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NONLETHAL WEAPONS AS FORCE OPTIONS FOR THE ARMY

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Introduction

For the past six years I have been working on a concept called Non-Lethal Defense. The development of this concept has been driven by two major factors. First, the geopolitics of the world have been altered dramatically, and with that, our requirements for national security have also changed. Second, technology has matured to a point that makes many nonlethal weapons systems feasible. Together, these factors make a strong case supporting the development of more nonlethal weapons and the concepts for employment of those systems.

In recent months the U.S. military services had gained significant experience in peacekeeping, peace making, and humanitarian operations. When we first began talking about nonlethal weapons it was from a hypothetical standpoint, predicting what we believed future requirements would be. Now, with Somalia, Bosnia, and other operations, we are beginning to be able to base these requirements on real experience. This is no longer hypothetical.

The issue of violent crime in American has taken on burgeoning importance. It is a serious problem in its own right. If allowed growth in current endemic proportions, it would also constitute a threat to our national security.

There are several important issues I want to address at the beginning of this study. Most importantly, I am proposing **additional options for application of force.** Nothing about this concept should detract from **maintaining a highly mobile and extremely lethal force.** In fact, I argue the concept should be linked to precision guided munitions, who's accuracy actually limits collateral casualties. Another significant issue is that any antipersonnel weapon must meet the international standards of humaneness.

As the concept has evolved, we at Los Alamos have come to focus our efforts on antimateriel systems. If you can stop the machines of war, you can inhibit the prosecution of conflict. This does not mean that antipersonnel weapons have been totally excluded. To the contrary,

there are many situations in which stopping people is necessary. However, the problem is very difficult. The National Institute of Justice has had a "Less-Than-Lethal" initiative for several years. The highly desirable, "totally-safe, stun-gun," a weapon that produces an instantaneous catatonic state, doesn't exist. In my estimation, it may never exist due to variances in human physiology. However, we can, and must, reduce the risks attendant to capturing or temporarily incapacitating people.

Another issue is that the tolerance for casualties has decreased dramatically. Protecting the lives of American troops is an imperative while minimizing collateral casualties is extremely important. Even reducing enemy casualties may be beneficial, as conscripts rarely have a vested interest in political outcomes. Some will argue the American public is not concerned with the number of casualties inflicted on an adversary. I believe this is short-sighted and an anachronistic view. It represents a carry-over from days in which enemies were dehumanized; a psychological ploy to make their demise more palatable. In regional stability operations both military and political objectives must be considered. Peacekeeping, peace enforcement, and humanitarian assistance are among the military operations that have been confirmed as necessary. Keeping all casualties to a minimum will be an important factor in achieving the long term goals of those operations.

Having a coherent policy is also a key issue. Nonlethal weapons and concepts are designed to provide options to commanders at all levels. These systems cannot be viewed as a panacea for resolution of complex foreign relations problems. Even if perfected and deployed, they must be used as an operational aspect of well thought-out, logical, and coherent policy. The long-term goals must be considered before applying any force.

Nonlethal weapons have applicability across the entire spectrum of conflict from operations-short-of-war to high-intensity conflict. These functions run from peacekeeping capabilities to strategic paralysis of an adversarial nation-state. Therefore, how we think about nonlethal weapons concepts is also a seminal issue. The assumptions applied during concept development must be broadened beyond conventional applications of force. I believe they offer alternatives that go far beyond just being adjuncts to traditional military operations. Instead, they may allow extension of diplomatic options into areas that have been called "coercive diplomacy" or

"technological sanctions." Nonlethal weapons may have a major role in such operations.

In early phases of our thinking, "soft kill" or "mission kill" systems were discussed as adjuncts to conventional systems. Generally, they were designed to temporarily immobilize a target so that it could be destroyed by a "hard kill" weapon. They were a means to increase the probability of hit (P_h) and probability of kill (P_k) factors. It was only after considerable thought, that we seriously investigated nonlethal weapons as a means to influence policy and their ability to have significant impact on national security. In fact, much debate ensued concerning whether the issues were primarily policy versus technology and acquisition. I believe both issues are important.

Technologies

A range of technologies are currently available or could be developed. Missing is our understanding of employment options. There is no integrated architecture that allows a coherent strategy to be developed. There have been a few technologies developed independently by various organizations. Many of them are black owing either to their potential impact or to their sensitivity to countermeasures. To date there has been no coordinated effort to determine requirements and measures of effectiveness issues.

The length of time it takes to thoroughly inculcate a new technology into the military suggests that we should employ simulation and modeling as primary tools in developing the concept. This will allow military planners and developers to explore technology options while concurrently designing appropriate strategy and doctrine. The speed of introduction of new technologies does not permit the luxury of long periods in which to determine the most effective applications. New areas of thought require even more exploration. Simulation and modeling will offer a cost-effective method to develop nonlethal requirements. Needed is a cohesive plan to study these capabilities and develop the supporting doctrine. It should be done from a framework that establishes a new paradigm for the needs of national security of the future while leveraging off the lessons of the past.

