NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

NON-LETHAL WEAPONS IN NONCOMBATANT EVACUATION OPERATIONS

by

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December 1999

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DTIC QUALITY INSPECTED 3

20000313 014

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	December 1999	Master's Thesis

4. TITLE AND SUBTITLE
NON-LETHAL WEAPONS IN NONCOMBATANT EVACUATION OPERATIONS

5. FUNDING NUMBERS

6. AUTHOR(S)
Kung, Jerry J.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT

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One of the challenges in NEOs is crowd control. Crowds have the potential for violence. Left unchecked, they can endanger the NEO mission. This thesis finds that a non-lethal capability is essential for responding to these threats. The thesis' methodology produces a short list of suitable non-lethal crowd control weapons for deployment in NEOs. Finally, the arguments for non-lethality in NEOs can be extended to other operations other than war, thus increasing the utility of non-lethal weapons in the US military inventory.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Noncombatant Evacuation Operations, Crowd Control, Crowd Behavior, Non-Lethal Weapons	156
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

Approved for public release; distribution is unlimited

NON-LETHAL WEAPONS IN NONCOMBATANT EVACUATION OPERATIONS

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Submitted in partial fulfillment of the
requirements for the degrees of

MASTER OF SCIENCE IN DEFENSE ANALYSIS

from the

NAVAL POSTGRADUATE SCHOOL
December 1999

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LIST OF ACRONYMS AND MILITARY HARDWARE

AC-130	USAF Fixed-wing Fire Support Gunship
ACT	Center for Advanced Concepts and Technology
AK-47	Russian Assault Rifle
BWC	Biological Weapons Convention
CENTAF	US Central Command Air Forces
CCW	Certain Conventional Weapons Convention
CH-46	Sea Knight (twin-rotor helicopter, 25 seats)
CH-53	Super Stallion (helicopter, 55 seats)
CN	Chloroacetophenone (Tear Gas)
CS	Ortho-chlorobenzalmalononitrile (Super Tear Gas)
CWC	Chemical Weapons Convention
DM	Diphenylaminechloroarsine (Sickening Agent)
DoD	Department of Defense
DoDD	Department of Defense Directive
ECC	Evacuation Control Center
ENMOD	Environmental Modification Convention
FM	Field Manual
HLZ	Helicopter Landing Zone
HN	Host Nation
JNLWD	Joint Non-Lethal Weapons Directorate
JTF	Joint Task Force
JTTP	Joint Tactics, Techniques, and Procedures
LAAW	Light Anti-Armor Weapon
LPD	Amphibious Transport Dock
LPH	Amphibious Assault Ship (Helicopter)
M-16A2	Assault Rifle
NAVCENT	US Naval Forces Central Command
NEO	Noncombatant Evacuation Operation
NVG	Night Vision Goggles
OC	Oleoresin capsicum
OMC	Office of Military Cooperation
PSYOP	Psychological Operation
RCA	Riot Control Agent
RPG	Rocket Propelled Grenade
ROE	Rules of Engagement
SAM	Surface to Air Missile
SEAL	Sea Air and Land
SOCCENT	Special Operations Command Central Command
TCN	Third Country National
UN	United Nations
USC	United Somali Congress
USMC	US Marine Corps
USS	United States Ship

ACKNOWLEDGEMENT

This thesis could not have been written without the strong guidance of my advisor, Professor David Tucker. His advice and editing prowess were invaluable to me throughout the thesis' composition. When I was lost in the details in writing, he brought me back to the proper perspective. Professor Tucker's experience at ASD(SOLIC) contributed immensely to refining my arguments on policy, non-lethal weapons, and NEOs. When I got stuck, he personally searched out and recommended several sources for my benefit in pushing past those spots. He was patient well beyond my expectations as I researched and wrote this thesis, and his encouragement and support were unwavering.

Special thanks to Professor Xavier Maruyama, for his support in the area of non-lethal weapons and his time spent discussing the issues with me. He put me in touch with several key figures in the non-lethal weapons field and got me started on my research. Through his efforts, I had the opportunity to attend the Force Protection Equipment Demonstration II, a showcase of non-lethal weapons and concepts, where I gained exposure to the plethora of technology out there today. Professor Maruyama deserves my grateful thanks for his direction, energy, and expertise.

I am pleased to acknowledge some key people in the Special Operation Academic Group here at the Naval Postgraduate School. Professor John Arquilla's course on Information Warfare in Fall 1998 sparked my interest in non-lethal weapons. Professor Gordon McCormick was instrumental to the start of my thesis organization. He encouraged my interest, helped me focus my proposal, pointed me towards Professor Maruyama and Professor Tucker, and funded my trip to Quantico. Perhaps most important in this team is Jennifer Duncan, the one who holds the whole curriculum together. She was always generous and helpful when I needed resources no one else could provide.

I am also indebted to Matt Begert, Mike Grossman, and Sid Heal, my points of contact in the law enforcement community. These experts are the forerunners for less-lethal weapons – their experience comes from using these weapons and experimenting with them every day. Matt Begert was one of my earliest contacts, and it was he who told me about R. J. Bunker's compilation of non-lethal terms and references. With regards to crowds, I am especially grateful to Matt Begert and Sid Heal for their tutelage in crowd control and crowd behavior. In addition to their own written work, they recommended that I look to authors like Raymond Momboisse and Rex Applegate for more information on classic police crowd control techniques. Both gentlemen, who I consider giants in the field, gave me personal encouragement that greatly motivated my efforts and interest.

I am obliged to Professor Clark McPhail of the University of Illinois for his published works on crowd behavior. His special attention to my email request for information deserves mention. In his reply, he guided me towards other background studies in the field of crowd theory, which helped me develop the discussions in this thesis. His office also sent me copies of some of his work. I sincerely apologize in advance for any inaccuracies or misinterpretations in this thesis concerning the theories he presents.

Grateful thanks go to my point of contact in the real world at the Joint Non-lethal Weapons Directorate in Quantico, VA. Like a constant star on the horizon, Marine Corps Major Steve Simpson, in charge of Concepts, supported my research with up-to-date information and also pointed me in useful directions. His accessibility and expertise are heartily appreciated.

In the course of researching NEOs, I had the pleasure of communicating with some of the men who were actually involved in recent operations. USAF Lt Colonel Frank Kisner, USAF Lt Colonel Brian Greenshields, and Army Major Taylor Beattie, key figures in Operation Assured Response, provided me with a wealth of information on operations, briefings, tactical difficulties, and the little situations you do not read about. Army Captain Fran Beaudette gave me his first-hand insights on Operation Noble Obelisk, and his friendly support is warmly acknowledged.

Thesis research is certainly not done in a vacuum. I want to thank the staff at the Dudley Knox Libray for their professionalism and enthusiasm. Their resourcefulness and expertise with research tools like Lexis-Nexus and Proquest were very helpful. Not enough recognition can be given to the interlibrary loan system, which yielded some of the material most critical to the arguments in the thesis.

Of course, I cannot forget to recognize the support of my fellow classmates, all embroiled in their own projects, but who all shared the same trials of thesis preparation. Finally, I want to express my gratitude to my family and two of my closest friends, T. Hartsfield and C. Saluna. Without their kindness, sympathy, and understanding, I would not have been able to carry through these months.

I. INTRODUCTION

Imagine a standoff at an isolated street corner in a country overseas. Three men armed with AK-47 assault rifles are facing off against your small squad of peacekeepers. If any of the three men decides to shoot, your rules of engagement unambiguously allow you to shoot back in self-defense. You could try to close in and disarm them, but there is a great risk someone will get killed doing it. There is nothing to do but wait – for a fight or for their surrender. You are well-equipped and well-trained to resolve the encounter, but only in the event someone makes a move. Tension increases as time passes.

Imagine another situation, this time with several teen-aged boys harassing your squad as you patrol the street. They are not armed, but they are spitting and cursing at you for being in their country. Then someone throws a rock to see what you will do. Your disciplined men refrain from a response. Next, someone throws a glass bottle, which shatters by your boots. This gets your attention and you turn to confront the boys, but your assault rifle fails to scare them. They know you cannot fire at them.

Imagine a busy street in which a crowd has gathered to watch you on your first day of peacekeeping in their country. Some glass bottles are thrown at you from the crowd. One of your men is hit and his face is bleeding. You did not see who threw the bottles, and you cannot shoot at the crowd because you do not have a legitimate target. Unless you are willing to injure innocent civilians to get the few offenders, you have no immediate recourse but to retreat and discontinue your patrol. You are prohibited from responding with lethal force to the threat, even though a man is injured.

The central theme to all three vignettes is the appropriate response. The first vignette points out that although our opponents are armed with lethal weapons, our lethal

response is predicated on an attack on us with lethal force. Our rules of engagement will not permit us to fire without justifiable provocation. Until they shoot, the situation remains unresolved and everything is put on hold, impacting our mission. The second and third vignettes illustrate the inadequacy of familiar lethal weapons, like the M16A2 assault rifle, against opponents who are not likewise armed or easily identifiable for a precise counterstrike. In effect, there is a gap in our capability to respond with force proportional to the threat. In other words, we have nothing in between using deadly force against opponents and dissuading opponents with the threat of deadly force. This gap exacerbates the dilemma of appropriate response illustrated by the vignettes.

The principle of appropriate response is based on a moral argument. As a leader in humanitarian issues, the United States must demonstrate a high moral position, striving to contain violence to a minimum level (Coppernoll, 1999, p. 1). That is why you do not unconditionally shoot the three armed men, or the boys harassing your unit, or the crowd. In addition to the moral motive, there are strategic and tactical interests in minimizing casualties and destruction. From a strategic standpoint, the repercussions from resorting to these methods are damaging to the international reputation of the US and the image of the US military. Failure to minimize violence can generate US domestic discontent, negative international publicity, and declining support for US military operations abroad. Similarly, the tactical fallout from an inappropriate use of force negatively impacts the immediate mission. Tensions on the ground are likely to increase. If there is the potential for violence and an increased likelihood for violence based on rising tensions, an escalation of threat develops. An escalation of threat to our troops puts mission accomplishment at risk. If our policy is to sanction indiscriminate use of force that

provokes locals to oppose our mission, then why undertake the mission at all and risk the lives of our troops? Those responsible for the American effort must smooth the path towards mission completion. Stirring the hornets' nest will only complicate our presence in the foreign country.

In general, noncombatant evacuation operations (NEO) are not combat operations. Fully lethal combat is not anticipated, but there are other challenges that put our troops at risk. In this multi-polar world, governments continue to crumble under conflicts based on issues such as religion, ethnicity, and politics. When the host nation's political situation becomes unsalvageable for the US Ambassador, US military forces conduct a NEO to evacuate all eligible personnel. Given the conflict-induced collapse of the local government that prompted the NEO, our troops face a volatile environment while carrying out their tasks. Their response to threats to the NEO has a direct bearing on whether the threat level relaxes or heightens, and correspondingly on whether the mission succeeds or fails. This thesis focuses on the role of crowds and crowd control in NEOs because of the security threat that crowds can pose. A crowd situation that becomes unmanageable can lead to a chaotic environment that taxes our force's ability to complete the NEO successfully. As Chapter III will explain, failure in these high-visibility operations has political ramifications for the US, which is why it is important to explore methods other than lethal force to resolve tactical challenges like crowd control.

The Department of Defense (DoD) is pursuing non-lethal weapons as a measure to fill the gap in our capabilities, depicted in Figure 1. The force continuum is the range of tactical options that lie between killing/demolishing and doing nothing. At the low end of force options are the show of force that intimidates adversaries, and psychological

operations (Psyops) and persuasion techniques that sway others to our will. As these methods prove insufficient to change our opponents' behavior, actual "pull-the-trigger" weapons dominate. Gaining our opponents' cooperation is replaced by the goal of forcing their capitulation by employing non-lethal weapons with effects that are short of death, permanent injury, and total destruction of property.

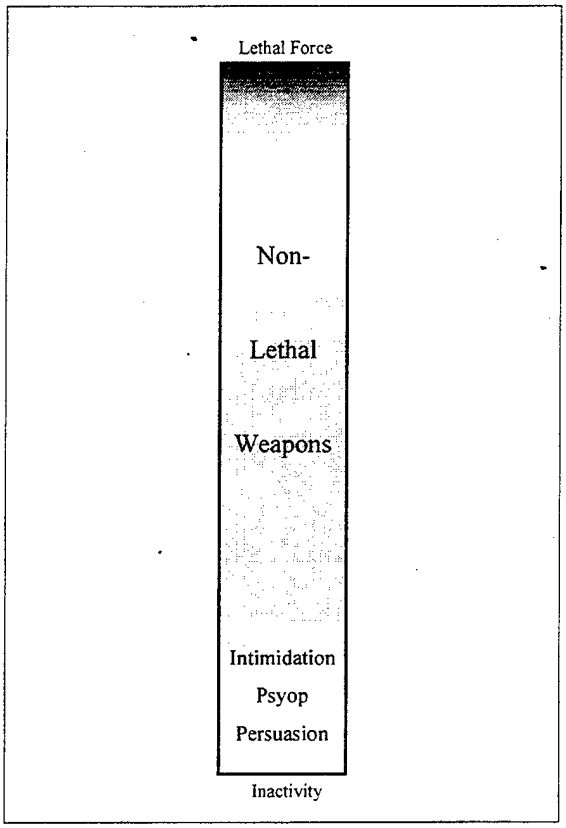

Figure 1. Capability Gap in the Force Continuum, after Lorenz, 1996, p. 3.

This thesis will focus specifically on non-lethal methods to reduce the threat (the likelihood for potential violence), as opposed to the military's traditionally lethal courses of action. Non-lethal weapons are a diverse class of weapons designed to incapacitate people and things without causing permanent damage. By resolving situations without

resorting to lethality, US forces minimize violence, enabling their mission to continue without the tactical obstacle presented by angry crowds and without generating wide-reaching political consequences for the US. These weapons are still controversial among strategic thinkers and the defense community. Despite arguments that non-lethal weapons indicate a lack of resolve, this thesis finds that these weapons increase the options available in the use of force and help to resolve tactically demanding scenarios. In particular, non-lethal weapons can defuse potentially violent encounters with crowds before reaching any provocation requiring lethality.

This thesis addresses the following questions:

- Are non-lethal weapons valuable to US forces in NEOs?
- What kinds of weapons and techniques can US forces use for crowd control in NEOs?

The next chapter recites the events of Operation Eastern Exit, a NEO conducted in Mogadishu, Somalia, in January 1991. The Marines and SEALs deployed into an uncertain environment and successfully evacuated 281 people without firing a single shot, though there were certainly opportunities meriting the use of deadly force. The US Ambassador did not want to provoke the armed factions overrunning the capitol. He stipulated that US forces withdraw if confronted, even if engaged in combat. His terms were accommodated by the disciplined NEO force. However, non-lethal weapons could have mitigated the risks our forces faced while meeting the Ambassador's request for nonviolence.

The third chapter discusses the anatomy of a NEO, using the doctrinal Joint Tactics, Techniques, and Procedures produced by DoD. Inherent in planning for a NEO

are the strategic and political-level considerations, which actually support the need for non-lethality as a force option. The fourth chapter discusses at length the challenge of crowd control while conducting NEOs. The scenario of a crowd is volatile in terms of threat and its potential for violence, so crowd control is a key security challenge.

The fifth chapter introduces non-lethal weapons as the solution that fills the gap in our capability for crowd control at appropriate levels of force. An expansive "universe" of non-lethal weapons is filtered into a short list of weapons that have tactical use for crowd control in NEOs. The five-step filtering process begins with the DoD definition of a non-lethal weapon. Because we are specifically interested in crowd control, the next step in the methodology filters out all those weapons that do not have conventional crowd control applications. The third filter is the legal review of each weapon for international treaty compliance. The fourth filter considers the weapon's acceptability as a weapon for the DoD inventory. The final filter examines a weapon's feasibility for deployment for NEOs. The opportunity cost of bringing a non-lethal weapon, instead of other equipment or personnel, is offset by the weapon's tactical value in NEOs, to include crowd control. Each weapon's size, weight, and versatility are factors that help determine whether US forces can and should deploy with it in a NEO. The logistical constraints in bringing non-lethal weapons pose a tough test for the utility of these weapons. The NEO force is armed with these weapons at the expense of deadlier force in a demanding and changing environment. The arguments in Chapter III, IV, and V answer the thesis' problem.

The sixth chapter re-tells the Operation Eastern Exit scenario, with the NEO force armed with non-lethal weapons to help them accomplish their mission. This sketch illustrates the worthwhile role non-lethal weapons can have in meeting various challenges

posed by NEOs. Based on the vignettes in Chapter VI, the concluding chapter extends the argument for the utility of non-lethal weapons to other operations other than war, generalizes the filtering process for non-lethal weapons with respect to other missions, and offers directions for further research.

II. OPERATION EASTERN EXIT

A. SUMMARY

Operation Eastern Exit was a NEO conducted in early January 1991 by US military forces, evacuating 281 people from Mogadishu, Somalia, in two days. On 2 January 1991, following a worsening civil situation in Mogadishu, American Ambassador James K. Bishop requested military assistance for the evacuation of his remaining Embassy staff and other eligible noncombatants (Siegel, 1991, pp. 1-2).

Two amphibious vessels, USS *Guam* (LPH-9) and USS *Trenton* (LPD-14), received orders to conduct the NEO. A sixty-man Marine and Navy SEAL force arrived at the US Embassy via two CH-53E helicopters in the early morning of 5 January. They secured the Embassy compound and prepared sixty-one evacuees for the flight to *Guam* and *Trenton.* During the night and into the early morning of 6 January, four waves of CH-46 helicopters extracted the remaining 220 noncombatants and the NEO force, thus concluding Operation Eastern Exit. By 11 January, the evacuees were transported to Muscat, Oman, and *Guam* and *Trenton* were back on station to prepare for Operation Desert Storm (Siegel, pp. 1-2).

B. SITUATION IN SOMALIA

Somali President Siad Barre had ruled the country since 1969 when he seized power. Civil unrest turned to armed resistance by the late 1980s. By 1990, three main rebel movements existed, primarily comprising certain clans active in large sections of Somalia. The Barre regime instituted reforms to pacify the rebel movements, and prepared for peace negotiations. However, the rebels perceived the overtures as pointless

as each of the rebel groups was vying to replace Siad Barre (Siegel, pp. 7-8). Somali government forces continued to fight the factions, just as the factions were struggling against each other. The government was falling apart, and order within Mogadishu disappeared. Crime contributed as much to the violence as the rebel sympathizers in the city. Foreigners were effectively under curfew by sunset. The growing indiscriminate violence compelled the Ambassador to announce, on 5 December, his recommendation for the voluntary departure of dependents and nonessential personnel (Siegel, p. 8).

By mid-December 1990, the United Somali Congress (USC) rebels were within 30 miles of Mogadishu, armed with mortars, assault rifles, and anti-aircraft guns mounted on trucks. Already, Britain, Italy, Germany, the US, and the United Nations (UN) were evacuating their personnel (Siegel, pp. 7-8).

By 30 December, Mogadishu resembled a war zone, with shells being fired into tribal neighborhoods, and uncontrolled small arms fire endangering foreigners and Somali noncombatants alike. Even though the compound had been hit by some stray bullets and vehicles were being hijacked outside, Ambassador Bishop felt he and his remaining Embassy staff could endure the fighting by remaining behind the compound walls. However, his sentiments changed during his New Year's Day jog in the compound; the constant small arms fire outside the walls forced him to reconsider the relative safety of the Embassy (Siegel, p. 8).

Truly caught in the middle of a civil war, Ambassador Bishop requested permission from the State Department to evacuate all Americans from Somalia on 1 January. Receiving approval on 2 January, Ambassador Bishop further requested US military forces to assist in the evacuation. Although other embassies were organizing

evacuation operations, Ambassador Bishop felt that the risk was too great for Americans to travel to those other evacuation sites, and remained adamant that a US military effort was necessary (Siegel, pp. 8-9).

C. THE MILITARY RESPONSE

US Naval Forces Central Command (NAVCENT) first became aware of trouble in Somalia on 31 December, and began looking at options to execute a possible NEO. When orders came from the Pentagon on 2 January, US Central Command (CENTCOM) organized its resources: Central Command Air Forces (CENTAF) would provide assets and forces for airfield extraction; NAVCENT would prepare for an amphibious extraction; and Special Operations Command Central Command (SOCCENT) would plan for helicopter extraction using tanker support. Because Ambassador Bishop felt travel outside the compound was dangerous, the airport was not a reliable evacuation point, ruling out CENTAF's direct role. SOCCENT's involvement never progressed past the alert order. The amphibious option was selected (Siegel, p. 11). Only later did the NEO planning staff discover that the Embassy was well inland (their Embassy material was out of date), precluding a beach evacuation. They had to use helicopters for the entire mission after all (Siegel, p. 16).

Late on 2 January, the NAVCENT Commander ordered USS *Guam* and USS *Trenton* to steam to Mogadishu to conduct the NEO. Stationed off the coast of Oman (see Figure 2), these ships were the closest amphibious assets to Mogadishu (Siegel, p. 12). *Guam* had two CH-46 heavy lift helicopter squadrons and one Marine Battalion Landing Team aboard. *Trenton* had one CH-53E heavy lift helicopter detachment and a contingent of SEALs and Marines (Siegel, p. 13).

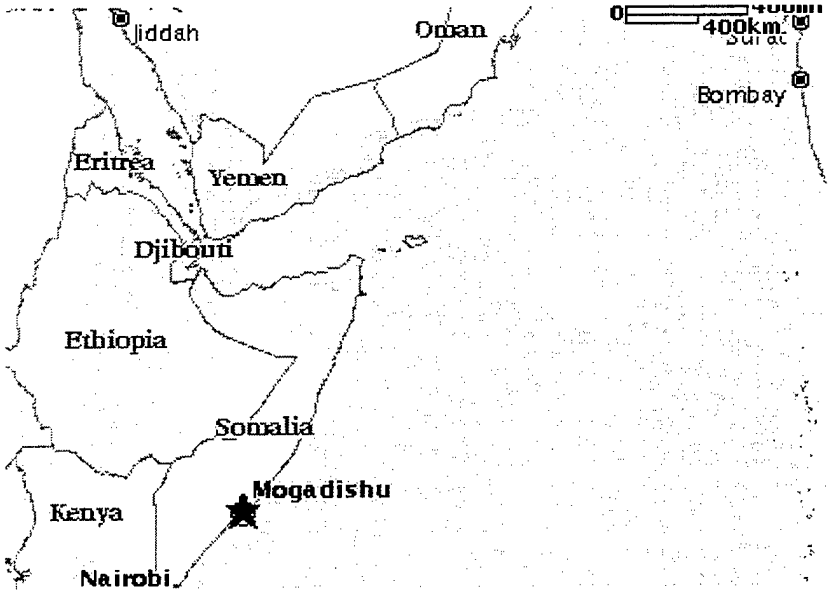

Figure 2. Regional Map around Somalia, from http://www.concierge.com.

