethal weapon program managers is designing a weapon that will be both effective and primarily nonlethal against the span of the human population. Meeting this challenge has required breaking new ground in defense acquisition processes. A Human Effects Center of Excellence has been established at Brooks Air Force Base to serve as a central repository for nonlethal human effects data and to support DOD nonlethal weapon program managers in human effects analysis. A pilot process has also been implemented in which JNLWP managers have their human effects analyses reviewed by an independent Human Effects Review Board (HERB). This board, consisting of representatives from the Armed Forces medical branches, assists and advises nonlethal weapon program managers in regard to planning and conducting target human effects evaluations. As a complement to the HERB review, a nongovernmental Human Effects Advisory Panel, consisting of experts from academia, may be convened to provide an opinion. This second review is intended to support customer confidence and to facilitate public acceptance as we move forward in fielding new and potentially controversial technologies.

Acceptance of nonlethal capabilities will depend heavily on education and training. Both critics and supporters of nonlethal capabilities within DOD must be educated to understand what these capabilities provide. This education begins with instruction at all levels in service and joint schools. It also includes combatant commander awareness regarding existing and emerging capabilities.

After education has provided awareness of the contributions of nonlethal capabilities, training will be needed to build confidence in their employment. In tactical situations, commanders must quickly decide which options in the force continuum to use. They must

understand and have confidence in the effectiveness of these systems and must intrinsically understand how targets might respond once engaged. The Interservice Nonlethal Individual Weapons Instructor Course helps build this confidence by preparing trainers to educate units and to insert nonlethal capabilities training into recurring unit and individual training events.

Realizing new nonlethal capabilities also will require acceptance by policymakers. This, too, demands education. All policymakers must be made aware of the capabilities that exist, and they must be comfortable with how we propose to employ them. More importantly, military leaders must demonstrate how these capabilities meet tactical and operational requirements placed on their forces. We must demonstrate how these capabilities enhance our ability to accomplish the full spectrum of missions assigned in the face of new realities.

To convince policymakers to support the procurement and employment of nonlethal capabilities, we need to do more than just assert that our forces need these capabilities. Policymakers often must weigh public acceptance of a program before providing support. Educating the public on nonlethal capabilities is critical because most of these capabilities are relatively new to domestic and international publics. Yet not everyone will accept these capabilities solely because they are intended to be nonlethal. Some will argue that these capabilities, if misused or in the wrong hands, may have catastrophic results. Some have called on the United Nations to scrutinize them. The process of educating the domestic and international public should include making a strong case not only for our need but also of our intent and what these capabilities can realistically accomplish. To be effective, we will need to demonstrate that tests of the human effects of these capabilities produce reliable results—a major effort of the JNLWP.

Appropriately, policymakers also want the assurance that these new capabilities comply with our domestic and international legal obligations, including those under the Law of War. DOD Instruction 5000.2 requires that all weapons, weapon systems, and munitions undergo a legal review to ensure that they comply with these legal obligations. DOD Directive 3000.3 subjects all nonlethal weapons and weapon systems to the same scrutiny. Crucial to the legal review is whether the weapon is calculated to cause unnecessary suffering—whether its normal and expected use would cause injury or suffering manifestly disproportionate to the military necessity of using the weapon. Nonlethal capabilities generally are designed to minimize injury and do not run afoul of this proscription. In addition, the legal review examines whether the weapon can be used in such a way as to discriminate between legitimate targets and innocent civilians. All nonlethal capabilities will be designed to pass this test, also. Finally, the legal review examines whether any specific treaties or agreements, such as arms control agreements,

**the real challenge for nonlethal  
weapon program managers is  
designing a weapon that will be  
both effective and primarily  
nonlethal against the span of  
the human population**

would prohibit their employment. The intent of these treaties is to minimize suffering on the battlefield and to the civilian population. Nonlethal weapons are, by design, consistent with this intent.

## Conclusion

Several reasons justify the pursuit of nonlethal capabilities. The most significant is that they save lives not only of the civilians that troops have been sent to protect but also of the troops themselves. These capabilities fill a vulnerabilities gap, and, in doing so, they allow American forces to effectively address a wider variety of situations and better control the escalation of violence in many situations. Nonlethal capabilities make our forces more, not less, formidable.

In addition to saving lives, nonlethal capabilities represent transformational change. The quest for these capabilities has led to the investigation of technologies that could meet an immediate need. It has also found those that offer new opportunities that were not widely expected.

As Martin Van Creveld wrote in *Technology and War*, "None of the most important devices that have transformed war, from the airplane to the tank . . . down to the electronic computer . . . owed its origins to a doctrinal requirement."<sup>1</sup> Military transformation has often resulted from operators exploring uses for nascent technologies. This precept—which stands for driving forward, ensuring that operations, policy, and technology are inextricably linked as we realize new opportunities for 21<sup>st</sup>-century warfighting—characterizes JNLWP today. It is about transforming our forces to meet the new reality and retaining our dominance as the finest military force in the world.

<sup>1</sup> Martin L. Van Creveld, *Technology and War: From 2000 B.C. to the Present* (New York: Free Press, 1989), 220.

## Other recent titles in the *Defense Horizons* series:

Charles L. Barry and Elihu Zimet

### ***UCAVs—Technological, Policy, and Operational Challenges***

(Number 3, October 2001)

Arthur H. Barber III and Delwyn L. Gilmore

### ***Maritime Access: Do Defenders Hold All the Cards?***

(Number 4, October 2001)

Hans Binnendijk and Richard L. Kugler

### ***Adapting Forces to a New Era: Ten Transforming Concepts***

(Number 5, November 2001)

David R. Oliver, Jr.

### ***Current Export Policies: Trick or Treat?***

(Number 6, December 2001)



James M. Loy and Robert G. Ross

### ***Global Trade: America's Achilles' Heel***

(Number 7, February 2002)

John L. Petersen and Dennis M. Egan

### ***Small Security: Nanotechnology and Future Defense***

(Number 8, March 2002)

For on-line access to *Defense Horizons*, go to:

<http://www.ndu.edu/inss/press/nduphp.html>

*Defense Horizons* is published by the Center for Technology and National Security Policy through the Publication Directorate of the Institute for National Strategic Studies, National Defense University. *Defense Horizons* and other National Defense University publications are available online at <http://www.ndu.edu/inss/press/nduphp.html>.

The opinions, conclusions, and recommendations expressed or implied within are those of the contributors and do not necessarily reflect the views of the Department of Defense or any other department or agency of the Federal Government.

Center for Technology and National Security Policy

Hans Binnendijk  
Director