The weapons systems in Non-Lethal Defense are multidisciplinary in nature. To provide a brief overview of the technologies involved I will describe a few possibilities. The physical discipline categories could be broken out a number of ways. I chose to do it as follows:

- **Electromagnetic/Acoustics**
- **Information Science**
- **Materials**
- **Kinetics**
- **Microbics**

Electronic warfare (EW) has assumed new levels of importance. Many of the weapons developed for EW are nonlethal. **In fact, in the** Journal of the IEEE **in the fall of 1992, a proposal was made that the EW community should take over the nonlethal field due to their historic relationship. Other systems such as optical munitions are designed to counter threat acquisition sensors. Another set of weapons in their inventory might include acoustic systems designed to disrupt threat forces or to keep crowds at bay. High acoustic levels make both point and area denial systems feasible. At lower levels, annoying sound might be employed as a distraction to keep the general population from gathering and becoming a potential threat.**

Materials include antimateriel chemicals designed to inhibit functioning of military weapons or support systems. These include agents that are sticky, slippery, rapid-hardening, obscurants, filter clogging, or otherwise system degrading. Supercaustics have been mentioned in other publications. These are very aggressive agents that can destroy most materials. However, no universal solvent exists and, thus the agents must be matched against the materials they are to attack.

A variety of foams could be used for missions such as to establish and control an evacuation corridor to move rescued individuals to an airfield or seaport. They would be used to isolate areas and prevent snipers from occupying positions that threaten our military personnel. Such systems would offer acceptable alternatives for situations in which snipers are in close proximity to noncombatants. In addition to foams, sprays could be dispersed that have a number of effects. They might be foul smelling to urge evacuation of an area or have safe dyes for marking and identifying of individuals or groups. Even water cannon might be used.

Some technologies would allow U.S. forces to control visibility. They might use multispectral smoke generators designed to inhibit observation. These smokes could be tailored with "windows" that

allow U.S. optical systems to observe accurately the situation, and if necessary, acquire targets.

Microbics is politically the most sensitive area. There is almost nothing that some microbe won't eat so the potential applications are extensive. The advent of biodegradation as an acceptable, even desirable, means of reducing waste will exacerbate the issue. On one hand it has made bioremediation more acceptable. On the other, it will spread both the use and possible misuse of the technology.

Kinetics is an inexact term to describe the use of high-strength materials to stop machine functioning. Simple examples include a stick in the spokes and commo wire wrapped around axles.

The final area, and another sensitive one, is that of information science. We are all well aware that such computer viruses as the Michelangelo Virus can be devastating. The entire world now relies on computers in some fashion. Most disconcerting is that we are the most information intensive society in the world and, therefore, the most vulnerable. The limits of nonlethal applications of information sciences have not yet been imagined.

We must be cognizant that for every technology proposed we must develop countermeasures. Even in politically sensitive areas, we should work on countermeasures whether or not we choose to develop an offensive capability. The head-in-the-sand approach, which says "if we don't develop this, no one else will," is irresponsible and inconsistent with historic reality.

There should be a strong tie to psychological operations (psyops). The need for employment of psyops in these operations is obvious. From an equipment perspective, they could be provided with new systems that allow them to capture the commercial radio frequencies. They then could broadcast so only the message we want is available to the threat population. Print and visual media would also be employed for information dissemination.

Applicability

Nonlethal weapons should not be viewed as stand-alone systems. They should be fully integrated with the supporting mechanisms including intelligence, command, control & communications, precision lethal weapons, and combat assessment. Many of these factors will

be complicated by nonlethal warfare. The intelligence requirements for developing a target list for national infrastructure are different from those necessary to attack a fielded force. Command and control when functioning on the edge of conflict are also difficult. Adequate communications between the National Command Authority and field elements will be essential. The recent lesson in Somalia clearly demonstrates the need for adequate lethal force to back any attempted mission. Finally, in measuring the effectiveness of strikes, the assessment techniques for many nonlethal technologies will be different from classical damage assessment involving physical destruction of targets. The assessment techniques should be developed in parallel with the proposed weapons systems.

Once a decision is made to engage in battle, options on the high end of the conflict spectrum can include the goal of strategic paralysis. This focuses power against the infrastructure of a potential adversary and attacks his centers of gravity. The attacks are conducted in such a way that the aggressor is deterred or dissuaded from an undesirable course of action. Failing that, his war-fighting capability is degraded to the point that prolonged armed conflict is clearly not viable. There is a limited set of targets that can be attacked resulting in strategic degradation of a potential adversary. Some of these include communications, command, control, and computer systems, power systems, energy distribution systems, transportation systems, and financial systems.

Emerging doctrine acknowledges these points of attack and calls for parallel war. In this situation, precision munitions targeting is designed to cripple simultaneously as many systems as possible. The emphasis on precision munitions allows the military to carry sufficient armament to accomplish their mission quickly while minimizing collateral damage. Non-Lethal Defense concepts propose employment of weapons other than smart hard bombs but that can achieve the same basic results in systems degradation: strategic paralysis of the adversary.