After analyzing the tactical scenario and threat, planners recommended a helo insertion to reach the inland Embassy. The original eighty-man force was pared down to sixty, comprising five Marines for Evacuation Control Center and Command duties, nine SEALs to complement the Marines' combat capabilities, and a Marine company of forty-six men (Siegel, p. 18). The NEO force planned for a semi-permissive environment, but learned the situation at the Embassy had grown desperate by the Ambassador's account. On 4 January, Ambassador Bishop sent an urgent message requesting airborne insertion of two platoons to bolster perimeter defense against the "lawlessness which now prevails in Mogadishu" (Siegel, p. 18). Recently, looters had a shoot-out with Embassy guards. Stray rocket propelled grenades (RPG) and machinegun fire striking the Embassy were becoming commonplace. The rebels were harassing and threatening foreigners at that point. The Marines and SEALs deployed heavily armed, almost everyone carrying an

automatic weapon and an anti-tank weapon. A follow-on force was organized into specially configured groups of fifteen men (called "sticks") so that the ground commander could call in a particular stick per tactical requirement (Siegel, pp. 18-9). Despite these contingency preparations, these assets were never approved to deploy by NAVCENT, even though the initial force proved to be short-handed (Siegel, p. 30).

D. INSERTION INTO MOGADISHU

Two CH-53Es loaded with the NEO force departed early morning 5 January. They refueled twice on their way to Mogadishu, but only once on their return (as the ships continued to steam toward Somalia). Intelligence briefed a surface-to-air missile (SAM) threat and anti-aircraft artillery around the city, so the pilots planned for a low-altitude ingress over the city to find the Embassy (Siegel, p. 22). By the time the aircraft reached Mogadishu, it was just after dawn. Flying at 25 to 50 feet, the pilots loitered for fifteen minutes over the city while trying to identify the landing zone, their out-of-date maps useless. They finally found it and landed inside the compound, close to their estimated time of arrival. On their way in, they scared off some Somalis attempting to scale the walls using ladders (Siegel, p. 24).

Upon landing, the SEALs quickly exited and went searching for the Ambassador. The Marines secured the Helicopter Landing Zone (HLZ), then moved out to secure the perimeter. For fire support, an AC-130 gunship arrived overhead shortly after the helos landed, providing a menacing deterrent against anyone considering hostilities directed towards the American evacuation efforts. After spending an hour on the ground, the CH-53Es lifted off with sixty-one evacuees (Siegel, p. 24), leaving the NEO force to prepare the remaining evacuees for extraction over the course of the next night.

E. ACTIONS AT THE EMBASSY

Ambassador Bishop prepared the Embassy for evacuation. He outlined three zones of defense for the NEO force as well as the rules of engagement (ROE) for lethal force. The first defensive task was to protect the Embassy compound at the walls. If that zone deteriorated, the next defensive task was to protect the Joint Administrative Office and the Chancery buildings (his designated safehaven buildings), the Marine House, and the HLZ (see Figure 3). If the security force were still overwhelmed, a final defense zone would be established to protect the two safehaven buildings (Siegel, p. 28).

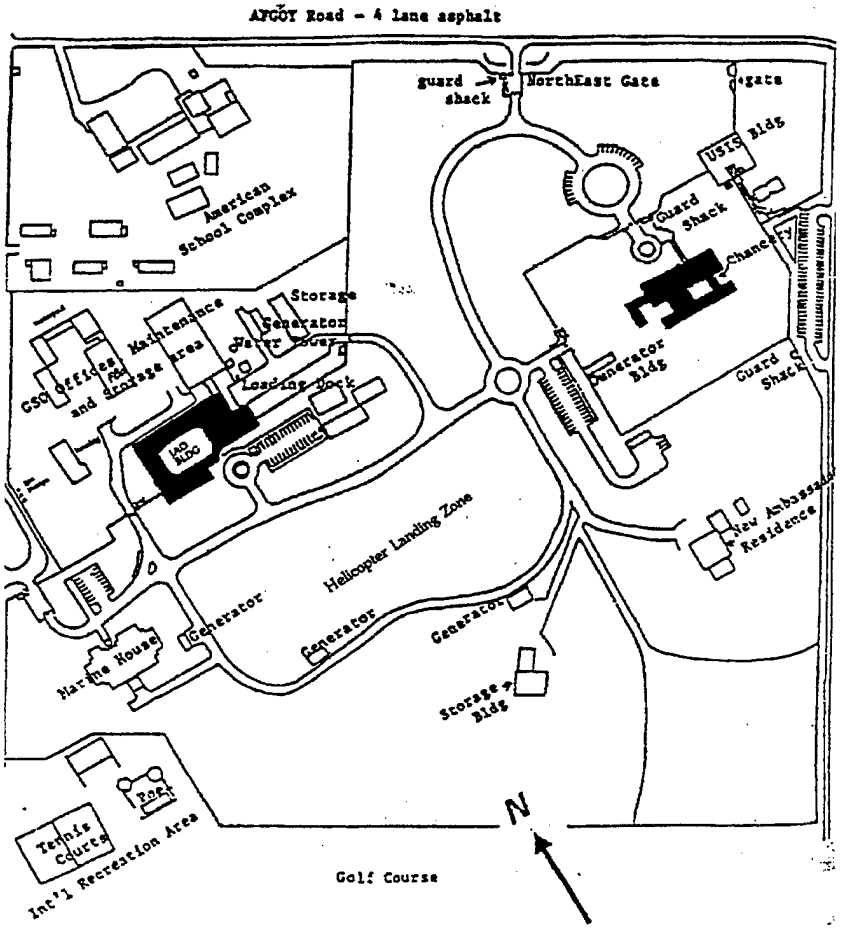

Figure 3. US Embassy Compound, Mogadishu, from Siegel, p. 6.

The Ambassador instructed the security force that deadly means should only be used if people breached the walls with obvious hostile intent; in fact, he preferred a withdrawal to his third defense posture before the use of lethal force against Somali intruders. Conscious of the volatile climate, Ambassador Bishop was concerned that shooting by US forces could lead any of the rebel factions in Mogadishu to believe that the US was taking action against them in support of the Barre government. The flashpoint would explode, and the Embassy would subsequently become the target of organized attacks instead of a victim of random looting and stray fire. To alleviate any animosity and fears of the Somali rebels toward a foreign armed force within Mogadishu, the Ambassador even took measures to announce over the radio that the purpose of the US military in Mogadishu was to evacuate Americans (Siegel, p. 28).

Foreign nationals wishing to be evacuated contacted the Embassy and were directed to make their own way to the compound. In general, Somali nationals could not be evacuated from their own country as part of a NEO, in accordance with international law and the relevant Status of Forces Agreement (JTTP, 1997, pp. B-1 – B-2). Also, Ambassador Bishop did not want to create the impression that the NEO was interfering with the ongoing faction fighting, so he was adamant regarding the policy prohibiting the evacuation of Somali nationals (Siegel, pp. 29-30).

1. Perimeter Security

The SEALs were there to protect the Ambassador and Chancery building. They worked with the Marine Security Guard, a five-man detachment at the Embassy. The NEO force's Marine security company was responsible for protecting the compound, with help from the Embassy's thirty contract Somali guards. However, the NEO force

quickly discovered that they could not cover the entire perimeter effectively with their manning (Siegel, pp. 28-9).

The Marines' sweep of the compound walls revealed several ladders still in place from when the CH-53Es buzzed Somali intruders on their ingress to the Embassy, revealing the ease with which determined intruders could breach the walls. One platoon defended the north and west walls, and the other watched over the south walls. The Marines prepared to defend the Embassy's two gates on the north and west walls using their anti-tank weapons. The SEALs, from the roof of the Chancery building in the east of the compound, covered the southeastern portion of the compound. From their positions, the Marines and SEALs could see the fighting in the surrounding area, including smoke from artillery rounds, sniper fire, looting, and trucks loaded with armed Somalis transiting along a road north of the Embassy (Siegel, pp. 28-9).

Although not seriously threatened directly during the day, the Embassy received isolated stray rounds, suffering bullet holes to buildings inside the walls and one RPG round in the southern wall (Siegel, p. 29). One incident was notable. A Marine sniper team, observing in all directions from the Embassy's 102-foot tall water tower, took fire from a sniper position four to five hundred meters away. The Marines targeted the sniper for fifteen to twenty minutes while being shot at, but were ordered to hold their fire and withdraw from their position, in accordance with the Ambassador's ROE (Siegel, p. 31).

As nightfall came, the Marines and SEALs had an advantage over any would-be attackers. Most of the men had night-vision goggles (NVGs) and could see Somali activity outside the compound. They could also watch for the CH-46s coming into the blacked-out compound (Siegel, p. 35).

As the night's planned evacuations approached, the workload of the Evacuation Control Center (ECC) increased, and Marines had to be pulled off perimeter defense to help process evacuees to board the helicopters. NAVCENT questioned and denied the Marines' repeated requests for follow-on augmentation (Siegel, p. 30).

2. Evacuation Control Center (ECC)

Without more personnel, the ECC (initially just one major and one warrant officer) relied on Embassy staff to generate accurate passenger manifests. Marines from the perimeter helped marshal evacuees to the waiting helicopters and prevent unauthorized individuals from boarding. Most of the evacuees and their baggage (one bag per person) were never searched for contraband such as weapons (Siegel, pp. 30-1). Prior to one flight, an evacuee took out his handgun and asked a crewmember what to do with it. The gun was immediately confiscated (Siegel, p. 24).

Other persistent ECC challenges included baggage limits, processing foreign diplomats and individuals, and handling unruly evacuees and locals falsely claiming eligibility for evacuation (Siegel, p. 29). Many of the evacuees wanted to bring more than their allotted single bag. The "airport" operations of the ECC seemed never-ending, especially for the short-handed, and eventually ad hoc, team.

3. Helicopter Landing Zone

The designated Embassy HLZ had become a relatively safe parking lot for Embassy workers. Prior to the first wave of five CH-46s, all the cars had to be removed by breaking the windows and pushing them clear (Siegel, p. 35). Also, because the extraction was an NVG operation, the compound lights had to be turned off. Without a central power switch (there were several independent generators on the grounds),

Marines had to enter each building to accomplish the task, which impacted the manning for perimeter security (Siegel, p. 31).

4. Marshalling Operations

Part of the NEO mission is to retrieve isolated American citizens and marshal them to the evacuation site. Because the Ambassador felt that movement on the city's streets posed a significant risk, he instructed those personnel in the Office of Military Cooperation (OMC) building, a few blocks from the Embassy, to remain in place. In three hardened vehicles, three Marines, six SEALs, and some Embassy security personnel set out to rescue the group of Americans and foreign nationals (Siegel, p. 29).

There was the possibility of a roadblock between the Embassy and the OMC. Rebels and looters routinely made carjackings in that chaotic environment. The marshalling team was instructed to run any roadblocks, shooting their way through if necessary. Fortunately, they did not encounter any delays, and returned to the compound within ten minutes with twenty-two evacuees (Siegel, p. 29).

F. WITHDRAWAL

The withdrawal from the compound occurred in four staggered waves of five CH-46s each. A short-handed ECC meant the helos were on the ground longer (for fifteen to twenty minutes total), increasing the risk to the aircraft. The ECC was too busy helping evacuees with the life preservers and headgear for the flight to the ships. However, the ECC tied chemical lights to the evacuees to help with the darkness and ease confusion on the way to the helicopters (Siegel, p. 34).

An unexpected problem occurred as the second wave was landing in the compound. At the Embassy gates, a Somali Major, who had been helping the ECC

during the day for cash, demanded an audience with Ambassador Bishop. The Major objected to the operation because his government had not granted permission to the US to conduct the evacuation. He threatened to shoot down the helicopters if they left; reports indicate that he held a grenade in one hand and was backed by two truckloads of soldiers. Ambassador Bishop dealt with the Major, offering him a bribe of several thousand dollars and keys to several cars in the compound in exchange for the Major's "protection." The Ambassador ensured the Major could not interfere with the departures. He distracted the Major through conversation until he could board the last helicopter wave (Siegel, p. 33).

Another problem affected the final wave. In the confusion arising from the Ambassador not departing on the third wave (he was keeping the Major busy), the Marines and SEALs collapsing from their security positions did not board the final wave smoothly. In the ensuing confusion, individuals from the NEO force were sent from helicopter to helicopter looking for a seat, creating an accountability nightmare. The two HLZ radio operators were nearly left behind; they did not realize that this was the final wave. Caught unprepared to move out, they quickly packed their gear with the help of a helicopter crew chief, and departed the Embassy. Because of the confusion with accountability, the final wave was on the ground another ten minutes, with no defense except for the helos' machineguns (Siegel, pp. 34-5).

Reports following the final wave's departure indicate that looting of the Embassy began within minutes. Two hours later, reports indicate RPG rounds were fired into the Chancery and the building was plundered. Ambassador Bishop declared Operation Eastern Exit complete twenty minutes after landing on *Guam* (Siegel, p. 34).

III. NONCOMBATANT EVACUATION OPERATIONS DOCTRINE

Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures (JTTP) for Noncombatant Evacuation Operations, summarizes the military tasks involved in conducting a NEO. This chapter outlines the procedures for conducting a NEO in order to identify the special political circumstances surrounding these Operations Other Than War. The discussions furnish an appreciation for the magnitude of the repercussions resulting from NEOs, supporting the need for non-lethal weapons from a strategic point of view.

A. OVERVIEW

As joint doctrine, the Joint Tactics, Techniques, and Procedures publication outlines the planning flow for NEOs, beginning with the Department of State. The Ambassador requests military assistance to conduct a NEO. Approved in the State Department, the request is passed to the Defense Department, which then forms a Joint Task Force (JTF) responsible for planning and conducting the mission. Based on factors such as timing, anticipated numbers of evacuees, and operational environment, an advance party for the JTF enters the country to coordinate extraction details with the Embassy. This advance party later links up with the JTF main body, which comprises forces for security, marshalling, processing of evacuees, and command and control. The main body secures the extraction and assembly sites, escorts eligible evacuees who are unable to reach the assembly sites, prepares the evacuees for extraction, then withdraws once everyone has been safely evacuated to pre-coordinated intermediate staging bases or safe havens (JTTP, 1997, p. x). Doctrine emphasizes the urgency with which NEOs must be conducted. A combatant command's military planners can begin reviewing options

for evacuation based on a country's anticipated collapse, well before the Ambassador requests such support. However, once ordered, NEOs are characteristically quick in execution. A testament to America's rapid force projection, a NEO force sweeps into the country, controls the evacuation and assembly sites for a finite period of time, and withdraws as planned when the evacuation is done (JTTP, p. I-2).

Doctrine identifies several key issues that the tactical planning must take into account: politics, operational environment, and rules of engagement (ROE). I will consider these in turn. The JTTP also delineates the procedural tasks which each of the JTF's operational elements must accomplish (security, marshalling, and evacuation control center), covered next.

B. THE ANATOMY OF A NEO

1. NEO Preparation

The scope of a NEO determines the amount of support and force projection. The security threat and the number of anticipated evacuees are important in deciding on a force size. The one constraint on force size is due to limited transport capacity, just as we saw in Operation Eastern Exit.. The original concept of eighty men plus equipment had to be reduced by 25 percent (with a subsequent loss in mission capability, no doubt) because of the availability and load capacity of transport, from four helicopters down to two. Other considerations include the size of the assembly and evacuation sites, usually co-located at the Embassy, which is larger in countries drawing major US interests. The evacuees consist of all US nationals, which include American tourists, businesspeople and their families, volunteers in relief organizations, and the Embassy Country Team. Added to that number are third country nationals (TCN). Their number is determined at

the highest levels of the US Executive Branch, based on the official relationship between the US and the third country (Zinser, 1973, p. 25). In general, host nation (HN) nationals are not eligible for evacuation, but the Ambassador has the authority to make exceptions for special cases such as political asylum and humanitarian reasons (JTTP, p. B-2).

The Ambassador plays a prominent role during the NEO. He is responsible overall for Americans in the host nation and their safe evacuation. He is also the senior authority for the NEO, though he does not command the JTF forces (JTTP, pp. vii, II-2). The JTF needs to work hand in hand with the Ambassador to ensure military requirements are addressed, while JTF planners incorporate the sensitive political considerations motivating the Ambassador into the military scheme. The Ambassador's instructions are particularly important because the operation will be oriented towards the civilian population rather than towards any rebels or dissidents (Zinser, p. 25). However, the NEO force needs to remember that these rebels and dissidents pose a danger to the mission if they decide to exploit the NEO for media attention to their cause.

2. Procedural Tasks for JTF Forces

There are three major tasks that the JTF main body must perform during a NEO, followed by the withdrawal upon mission completion. These tasks are security, marshalling, and evacuee processing by the ECC.

a) Security

Security elements provide perimeter security for evacuation sites, assembly sites, the Evacuation Control Center (ECC), and each landing zone. In addition, they protect the Ambassador and transports, and serve as a ready reserve if the marshalling teams need help. Without security, a smooth evacuation is vulnerable to

disruption from interference by civil disturbances and curious and hostile individuals. Threats must be controlled through vigilance and adequate force composition, which includes Embassy and host nation security forces (JTTP, p. V-11). Simply stated, task force planners and commanders need to accurately assess the threat, then put together the main body so that the NEO force can overcome as many anticipated obstacles to the mission as possible.

Perimeter security involves defensive positions at intervals along the site perimeter. Access control and surveillance are also functions of perimeter security (FM 90-29, p. 5-3). Intrinsic in their security role is their preparation for civil disturbances (Zinser, p. 26). The NEO force must therefore anticipate the need for crowd control training and equipment (FM 90-29, p. 5-4).

As with many military operations with limited personnel, it should not be surprising that the number of bodies available for tasks quickly disappears with all the security responsibilities in a NEO. Operation Eastern Exit is a prime example of an insertion team, limited to sixty men because of helicopter transport capacity. They came up short on perimeter security and were stretched to the limit. The only way they could meet their responsibilities to cover the Embassy walls was through augmentation by the Embassy's contract guards, and even then, the ECC was drastically short on personnel.

b) Marshalling

As the NEO force's operational arm, marshalling elements are responsible for securing the assembly sites and escorting their evacuees to the ECC and evacuation site (FM 90-29, p. 5-2). Each time they venture out from the protection of the main body's perimeter security, marshalling elements are exposed to the risks that prompted

the Ambassador to instruct eligible evacuees to stay put. Marshalling is arguably the riskiest portion of the ground force's mission.

Usually, the Embassy is the focal point in an evacuation; assembly and evacuation sites are co-located within the Embassy grounds, easing the burden on command and control. The marshalling team consists of security elements and search squads. The search squads are tasked to locate evacuees at their residences and escort them to the assembly site. Each squad is augmented with security because it is exposed to possible hostile activity (JTTP, p. V-9). The search squads have a risky assignment that involves interaction with locals during their movement within the country or city. Considerations for search operations include: adequate transportation for the squad and evacuees, familiarity with local road networks, primary and alternate routes and checkpoints, convoy control, and separated or lost convoy vehicles (JTTP, p. V-10). Through a good map study and good information, the marshalling team can improve the chances for task completion without incident by avoiding precarious choke points and hostile neighborhoods.

c) Evacuation Control Center (ECC)

The NEO command element includes communications, logistics, and the ECC. The ECC prepares the manifests for each extraction sortie, and tends to the welfare of the evacuees. The ECC has several other functions, such as enforcing baggage limits, screening for contraband, disarming evacuees, and verifying and recording their identities, (FM 90-29, pp. 5-10 – 5-11). Many of these tasks are administrative in nature, since the evacuee is processing to leave the host nation under a NEO.

d) Withdrawal

After the evacuees are safely away, the NEO force conducts its own withdrawal through a systematic collapse of the perimeter, with no single element left on the ground without the capability to ward off provocative engagements. The last transport should extract the remaining force in one lift (FM 90-29, p. 5-20). Operation Eastern Exit is an example of such a final withdrawal. Sometimes, NEOs can also involve a small, rapid-deployable NEO force that turns over the mission to a larger force like the Marines, with their capability for sustaining themselves for longer missions.

C. PLANNING CONSIDERATIONS

Having introduced the pieces of a NEO that are relevant to the rest of the thesis, this chapter now considers the planning considerations that impact a NEO from a strategic level. NEO doctrine identifies political consequences, operational environment, and the rules of engagement, which all support a strategic need for non-lethal weapons to be used in NEOs.

1. Political Consequences

What is at stake when the US military undertakes a NEO? Not only are the lives of troops at risk, US forces take a chance at enhancing American prestige or muddying it in the eyes of the region and the world. The importance of a well-executed NEO cannot be overstated.

There will be political pressure on the NEO force, pressure to do well and rescue noncombatants given very short notice. The military forces assigned to the NEO can expect high-level US government –and, accordingly, military – interest (Blanchard, 1996, p. 1). The State Department's order to evacuate is the final signal that the US

government has lost faith in the ability of the host government to control the situation and guarantee the safety of diplomatic missions. This signal can contribute further to the country's downward spiral (FM 90-29, 1994, p. 1-1). The gradual deterioration within a country is an indicator for the Ambassador to set into motion the evacuation of nonessential personnel while he continues his efforts to bolster the host government and strive towards a peaceful solution to the internal conflict (Lambert, 1992, p. 35). His request for military assistance in a NEO is usually the last resort, which is why Ambassadors typically wait until the last minute to request a NEO.

It is possible that any indiscriminate use of force can impact foreign policy and future relations with the presently ailing nation and perhaps its neighbors and allies. The resultant poor relations can lead to difficulties in pursuing American trade and business interests in addition to diplomatic and political goodwill in support of US-sponsored activities. On the other hand, the judicious use of force can lead to overall positive feedback in the region, strengthening the status of the US in regional relations. The pressure to not use deadly force comes from these wide-ranging political consequences. US forces must conduct these sensitive missions with the highest regard for investing in friendly relations in the future. It is not in the US's best interests to kill host nation nationals who get in the way of the NEO. To resolve the dilemma of not being able to respond to a hostile act with the lethal weapons at hand, non-lethal options should be pursued which allow US forces to respond with force but not necessarily generate casualties. With non-lethal weapons, they have a viable capability to respond to threats while also paying due regard to the political consequences that may arise from the killing of foreign nationals.

2. Operational Environment

Mindful of the political scrutiny and potential violence associated with NEOs, the JTF planners must correctly appraise the operational environment (FM 90-29, p. 1-3): permissive, uncertain, or hostile. The assessment of the operational environment contributes to the NEO force's composition and armament. This thesis is particularly interested in uncertain and hostile environments, which place our troops at risk and may require their use of force.

A **permissive** environment is one in which the host nation or indigenous factions will not oppose or attack the military evacuation of eligible noncombatants, and no resistance is expected (FM 90-29, p. 1-3). The mission may simply entail additional personnel to ensure an orderly and thorough evacuation operation, such as during a natural disaster. Combat troops are not the primary players. Rather, the focus would be on logistical and medical augmentation.

An **uncertain** environment is one in which the threat against a NEO conducted by military forces is unclear. The host government may not be able to protect US citizens in that environment, so the JTF must plan for combat troops to ensure the noncombatants' safety during the evacuation. The introduction of armed troops can especially have an adverse effect in an uncertain environment by adding to the tension already present. By advising the locals of US intentions and rules of engagement, the Embassy and NEO force can try to minimize the chances for intervention or escalation of hostilities due to local misperceptions. For our part, our troops must become familiar with the Ambassador's specific guidance supplementing the ROE (FM 90-29, p. 1-3).

In a **hostile** environment, local interference in the NEO is very likely, whether by the host government or other groups (FM 90-29, p. 1-3). Force protection considerations

alone compel the JTF to organize large combat forces to offset the threat and prepare for several contingencies like defensive perimeters, reserve forces, riot control, and armed marshalling convoys. It may even be necessary to conduct a forced-entry into the country to establish the evacuation and assembly sites (JTTP, p. I-4). As in an uncertain environment, troops must know the ROE since they are likely to interact with hostile locals.

The introduction of US military forces into an already unstable environment might change the level of threat in that environment. Our presence can stabilize the situation, exacerbate it, or merely put the local fighting on hold until the NEO force leaves at mission's end. Who can tell what effect our military presence will have on the dynamic and volatile conditions in a country in civil strife? If our presence aggravates the turmoil, then there is the familiar chicken and the egg argument. The conditions that initiated a military NEO also set the conditions for the escalation of violence within the operational environment. In Operation Eastern Exit, Ambassador Bishop feared the US presence in the area could possibly trigger organized violence focussed on the American effort. The worsening threat environment impacts US force protection measures, thus requiring the inclusion of a heavily-armed and responsive reaction force (FM 90-29, p. 1-3), which adds more fuel to an already growing fire. It is just this kind of escalation of threat that must be avoided because it only makes carrying out the NEO tasks riskier and more resource-intensive. US forces need to be able to deflect hostile acts way from their mission while minimizing any attention they may get from armed fighters and curious locals. In particular, they must avoid the negative attention that comes from having to kill someone while doing their tasks. Non-lethal weapons have a role in the operational

environment, since they can be used to project force without necessarily killing anyone. By not resorting to deadly force, our forces may encounter decreased threat, easing the vulnerability from having a small force size. Non-lethality can potentially mitigate a worsening threat environment, thus demonstrating political value in a NEO in addition to tactical value.

3. Rules of Engagement

The rules of engagement (ROE) will reflect the NEO's limited military objectives and political sensitivity. In particular, the ROE highlight the defensive posture of US forces in the country, specifying that no actions be taken that might be interpreted as initiating hostilities (FM 90-29, p. B-1). The rules are based on the Law of Armed Conflict and are meant to guide our troops against violating these internationally recognized laws. Soldiers are only authorized to use deadly force only when their lives are directly threatened. Harassment does not qualify as life-threatening (FM 90-29, p. B-3), which becomes problematic during NEOs or any other operation in which our troops might become the targets for civilian or organized guerrilla harassment. Clearly, for force protection reasons alone, there is the need for non-lethal weapons so they can respond appropriately to harassment. In all cases, commanders must judge the minimum force necessary and appropriate to overcome the threat (JTTP, p. I-3). ROE normally begin with verbal warnings, progressing to a show of force and ultimately to lethal means to enforce US resolve in mission accomplishment. Non-lethal capability fills the gap between the show of force and the use of deadly force.

The indoctrination of troops to the ROE is important to non-escalation of hostilities during a NEO. Combat troops must understand the stakes involved in resorting to lethal means (JTTP, p. A-1). They must obey the ROE that restrict the use of lethal

force. While it is up to commanders to enforce fire discipline, the Ambassador, JTF planners, and advance team are responsible for shaping the mission so that our forces can accomplish it with as little direct interaction with locals as possible. Shaping the mission includes measures such as having intelligence about marshalling routes, consolidating isolated evacuees, and starting a psychological operation to coerce locals and factions towards non-interference with the NEO. Infractions of the ROE can lead to the negative political consequences from conducting the NEO poorly.

D. SUMMARY

This chapter discusses the NEO mission. NEOs require rapid force projection, and impose physical constraints for size on the NEO force. During planning, the JTF must consider the mission's political aspects that make the execution of NEOs by our military forces so critical to America's influence and foreign policy in the region in the future. The rules of engagement, supplemented by the Ambassador's instructions, discourage the use of deadly force. Fear of an escalation of threat in the operational environment also discourages the use of deadly force. Non-lethal weapons offer a way for the NEO force to reduce the anxiety of troops faced with a threatening situation without any capability to respond. Non-lethality also addresses the political consequences in a NEO.

Tactical consequences arise when the threat escalates beyond the force protection capabilities of the NEO force, thus jeopardizing the rest of the mission. In a NEO, security, marshalling, and ECC are the primary tasks, with protection of the force and evacuees a constant concern. Contributing to the security problem is the formation of

crowds. The next chapter discusses the impact of crowds on NEOs and the courses of action US forces can take to resolve an encounter with them.

IV. THE CHALLENGE OF THE CROWD

The previous chapter focuses more on the strategic aspects of NEOs that weigh into the initial planning considerations for the operation. These aspects include the overarching ROE, high-level politics, and world perception. This chapter focuses on the NEO at a tactical level – things the NEO force must do. Though complicated through the interaction with civilian noncombatants as well as the interface with the Ambassador, the military tasks in a NEO involve some basic military challenges. One of the challenges is crowd control because of the potential for crowd violence, which ties into increased threat to the NEO. Our force's response to crowds requires a rudimentary understanding of crowd behavior. Knowing the basics of crowds, our troops can effectively disperse the crowd before it becomes violent and compounds the risks to the mission.

The security tasks in a NEO present the NEO force with a wide range of contingencies. Perimeter security must deal with looters, clearing and defending Embassy access points, snipers, wall breaches, and crowds outside the assembly and evacuation sites, assumed from now on to be the Embassy. Marshalling teams must deal with the dangers inherent in movement through a city, such as choke points, roadblocks, and crowds. There are other important challenges, such as the ECC problems (short manning, contraband searches, etc.) and lift problems (such as a darkened HLZ, RPG-fire, SAMs, etc.). Nevertheless, this thesis is primarily interested in how to resolve the security issues facing the perimeter security and marshalling teams arising from the presence of potentially violent crowds.

A. CROWD CONTROL MEASURES

Crowds present a security risk in a NEO's uncertain or hostile operational environment. Crowd control is a solution that mitigates this risk. Because the mission centers on evacuating civilians in a deteriorating civil environment, US forces should expect to interact with the local noncombatant citizens and the combative factions, such as rebels, tribes, clans, and sects. These factions may perceive our forces as their common enemy, or a target for exploiting for media coverage, or a militarily superior force that should not be provoked. The people in the middle of the fighting may perceive the troops as a stabilizing force, or their enemy, or their chance to get out of the country. The reactions of both factions and noncombatants cannot be determined until an encounter. Because of the uncertainty in knowing the locals' attitudes, the NEO force must prudently prepare for hostilities as part of its security responsibilities.

Standard military crowd control measures encompass four main actions: monitor the crowd's activity, disperse the crowd, contain the crowd, and block the crowd (FM 19-15, 1985, p. 6-5). Monitor the crowd if it is nonviolent. If it turns violent, respond to the threat through one of the other three actions. Dispersal is self-explanatory. Containment refers to surrounding the crowd and preventing its growth. Blocking the crowd is a measure to protect facilities or areas from penetration by the crowd. The doctrinal strategies for large-scale civil disturbances require huge resources from the military (likewise for civilian law enforcement agencies) in terms of equipment, manning, training, and logistics. However, the NEO force size is restricted by insertion platform (helicopter, aircraft, amphibious vessel, etc.). The limited number of men cannot support full-scale crowd control measures like crowd containment and blocking in addition to the other security responsibilities. Based on these considerations, the only measures the

NEO force may be capable of using are crowd monitoring and crowd dispersal. So instead of deploying with a capacity for standard crowd control measures, the NEO force deploys with only a limited crowd control capability.

However, that limited capability should suffice in the NEO environment, based on the mission objectives. NEOs are an emergency operation. The primary objective in a NEO is to assemble all evacuees and safely move them out of the country. US forces are not there to police the local citizenry or fight the factions. Force manning and equipment must reflect the nature of the mission. In NEOs, crowd control solely enables the force to complete its primary tasks. Crowd control is not the mission; it is a supporting task that helps the NEO force press on with its primary tasks.

B. CROWD BEHAVIOR

Before we can discuss how crowds react to crowd dispersal techniques, we need to formally introduce the notion of a crowd and become familiar with some basic crowd behavior concepts. Knowing how a crowd works can help us see how effective our dispersal methods may or may not be.

Crowds are temporary gatherings of people, assembling in the same place at the same time. For instance, some crowds gather to voice a grievance, others to watch a sports game, while others gather to pray. Individuals join crowds for just as many reasons, including the crowd's capability to make a statement that a single person could not make. Because crowds are temporary, they will eventually disperse whenever their business is concluded or people get tired, or when forced to disperse by the police or in the event of a disaster such as an earthquake.

The crowds our forces may encounter in a NEO environment pose serious control challenges. The density of people impedes free movement through the streets, something the NEO force wants to efficiently accomplish the mission. Also, the crowd's physical activities stress the NEO force's capacity to adjust to the developing situation. For instance, crowds may block the way into facilities like the Embassy or a safe house where evacuees are waiting for escort to the assembly site. Crowds can clog the streets during holidays and firearms might be discharged into the air, increasing anxiety among our troops. In other scenarios, crowds might begin to riot for food. Or, looking for rescue from their plight, crowds of desperate and scared people might rush a marshalling team. Ethnic or religious "feuds" generate crowds that are already hostile to each other and need very little to start rampant violence. The start of violence through any of these crowds can create a worse security environment for the NEO force. Obviously, not all crowds, rallies, street parties, pickets, and demonstrations turn violent. Those that do turn violent are typically called mobs (Cerrah, 1998, p. 60), with all the popular associated negative connotations. In any event, crowds are hard to predict, and fast-paced violence makes things even more difficult to resolve from the perspective at ground level.

While not all crowds require immediate intervention, they must all be watched carefully for any triggering events that can turn a peaceful crowd into a violent one. Law enforcement agencies need to understand the type of crowd they are facing in order to develop a coherent and appropriate strategy for crowd control (Cerrah, p. 45). It is just as important for a NEO force to understand the types of crowds it encounters. We turn now to the academic approach towards crowds because crowd theories offer a framework for determining effective courses of action for crowd control.

1. Crowd Theories

There are as many crowd classification schemes as there are crowd behavior theories. Classical crowd theorists like G. Le Bon (1896) and S. Freud (1921) classify a crowd according to its overall mood. To them, crowds are homogeneous in their activities. Crowd activity is explained through psychology. Very little attention is given to the sociological setting, which includes the underlying social factors that motivate individuals to gather in the first place. In contrast, modern theorists use a variety of disciplines to understand the nature of crowds, but mainly focus on sociological processes. C. McPhail's "Social Behavioral/ Interactionist" theory is an example of a modern crowd theory that builds on its predecessors and draws conclusions based on scientific observations of crowd behavior. Based more on sociology than psychology, modern theories attempt to explain crowd gatherings in terms of "collective action" (Cerrah, p. 22). In contrast to Le Bon's notions of the crowd, evidence supporting modern theories refutes the homogeneity of crowds. Modern crowd theorists reject the homogeneity of crowds and instead examine crowd structure to understand activity and behavior. Although the theories lack complete explanatory power (and thus are subject to academic criticism), classical and modern theories all offer insights into the crowd. This thesis borrows concepts from several theories to illuminate aspects of crowd behavior and to set a framework for thinking about an individual's decision-making process. Ultimately, successful crowd control depends on the individual's cooperation/capitulation.

I. Cerrah (1998) examines crowds from an organizational point of view. Organized crowds assemble for a reason, such as a football game or a political rally. Unorganized crowds have no such common purpose tying the participants together

except for being in the same place at the same time. The term "organized" does not necessarily imply everyone's actions are coordinated in any way. Crowds can also be classified based on level of activity. They can be relatively passive or active, and can shift from one to the other. Cerrah suggests four broad combinations of organization and level of activity: organized-passive, organized-active, unorganized-passive, and unorganized-active. Examples of these combinations are fairly easy to imagine. A midnight vigil supporting a community activity is an organized-passive crowd. A protest march against some political issue is an organized-active crowd. A gathering formed around a lifeguard rescue at the beach is an unorganized-passive crowd. People shopping at the mall form an unorganized-active crowd.

The level of activity in a crowd deserves further examination. People in organized-active crowds are not even all active to the same extent. A small portion of the crowd may be boisterous or violent while the rest remains docile and passive. Therefore, each crowd has active and passive components. If violence erupts, there will be violent and nonviolent components. Even the intensity of violent activity by certain members of the crowd varies from one person to the next (Cerrah, pp. 53-4). The violent members stand in contrast to the nonviolent disposition of the crowd's passive participants. Crowd dispersal techniques capitalize on these varying levels of a crowd's active and passive components, which will be discussed later. Unorganized-active crowds are particularly interesting to this thesis and relevant to NEOs. So-called spontaneous outbreaks of mayhem like the 1992 LA riots (sparked by the Rodney King incident) and the riots in the UK's inner cities in the 1980s are extremely difficult for riot control units to manage.

2. Collective Action

A natural part of society, crowds assemble because group action can accomplish what a single person cannot. Celebrations, rallies, riots – these have a scale of activity far beyond an individual's capacity. Crowds are also characteristically temporary in nature. So how do dozens of people, if not thousands, gather at the same place at the same time? Prior organization and coordination is one means. Another is word of mouth, especially for unorganized "spontaneous" events. One person hears something is going on downtown, and checks to see if his friend wants to go with him. This cluster can grow to include more family and friends. Clusters assemble together, stay together, do similar things, and disperse together. In addition to clusters, we expect that unusual events like a spontaneous gathering will attract curious bystanders as well as self-serving individuals seeking to exploit the crowd phenomenon. In general, crowds are made up of clusters of people familiar with each other, thus facilitating collective action; crowds are not made up of complete strangers (McPhail, 1991, p. 212). These clusters provide the basic units for interaction and collective behavior in crowds because socially, people turn to those they know before turning to a stranger when deciding what to do (McPhail, p. 213).

Crowds do behave collectively, but the activity varies in kind, duration, intensity, and numbers of active participants (McPhail, p. xxviii). Even the act of assembling is a collective behavior. However, once formed, a gathering does not guarantee collective activity (McPhail, p. 187). Such collective action is difficult to achieve in a large crowd, made up of many clusters, each having various motivations, sentiments, and commitments. Rarely does everyone in a crowd engage in the same sequence of behaviors. Unanimous crowd behavior is an illusion, reported by impressionable participants and bystanders. Any activity that involves a majority of the gathering is

usually simple, such as facing one direction, sitting, or kneeling. More complex actions (such as chanting to a rhythm, standing in an arc, or forming a "human chain") will last for less time and usually involve fewer people (McPhail, p. 171). Essentially, the smaller the number of people involved in a collective activity, the more complex and longer the activity can be (McPhail, p. 162). The manifestation of collective action in large groups indicates that there is a third party orchestrating the action, called the agitator. Through manipulation, the agitator exploits common symbols, emotions, and principles among the various clusters and onlookers in order to generate greater fervor and make the crowd more effective as a tool for collective action. The agitator tries to focus the direction of the clusters in the crowd, coaxing them to participate in collective behavior to accomplish some goal. Audience manipulation is well-documented (McPhail, p. 216). Nevertheless, the complexity of collective action is still subject to the size of the crowd. For instance, while a preacher can influence his large congregation's behavior, he cannot make all of them surrender their life savings. Yet leaders of small cults may be able to manipulate their followers to what most normal people believe are irrational ends. Therefore, the agitators in a crowd are the natural flashpoints that crowd control forces must watch for.

3. Violent Action in Crowds

How does a crowd's collective action translate into mob violence? Classical crowd theorists believe that crowds are impulsive and wont to violence to overcome obstacles (Le Bon, 1896, p. 38). They claim that crowds basically consist of riff-raff and criminal elements in society, since many historical crowds seemed affiliated with violent, revolutionary causes that rocked the establishment. However, studies have shown that violent crowd participants are actually normal people having no criminal records. Although popular reports through the media give the impression that those responsible

for violence in crowds are criminals and adolescents, ample academic studies invalidate that viewpoint (Cerrah, p. 69).

Several authors have attempted to link a person's normal law-abiding behavior to the same person's violent activity when part of a crowd. Le Bon believed in the crowd mentality, that individuals lose their sense of self and submit themselves to the primal collective "crowd mind." Though this belief is unsubstantiated, there is undoubtedly a difference between someone standing as part of a crowd and that same individual standing alone; the crowd has an influence on its members. However, modern theorists have yet to develop a clear explanation of violent acts carried out by crowds (Cerrah, pp. 70-1). It may be the agitators who manipulate smaller portions of the crowd towards violent activity.

4. Rational Calculus

The individual is the critical actor in collective behavior and remains the subject of interest in terms of crowd behavior; nothing happens without the individual making a decision to act. An individual in a cluster can influence similar behavior in his or her cluster. Clusters behaving a certain way can induce similar behavior in a neighboring cluster. If there is an agitator in the crowd, he or she acts as a focal point for the crowd, promoting similar behavior among many clusters in the crowd. However, collective activity still does not occur unless there are many individuals that decide to act, based on influences and their own perceptions.

That decision to act is a rational decision. Crowd behavior may appear irrational to the casual observer, but there is no evidence that the individual loses cognition of his or her surroundings, options, and self. Crowd members may have diminished vision and hearing from being in a crowd, and their freedom of movement may also be restricted by

the crowd's density, but they are at least as rational as the authorities attempting to control the crowd, even in dangerous circumstances like a riot (McPhail, p. 124). Here, "rational" means that a person reasons through the consequences of his or her actions, not that the action is necessarily justified (Cerrah, p. 83).

R. Berk's "Rational Calculus" theory of individual behavior in a crowd opposes classical theorists' notions of irrational or cognition-impaired crowd behavior. Berk proposes that individuals make decisions to act based on the information available to them (McPhail, pp. 121-2). Crowd participants estimate a net payoff determined from the perceived costs and rewards associated with a situation, along with the probabilities that the costs or rewards will increase or decrease. The individual then chooses the course of action that will maximize the rewards and minimize the costs. The participant's cognition is not impaired, though the extent of his senses might be, due to the crowd. A straightforward process, rational calculus also includes a number of intervening considerations that can impact on whether the individual will act. For instance, the likelihood of taking an action will be low when the anticipated crowd support is low, even if the reward is high. If the support is high, but the rewards are low, the individual will not find it worthwhile to take action (McPhail, p. 122). Berk's theory is incomplete in that the rational calculus is based on mental estimates of support and payoff, which cannot be objectively measured to validate the theory. Berk's work is also problematic in that people do not always make decisions based on rewards and costs, but often choose the plan with the best chances for working (a goal-oriented approach) (McPhail, pp. 124-6). However, the rational calculus theory is a useful framework with which to approach an individual's decision to leave the crowd.

The crowd has an influence on its members. The extent and nature of that influence are unknown, and the effects on an individual's rational calculus are not measurable. The crowd's influence may or may not facilitate an individual's reasoning that a personal act of violence is okay. Assuming the crowd breaks out in violence and becomes a mob, the individual re-evaluates the predicament. When being subjected to RCAs or other crowd control measures, the individual rationalizes his or her situation again, weighing the rewards from remaining in the mob against the dangers from continuing to support the mob violence. This rational calculus repeats continuously. The individual, though part of the mob, is still thinking clearly, and has a certain motivation to remain in the mob. While it may appear to us on the outside that any decision to remain part of a violent gathering is senseless, the participant in the crowd has a different vantage point. He or she may decide it is in his or her best interest at the moment to remain affiliated with the mob (there may be more people in the mob than the police can arrest, reducing each individual's chance for arrest). Verbal police warnings may be enough to break the individual's commitment to the crowd, or it may take the sight of an advancing line of riot police. But at each step, the individual is making a conscious decision based on what he or she perceives as the situation. When the costs from being part of the action outweigh the rewards, it is time to leave the crowd behind.

5. Dispersal

Dispersal is essentially a reversal of the assembly process. **Routine** dispersals have not been academically scrutinized because there has been no urgency to understand the mechanisms. **Emergency** dispersals occur when a building is on fire, or there is a bomb threat, etc. There are actually many computer simulations that model crowd behavior as people disperse from buildings, villages, cities, etc. However, **coerced**

dispersals are of interest here because problematic crowd situations can provoke intervention by authorities. Many authors on the subject of coerced dispersal are social control experts, rather than the social scientists that are developing modern crowd theory (McPhail, p. 153). This important distinction in backgrounds results in divergent crowd dispersal techniques, as we shall see later.

As discussed earlier, a person in a crowd is rational. He or she acts based on a system of rewards and costs. During coerced dispersal, authorities must make each individual's costs of staying in the crowd outweigh any rewards he or she may perceive. In keeping with the principle of minimum force, dispersal methods must begin with verbal commands and progress towards deadly force. At some point between warnings and lethal force, the individual's perceived costs will outweigh the rewards for remaining in the crowd, and the person withdraws. Most of the time, a show of force is sufficient for civilians (Applegate, 1976, p. 230). Physically violent mobs (indicated by looting, rioting, or fighting) may require harsher methods such as tear gas in order to be brought under control and dispersed. However, it is a matter of increasing the level of force until the breaking point is reached for each individual.