Another advantage in employment of some nonlethal weapons is that physical damage can be minimized. In many of the scenarios projected above the outcome of conflict is a given, the U.S. has sufficient military might to prevail. However, once the military objective has been achieved, the task of rebuilding begins and the cost most likely will fall on the American people or our allies. Therefore, development of weapons that temporarily incapacitate or

degrade system functioning without major structural damage to the target makes sense. The emotional impact of some nonlethal systems can be enormous and the full power of psychological operations should be brought to bear in support of target degradation.

As an example of limited physical damage, actually used in Desert Storm, was the degradation of the Iraqi electrical power generation and distribution network. However physical destruction of electrical power plants yields long-term rebuilding problems. While some casualties at the time of conflict may be acceptable, there is a temporal component. Secondary and tertiary casualties are not acceptable in most circumstances. Hospital patients dying for lack of electricity quickly become intolerable. Inappropriate casualties engender deep and pervasive hatreds that can last for a long time, even centuries.

The entire world has become dependent on automated information systems. Even nations that are just beginning to evolve industrially use, and often rely on, computer technology. As individuals, industry and government organizations become more dependent upon, and interconnected by advanced information systems, those systems will be more vulnerable to attacks of a wide variety. The U.S. society is by far the most advanced in these systems, and therefore most vulnerable. However, all societies will continue to become more vulnerable as the information age matures worldwide. An advantage to degradation of critical information systems is that restoration of service can be made without the need to rebuild large facilities or complex machinery.

On the low end of the spectrum of conflict, nonlethal technologies offer military and political leaders options that can be applied in relatively ambiguous situations. These same systems can be employed to send a message of resolve to a potential adversary. In other cases, covert employment may be a desirable option.

The nonlethal technologies are found in a wide range of maturity. Some are "off-the-shelf" while others would require extensive development. Cost of the new nonlethal systems should not be a significant issue. Most of the technologies under consideration do not require new delivery platforms, alleviating expense significantly. Many are new munitions or subsystems that can augment existing weapons systems as modifications and upgrades. The overall costs should be moderate when compared with development of totally

new weapons systems. When the utility and effects of nonlethal systems are considered, the cost effectiveness is clear.

Nonlethal weapons could impact force structure. Consideration should be given to providing special units with equipment designed to meet the nonlethal task, but backed by substantial firepower. Psychological operations units can play an important role in increasing the effectiveness on the weapons systems. Additionally, there may be a greater need for civil affairs units with enhanced capabilities. When considering the limited size of the active units available in the future, nonlethal weapons may be considered a force multiplier allowing early resolution of problems.

In addition to military applications, nonlethal weapons are urgently needed by civilian law enforcement agencies. The events in Waco earlier last year provided tragic evidence of just how great that need really is. There are substantial differences in the safety parameters between military and law enforcement use. When military force is applied, some loss of life, while not desirable, may be accepted as a reasonable risk. In civilian law enforcement, the acceptable risk factor must approach zero. These agencies are constantly being sued over perceived misuse of force. As crime has emerged as a major civil issue demanding attention at the highest levels, the need to provide new weapons to law enforcement agencies has risen dramatically.

This is driven by a true paradox. First, we cheer retribution delivered by the "Dirty Harry-type" character in the entertainment media. Then in reality, as the most litigious society in the world, we constantly sue our police departments for use of excessive force. While some cases are justified, many reach the point of absurdity. The results of these suits are the tremendous expenditure of scarce training funds, and officers made unsure of their limits of authority.

There are many issues in common across government agencies. The Attorney General, Janet Reno, has asked the Department of Defense, and others for assistance in the development of less-than-lethal systems. This is an excellent opportunity for joint ventures in dual use technology.

Another consideration supporting the dual use development of nonlethal technologies is the evolution of transnational threats. When addressing an adversary nation-state, the roles and missions

of various governmental agencies is quite clear. However, I believe in the future we will be faced by other entities that do not have nation-state status, but still approach some element of power necessary to threaten US national interests. Drug cartels are one such example. One problem is that part of the adversarial organization may be comprised of American citizens. At this point the lines of responsibility are no longer as clear. Given the integration of economic and national security issues, one might consider the possibility of a multinational conglomerate posing such a threat. For these future contingencies we need new force options.

Summary

This paper suggests that future challenges to U.S. national security will be very different from those previously experienced. In a number of foreseeable circumstances, conventional military force will be inappropriate. The National Command Authority, and other appropriate levels of command, need expanded options available to meet threats for which the application of massive lethal force is counterproductive or inadvisable.

It is proposed that nonlethal concepts be developed that provide additional options for military leaders and politicians. Included in this initiative should be exploration of policy, strategy, doctrine, and training issues as well as the development of selected technologies and weapons.

In addition, civilian law enforcement agencies have similar requirements for less-than-lethal systems. This may be an excellent example for a joint technology development venture.

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