The crowd continues to have influence on the individual, even during dispersal. Dispersal is contagious, which also applies to routine and emergency dispersals. Once dispersal begins, the crowd will melt away on its own (Cerrah, p. 210). When one participant's breakpoint is reached and he decides to leave, he can convince his cluster to leave with him. As more people disperse, the crowd thins, and any supportive crowd activity that anyone may be contemplating will quickly dissolve as the crowd fades away.

The individuals who remain are left to contemplate the possibility of initiating or even sustaining collective activities since they will likely be singled out for reprisals.

C. MOB VIOLENCE

Mob violence against person and property is rare, and collective violence is rarer still (McPhail, p. 163). These observations may be true in stable urban, democratic environments but are not necessarily true in NEO conditions. Without academic research into gatherings within countries in strife, I cannot claim that violence is more prevalent in such conditions.

However, recent developments in Indonesia, Nigeria, and Kosovo lend credibility to the hypothesis that crowds in unstable countries can lead to extreme violence, usually set off by local security forces (Heal, 1998, p. 12). On 29 November 1999, Kosovo "Flag Day" celebration events went bad. Crowds were blocking the police, and a mob attacked three people. Firearms and celebratory firecrackers can be extremely provocative when there is tension between police and citizens. As high-profile as Kosovo is in today's headlines, opportunists motivated by publicity might try to inflame the tension and take advantage of the chaos triggered.

Indonesia is undergoing a sort of separatist movement. On 2 December 1999, civilians clashed with the police. The day before, the separatist flag was permitted to fly for one day by the Indonesian government in a ceremony with twenty thousand participants, with no violence occurring at all. The next day, the local people resisted orders to take the flag down. The police were forced to remove it, and were attacked with knives and tribal weapons. The police fired shots into the air and started a frenzy in which some crowd members were injured. In another incident in Indonesia on 27

November 1999, a crowd had gathered in a Christian suburb close to a Muslim town. It degenerated into religious fighting between Muslims and Christians wielding Molotov cocktails, home-made guns, knives, and bows and arrows. The volatility was certainly present, exacerbated with lethal weapons.

In Nigeria, tribal-based rioting was ripping the country apart. Following the end of military rule, the two hundred repressed ethnic groups unleashed their ethnic passions against each other over resources. On 27 November 1999, two major tribes clashed with each other, spreading violence in Lagos, Nigeria, resulting in a death toll of fifty. Nigerian police failed to handle the situation adequately, and the rioting progressed to the point that police were subsequently authorized to shoot rioters on sight.

These real scenarios demonstrate the magnitude of mob violence, once triggered. Anything might set things off, from a loud firecracker bang to a perception that the police are unjustly arresting members of the crowd. The underlying causes for the grievances that bring about a gathering can be political, ethnic, religious, economic, and so on, but the trigger can be totally unrelated (Cerrah, p. 86). The trigger simply unleashes the tension that has been growing over time, supporting the notion of crowd volatility.

The situation in a NEO may actually heighten the potential for violence associated with crowds. There is an opportunity for agitators (from factions, tribes, etc.) to provoke US military personnel to martyr someone (if they are not careful or disciplined), drawing worldwide publicity to the agitators' cause and inviting international criticism of US methods. The act of killing a civilian in a crowd is almost sure to result in retaliation by a portion of the local population, and martyrs will excite the crowd-turned-mob into even greater violence. The use of extreme force and deadly weapons serves to increase the

potential for violence (Applegate, p. 324). Though typical military rules of engagement during civil disturbances permit deadly force under certain circumstances such as self-defense or preventing a crime (FM 19-15, p.7-4), our forces must clearly avoid killing or else risk an escalation in threat.

A crowd must be assessed for its nature and its numbers. With time being a factor, the police must promptly employ their crowd control measures. A characteristic of unorganized crowds is the lack of crowd leadership, at least any kind of leadership that directs the entire crowd's activity. Without a figurehead with which to deal, police negotiations become a futile endeavor (Cerrah, p. 54). The only recourse leads to the volatile scenario of a mass of police versus a mass of people. This situation emphasizes the importance of a police force with good crowd control strategy and proficiency in crowd control measures.

For a NEO force, the time to respond is even shorter than for the police, and the resources available to apply towards crowd control are scarce. The unorganized-active crowd is the worst case for a NEO because there are no immediately recognizable focal points yet the crowd is still physically active. The NEO force cannot negotiate effectively (though the measure must be attempted in accordance with the force continuum), and manpower constraints exclude crowd containment and blocking as control measures. For a static-defense perimeter security team, monitoring the crowd is an option, since troops are relatively stationary and can react to a changing crowd. However, marshalling teams encountering these crowds with the worst-case potential for violence cannot afford to delay and watch a crowd to see if it turns violent. The team has a time-sensitive task. It must recover isolated evacuees quickly to minimize its exposure

time outside the Embassy. For marshalling teams, crowd dispersal appears to be the only option available if they are to check the threat of unmanageable violence associated with crowds-turned-mobs and complete the primary task of recovering evacuees.

D. COERCED DISPERSAL

In general, coerced dispersals can be attempted either with or without force. We need to examine how to break up crowds either before they reach any flashpoint. Otherwise, we need to break them up soon afterwards in order to minimize any growth in the violence. A NEO force may have to pre-empt crowd violence when it encounters a crowd, which could prove problematic with respect to ROE (discussed later on).

1. Options without Using Force

Law enforcement agencies have five main tactical crowd control methods that do not involve force but require considerable resources and time. These tactics aim to circumvent the crowd's processes: (1) remove or isolate key agitators before the crowd assembles; (2) interrupt the crowd's ability to communicate by dividing the crowd into smaller units; (3) remove the crowd leaders if it can be done without the use of force; (4) divert the crowd's attention away from its focal points; and (5) isolate the crowd to prevent its spread and growth. If all of these methods are achieved, then the crowd will disperse peacefully, losing its "fizz." However, tactic #3 may be the riskiest one to carry out. It can result in an uncooperative crowd, possibly leading to a violent episode. Unless all five can be carried out, dispersal by force is the only other option (Cerrah, pp. 208-9).

2. Forceful Options

The NEO force's limited crowd control objectives do not permit it to undertake tactics #1 or #5, so it is simply left with the forceful options for crowd dispersal. Social control experts and authors R. Momboisse (1964) and R. Applegate (1976) wrote from their experiences in crowd control in both the civil and military sectors. They understood crowds according to the classical theory, in which the crowd is homogeneously violent. While recognizing that not all participants may be committed to the violence to the same degree as others, they propose that all members of a violent crowd are legitimate targets for forceful crowd control measures. Momboisse and Applegate's classic crowd control principles have been historically effective and are still followed by law enforcement agencies today. The military's crowd control manuals reflect their approach as well (FM 19-15). The dilemma in using force comes from using the appropriate level of force. If the measure used is too little, too late, then crowd control forces become victims of the crowd. However, if the measures used are too much, too early, then they risk catalyzing a reprisal and an undesirable escalation in threat (Heal, p. 16). When using force to disperse a crowd, authorities need to remain flexible and be judicious in varying the level of force required for the task and the changing threat. While adapting their methods to the changing threat, they must nevertheless act decisively and not hesitate, for the sake of maintaining authority (Momboisse, p. 62).

Proponents of minimum force in crowd control agree that dispersal measures must begin with verbal commands and a show of force. If the crowd resists, those measures are followed by incremental increases in force. Classic crowd control techniques advise concentrated RCA attacks on the mob, in line with the classical thinking that everyone in the crowd shares the violent tendencies manifested by the mob.

The concentrated burst will douse the motivation of many crowd participants, causing the dispersal process to begin. Classic techniques also suggest that dispersal efforts be targeted at the less violent and courageous members. Dedicated individuals may be willing to suffer through the RCAs, so when the weaker, less committed members begin to disperse, the body of the mob quickly loses substance (Momboisse, p. 67).

However, the social-control methods for dispersal differ from the recommendations of social scientists at this point. Modern theorists recognize violent and nonviolent orientations among participants in the same crowd. They suggest that the use of force should be selective, since unnecessary and excessive force could endanger peaceful participants and drive them towards violent action. Instead of directing dispersal efforts at the crowd as a whole, only isolated individuals should be targeted (Cerrah, p. 211). This means no area effect weapons should be used, for fear of injuring and alienating otherwise nonviolent participants. Only the agitators and actual violent offenders should be removed through force, to allow the rest of the crowd to disperse with minimal ill will towards the authorities.

Over the years, applications of classic crowd control measures have proven successful. On the other hand, selective application of force is true to the principle of minimum force. The decision whether to employ area effect weapons or more discriminating weapons must be left to the tactical commander faced with the crowd situation during a NEO. He must still strive to disperse the crowd as quickly as possible because of the threat of violence, but he must make his own determination as to crowd composition and probable weapons effectiveness. What is the overall tone of the crowd? Are there more women and children in the crowd than men, making the use of less

discriminating area effect weapons too unsafe? Is the crowd so large that it cannot feasibly be whittled down incrementally? Can any agitators even be identified? It is ultimately up to the tactical commander to apply the appropriate, minimum required force to expeditiously disperse any threatening crowds encountered.

The tactical commander is also faced with the possibility of violating the rules of engagement when it comes to pre-emptive dispersal of crowds. Recall the minimum interaction and minimum force advocated in the ROE as discussed in Chapter III: no action will be taken if it can be interpreted as initiating hostilities. Stern verbal warnings to disperse can arguably be interpreted as initiating hostilities if the crowd is behaving peacefully. The assessment of the tactical commander must bear on this course of action in crowd control before any determination can be made on violating the ROE. Based on his subjective estimates of the crowd and its potential for violence, the commander has the burden of deciding whether to pre-empt potential crowd violence by dispersing the crowd before it becomes a problem or to leave it alone and bet that the undisturbed crowd will remain nonviolent. The stakes are high when possibly volatile crowds are involved. The tactical commander's training and intuition in crowd situations weighs heavily on the course of action taken and the risks that follow.

E. SUMMARY

Crowds can be dangerous and unpredictable. They have a potential to spread violence that makes NEO success more difficult. Crowd dispersal in NEOs requires an incremental use of force to reach that breaking point in every individual at which he or she decides to cooperate and disperse. While most civilians will disperse from a show of force, crowd control forces must be prepared for more defiant crowd members and more

dynamic crowds. As effective as riot control agents are at crowd dispersal, there may yet be other options that fill the gap between the show of force and RCAs, and RCAs and deadly force. The next chapter discusses how non-lethal weapons can expand the repertoire of force options for crowd control. Non-lethal weapons become a tactical requirement because they will help with crowd control so that NEO forces can achieve their primary mission.

V. NON-LETHALITY AND CROWD CONTROL

Crowds pose a threat to our forces in completing NEO tasks. What are the options for controlling this threat? Rather than wait for the threat to escalate to the point at which lethal force is justified, it can be managed through lesser levels of force, namely non-lethal weapons. In this chapter, I focus on determining what kinds of non-lethal weapons can be used to manage crowds in NEOs, emphasizing the practical requirements for deployment and employment of these weapons by our forces. I sift the universe of non-lethal weapons through five successive filters to arrive at a group of non-lethal crowd control weapons for NEOs.

The first filter that a prospective non-lethal weapon must pass is DoD's **definition of a non-lethal weapon**. Because we intend to focus on **crowd control**, the second filter removes all those weapons that are not crowd control applications. The next filter is the **legal review**, during which international conventions are considered for each non-lethal crowd control weapon. The fourth filter is the weapon's **overall supportability** from the standpoint of technology, operations, logistics, and US cultural acceptance. The last filter allows only those non-lethal crowd control weapons to pass that are **physically and tactically practical** for deployment in a NEO. For example, though the US Marine Corps (USMC) has a Non-Lethal Weapon Capability Set designed for crowd control, NEOs have constraints on transport loads which limit the number of troops deployed and the type of equipment carried into the mission. Therefore, there should be a capability set designed for NEOs, not necessarily the same as the Marines' set, to provide for non-lethal crowd control capability as well as a non-lethal response to other mission challenges. The NEO scenario is a tough test for the utility of non-lethal weapons because it puts

them in a demanding environment. These weapons must prove their value because in order to take them along on the NEO, the NEO force had to give up some other essential gear.

This chapter has three main sections. I start with a short survey of non-lethal weapons and concepts, to familiarize the reader with the breadth of weapons falling under the term "non-lethal." Next, I discuss the five filters I applied to this universe of weapons to reach the few non-lethal weapons that passed all five filters. In the third section, I introduce each of these weapons, with short discussions on their usefulness for crowd control in NEOs.

A. THE UNIVERSE OF NON-LETHAL WEAPONS

In a 1997 Occasional Paper for the Institute for National Strategic Studies, R. J. Bunker compiled an exhaustive index of non-lethal weapons terms and references. This listing illustrates the diversity of non-lethal weapons as a class of weapons, and should give the reader a glimpse of today's creativity in non-lethal weapons and concepts. Several other authors on the subject provide similar collections of weapons, but not as encyclopedic as Bunker's. This Occasional Paper therefore serves as a good starting point in examining non-lethal weapons. Nevertheless, we need to keep in mind that technological improvements and new non-lethal concepts and weapons have continued to enter the scene after the extensive research conducted by Bunker and his collaborators.

Acoustic energy weapons act through sound wave generation, with effects such as bowel discomfort, nausea, and dizziness. Because of the long wavelengths associated with sound, weapons in this category are generally quite bulky. Other less intense acoustic weapons just generate sound. Chemical-based weapons include reactants (such

as liquid metal embrittlement and superacids) and most riot control agents (such as tear gas, pepper spray, and mace). Barriers include spiked strips to stop vehicles and superadhesives/superlubricants for coating roads and walls. Physical-action non-lethal weapons include various batons and projectiles (like rubber bullets, small beanbags shot from a shotgun, and water cannon). Biotechnical weapons generate a variety of human effects; examples include malodorous agents that work through smell, drugs that induce sleepiness, and computer implants that (in concept) modify behavior. Biotechnicals also include biological warfare via non-fatal viruses directed at humans, and microbial infestation designed to consume fuel or produce enzymes that degrade building materials. Electrical weapons (such as stun guns or tasers) are designed to subdue individuals via a voltage jolt; this concept can be applied to almost any existing system, like the butt of a flashlight or the front grill of a vehicle. Electromagnetics, also known as directed energy weapons, include the high power microwave laser and non-nuclear electromagnetic pulse; these weapons are designed to disrupt sensitive electrical systems, though the collateral radiation effects can be harmful to humans. Entanglers retard physical movement through nets and bolas, and they also include polymers that clog engines (thus stopping movement, only from the inside). Obscurants degrade our ability to see clearly, whether through smoke, eye-glare, or crazing (a cracking of glass lenses by laser heating). Like obscurants, opticals act on human eyesight, and include high-intensity strobe light that causes disorientation or temporary blindness, and flashbang grenades used as diversionary devices (Bunker, 1997, pp. 4-16). While it may not be obvious that some of these indexed weapons are actually weapons (such as obscurants), how we use them can qualify them to fit DoD's definition of a non-lethal weapon.

B. THE FIVE FILTERS

In the Appendix, I include a partial excerpt of Bunker's compilation on non-lethal weapons terms and references. Each weapon is scrutinized under each filter. Those that pass all five filters make up a list of weapons I believe to be most useful for crowd control in NEOs.

1. Definition of Non-Lethal Weapon

Department of Defense Directive 3000.3 defines non-lethal weapons as "weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment" (DoDD 3000.3, 1996, p. 1). Damage to people and things should be reversible or reparable and temporary. As the first filter, this definition categorically eliminates several items in Bunker's index. I rule out all the items that are questionable as weapons in the first place. Though we can turn practically anything into a lethal weapon (even a non-lethal weapon can be misused to kill), the weapon's *intended* effects must satisfy DoD's definition. Passive defenses such as acoustic intrusion sensors or cyclone fencing are included in Bunker's Occasional Paper, but these systems fail to qualify as non-lethal weapons according to DoD's definition. Although their effects are not lethal, these defenses are not designed to be used willfully to inflict non-lethal damage to people or things, in contrast to weapons such as batons, lasers, and microwave bursts.

Non-lethal concepts described in the list are discounted as well. For example, the "Bucha effect" refers to a subject's disorientation under strobing light. The Bucha effect and other concepts included in the index are not really weapons at all, unlike specific things like batons, rubber bullets, and pepper spray. Also discounted are the items of

historical interest that have dubious non-lethal qualities, like the stun bag projectile (more likely to kill than not) and the sickening agent called DM (Diphenylaminechloroarsine – discontinued due to health risks). Bunker includes them in his list because they used to be considered good non-lethal weapons but lost their standing as they were shown to be unreliable in terms of non-lethal effects. Therefore, these weapons are not considered beyond the first filter. Also removed are "weapons" which are really enablers (or supporting technologies (JNLWD, 1999, CD-ROM)) as opposed to direct-effects weapons. For example, wetware soldier sensory enhancements enable the soldier to better perform his duties, but the wetware itself does not directly cause a non-lethal effect on adversaries. Similar reasoning applies to the categories for anti-plants and anti-lethals. Anti-plant agents destroy foliage and help us to find the enemy. Anti-lethals help us counter the enemy's lethal systems so that we can reach the enemy intact. Because these supporting technologies enable us to attack targets, but do not themselves generate non-lethal effects, they should not be technically categorized as non-lethal weapons according to DoD's definition.

2. Crowd Control

Crowds can be controlled through several measures. We can use weapons such as riot control agents to disperse them. We can contain or block them using means such as barbed wire or armored vehicles. We can even attempt to dampen their fervor by enveloping them in smoke or judiciously targeting agitators in the crowd. Any of these measures can be valid for crowd control. But what can high power microwave weapons or engine-clogging filaments directly do against crowds? This filter naturally excludes several weapons on the list. Clearly, not all non-lethal weapons are designed to control crowds. For instance, most anti-materiel weapons fail to pass this filter. Weapons meant

to disrupt electronics (electromagnetics), stop vehicles (entanglers and some barriers), or corrode metal (reactants) do not have conventional applications in crowd control scenarios.

3. Legal Review

Before system acquisition, DoD accomplishes a thorough legal review of the proposed weapon system. This review is based on international treaties and the Law of Armed Conflict (DoDD 3000.3, p. 3). New weapons are subject to legal and ethical scrutiny during their concept phase. Under the Law of Armed Conflict, the law of proportionality should be addressed. Does the weapon, even if non-lethal, cause suffering disproportionate to the anticipated military advantages? Additional standards for military appropriateness are found in five international conventions. The Chemical Weapons Convention (CWC) prohibits the use of chemical riot control agents against combatants during war. The Biological Weapons Convention (BWC) bans the development, stockpiling, acquisition, and production of biological agents or toxins that are not justifiably helpful to flora and fauna. The Nairobi Convention restricts the use of electromagnetic weapons, particularly with respect to interference with communications during peacetime. The Environmental Modification Convention (ENMOD) prohibits weapons with effects based on altering the environment, effects that can last months, affect a wide area, or severely disrupt natural resources. The Certain Conventional Weapons (CCW) Convention, also known as the UN Inhumane Weapons Convention, mainly applies to lethal weapons and includes a protocol that outlaws lasers designed to cause permanent blindness (Coppernoll, p. 5).

This third filter blocks a few of the weapons that passed the first two filters. Some of the weapons are clearly problematic in terms of satisfying international

conventions. Some older laser programs, for example, could not be pursued because of the ban on blinding lasers as a form of attack. With respect to chemical riot control agents (RCAs) as weapons, CWC does not define "method of warfare." The US government's interpretation of the CWC is that RCAs are permissible in operations other then war, such as peacekeeping, humanitarian relief, NEO, counter-terrorist operations, and law enforcement (Coppernoll, p. 11). Without exception, all of the RCA items in Bunker's list passed the third filter because of the government interpretation of the CWC.

Although legal scrutiny can generate debate over whether a proposed weapon satisfies each international convention, the Joint Non-Lethal Weapons Directorate (JNLWD), DoD's focal point for non-lethal weapons, has yet to rule out a proposed system based solely on treaty compliance. Rather, the controversial aspects of the weapon are addressed as an engineering issue. That is, efforts are made to specifically design the weapon so that it satisfies all treaties. For instance, the class of biodegrading microbes is a promising non-lethal weapon. Microbes can be designed to eat fuel or make acids that dissolve metal, for instance. However, it is possible that these organisms may create environmental side effects. Therefore, we should try to genetically engineer the microbes to minimize any incidental environmental effects they may cause. DoD does not generally rule out legally controversial weapon concepts because solutions can still be designed into the weapon so that it will satisfy all international conventions.

4. Supportability

During the acquisition process, a non-lethal weapon system must demonstrate a high probability of desired effects on target and a low probability of permanent and collateral damage. In other words, the weapon must work as advertised and meet tactical requirements for its concept of operation. However, some weapons programs cannot

meet this rudimentary milestone. Several acoustics-based weapons are beyond our current technological capabilities, and the effects from acoustic weapons on humans are diverse and irregular even from the exact same weapon. Without the capability to reliably predict a weapon's effects, we cannot be confident of its non-lethality.

As important as the weapon's reliable operation is the logistics train required to support it, such as ammunition resupply, power requirements, and maintenance. Even if a non-lethal weapon works, DoD may decide it is too costly to support, at least at the present time. An example is the decision to set aside sticky foam as a deployable non-lethal weapon. Sticky foam was originally designed as a defensive weapon to protect the US nuclear inventory. When triggered by an intruder, sticky foam would engulf the room, immobilizing the suspect for arrest (Alexander, 1999, p. 70). Sticky foam evolved into an antipersonnel weapon, featured in the 1994 USMC-assisted withdrawal of United Nations (UN) troops from Mogadishu (Operation United Shield). Even with improvements in dispensers, sticky foam has a short range (35 feet) and must be carefully aimed to avoid coming into contact with an opponent's face (suffocation is the danger). The man-portable unit has a single-shot capability, then must be recharged by a high-pressure nitrogen unit weighing 900 pounds (Alexander, p. 71). The logistics support required to employ sticky foam is unwieldy for application today. At its current technological stage, sticky foam has been rejected as a non-lethal weapon that can be successfully fielded (Gourley, 1998).

Public acceptance is also a part of this third filter. In other words, American culture contributes to the filtering process. Ethical arguments based on controversial use of a particular weapon in the past can generate public uneasiness with DoD's use of that

same non-lethal weapon in the present. An example is the electrified cattle prod that was outrageously misused against Blacks in the mid-1960s (see Appendix, under Electricals). In another example, the suffering connoted with Vietnam-era punji sticks would likely preclude our military from pursuing further development of that particular design. In this fashion, some historically and publicly controversial non-lethal weapons can be barred from serious DoD consideration, so this filter excludes them from further consideration.

5. Crowd Control in NEOs

The US Marine Corps is pursuing a Non-Lethal Weapons Capability Set tailored for crowd control. The set includes pepper spray dispensers, shields, batons, shotgun and 40 mm munitions, and non-lethal varieties of hand grenades. Only some items in the Capability Set met the last filter's criteria. Marine units are trained to use the set using their crowd control techniques, tactics, and procedures. They organize in a phalanx-type formation, presenting a coordinated, formidable, and disciplined body of troops to the crowd. Each advance in position and gradual increase in non-lethal force is preceded by the team leader's warnings over a loudspeaker. The weapons in the set were included for their usefulness in breaking up crowds in this mass-advance fashion. However, in the case of NEOs, there are certain constraints that filter out some USMC Capability Set items as well as other non-lethal weapons on Bunker's list.

There are two things we need to consider in using non-lethal weapons for crowd control situations in a NEO. The first consideration is the opportunity cost of bringing a non-lethal weapon or munitions instead of another troop or other equipment. NEOs are initiated with relatively small groups, like the sixty-man team that landed in Operation Eastern Exit. Since helicopter lift capacity and fuel requirements are at a premium, a real concern in NEOs is whether we can send enough men, prudently equipped, to accomplish

the various tasks. The weapons at this filtering stage need to be economical in weight and space. Preferably, they should be useful in a variety of tactical scenarios because something else will be supplanted to improve the force's overall capability with non-lethality. When deploying for a NEO in which space and weight are critical factors, we should minimize the impact of bringing non-lethal force in addition to the usual lethal weapons. This way, fewer equipment and personnel tradeoffs have to be made, enhancing mission effectiveness. For instance, dual-use launchers or attachments optimize the non-lethal munitions' economy. The M203 grenade launcher fits beneath the barrel of the standard M16A2 rifle, and can launch lethal and non-lethal 40 mm munitions. A beneficial corollary to dual-use launchers is the minimal impact on training as the individual troop maintains his confidence in his accuracy with a familiar launcher while gaining confidence in the new munitions (Lorenz, p. 2).

Some of the weapons filtered out are aqueous foam, barbed wire, and shotguns. Despite their effectiveness, aqueous foam and barbed wire are two weapons that, because of the physical size of their dispensing systems, cannot feasibly be initially deployed with the small NEO force. However, if the operation becomes extended, then such systems may be delivered later to augment Embassy defense. Though part of the Marines' Non-Lethal Weapons Capability Set, shotgun munitions are filtered out here because an extra weapon would have to be carried into the NEO, costing weight, space, and training.

The second consideration in the choice of non-lethal weapons for crowd control is the general tactical scenario and military objectives for controlling the crowd. In reality, the NEO force has no business trying to contain, arrest, or subvert a crowd; these operations are the realm of domestic law enforcement. The NEO force's business is to

complete the NEO task at hand, whether it is to get to the isolated evacuees, clear a path to the Embassy gates, and so on. When the NEO force spots a crowd and assesses that it could complicate the task at hand, the force should try to disperse it. All it may take to disperse a crowd might be a stern command and the threat of force. If that does not work, then non-lethal weapons may have to be called upon. As a last resort, lethal fire can be used if authorized and justified.

The crowd control capability we are interested in having in NEOs is crowd dispersal. Standard riot control tactics, conducted with more elements than a NEO will probably have available, must be modified. Standard tactics call for a show of force and divide-and-conquer maneuvers (Applegate, p. 401), but the NEO marshalling and security elements will be too small to do any of these measures effectively. Their attempts will produce limited results like a temporary dispersal. Hopefully, this limited control will be enough for them to continue with their primary tasks in support of the NEO.

With regard to the fifth filter, weapons for crowd dispersal are a smaller subset to those weapons designed for crowd control. Entanglers are filtered out because the objective in NEOs is not to apprehend or arrest civil offenders. Also, the NEO force should not expect a need to set traps like non-lethal claymores. The open street gathering characterizes the crowds outside Embassy walls or crowds downtown, so weapons designed to penetrate barriers or be inserted between foliage/fences, like the flash-stick or painter's pole (see Appendix, under Acoustics & Opticals), have marginal value for our forces.

Because NEO forces cannot afford to be overrun, the majority of their weapons need to be fired from distances farther than objects thrown by arm from within a crowd. Basically, they need good standoff range in our weapons in order to disperse the crowd before it threatens to overwhelm their small force. Here, understanding the crowd's organization, psychology, and motivation can help the tactical commander form a plan for crowd dispersal. Stern warnings might work, but if unsuccessful, he could employ smoke to break up cluster communication, or use RCAs to try to force individuals to escape the area and leave the crowd. Of course, there is always the brute force option of firing non-lethal projectiles if participants' determination to resist is high.

Many baton variants are eliminated because of their limited tactical value to a small marshalling team facing a large crowd. Tactically, batons would be used to fend off a crowd that is too close for our standoff weapons to be used safely. A small element wielding batons would not use them to subdue the crowd. That is just not tactically sensible. In the event that our troops find themselves in close quarters with a hostile crowd, the batons still offer troops a non-lethal option for close-in fighting. Thus, deadly force is not the only option available to ward off a crowd's imminent advance. The military element still has a chance to break away from the crowd without killing anyone.

The only RCA to pass this final filter is oleoresin capsicum (OC), the main ingredient in what is popularly known as pepper spray. The well-known riot control agents CN and CS ("tear gas" and "super tear gas," respectively) are lacrimating (stimulating tear ducts) irritants that act on mucous membranes, tear ducts, and the respiratory system. The burning pain sensation is relayed to the brain from nerves in the skin, and is heightened when the skin is moist. In general, these tear gases will not be

effective on animals, nor on humans who are drunk or on narcotics. Oleoresin capsicum produces similar effects in individuals, but it also affects animals (and thus are useful if aggressive animals are encountered). The difference between CS/CN and OC lies in the nature of the chemicals' reactions with the human body. While CN and CS generate tearing to promote the burning sensation on the skin (Logman, 1996, pp.12-8), OC acts on a person's mucous membranes, directly causing automatic inflammation and swelling of eyes, nose, and throat. The suspect experiences coughing and runny nose, and his eyes are swollen shut. In addition, he feels pain because OC also reacts with the trigeminal cells, pain receptors located in the mouth, nose, stomach, and mucous membranes (Logman, pp. 30-1). Essentially, without some form of protection, humans cannot resist this RCA's effects and command enough senses to accomplish anything other than flee. The exposed individual's reaction will be to get away before experiencing another dose of OC.

Area decontamination is a considerable issue for CN and CS, especially near hospitals, playgrounds, etc. In contrast, OC requires no special decontamination. It is biodegradable and will not linger on clothing or in the area. Law enforcement agencies have recently begun using OC over the traditional tear gases as a more reliable, less harmful crowd control measure (Edwards, et al., 1997, pp. 2-3). The Marine Corps has incorporated OC into its Non-Lethal Weapons Capability Set.

C. CROWD CONTROL WEAPONS FOR NEOS

The Appendix considers over two hundred non-lethal concepts and weapons candidates. After applying the five filters, only eight non-lethal weapons are found suitable for crowd control in NEOs: smoke, high-intensity light (or glare weapon),

dazzler, flashbang grenades, oleoresin capsicum, batons (expandable and side-handle), stingball grenade, and 40 mm munitions. Figure 1 showed the domain non-lethal weapons occupy along the force continuum. Figure 4 below includes the eight acceptable NEO crowd control non-lethal weapons, sequenced according to their incremental approach towards lethality, relative to each other. Each weapon is described next.

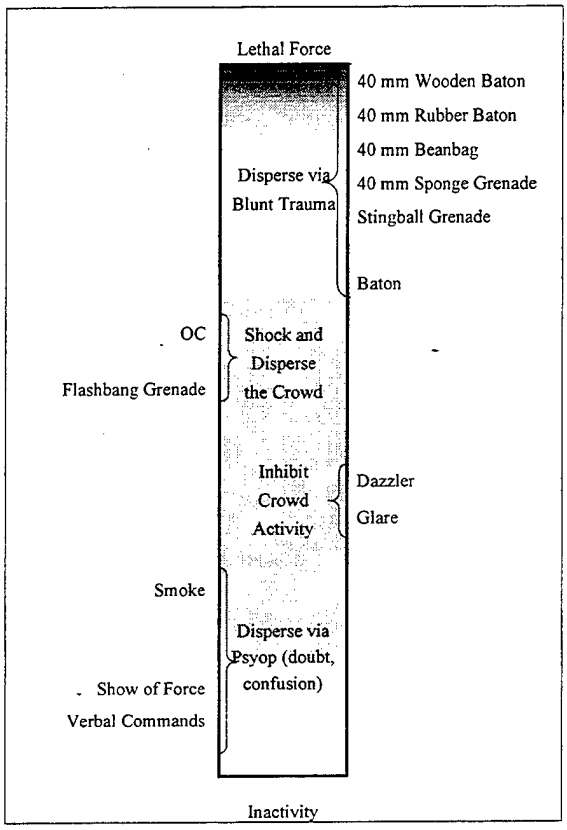

Figure 4. Force Continuum, after Lorenz, p. 3.

1. Smoke

Subject to weather conditions, smoke is an undeniable asset for concealing friendly forces from observation by adversaries. As a crowd control device, smoke can engulf a crowd, causing disorientation and hindering organized activity. The

disorientation can create a situation in which people now focus on their personal predicament of not being able to see. When they try to get out, there must be avenues of escape for the safety of the crowd. Variants include colored smoke, which can scare the crowd into believing the next step involves chemical RCAs. Smoke can also cover a military withdrawal from unruly crowds. The individual soldier can be armed with smoke hand grenades to have this capability. Typical smoke grenades can produce enough smoke to cover a volume of space 35x35x35 feet, or about 40,000 cubic feet (JNLWD, CD-ROM). Larger systems, such as the Army's Light Vehicle Obscuration Smoke System (LVOSS) which disperses smoke from atop a vehicle, are impractical for the insertion airlift limits typical for NEOs.

2. Dazzler and Glare Weapon

Our troops also need weapons that will cover their egress or hinder direct attacks if the crowd or mob gets unmanageable. These optical weapons give them this capability by temporarily blinding their adversaries. It is feasible to combine the following two directed-energy weapons into one unit that toggles between functions, increasing capability without adding much weight. Currently, the Air Force is pursuing this technology in support of perimeter defense for airfields. Operational testing has shown the glare weapon to be effective.

a) Glare Weapon

The glare weapon is a high-intensity light weapon. It looks like a large flashlight that can be mounted underneath a rifle's barrel. The glare weapon is an eye-safe laser (or otherwise high-intensity light source) that produces a continuous beam of light more intense than a flashlight but not as dangerous as a laser pointer (SEA

Technology, 1999). The glare weapon is easier to use at night than by day because we can see where it is shining. It is also more effective at night because of the human eye's sensitivity in low-light conditions. However, as anyone knows from driving into the sun, the intense glare can be quite intolerable, and can make operating a vehicle hazardous and disrupt other activities requiring vision.

Similarly, the high-intensity light beam from the glare weapon, when shone into a suspect's eyes, produces a glare in the direction of the user, compelling the subject to look away. Without visual information on the bearer of the glare weapon, the target being illuminated cannot aim a weapon or attack in the direction of the glare, much less see how many adversaries he faces. The glare renders the subject temporarily unable to continue his actions in the direction of the glare without permanent harm to his eyes. Applied to vehicle windshields, a glare weapon can also impair the driver's vision and slow his reactions. The psychological effect on a subject being designated with a large red dot is obvious: the suspect has been detected, and there are likely to be other weapons trained on him. Glare weapons can be used in crowd control to hinder crowd activity. They can also be used to point out suspected agitators to military marksmen, and prevent, delay, or make inaccurate direct attacks on our troops by crowd members.

b) Dazzler

The dazzler is a handheld pulsing, eye-safe laser (or otherwise high-intensity light source) used to temporarily blind adversaries. Like the glare weapon, the dazzler is more effective at night than by day because of the human eye's greater sensitivity to light at night. Having dimensions of a foot-long flashlight, the Laser Dazzler™ (LE Systems, Inc., 1998) weighs about three pounds. By exploiting the pupil

reflex in human eyes, intense strobing can create a ghost image of the light source. This flashblindness effect hinders the adversary's ability to clearly see what he is doing. The effects are observable as the suspect staggers and shields his eyes from the blast of pulsed light. Even one second of exposure (the light is mesmerizing at first) can achieve enough partial vision loss to induce mild dizziness. Longer exposure may result in nausea. The dazzler can deter any direct attacks by the crowd on our forces. The temporary blindness it causes can help us retreat or give us time to prepare a stronger response to disperse the crowd.

3. Flashbang Grenade

The startling sound and dazzling flash of a flashbang grenade are useful as diversionary measures in crowd control. There are several varieties currently available, but in general, the flashbang is a non-shrapnel producing, low hazard hand grenade that bursts with very little smoke and fragmentation (FM 90-40, 1998, p. A-6). Incapacitation of individuals occurs through auditory stun and temporary flashblindness (JNLWD, CD-ROM). It can be used to surprise a crowd and interfere with crowd dynamics. The crowd's delayed reaction can give our troops time to prepare a more effective dispersal tactic. This weapon is already a component of the Marine Corps' Non-Lethal Weapons Capability Set.

4. Oleoresin Capsicum (OC)

Oleoresin capsicum (OC) comes from natural cayenne pepper extracts, but it is subject to the same authorization guidelines as RCAs because its action is chemical-based and relies on a sufficient toxicity level to affect humans. Exposure to OC causes involuntary inflammation of the mucous membranes of the eyes, nose, and throat. Even if intoxicated or violent, a suspect will feel his eyes close by reflex to the swelling, and

his airways will become constricted, yielding gagging, coughing, and shortness of breath. The flight response is typical, as the affected person tries to get away from the area in order to alleviate the OC's effects. Hand grenades filled with OC instead of tear gas are valuable in crowd dispersal. Though Bunker has no material on OC-filled grenades, the extension from CS grenades is logical. A 40 mm version can also be useful for increased standoff. The Marines' Capability Set includes pepper spray, but the dispenser's short range is unimpressive compared to the following adapted technology.

Jaycor, Inc., has adapted recreational paintball technology into a non-lethal weapon that has become a favorite of Los Angeles Police officers. In law enforcement, these air-compression-based PepperBall™ weapons fire bubble gum-sized pellets filled with OC. Lightweight, quick to reload, adequate in firing rate, and accurate to hundreds of feet, these weapons are currently being field-tested by the LA Police and Sheriffs Departments. While the hand grenade version is an area effect weapon, the PepperBall™ is more selective in targeting individuals or moving suspects (like looters). It can also be fired as a volley to disperse a crowd. As the first increment in the use of RCAs against the crowd, PepperBalls™ releasing individual doses of OC may be enough to start the dispersal process. If not, grenades would be the next step.

While law enforcement is Jaycor's primary user of this product, the company is developing a package for military rifles. The defense market seeks weapons that fit onto existing weaponry in order to reduce individual combat loads, consistent with our fifth filter. The JNLWD is experimenting with an Under Barrel Tactical Payload System. Monterey Bay Corp has designed a rifle-compatible launcher that is accurate with re-designed fin-stabilized paintball munitions up to 100 meters (JNLWD, 1998, p. 17).

5. Batons

Batons are not new to the crowd and riot control scene. A baton is used to strike noncombatants just outside of arm's reach, deflect direct attacks, and apply submission holds (FM 90-40, 1998, p. A-1). Several versions have been developed over the years. A side-handle baton can be twirled for better blow deflection (see Appendix, under Batons). The Marines are testing a 24-inch long telescoping baton in their Capability Set.

Batons are inherently hand-to-hand non-lethal weapons. It is an offensive weapon, but is usually used defensively to allow its user to survive an attack. A baton can be used to hit, jab, parry, or restrain depending on the situation (Applegate, p. 298), and it is most effective when used in a mass attack or in defensive formations (Applegate, p. 305). In a NEO, because of the small size of our forces relative to crowds, these weapons can only really be used defensively to repel crowds as a last measure prior to a retreat. In the event of close quarters crowd control, our troops will need their batons for the physical advantages of leverage and hardness while pushing people away from the Embassy gates, for instance.

6. Stingball Grenade

Stingball hand grenades burst and scatter many small rubber balls, pelting crowds without seriously hurting people. Generally, when a stingball grenade bursts on the ground, the scattered balls slow down and lose their sting above a height of 4 feet (JNLWD, CD-ROM), designed to spare the eyes of adults; an airburst is more dangerous. Some good features of this weapon are its minimal environmental impact and the ability to hit the target in defilade to disperse a crowd from its center out. Proven effective in domestic prison riots, the stingball grenade can quickly gain the attention and compliance of unruly mobs. When thrown by hand, the grenade has at least the same standoff range

as objects thrown by the crowd. Also, a 40 mm stinger cartridge (filled with rubber pellets similar to the stingball grenade) can be fired from an M203 grenade launcher (FM 90-40, p. A-6), increasing the standoff range. A variant called the M453 Stingette™ impact/distraction/diversion grenade combines the stingballs with the features of a flashbang (JNLWD, CD-ROM), a very economical fusion of effects available in one grenade.

7. 40 mm M203 Munitions

In addition to the 40 mm stinger cartridge, several other 40 mm non-lethal options are available. These projectiles are designed to deflate violent opponents' aggression by knocking them to the ground and causing blunt trauma. The Marine Corps' Capability Set includes the 40 mm foam rubber baton round and the 40 mm wooden baton round, and a shotgun-fired version of the beanbag round, though not the sponge grenade. The 40 mm metal cylinder encases the specific non-lethal munitions: a sponge-covered projectile, 180 rubber pellets, three short cylindrical batons made of wood or rubber, or shot-filled fabric beanbags. None are muzzle safe; that is, the munitions can kill at point blank range and can be lethal if fired short of recommended minimum ranges. These munitions can also be laced with an RCA to augment their blunt trauma effects (MK Ballistic Systems, 1998).

All of these munitions require training to use. The training emphasizes the danger of fatal injury in a head shot or at close ranges. Skip firing is the recommended course of action. Skip-fired munitions require extensive training to minimize casualties. Because of the chance of serious injury from these munitions, they are near the "lethal force" end of the force continuum (see Figure 4).

A development under way for the M203 grenade launcher is the capability to fire repeatedly through an added magazine and a feeder mechanism (JNLWD, CD-ROM). This multi-shot feature will give our forces even better response time when they need to fire a volley of non-lethal munitions.

D. SUMMARY

Beginning with an expansive collection of 217 non-lethal weapons and concepts, five filters were applied that gave us a short list of eight non-lethal weapons potentially useful for crowd control in NEOs. From the universe of non-lethal weapons are those weapons that meet DoD's definition of a non-lethal weapon and have crowd control applications. They satisfy DoD's legal review for international treaty compliance, and are supportable in terms of technical feasibility, tactical operation, logistics, and public acceptance. The final filter eliminated certain crowd control weapons because of a NEO insertion's practical limits on size and weight, and because of the limited objectives in controlling crowds in NEOs. This thesis' recommended array of non-lethal weapons for crowd control in NEOs includes: smoke grenades, the glare weapon, the dazzler, flashbang grenades, oleoresin capsicum (OC), batons, stingball grenades, and 40 mm munitions. These eight weapons give the tactical commander several non-lethal options in the use of force between inaction and lethality. Table 1 on the next page compiles these weapons, identifying their main applications and key shortfalls.

The next chapter is a re-telling of Operation Eastern Exit with the addition of non-lethal weapons. This non-lethal capability should help the SEALs and Marines reduce the uncertainty associated with an increasingly threatening environment.

Non-Lethal Weapon	Crowd Control Uses	Other Uses in NEOs	Shortfalls
40 mm Munitions	• Skip-fire multiple batons • Cause physical pain • Usable in adverse wind conditions	• Knock down adversaries • Launcher is compatible with all other 40 mm munitions	• Increased risk of eye injury/physical trauma
Stingball Grenade	• Fire in defilade • Cause physical pain • Area effect produces dispersal		• Increased risk of eye injury
Baton	• Defensive CQB • Unambiguous symbol for riot control		• No range
Oleoresin Capsicum	• Induce flight response • Area effect produces dispersal • Cause involuntary symptoms	• Target individual suspects	• Subject to wind and weather • Area contamination • Gas masks to protect users
Flashbang Grenade	• Startle/distract crowds		• Risk of hearing damage
Dazzler	• Blind crowd and hinder activities	• Defensively blind adversaries	• Must be continuously trained on target • Line of sight • Functions better at night • Effects degraded in precipitation or obscurants
Glare Weapon	• Blind crowd and hinder activities	• Defensively blind adversaries • Warn suspects of our surveillance • Designate target to marksmen	• Must be continuously trained on target • Line of sight • Functions better at night • Effects degraded in precipitation or obscurants
Smoke	• Induce flight response • Blocked vision degrades crowd communication	• Conceal our retreat/movement • Mark an HLZ	• Subject to wind and weather

Table 1. Non-Lethal Weapons for Crowd Control in NEOs, listed in order of most forceful to least forceful as depicted in Figure 4.

VI. OPERATION EASTERN EXIT REVISITED

In this chapter, I briefly review the highlights of the problems we faced on the ground in Mogadishu during Operation Eastern Exit. Having identified this story's particular points of friction, I add in a non-lethal capability to the NEO force's armament to see how they may have been better tailored to deal with some of the challenges.

A. THE HIGHLIGHTS

Recall the Operation Eastern Exit scenario. In December 1990, Mogadishu was being torn apart by well-armed factions and government forces fighting each other. The urban fighting threatened the safety of Americans in Mogadishu. US Ambassador James Bishop requested a noncombatant evacuation operation on New Year's Day. NAVCENT organized its forces and sent two ships to the rescue.

Arriving on two helicopters, sixty men (nine SEALs and fifty-one Marines) swarmed into the US Embassy on 4 January. Expecting heavy fighting, they were armed to the teeth with automatic weapons and anti-tank weapons. As it turned out, the armament and menacing appearance of the troops proved intimidating to most Somali aggressors. For example, some armed Somalis gathered at an Embassy gate and demanded to be let in or they would start shooting. When they noticed the SEALs and Marines stationed on the wall, they immediately cowered and backed off, saying they had made a mistake (Gellman, 1992). For their sheer deterrent value, the lethal weapons the SEALs and Marines carried effectively addressed many problems, though not all. In fact, Ambassador Bishop's stipulation restricting lethal force limited the combat options the NEO force could actually pursue with all their heavy weapons.

The security situation was not good for our forces. Within the city, the dangers comprised artillery fire, snipers, looting, and roving trucks full of armed rebels. The fighting was between Somali government forces and three different rebel factions, and all four groups were vying for territorial control in Mogadishu, though no one was actually targeting Americans. However, some Somali citizens were interested in looting the US Embassy. At the Embassy, our troops dealt with stray bullets, stray RPG rounds, and some sniping aimed at the Marines on the water tower. These factors represented a serious threat to force protection.

Because of the risk of injury in the streets of Mogadishu, the Ambassador instructed all Americans outside the Embassy to remain where they were. Foreign nationals wishing to be evacuated by the US military were instructed to make their own way to the compound. Somalis were not eligible for evacuation, by international law.

Other aspects of the mission presented more friction. The Evacuation Control Center was swamped with processing all the refugees. Short-handed, the Marines could not efficiently search passengers for contraband. The HLZ had to be cleared to receive the helicopters in a safer manner. Cars were pushed out of the way and the lights in the compound had to be switched off so that the helos could fly in under cover of darkness. Though only one marshalling trip was made to recover isolated evacuees at the Office of Military Cooperation (OMC), the marshalling team was instructed to shoot through any roadblocks encountered. Even though the task was completed without incident, there was the potential for an escalation of threat to US forces if they had to engage rebels and kill them.

During the mission's withdrawal phase, the ECC's inefficiency held up the loading of the helicopters. Adding to the problems was a self-serving Somali Major who threatened to shoot down the helicopters. He was distracted and bribed by Ambassador Bishop in order to ensure the helicopters could leave. While diverting the Major's attention, the Ambassador missed his assigned flight, disrupting the withdrawal plan. The final departing helo flight was vulnerable in the confusion. Only the helicopter-mounted machineguns safeguarded the withdrawal while the remaining troops made their way onto the helos.

B. HOW WE COULD USE NON-LETHAL WEAPONS

The Marines' and SEALs' actual weaponry was not specified in the researched accounts, so some assumptions need to be made. Nearly each man carried some kind of automatic weapon, like the M-16A2 assault rifle, and some kind of anti-tank weapon, like the Dragon or the Light Anti-Armor Weapon (LAAW) (Siegel, p. 19). Non-lethal weapons should never be a soldier's only form of self-defense, so in this re-telling of the NEO, each Marine and SEAL carries his automatic weapon. As for the anti-tank weapons, this revised scenario trades some of that firepower for non-lethal weaponry. LAAWs are relatively light, weighing about five pounds and measuring about a meter in length. On the other hand, the Dragon is a bulky shoulder-fired single-shot weapon weighing forty pounds. It is undoubtedly menacing to behold, but for its weight and size, the NEO force can easily opt instead to take non-lethal weapons to increase its capability to respond to threats. Not everyone needs to be armed with non-lethal weapons. Some can retain the anti-tank weapons to ensure the main body still has that kind of firepower

available. The goal is to expand the NEO force's capabilities in reference to the force continuum.

The non-lethal weapons discussed in the previous chapter include smoke grenades, glare weapon, dazzler, flashbang grenades, oleoresin capsicum (dispersed through PepperBalls™ and grenades), the individual's baton, stingball grenades, and several 40 mm munitions (sponge grenade, beanbag, and rubber and wooden batons). These weapons help address some of the tactical problems seen during Operation Eastern Exit.

C. THE NEW STORY

The sixty Marines and SEALs rush into the Embassy armed with an array of force: anti-tank weapons, automatic weapons, and non-lethal weapons. On the perimeter, the troops are armed with optical weapons, used to dissuade hostile actions. At the gates, the troops are concerned with crowds, and so are armed with crowd dispersal non-lethal weapons such as 40 mm munitions and OC. During marshalling operations, the troops carry the complement of non-lethal weapons for a full range of response to varying levels of threat.

1. Perimeter Security

The Somali factions are not directly targeting American forces during the NEO, but the safety of the troops and the evacuees is certainly not guaranteed. Armed faction fighters roam the streets outside the Embassy, embroiled in their own struggle for control of the city. Meanwhile, our own well-armed men are stationed along the perimeter, watching for possible hostile activity targeting the Embassy. Were the perimeter security teams armed solely with lethal weapons, they might have difficulty communicating our

intentions of repelling aggressors, especially in the dark. Before inquisitive Somalis would turn around, our sentries would have to first be seen and recognized as prepared to shoot. This visual identification process reduces the distance between both parties if a combative situation emerged. The time the security team has to react is also reduced.

However, with non-lethal options that work at a distance, they have a better chance to deter hostility and curiosity from a longer range. A truck loaded with armed men is spotted heading towards the Embassy. A Marine perimeter security team uses a dazzler and a high-intensity glare weapon to deter the advancing truck. The optical warning not only impairs the rebels' ability to approach or even attack, but it sends a signal that US forces are aware of them and can respond with deadly force if provoked. The Somalis are not primarily concerned with American forces this early in the NEO, so their level of commitment to fighting with US forces is low. Having been warned but with no physical harm done to the Somalis by the optical effects, the men in the truck seek another way around the Embassy, deciding it is easier to bypass the compound than test the Americans' resolve.

A Marine sniper team on the water tower is being targeted by a Somali sniper. The Ambassador's instructions do not permit return fire even though our men's lives are clearly at risk. The entire time they are under fire, one of the Marines designates the sniper with a laser aim point, prepared to shoot. In the actual account, the Marines were ordered down from their perch as a measure of force protection. But when they came down, they gave up a valuable vantage point for area surveillance. In this chapter's account, the Marines use the optical weapons to convey an unambiguous message to the sniper that they can return fire. The glare and temporary blindness suppresses the

sniper's ability to target the men on the water tower, plus the Marines keep the high ground to better evaluate the security situation around the Embassy. The Ambassador, knowing the Marines have a non-lethal option, allows them to stay at their vantage point.

At the gates, frightened Somali nationals seek refuge within the Embassy's walls. The number of people at the gates was apparently not a problem in the actual NEO. However, suppose the numbers become unmanageable for gate security. Some crowd control measures would be appropriate. This is especially important because though Somalis are not eligible for evacuation, other foreign nationals are. These nationals have to find their own way to the US Embassy, then enter through the gates. If the gates are blocked by a crowd of desperate Somali civilians, then there is no passage into the compound for the foreign nationals. Therefore, it is imperative that access to the gates remains clear. The gate security needs to disperse crowds before they overwhelm the security's ability to distinguish who can enter and who should not. Certainly, in addressing Somali gatherings outside the gate, we must begin at the lowest level of the force continuum, starting from verbal warnings. In Operation Sharp Edge, Marines used a bullhorn and a show of force to clear the area around the Embassy gate (Sachtleben, 1991, p. 85). If these initial methods do not disperse the Somali crowd, then the security team must enforce their warnings with the next step in force, from OC and flashbangs, then on to 40 mm munitions. When non-lethal weapons are fired at the Somalis, they should, in their rational calculus, question whether they still want help from the same people who are firing at them. If the Somalis feel they would rather be hit with American non-lethal measures than face death in the city, then the Ambassador must resolve the

issue and decide whether to shelter these desperate people. Non-lethality can solve problems only to a certain point.

2. Marshalling Operations

Though the single US marshalling operation in Operation Eastern Exit ended without incident, no one could be certain an armed encounter would not happen. In the actual NEO, the team's orders were to shoot through any roadblocks to reach the OMC, a few blocks from the Embassy. The evacuees awaited the marshalling team's arrival, since Ambassador Bishop felt street travel was unsafe. However, he authorized the use of lethal force to complete the marshalling task. Perhaps the Ambassador decided that the isolated evacuees had to be recovered at any cost, even if it meant risking an escalation in threat to the rest of the NEO.

In this non-lethal weapons account, we approach tactical problems with solutions short of killing the adversary, avoiding a risk of threat escalation. The three Marines and six SEALs on the marshalling team are armed with every non-lethal weapon available to the NEO force. They are travelling in three armored Embassy vehicles, along with several Embassy-contracted Somali guards. They are authorized to use all available means to defeat roadblocks and continue the mission. Facing an unexpected roadblock on their way to the OMC, the convoy stops. Since the Somali factions are targeting each other, the US force tries first to negotiate passage. Nine large Americans with weapons may be enough to scare away a handful of Somali looters, but the dozen or so seasoned faction members are not immediately daunted. The potential for combat is high, but the SEALs and Marines still prefer no bloodshed, fully aware of the tactical repercussions. As soon as a Somali raises his weapon to fire, the team leader, a SEAL, gives his orders. Three SEALs spray the roadblock with dazzling light and high-intensity glare. One

Marine launches a flashbang over the roadblock to startle the Somalis, then takes the wheel of the lead car. Two Marines fire 40 mm rubber baton rounds into the middle of the roadblock to clear people out as the armored car charges forward to bust through the roadblock; one round is skip-fired for an area effect, and the other is fired directly at an opponent who needs to be knocked out of the way of the charging vehicles. The remaining two SEALs cover the scene with their assault rifles, ready to fire if necessary. No PepperBalls™ are fired since the convoy must drive through the road, and not everyone has a gas mask. All nine troops have their primary lethal weapons up and ready, but through teamwork, six use their attached non-lethal weapons to overload their adversaries' senses. Breaking through the roadblock, the convoy continues to the OMC and radios a message back to the Embassy, reporting the recent use of non-lethal force against a faction.

The Embassy immediately tries to get in touch with all factions and groups, reiterating the nature of the evacuation mission and stressing the US position of remaining neutral in all the civil conflicts. If US forces had intended to take sides, they would have already used deadly force. However, the choice of non-lethality emphasizes their commitment to remaining uninvolved in the local fighting, and it serves as a warning that the US can escalate the force in retaliation if provoked. As the faction leaders weigh the situation, they remain suspicious but fearful of an American escalation. With no need to seek revenge for any murdered faction members, leaders can hold off the more radical elements of their factions until the US is out of the country. Faction-led hostile activity against the NEO force goes dormant, and the marshalling and perimeter security teams face a relatively less tense environment.

However, just because the threat of faction hostility is reduced does not mean the threat to the NEO force is reduced everywhere. What if the convoy passes near a downtown riot? The convoy should continue and not get involved. If somehow it becomes a target for the mob, the team must retreat, being hopelessly outnumbered. Of course, nine men can do very little against a violent mob at close range, except to try to break contact using a quick volley of PepperBalls™ and 40 mm munitions, for example. From a farther distance with more response time, the team may be able to disperse or confuse the crowd, or just break contact and get away by using a graduated response of the non-lethal weapons available. A combination of weapons effects in concert, as in the roadblock scenario, may enable a safe withdrawal. PepperBalls™ can disperse the crowd and temporarily deny the area to other gatherings. Stingball grenades can clear out sections of the crowd to begin the dispersal process. Smoke can break up the crowd's cohesion by obstructing individual members' sight with each other and with marshallers, thus helping to diffuse the crowd's sense of direction and purpose. Smoke can also cover the team's retreat. Dazzlers, glare weapons, and batons give the team a final defense against a rushing mob.

3. Withdrawal

The withdrawal in the actual Operation Eastern Exit was problematic because the threats of a single self-important Somali Major interfered with the withdrawal sequence. When the Ambassador did not depart on his assigned flight, accountability problems nearly grew out of hand as troops ran from one helo to the next trying to find a seat. This confusion contributed to two communications troops being unaware the last flight was about to leave them. While the radio men packed their gear, the helicopters were vulnerable to outside fire because there was no more perimeter security. As looters

breached the Embassy and RPG rounds blasted through walls, the helicopters' only defense was their machineguns.

The defense changes with the addition of non-lethal weapons. Rather than wait to be targeted by Somalis rushing in to take their shot at the huge helos, the Marines and SEALs use opticals to temporarily blind Somalis and impair their ability to aim their weapons. OC PepperBalls™ and grenades may also be handy in buying time for the climbing helicopters. As the aircraft gain altitude, the optical weapons are shut off and the helicopters depart blacked-out at about 0300 local time.

D. SUMMARY

Non-lethal weapons enhance force protection in that our forces can use them well before the ROE justify lethal force. Operation Eastern Exit actually occurred without a single shot fired, but concessions were made. For instance, the NEO force conceded the tactically advantageous position on the water tower. Also, when the marshalling team was authorized to shoot through roadblocks, the US military broke faith with our commitment to avoid initiating an escalation of force. The NEO force compromised its heavy weaponry by not being allowed to engage for fear of escalation. But having non-lethal weapons allows the troops to retain the water tower, maintain the policy of non-escalation, and engage their adversaries with more than just verbal warnings.

Through this re-telling of Operation Eastern Exit, it is clear that the eight crowd control non-lethal weapons are useful in a variety of situations. These functional weapons are versatile and relatively lightweight, and offer our forces options that optimize operational effectiveness while obeying ROE.

VII. CONCLUSIONS

> Today, world events mandate a need to project non-lethal force across all levels of war to enable our warfighters and leaders to effectively deal with a host of traditional as well as non-traditional threats. Now more than ever, the minimal level of public tolerance for collateral damage and loss of human life, coupled with the tendency for the typical adversary to exploit our rules of engagement to his benefit, necessitates an effective and flexible application of force through non-lethal weapons.
>
> General James L. Jones
> 32nd Commandant of the
> United States Marine Corps

General Jones' (1999) opening quote on the homepage of the Joint Non-Lethal Weapons Directorate summarizes DoD's motivation to pursue non-lethal weapons. This thesis' findings parallel the General's comments by demonstrating the need for and utility of non-lethal weapons through an examination of noncombatant evacuation operations and crowds. Critical to this need for a non-lethal capability is the position that casualties must be minimized, for moral as well as political and tactical reasons.

The 1999 Non-Lethal Technology Academic Research Symposium Proceedings include the briefings of several speakers who expressed ideas shared by this thesis. Colonel P. Dotto (1999) told a story of a checkpoint security team having to open fire on a truckload of people in order to stop the vehicle, resulting in legal and public relations ramifications. Major General W. Gregson (1999) warned that "a military campaign, where the damage to noncombatants is excessive, becomes the foundation for our political defeat in the conflict." B. Foley (1999) illustrated how non-lethal weapons reduce the escalation of conflict. Senator R. Smith (1999) remarked how crowd control can quickly become combat. Colonel A. Mazzara (1999) spoke of the lack of standoff range in traditional crowd control without the benefit of non-lethal weapons. Colonel G.

Fenton (1999) described some requirements of non-lethal weapons that are analogous to the filters in this thesis. Non-lethal weapons for our forces must be expeditionary (i.e., the concept must be weaponizable with consideration for the soldier's load), publicly acceptable, and have effects that are reversible (per DoD definition of a non-lethal weapon). Clearly, people are thinking about non-lethal weapons, why we need them, and how we can use them. This thesis aims to accomplish the same goal.

Certainly there is role for non-lethal weapons. They expand the tactical options our forces have to use in various scenarios. As in the saying "for every job, there is the right tool," non-lethal weapons allow US forces to tailor the response to the threat. But is there necessarily a need for non-lethal weapons? The arguments in Chapters III and IV support the need for non-lethal weapons. If lethal weapons get ruled out based on reasons such as rules of engagement, political consequences, and fear of escalation of threat, then even if lethal weapons are the right tool for the job, our forces cannot use them. With deadly force unavailable as an option, they must turn to non-lethal force in order to operate within the boundaries of their particular mission. In this case, NEO is the mission, and the specific challenge examined in the thesis is crowd control. Nevertheless, the arguments apply to other operations other than war. Where international scrutiny, media attention, and political demands exert pressure on military forces for a successful mission outcome with minimal casualties, non-lethal weapons are indeed necessary and fill an important role in mission accomplishment.

Non-lethal weapons give our forces an edge in fighting adversaries who wish to take advantage of our rules of engagement. The adversaries may seek to discredit US forces and drive them to use deadly force to create a martyr. However, by using non-

lethal weapons, US forces obstruct their adversaries' goal in exploiting the ROE. At the same time, our forces can continue towards their goal without having generated negative consequences associated with killing people in a non-combative mission. It appears that non-lethal weapons give the US leverage in fighting under asymmetric warfare conditions, in which our forces fight with limited objectives or under restrictive ROE and the enemy does not.

The National Defense University's Center for Advanced Concepts and Technology (ACT) published a report on technological implications for operations other than war from a scope wider than this thesis' focus on NEOs. The paper reviews the technology needed for missions such as NEOs, counter-drug, counter-terror, disaster relief, police operations, peace operations, civil operations, and counter-insurgency. Along with the finding that non-lethal weapons have applications in NEOs, including crowd control (corroborating this thesis' findings), the report determines that non-lethal weapons have applications in all the other missions (ACT, 1995, Ch. 3). The study cites several general problems with non-lethal weapons, but it supports the need for this technology as the US military becomes involved in operations other than war with greater frequency. Crowd control is identified as a factor in all operations other than war with the exception of the counter-drug mission (ACT, Ch. 3). Therefore, this thesis' treatment of crowds and crowd control can be extended beyond NEOs to the other operations other than war.

The goal of this thesis has been to show the utility of non-lethal weapons specifically for crowd control in NEOs. While there is abundant support for the general need for non-lethal weapons to resolve challenges in future conflicts, specificity in

solutions is lacking. Having a narrower focus than the available material supporting non-lethality, this thesis addresses a specific problem for US forces conducting a specific kind of mission. The findings support the need for non-lethal crowd control weapons in NEOs and proposes a short list of weapons appropriate to the task. To the current literature on non-lethal weapons, this thesis contributes these specific findings plus a methodology for approaching challenges in other missions. The filtering process in Chapter V and the Appendix trims the field of non-lethal weapons to only those that meet the requirements of a specific mission, giving policymakers a technological direction towards addressing specific problems. For the crowd control challenge in NEOs, this filtering process yields eight weapons: smoke grenades, the glare weapon, the dazzler, flashbang grenades, oleoresin capsicum, batons, stingball grenades, and 40 mm munitions. Applied to other challenges in other missions having their own criteria, the filtering process can deliver a set of non-lethal weapons appropriate to those mission parameters. As proposed weapons mature and new weapons enter the universe of non-lethal weapons, the index can be updated so the filtering process can generate a final product that reflects the area's technological advances.

Suggested topics for future research follow. The research might add greater resolution to the findings in this thesis and generate more implications for crowd control, operations other than war, and non-lethal weapons.

- Is there an optimum composition for the NEO force, a balance of crowd control experts and others? Though NEO forces should remain largely tailored to the threat environment and the requirements of the evacuation, crowd control is a task continually required in NEOs due to their civil

focus. Should we rigorously train our forces in crowd control so that mistakes are reduced and individual experience rises, especially for tactical commanders?

- How much more likely is crowd violence among third world countries than industrial countries like Britain and the US? Perhaps this data can be used to correlate the scholarly studies of crowd violence in modern countries with the news reports of violence in third world countries, which would strengthen the argument to have a non-lethal capability whenever operating overseas.
- What determines the initial proportion of lethal weapons to non-lethal weapons on a deployment not necessarily a NEO? Should the proportion be linked to the operational environment and ROE? Should there be more lethal capability than non-lethal when deploying into hostile environments?

APPENDIX

Applied against each item are the five filters in sequence from left to right, as in the example below. A shaded box in the columns on the right indicates the failure of a weapon to pass the particular filter heading the column. The last column provides a convenient visual cue as to the weapons that failed to pass all the filters. If shaded, the weapon did not pass. If white, the weapon qualifies as a potential DoD crowd control weapon for NEOs. I include abbreviated comments when eliminating some weapons to reveal my thinking. Question marks instead of a shaded box denote my uncertainty in marking the box, though I felt it reasonable to exclude the item within this methodology.

ACOUSTICS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Acoustic, Teleshot. Cartridge projecting a powerful sonic device delivered by a 12-gauge shotgun. Experimental use in 1972.				R&D?	Extra weapon	

In this example, the teleshot acoustic weapon failed to pass the filters. In concept, it can be used for crowd control, and there are no relevant legal concerns for weapons use. However, this weapon is based on the shotgun, which introduces an undesired extra weapon into the NEO deployment. Also, it is unclear whether this item ever reached any level of maturity, so its supportability (operational and logistical) is undetermined.

The tables on the following twenty-nine pages are based on text from R. J. Bunker's Occasional Paper #15 for the USAF Institute for National Security Studies available at http://www.usafa.af.mil/inss/occasion.htm.

ACOUSTICS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Acoustic Beam. High power, very low frequency beam emitted from weaponry under development. Envisioned to be a piston-driven or detonation-driven pulser which forces compressed air into tubes to generate a low frequency wave.						
Acoustic, Blast Wave, Projector. Energy generation from a pulsed laser that will project a hot, high-pressure plasma in the air in front of a target. It creates a blast wave with variable but controlled effects on hardware and troops.						
Acoustic Bullets. High power, very low frequency waves emitted from one to two meter antenna dishes. Results in blunt object trauma from waves generated in front of the target. Effects range from discomfort to death. A Russian device that can propel a 10-hertz sonic bullet the size of a baseball hundreds of yards is thought to exist. Proposed fixed site defense. Also known as sonic bullets.						
Acoustic, Curdler Unit. A device which is plugged into an HPS-1 sound system to produce a shrill shrieking, blatting noise. It is used to irritate and disperse rioters and has a decibel range just below that of the danger level to the human ear. It is used in night operations to produce a "voodoo" effect and effectively breaks up chanting, singing and clapping.				R&D?		
Acoustic, Deference Tones. Devices which can project a voice or other sound to a particular location. The resulting sound can only be heard at that location.				R&D?		
Acoustic, Doppler Effect Alarm. Any movement in the area between a transmitter and a receiver causes a slight variation in the sound pattern received. By measuring this variation an alarm system can be made to be activated.						
Acoustic, High Intensity Sound. Loud music was used by American forces to drive Manual Noriega from the Vatican Embassy in Panama in 1990. Also known as polysound. ,		Effective?				
Acoustic, HPS-1 Sound System. A 350 watt sound system with an audible voice range of 2½ miles. Used by the military in Indo-China and then supplied to law enforcement. First used by police forces at San Francisco State College and at Berkeley in the 1960s. See also Acoustic, Curdler Unit.					Man-portable?	

ACOUSTICS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Acoustic, Infrasound. Very low-frequency sound which can travel long distances and easily penetrate most buildings and vehicles. Transmission of long wavelength sound creates biophysical effects: nausea, loss of bowels, disorientation, vomiting, potential internal organ damage or death may occur. Superior to ultrasound because it is "in band" meaning that its does not lose its properties when it changes mediums such as from air to tissue. By 1972, an infrasound generator had been built in France which generated waves at 7 hertz. When activated it made the people in range sick for hours.						
Acoustic, Squawk Box. Crowd dispersal weapon field tested by the British Army in Ireland in 1973. This directional device emits two ultrasonic frequencies which, when mixed in the human ear, become intolerable. It produces giddiness, nausea, or fainting. The beam is so small that is can be directed at specific individuals in a riot situation.					Man-portable?	
Acoustic, Teleshot. Cartridge projecting a powerful sonic device delivered by a 12-gauge shotgun. Experimental use in 1972.				R&D?	Extra weapon	
Acoustic, Ultrasound. A very high frequency sound whose wavelength is "out of band," making it less effective than infrasound because it losses its properties when it changes mediums. Example, from air to human tissue. Like infrasound, a lot of power is required to generate these waves which create biophysical effects. See also Acoustic, Infrasound.						

- Several of the acoustic weapons' effectiveness and level of development proved difficult to verify during research. The shaded boxes indicate my confidence in making the unambiguous assessment. Non-shaded elements containing remarks with question marks indicate my lacking enough data to confidently give a pass or fail on the issue.

ACOUSTICS & OPTICALS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Acoustic & Optical, Air Burst Simulator. A diversionary device normally used to simulate the air burst of artillery rounds during infantry training. The device is fired via a 37-40 mm launching device and has an 8-second fuse prior to ignition.					Scenario?	
Acoustic & Optical, Cod-Weight. A heavy (2 pounds or greater) weight to which a diversionary device is attached to allow it to be thrown through window screens, window glass, bushes, and similar materials. The name is derived from the original weights used for deep-sea fishing for cod.					Weight/ scenario	
Acoustic & Optical, Diversionary Device. A hand thrown pyrotechnic device which emits a loud bang and dazzling light when ignited. The device is designed to create a sensory overload which temporarily causes confusion and an inability to effectively respond to a tactical team's actions. Sometimes called a flashbang grenade.						
Acoustic & Optical, Diversionary Device, Launched. A diversionary device which can be launched from a 12-gauge shotgun.					Extra weapon	
Acoustic & Optical, Flash Stick. A stick or pole to which a diversionary device is affixed, allowing it to be precisely placed and held during ignition. Often used for exact insertion through chain link fences, windows, heavy brush, and so forth.					Scenario?	
Acoustic & Optical, Painter's Pole. An extendible pole to which a diversionary device is affixed allowing it to be precisely placed and held during ignition. Often used for supporting second story entries from beneath. The name is derived from the pole used by painters to hold paint rollers when painting overhead.		Scenario?				
Acoustic & Optical, Photic Driver. A crowd control device developed by a British company prior to 1973 which uses ultrasound and flashing infrared lights which penetrate closed human eyelids. Potential for epileptic fits because of the stroboscopic flashing effect. May have been employed by South African Police during interrogations.				Permanent eye damage?		
Acoustic & Optical, Psycho-Correction. A technology invented by a Russian scientist that involves influencing subjects visually or aurally with imbedded subliminal messages.						
Acoustic & Optical, Stun Grenade. A non-lethal grenade, XM84, in development to be used by Army military police.				R&D		

- I had difficulty verifying the photic driver, which has seemingly unsavory effects.

ANTILETHALS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Antilethal, Camouflage-Active. Created by dynamically matching the object to be camouflaged to its background colors and light levels rendering it virtually invisible to the eye. This is conceptually the same camouflage process as that used by a chameleon. This is accomplished through a sophisticated color and light sensor array which detects an object's background color and brightness. This data is then computer matched and reproduced on a pixel array covering the viewing service of the object to be camouflaged. Also known as chameleon camouflage.						
Antilethal, Camouflage-Metamorphic. Uniforms or paint which change color due to either light or heat sensitivity. Extremely useful for night and day operations and those taking place in urban environments.						
Antilethal, Counter-Sniper. Electronic sniper-locating systems based on acoustic, shock wave, or infrared measuring technologies. Provides the location of a hostile sniper to a sniper team or to an automated counter-sniper system which can fire either a kinetic round or a low-energy laser at the hostile sniper.						
Antilethal, Electronic-False Target Generation. An electronic device that creates and presents an image of a target to a precision laser-guided weapon that causes that weapon to aim at the false target. Used as a countermeasure to those precision guided weapons.						
Antilethal, Electronic-Shell Detonator. A system fielded by US troops in Bosnia which creates an electronic field that causes mortar and artillery shells to explode prematurely by signaling to them that they have reached their target.						
Antilethal, Electromagnetic Shielding. A form of defense against microwave attack. A metal box known as a "Faraday Cage" can sometimes function as one by excluding electromagnetic fields.						
Antilethal, Food Bomb. Humanitarian use of nonlethal weapons. Place concentrated food pellets rather than anti-personnel bomblets in a cluster bomb unit. For use in cities under siege on the verge of starvation.						
Antilethal, Laser Protection-BLPS. Ballistic and Laser Protective Spectacles. Since 1988, these devices have been issued to high priority Army and Marine Corps units. The BLPS are dye-filled polycarbonate plastic filters which will protect eyesight against the low energy lasers most likely encountered on today's battlefield, specifically the two or three wave lengths used by common range finders and target designators based on Nd:YAG and ruby lasers. They will not give protection against frequency-agile low energy laser weapons.						

ANTILETHALS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Antilethal, Laser Protection-Smoke. Smoke's attenuative properties allow it to serve as a passive defense against blinding laser weaponry. Large-area smoke generation may provide a means to offer continuous protection for forward elements of US combat forces.						
Antilethal, Low Energy Laser. An Air Force project, known as Have Glance, in which a pod-mounted, low energy laser would be mounted on an aircraft to confuse the heat-seeking function of infrared missiles.						
Antilethal, Sensor-Acoustic. Remote acoustic sensors placed in an area overwatch position in urban zones to detect and locate gunfire within that area.						
Antilethal, Sensor-Facial Recognition Technology. Experimental information systems which recognize human facial features and compare them to databases of wanted suspects. Great potential for apprehending terrorists in airport terminals and criminals in large crowds. More advanced subdermal systems will be required as a follow-on to these systems as a counter to criminals/non-state soldiers who surgically alter their facial features.						
Antilethal, Sensor-Ground Penetrating Radar. Sensor that can detect nongeologic objects and human engineered structures beneath the ground by analyzing the return of electromagnetic waves traveling through geologic structures. Detection of buried mines and discovery/mapping of underground bunkers represent practical, nonlethal applications.						
Antilethal, Sensor-Nonimaging Portable Radar. A radar unit which weighs less than 10 pounds, uses rechargeable batteries, is small enough to fit into a briefcase, and will detect motion through nonmetallic walls and floors. Using sounds instead of images, it detects motion and can transmit to a receiver up to 200 feet away.						
Antilethal, Sensor-Retroreflectivity. A theory based on the reflection of light. Common example is seeing an animal's eyes at night in your headlights. Allows for an electro-optical sensing mode that can be used to find opposing electroptics looking into the night for location and targeting purposes.						
Antilethal, Smart Gun. A gun which can only be used by the proper user or users. Identification is automatic and would be carried out by radio frequency signals or other technologies.						
Antilethal, White Light Goggles. Experimental goggles which "gate out" bright white light so that the user will not be affected by them along with the targets.						

- As discussed in Chapter V, these "weapons" are supporting technologies, which enable us to continue our mission or task. They fail to fit under DoD's definition.

ANTIPLANT AGENTS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Antiplant Agent. Compounds used to destroy plants or crops function in one of two general ways. Growth regulators and desiccants kill or defoliate by stimulating the leaf fall process (growth regulator) or by drying the leaf blade (desiccant). The other category, soil sterilizers, contaminate the soil, preventing or retarding growth. Uses of antiplant agents include destruction of crops and foliant removal to deny/degrade camouflage.						
Antiplant Agent Blue. Fast acting antiplant desiccant containing sodium dimethyl. The desiccant, unlike anti-plant growth regulators, works by drying the leaf blade of the plant rather than simulating the plant's leaf fall process.						
Antiplant Agent, Defoliants. Any of a variety of chemical compounds that either stimulate the leaf fall process, dry the leaf blade, or sterilize the soil.						
Antiplant Agent, Operation Ranch Hand. A defoliation program conducted during the Vietnam War from 1962 to 1970. The primary purpose of the operation was to deny cover to enemy forces, thereby making ambushes more difficult. Crop destruction missions were also conducted in northern and eastern central areas of South Vietnam.						
Antiplant Agent Orange. Antiplant growth regulator containing n-butyl esters of dichlorophenoxyacetic acid and trichlorophenoyacetic acid. Publicized for its use in Operation Ranch Hand in the Vietnam War from 1962-1970.						
Antiplant Agent Purple. Growth regulator similar to Agent Orange but contains, in addition, the isobutyl ester of trichlorophenoxyacetic acid.						
Antiplant Agent White. Antiplant growth regulator composed of a mixture of tri-iso-propanolanime salt of dichlorophenoxyacetic acid and picloram in water.						

- The effects of these anti-plant agents are contrary to DoD's definitional requirement to minimize destruction. Therefore, this form of weapon is categorically stricken from further consideration.

BARRIERS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Barrier, Air Bag, Backseat. An automobile airbag designed to hold in place a suspect placed in a police car. Designed because of the frequency of violent behavior once suspects have been handcuffed and placed in a police car for transport.						
Barrier, Air Bag Mine. A nonlethal vehicular mine based on a type of air bag.						
Barrier, Caltrops. A personnel and vehicular barrier device with four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward. The term caltrop is derived from an English water chestnut which was used to impede the mobility of heavy cavalry during the Middle Ages. Caltrops were used in Somalia by the Marines during United Shield to supplement key barrier systems at night during the final hours of the withdrawal.						
Barrier, Coating-Slick. Teflon-type lubricants which create a slippery surface because of their chemical properties. These chemical agents reduce friction with the intent to inhibit the free movement of the target. In the 1960s the term "Instant Banana Peel" was coined to describe the capability provided by Riotril. When applied to a hard surface and wetted down, this dry, relatively inexpensive, non-toxic, non-corrosive white powder becomes ice slick. It becomes virtually impossible for an individual to move or stand up on a hard surface so treated. Tire-type vehicles are also unable to get traction. Riotril, if allowed to dry, can easily be peeled away or, because of its water-soluble nature, can also be hosed away with high-pressure streams. Also known as low-friction polymers, slick'ems, and superlubricants.					Who will clean up afterwards?	
Barrier, Coating-Sticky. Polymer adhesives used to bond down equipment and human targets. Also known as stick'ems and superadhesives.						
Barrier, Emulsifier. Agents, contained in a mixture of mutually insoluble liquids, which were dispersed over the Ho Chi Minh trail to degrade the logistical lifeline of Viet Cong forces during the Vietnam War. Used in tandem with clouding seeding. Also known as soil destabilizers.						
Barrier, Fence-RPG. Conventional fencing, usually 6 feet high, with barbed wire on top. While the anti-mobility utility of such fencing is apparent, it also had an anti-lethal capability. In Vietnam this fencing was erected as a rocket propelled grenade (RPG) screen in front of armored fighting positions and around command vehicles. RPGs which hit this screen either had their fusing systems disabled (RPG7s) or prematurely detonated (RPG2s). Also known as cyclone fencing.						

BARRIERS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Barrier, Foam-Aqueous. Originally derived from a fire-fighting compound used to put out airplane fires. Barrier foam is a derivative which is thicker in consistency. This technology employs a safe, biodegradable form of suds which can be piled up to as high as four feet. Barrier foam can be applied over fences, concertina wire, ditches to be seeded with caltrops (a four pointed device designed to puncture tires) to prevent vehicular passage. By applying the foam over obstacles, it impedes the ability to defeat them. Barrier foam, as its name implies, is used to deny entry or passage. The conceptual origins of this foam date back to 1965.					Size	
Barrier, Foam-Aqueous, Generator. Concept involves blowing air through nylon net kept wet with mixture which creates aqueous foam.				R&D?	Size	
Barrier, Foam-Aqueous Riot Control Agent. The ordinary suds of barrier foam can be enhanced with the addition of substances such as oleoresin capsicum, the primary ingredient in "pepper spray," or CS.					Size	
Barrier, Foam-Sticky. A name given to a polymer-based superadhesive agent. The technology first began appearing in commercial applications such as "super glue" and quick setting foam insulation. It is extremely persistent and is virtually impossible to remove without a liquid solvent which has a pleasant citrus odor. The solvent can be applied as a spray or poured on. The foam then appears to dissipate, releasing its hold and allowing suspects to be arrested and safely transported. Sticky foam came to public attention on February 28, 1995 when US Marines used it in Mogadishu, Somalia, to prevent armed intruders from impeding efforts to extricate United Nation forces from that county.				Logistics		
Barrier, Foam-Sticky, Dispenser. An interior barrier system, operated by either intruder penetration or command, which administers a sticky-foam barrier in a passageway from floor to ceiling.				Temperature sensitive		
Barrier, Rope, Launcher. Nylon rope dispersed by a compressed air launcher using mounted on a truck. Thirty cubic feet per minute.						
Barrier, Smoke-Cold. A thick, disorienting "cold smoke" which can be generated in areas from 2,000 to 50,000 cubic feet. It restricts an intruder's hand-eye coordination and interactions among members of an intruding group.					Size	
Barrier, Spike. An angle-cut metal rod driven into an unsurfaced road's wheel pit. A ½" diameter rod, protruding only about 3", is blunt enough so as to not penetrate a shoe sole under a person's weight, yet a heavy vehicle will drive it through a tire.						

BARRIERS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Barrier, Spiked Strip. Flat strip resembling a fire hose with retractable hollow spikes designed to flatten the tires of a target automobile. When the strip is activated, hollow spikes extend vertically and puncture the tires as the vehicle rolls over the strip. Also known as road spikes.						
Barrier, Stakes. A sharp stake, often of wood or bamboo, that is concealed in high grass, deep mud or pits. It is often coated with excrement, and intended to wound and infect the feet of enemy soldiers. Can be utilized both as a booby trap and as a barrier. Commonly known as punji stick or punji stakes.						
Barrier, Wire/Tape-Barbed, Launcher. Dispensing systems for flat barbed tape and barbed wire which could be quickly deployed into concertina form.						

- The barbed-wire dispenser and the generator systems for the cold barrier smoke and the aqueous foam are vehicle-mounted. Thus, they are impractical for light and small NEO forces.
- The slick-coating barrier has definite crowd blocking applications, but who will clean it up after we leave upon completing our primary mission of evacuating people? Therefore, from a scenario viewpoint, it is also an impractical weapon.

BATONS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Baton, Biotechnical-Injector. A baton with an automatic self-injecting syringe for administering the antidote to nerve gas built into its tip and filled with calmatives or other biotechnical agents.						
Baton, Breakaway. A baton made of a substance that will break if used incorrectly.				Useful?		
Baton, Electrical. Standard dimension baton which delivers an electric charge of low voltage, powered by standard flashlight cells. Also known as stun baton or shock baton.					Tactics	
Baton, Expandable. Measures 6″ to 7″ in closed position. The three telescopic sections rapidly flick open to an extended 16″ to 18″. Also known as extensible billyclub.						
Baton, Riot Control Agent. 12-26″ plastic baton which is able to project riot control agents.				R&D?	Range?	
Baton, Side-Handle. A baton with a side-handle attachment which allows it to be twirled for greater impact and used more effectively to block an opponent's blows.						
Baton, Straight. Wooden, plastic, metallic rod from 12″ to 36″ used as a swung impact weapon. Can either hang from a leather throng or be held in a holster. Smaller version, 6″ to 8″. Also known as nightstick or billyclub.					Tactics	
Baton, Straight, Flashlight. Heavy shock resistant flashlight which can be swung like a baton.					Extra weapon	
Baton, Straight, Flashlight-Riot Control Agent. Shock resistance polyethylene flashlight. Besides providing a light source, this flashlight can be used as a baton and to project a riot control agent.				R&D?	Range?	
Baton, Two-Handed Riot. The 36-inch long riot baton is employed like a rifle and bayonet – overhead blows could be fatal. Short, one-handed batons are in appropriate for close-quarter riot actions.					Tactics	

- As discussed in Chapter V, the tactical utility of batons in NEOs is limited essentially to close-in fighting scenarios in which overwhelmed troops must defend themselves non-lethally in an attempt to break contact. It is not in our tactical interest to use batons for more labor-intensive crowd control measures.
- I excluded baton hybrids (baton+RCA, etc.) in an effort to minimize the number of different batons we might carry in a NEO, precisely because we should hardly be using batons at all.

BIOTECHNICALS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Biotechnical, Biodegrading Microbes. Microbes which turn storage tanks full of aviation fuel into useless jelly. Such microbes may produce acids or enzymes which can be tailored to degrade almost anything, even concrete and metal, so their potential use as nonlethal weapons could be extensive.			BWC or ENMOD?	Feasible?		
Biotechnical, Calmatives. Biotechnical agents which are sedatives or sleep-inducing drugs; includes alfentinil, fentanyls, ketamine and BZ. Several of them make ideal choices for this application when mixed with dimethyl sulfoxide (DMSO), which promotes absorption through skin to quickly sedate persons contacted. DMSO introduces the calmative agent into the bloodstream by increasing the epidermal absorption rate by about 1,000 percent. The explosion of a flashbang (sometimes called a diversionary device) represents one method of dispersing DMSO and a calmative agent. Calmatives were reportedly used by the Soviets against the Mujahideen in Afghanistan. Also known as sleep agents.			CWC?	R&D		
Biotechnical, Disease Organisms. Nonfatal diseases targeted toward troops and civilians. Such viral agents were developed by Iraq to be used against Western forces during the Gulf War so as to create long term disabling injuries. Agents being considered for use were those that cause hemorrhagic conjunctivitis, chronic diarrhea, yellow fever, and Crimean Congo hemorrhagic fever.			BWC?	Ethical?		
Biotechnical, DM. Diphenylaminechloroarsine. A sickening agent no longer in use by the military because of health risks. Probably ruled out of use in Vietnam by October 1965. Effects include sneezing, shortness of breath, retching and vomiting, hemorrhaging, and possible death. Mixed with CN for immediate effect.						
Biotechnical, Genetic Alteration. The act of changing genetic code to create a desired less-than-lethal but long-term disablement effect, perhaps for generations, thereby creating a societal burden.						
Biotechnical, Hypodermic Syringe-Dart. Modified shotgun or handgun in which the projectile is a drug-filled syringe activated by a small charge on impact. Wide variety of drugs available including emetic (vomiting) agents.				R&D		
Biotechnical, Malodorous Agents. Foul-smelling gases and sprays such as hydrogen sulfide (H_2S) or a compound known as NaS_8 which is used in making plastics. Could be delivered by a grenade. Past work on "cultural specific" agents has also been undertaken. See also Biotechnical, Project Agile.				Clean-up?		
Biotechnical, Neuro-Implant. Computer implants into the brain which allow for behavioral modification and control. Current research is experimental in nature and focuses on lab animals such as mice.				R&D		

BIOTECHNICALS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Biotechnical, Pheromones. The chemical substances released by animals to influence physiology or behavior of other members of the same species. One use of pheromones, at the most elemental level, could be to mark target individuals and then release bees to attack them. This would result in forcing them to exit an area or abandon resistance.				R&D		
Biotechnical, Project Agile. Series of military science studies in Asia conducted by Battele Memorial Institute in May 1966 for Advanced Research Projects Agency (ARPA). One such study centered on developing "stink" bombs which were race specific.				R&D		
Biotechnical, Wetware. Advanced technology devices which are surgically implanted into the body rather than worn. These devices can be used to enhance memory and the human senses, modify behavior or to locate allied troops. Pacemakers represent an early form of wetware. New concept developed in this document.	R&D					

- These technologies are problematic in satisfying treaty requirements, and some will undoubtedly generate controversy over their development and use (disease organisms as a weapon, for instance).
- Also, the research and development in this field is ongoing, so reliability and supportability for most of these proposals are yet to be determined.

ELECTRICALS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Electrical, Armored Personnel Carrier. Standard armored personnel carrier fitted with a gate-like apparatus in the front and charged to a high voltage. Used by West German police to clear streets or round up small groups of people.					Size	
Electrical, Fence. A fence which delivers a nonlethal electrical shock. It can be employed as an effective barrier against intruders.						
Electrical, Flashlight. A type of flashlight designed with electrodes on the base. Effective range is minimal.					Tactics	
Electrical, Glove. A glove with an electric impulse generator in the palm and the bottom sides of the glove fingers. A close-in device similar to the electric stun gun and the electric flashlight.					Tactics	
Electrical, High-Voltage Tesla Coil. Passed from public scene because of their indiscriminate use against blacks in several Southern states in the mid-1960s. Example, electric baton or electric cattle prod.				Politically incorrect		
Electrical, Homemade Body Armor. Newspapers and magazines stuffed down inmates' clothing and/or the use of mattresses as shields to counter the effects of stun guns.						
Electrical, Police Jacket. Police jacket which jolts anyone who touches it.					Tactics	
Electrical, Projector. An advanced version of the standoff stun gun, where no wires are required. The charges are delivered through the air through pre-ionized air channels or by charging a low energy projectile which releases the charge at impact. Another approach is to launch a low energy projectile that releases the electrical charge at impact by compressing a piezoelectric element.					Tactics	
Electrical, Stun Belt. A command activated belt worn by prisoners which delivers a mild electric shock when they become combative.						
Electrical, Stun Gun-Close In. A small, two-pronged, handheld electrical discharge weapon. Effective range is less than an arm length. It works by affecting the muscle signal paths, disturbing the nerve system.					Tactics	
Electrical, Stun Gun-Standoff. A form of stun gun with a range of 20 feet. It fires small, barbed electrical contactors, via a fine trailing wire, which snare a victim's clothing. A 3-4 second lapse takes place before the target is subdued. The development of this device was inspired by the Watts Riots in 1965.					Tactics	
Electrical, Water Stream. A mobile unit projects a water stream charged with high voltage, low amperage. Another method cites two water jets, one negatively charged and one positively charged, which meet to close the circuit.					Size	

ELECTROMAGNETICS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Electromagnetic, Engine Kill. The use of high-powered microwaves to kill the electrical system of an engine.				R&D?		
Electromagnetic, High Power Microwave [HPM], Weapons. Energy generated by a conventional electromagnetic apparatus, such as a radar transmitter, or released from a conventional explosion converted into a radio-frequency weapon which causes the disruption of electronic systems. Usually an ultra-wide ban source focus due to target vulnerability considerations. HPMs can also cause human unconsciousness without permanent maiming by upsetting the neural pathways in the brain and/or death.			Nairobi?	R&D?		
Electromagnetic, Interference (EMI). Flight control systems of military aircraft are sensitive to electromagnetic interference (EMI). It is suspected that several crashes of Army UH-60 Black Hawk helicopters may have resulted when they flew too near large microwave transmitters.						
Electromagnetic, Maser. Microwave Amplification by Stimulated Emission of Radiation. A microwave generation device.				R&D?		
Electromagnetic Pulse, Non-Nuclear [NNEMP], Weapons. Non-nuclear EMP generating weapons mounted on cruise missiles or unmanned aerial vehicles (UAVs) which would disable enemy tanks and early warning radar would be invaluable. Such weapons when they explode would produce a momentary burst of microwaves powerful enough to disable all but special, radiation-hardened electronic devices.			Nairobi?	R&D?		
Electromagnetic, Radio Frequency [RF], Weapons. A class of weapons which transmit short, high-powered pulses of electromagnetic radiation over significant ranges.				R&D?		
Electromagnetic, Rocket-Powered Unit. Unmanned miniature-wheeled vehicle launched by a police cruiser which delivers an electromagnetic energy pulse to the underside of a fleeing car's engine controls and associated sensors to disable it.				R&D?		
Electromagnetic, Static Unit. See Electromagnetic, Rocket-Powered Unit. Static version resembling a pancake shaped bump in the road. Remote control or unmanned automatic control.				R&D?		
Electromagnetic, Thermal Gun. A device that directs energy to produce heat, in concept similar to a microwave oven.				R&D		

- Most of these weapons do not have conventional crowd control applications; they are mainly anti-materiel in nature.

ENTANGLERS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Entangler, Animal "Come-Along." A pole with a looped wire attached to one end. When the wire is placed around the neck of a subject and then tightened it produces a choking effect much in the same manner as that of a choking collar used for dogs.						
Entangler, Bola. Device consisting of two or three heavy balls attached by one or two ropes/cords and used for entanglement purposes. It is twirled overhead in one hand and hurled or cast at the intended target. Designed to entangle legs to retard/stop movement. Probably an ancient weapon, but made famous by the gauchos of South America, who used them to catch cattle and ostrich.						
Entangler, Cloggers. Polymer agents, sticky-soft plastics, used in burst munitions to clog up jet and tank engine intakes.						
Entangler, Cloggers-Colored. Clogging agents when mixed with dye result in "tinted clouds" whose presence let friendly forces know not to enter them.						
Entangler, Cloggers-Colored, Mine-Air. Cloggers mixed with colored gas which designate an air mine to allied pilots or drones. These air mines can be intermixed with "decoy mines" consisting solely of colored gas and laid in air mine fields to restrict aerial mobility.						
Entangler, Monofilament Fishing Line. When spread out on snow, monofilament fishing line may be sucked into a snowmobile's track mechanism and cause it to jam. Effectiveness unconfirmed.						
Entangler, Net-Electrified. A net shot from a gun at a targeted individual. Releases an electric shock if the target tries to struggle.						
Entangler, Net, Gun. Fires a net which entangles a human or vehicular target. One such net is 18 feet wide and employs glue-coated strands. Another is 28-foot-wide, fired from a cannon and can envelope a car or armored vehicle.						
Entangler, Net, Mine-Human. Mine detonation fires a net into the air which lands upon a soldier target.						
Entangler, Net, Mine-Vehicular. A device laid across a road which shoots a fabric barrier up about to 2 meters to ensnare an oncoming vehicle.						
Entangler, Net-Poles. A capture device based on a pair of 6 foot nylon poles that have a strong chain interlaced between them. It is employed by two people who capture the target in the chain mesh between the poles.						
Entangler, Riot Gloves. Heavy protective gloves used by prison guards and riot police which protect the hands and forearms from cuts and blunt trauma. These gloves allow for the grappling of prisoners and rioters.						

- Entanglers are useful for apprehensions, but not for the limited crowd control in NEOs.

HOLOGRAMS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Hologram, Death. Hologram used to scare a target individual to death. Example, a drug lord with a weak heart sees the ghost of his dead rival appearing at his bedside and dies of fright.				Feasible?		
Hologram, Prophet. The projection of the image of an ancient god over an enemy capitol whose public communications have been seized and used against it in a massive psychological operation.				Feasible?		
Hologram, Soldiers-Forces. The projection of soldier-force images which make an opponent think more allied forces exist than actually do, make an opponent believe that allied forces are located in a region where none actually exist, and/or provide false targets for his weapons to fire upon. New concept developed in this document.				Feasible?		

- Holograms are still a new concept for non-lethal technology.
- Miniaturization of power sources and military specification hardware containing the proper lenses, geometries, and holographic materials must happen before we ever see these concepts employed in any kind of environment other than laboratory conditions.

MARKERS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Marker, Foam Dye. Handheld device which is used to spray green foaming dye into the face of an opponent. Obscures vision and marks the target for one week for future identification.				Blinding?		
Marker, Invisible. One concept envisions a fluorescent powder sprayed into crowds from pressurized container. Particles adhere to clothing and are only visible under ultraviolet light. Another concept envisions sponge grenades impregnated with infrared dye so that rioters can be later identified.						
Marker, Laser Paint. A laser dye and scatterer suspended in a host medium. When irradiated with a laser beam, this "laser paint" exhibits laser-like properties, becoming a brilliant light source, without being a collimated beam.						
Marker, Paint Gun. Gelatin capsule containing a marking agent which splatters on impact leaving a 3″ circle and streamers from 12″ to 18″.						
Marker, Smart Metals. Metals formed with chemical additives or blended in a particular form so that they would function only when used for legitimate purposes or give off telltales signs to inspectors when used improperly.						
Marker, Smoke Dyes. Marking dye added to smoke during crowd control situations.						

- These marker concepts are supporting technologies which generally fail to meet the DoD definition for non-lethal weapons. Except for the Foam dye marker, they are designed to neither incapacitate nor disable, but rather to convey useful information.

OBSCURANTS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Obscurant, Agents. Rapid-hardening agents used to obscure the vision ports/optics of an armored fighting vehicle.						
Obscurant, Crazing. Higher powered low energy laser weapons have the capability of heating and distorting or cracking the glass lenses of optical systems. This effect is called crazing and is caused when the heat buildup and subsequent cooling in the glass surface creates uneven stresses in the glass surface to crack it. The result is a frosted effect, making it impossible to see through the glass lenses or vision blocks (glass windows) in tanks. Such targets may be effected at long ranges, and the optics can be crazed in less time than is needed to blink an eye.				R&D?		
Obscurant, Laser-Argon Beam. An Argon laser aimed at windows, automobile windshields, or airplane canopies for vision denial purposes. Microabrasions in the glass scatter this particular wavelength of light turning the entire sheet a glaring, opaque green. As a result, a sniper could not see through a window or a suicide driver would not be able to look out through the windshield of the truck laden with explosives that he was driving.						
Obscurant, Myopia. The inability of the human eye to focus light from infinity accurately, which, in practical terms, means beyond approximately 20 feet. If induced through nerve/chemical agents, performance degradation could be dramatic, especially in aviation operations, because studies indicate that as much as 85% of pilot sensory perception/performance is through sight. Nerve gas can induce myopia.				R&D?		
Obscurant, Smoke-Colored. Colored smoke concentrations produce greater initial psychological and panic effect than white smoke. Caucasians are said to have a greater repugnance to brilliant green smoke, which is associated with disagreeable personal experiences such as seasickness, bile and vomit. Negroids and Latins are declared to be most adversely affected by brilliant red. Rioters confronted with a strong concentration of colored smoke feel, instinctively, that they are being marked, or stained, and thus they lose anonymity.						
Obscurant, Smoke-White. White obscuring smoke delivered by grenades or smoke pots. Relatively inexpensive, non-toxic, noncontaminating, and tactically ideal for police use. Obscuring smokes are temporarily irritating to the nose and throat, and cause those affected to lose visibility, sense of purpose, and direction.						

OPTICALS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Optical, Add-On Combat Assault Weapon. The use of a low energy laser weapon as a complement to the main armament of a tank or infantry fighting vehicle, or as a complement to an antitank missile system.						
Optical, Bucha Effect. High intensity strobe lights which flash at near human brain wave frequency causing vertigo, disorientation, and vomiting. See also Optical, Stroboscopic Device.						
Optical, Cameo Bluejay. A 75 pound version of the AN/VLO-7 Stingray designed for use by the Apache attack helicopter.						
Optical, C-CLAW. The Close-Combat Laser Assault Weapon, code named "Roadrunner," was an early 1980s Army tactical laser proto-type which was designed to attack the optics of opposing armored fighting vehicles. The program was canceled in 1984 as a result of adverse publicity over human blinding issues and cost/weight requirements.				Blinding controversy		
Optical, Cobra. Prototype of the AN/PLQ-5 Laser Countermeasures System. A 30-pound hand-held laser weapon used to damage enemy sensors and human eyes. Because this device may operate on three-different wavelengths it may be impossible to be currently defended against.			Blinding			
Optical, Cornet Prince. Air Force version of the AN/VLO-7 Stingray. It is a pod mounted system which is intended to protect an aircraft from enemy air defense weapons which are dependent on optics and electro-optics for their effect. Cornet Prince has a detection system which notifies an air crew if it is under attack or if attack is imminent so that it can take the proper counter-measures.						
Optical, Dazer. Battery-operated 20,000 candlepower "flashlight." It uses an alexandrite laser and is meant to provide infantry with a nonlethal capability against armored targets by attacking sensors, night vision devices and personnel. The shoulder-fired Dazer weighs about 20 pounds and is submachine gun size.					Weight	
Optical, Dazzle. A class of optical weapons that emit extremely bright light causing temporary blindness.						
Optical, Dazzle Rifle. A rifle which emits an eye-safe argon-ion laser beam designed to disorient the target.					Extra weapon	
Optical, Electro-Optical Countermeasures System. AN/VLO-7, Stingray. A laser designed to blind the optics and electro-optics of enemy tanks and armored fighting vehicles. Two test versions were deployed in the Gulf War by the Army but not used. This device weighs about 160 kilograms. It can be mounted on both the M1 Abrams tank and the Bradley infantry fighting vehicle. See also Antilethal, Sensor-Retroreflectivity.						

OPTICALS **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Optical, Flares. Both directional and omnidirectional flares can be used against personnel and materiel to obscure vision.					**Flammable**	
Optical Flash. A 40 mm artillery shell filled with plastic dye laser rods. Used to blind electro-optic sensors and enemy personnel.						
Optical, High Intensity Lights. High intensity hydrogen-chloride light on a reflector equipped handheld candle holder.					**Extra weapon?**	
Optical, Illuminating-Grenade. In night ambushes in Vietnam, the MK1 Illuminating Grenade, which produced 55,000 candlepower for 25 seconds, effectively blinded Viet Cong caught in the center of its illumination zone for short periods of time.					**Fratricide**	
Optical, Isotropic Radiators. Special munitions that illuminate or bloom with laser-bright intensity causing the same retinal or optical damage as LEL (low energy laser) weapons. Isotropic radiation is generated by an explosive burst that superheats a gaseous plasma surrounding it, causing a laser-bright flash.					**Fratricide**	
Optical, Laser-Anti-Oil Storage Tank. Man-portable laser system with a backpack power supply designed for use against storage tanks in the Gulf War. Use debated.						
Optical, Laser Countermeasures System [LCMS]. AN/PLQ-5. M-16 rifle-mounted and backpack-powered 42 pound system. Can detect and disrupt optical and electro-optical targeting systems at "standoff ranges." While not specifically intended to harm human eyes, the system was canceled so US troops would not be subjected to war crimes concerns.						
Optical, Laser Dazzle System [LDS]. UK Royal Navy's low energy laser system deployed during the 1982 Falklands war by two of its frigates.						
Optical, Laser-Infrared CO_2. Laser which can heat the skin of a target to cause pain but will not burn the skin. Application against the hand of a suspect holding a knife or gun to a hostage.						
Optical, Light Flashing Devices. Devices which are much like a photographer's flash bulb but at a greatly increased power. They are used to disorient target individuals by causing temporary flashblindness.						
Optical, Low Energy Laser-Eye Safe. A continuous wave laser, mounted on a M-16/M-203 rifle, that produces a high-intensity glare strong enough to temporarily delay and disorient an adversary so that he can't complete a mental task, like cutting a fence or walking on rough terrain. Effective range of several hundred meters. Laser powered by 6 rechargeable AA size batteries.						

OPTICALS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Optical, Mobile Test Unit. Mid-1970s Army tactical laser concept utilizing a medium powdered laser mounted on a Marine Corps armored personnel carrier called the Mobile Test Unit. Used to shoot down some helicopter drones.				R&D		
Optical Munitions. A class of non-lethal weapons which rely upon either a multi-directional or uni-directional intense burst of light [isotropic radiator (laser)] generated by the high-explosive shock heating of an inert gas.				R&D?		
Optical, Stroboscopic Device. Devices employed against demonstrators which cause stroboscopic flashing. Same principle as a discotheque "strobe." In the 5-15 hertz range these devices can cause various physical symptoms and in a small portion of the population may trigger epileptic seizures.						

- The comment "Fratricide" refers to us becoming accidental victims of our own weapons' effects. In the case of opticals, we ourselves could suffer temporary blindness when exposed to something like illuminating grenades or isotropic radiators.
- As testing continues in these proposed systems, we may see more optical weapons that meet criteria for eye-safety, effectiveness, weight, and size.

PROJECTILES **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Projectile, Bag-Bean. Fabric sacks filled with lead shot (usually No. 9) weighing from 40 to 150 grams, designed to be fired from 12-gauge shotguns and 37 mm (40 mm) launchers. The bags conform to the shape of the target on impact, producing less damage than a solid hard projectile. The bags are rolled in the cartridge and unroll after exiting the launch barrel. These projectiles are designed for direct impact on the target, therefore accuracy is important to ensure effective impacts. The level of energy delivered ranges from 40 to 100 foot-pounds; depending on the distance the projectile has to travel. Also known as Flying Bean Bag or Shot Bag.						**40 mm only**
Projectile, Bag-Bean-Rubberized, Gun. A prison gun which utilizes rubberized bean bag projectiles. Used for movement of cell blocks and surprise advances.						
Projectile, Bag-Stun. Early form of nonlethal projectile composed of a 5¼ ounce canvas pouch filled with metal buckshot which spread into a 3″ diameter pancake in flight. Known to cause serious injury.						
Projectile, Bag-Stun, Launcher. An obsolete gun which delivered a cartridge containing a 4″ diameter stun-bag loaded with 1/5 to 1/2 lb. of shot. It could be used as handgun or with an extension as a shotgun. It has been replaced by the 12-gauge shotgun and the 37 (and 40) mm launchers. Also known as the stun gun.				**Obsolete**		
Projectile, Ball-Rubber, Grenade. An explosive anti-riot device which hurtles a large number of small "stinging" rubber balls at rioters when ignited. May or may not contain riot control agents. Also known as stingball or stinger grenade.						
Projectile, Ball-Rubber, Round. The common usage of this term now refers to a number of 5/8″ rubber balls fired from a 12-gauge. shotgun. The 3/8″ ball is also common. Both have a hardness of about 50 shore. These rounds have maximum effect when fired in confined spaces, where multiple bounces augment the number of impacts on the target with sufficient force to sting rather than hurt. The eyes are the most at risk of damage, due to the small size and velocity of the balls. The older use of this term refers to a rubber ball fitted with a "Blake" attachment to a shotgun. The ball can be solid or filled with liquid or gas. Various designs existed for point or area targets.					**Extra weapon**	
Projectile, Barricade Penetrating. Any projectile which delivers a riot control agent into a barricade situation via a window or plate-glass. One such projectile is a fin stabilized injection-molded plastic device which disperses a highly volatile liquid CS agent.					**Scenario?**	

PROJECTILES **Weapon Categories and Descriptions**	**DoD Definition**	**Crowd Control**	**Legal Review**	**Supportability**	**Crowd Control in NEOs**	**Failed to Pass the Filters**
Projectile, Baton-Plastic. A PVC cylinder ½″ in diameter and 4 inches long. Instead of being bounced off of the ground these rounds are directly fired at the intended target. Causes a bruising impact blow with a claimed effective range of 30 to 65 yards. At point blank range this round can be fatal. First used by the British Army in Northern Ireland in February of 1973 as a replacement for rubber bullets. Also known as riot baton round, plastic bullets or PVC bullets.					**Extra weapon**	
Projectile, Baton-Rubber. Pliable rubber cylindrical projectiles delivered from the riot gun or British Army signal gun. Aimed at crowd's legs or at the ground for ricochet effect into a crowd. Also known as rubber baton or rubber bullet 6-inch.						**40 mm version**
Projectile, Baton-Wooden. Wooden cylinder delivered by a riot gun or by a British Army signal gun. Also known as broomstick round.					**Extra weapon**	
Projectile, Baton-Wooden Multiple. A 37-38 mm round which disperses 5 wooden pellets which can be fired from a distance or ricocheted into the mob. Direct fire at close or point blank range can cause serious or fatal injuries.						**40 mm version**
Projectile, Baton-Wooden Whistling. A short fluted cylinder made of wood and fired at low-velocity for crowd dispersal. This round makes a whistling sound when fired. Whistling sound and visibility of round valued over kinetic impact. Fired by a Hong Kong Pellet Gun.					**Extra weapon**	
Projectile, Chaff-Ceramic. Dropped or fired in front of an aircraft which when ingested by a jet engine will destroy its turbine blades and other mechanisms.						
Projectile, Gas Vortex. If a gas vortex, a highly stable phenomenon, was projected at some velocity, the difference in pressure on the leading and trailing edges would produce an impact. Potential use in crowd and riot control situations.				**R&D**		
Projectile. Launcher-ARWEN. Anti-Riot Weapon Enfield. A handheld, cylinder-fed, shoulder-launched 37 mm anti-riot weapon which is used to launch a variety of impact devices such as bean bags, pellets, rubber and wooden baton rounds, etc.				**Incom-patible**		
Projectile, Launcher-Blake Impact Gun. Aluminum alloy-type, golf ball-sized projectile fitted to a bolt-action shotgun.					**Extra weapon**	
Projectile, Launcher-Velocity Adjusting. Small arms weapon with an adjustable muzzle velocity intended for delivery of less-than-lethal munitions such as rubber or PVC bullets. The purpose of the adjustment is to tailor the velocity to the range.					**Extra weapon**	

PROJECTILES Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Projectile, Launcher-Very Pistol. A 37 mm pistol used to fire tear gas and other nonlethal projectiles.				Incompatible		
Projectile, Liquid Filled. Several types of hollow rubber projectiles have been manufactured. The most recent, in a 12-gauge shotgun size, is filled with a liquid dye to mark the target for subsequent identification, in addition to the impact effect. The working range is from 5 to 75 feet. Older types included a 3″ diameter, ½ lb. rubber ball filled with water, to be used as an impact projectile. The range was 75 feet. The launcher was large and heavy.					Weight	
Projectile, Mine-Claymore. Modular Crowd Control Munition. A nonlethal claymore-type mine which disperses blunt impact ordnance for crowd control purposes.					Tactics	
Projectile, Muzzle Launch Ordnance [MLO]. MLO MA/RA 88 less-than-lethal shot for the M16A2 Rifle. Must disorient targets at effective ranges of 30-70 meters, not create shrapnel, and be of minimal hazard.					Muzzle adapter required	
Projectile, Ricochet-Soft Plastic. Polyethylene pellets 1/16″ in diameter delivered from a standard 12-gauge shotgun aimed to ricochet. Available in larger sizes.					Extra weapon	
Projectile, Ring Airfoil Grenade, Launcher. Launcher Adapter, M234 Designed for attachment to M16A1 rifle. Uses blank cartridge (M755) to propel either Soft Ring Airfoil Grenade (M742) or Sting Ring Airfoil Grenade (M743).				Obsolete		
Projectile, Ring Airfoil Grenade-Soft. Soft RAG, M742. A rubberized donut shape with airfoil cross-section that is launched spinning from M234 adapter attached to M16A1 rifle. A series of cavities in the projectile body contain packets of CS powder. Target impact opens the CS packets and disseminates the chemical (powder). This system has been replaced by the Non-Lethal 40 mm Sponge Grenade.				Obsolete		
Projectile, Ring Airfoil Grenade-Sting. Sting RAG, M742. A rubberized donut shape with airfoil cross section that is launched spinning from the M234 adapter attached to M16A1 rifle. Intended as an initial deterrent via kinetic energy impact. Can also be used as a training round. This system has been replaced by the Non-Lethal 40 mm Sponge Grenade.				Obsolete		
Projectile, Rock Salt. Large salt crystals fired from shotguns. Crowd dispersal method.					Extra weapon	

PROJECTILES Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Projectile, Rubber. These projectiles can be solid (homogeneous) or clad (composite). Solid rubber projectiles can be further classified by density, ranging from high density (hard), to soft (foam). The shape of the homogeneous projectiles varies from a right cylinder (35 mm diameter by 3 inches long) to a cylinder with a hemispherical nose, to short cylinders (35 mm diameter by 1½ inches long multi-projectiles, soft foam) to hard, finned shape projectiles (12-gauge), and balls about 5/8″. The large cylinders fired to strike the ground in front of the target individuals, bouncing up to hit them. Depending on the distance from the ground impact to the target, the impact point can range from the knees to the head, producing different results. Past experience with this method of firing has shown that.					Extra weapon	
Projectile, Shards-Ceramic. Fired against aircraft to disable their engines or to degrade their stealth capabilities.						
Projectile, Splatt-Thixotropic. Special Purpose Low Lethality Anti-Terrorist. Any projectile that deforms at impact, without penetrating the body. One materiel preparation designed to accomplish this action is described in the patent. The whole projectile is made of this substance, not just the tip. The older usage of this term referred to any caliber shotgun shell with grease or soft putty on the tip which would deform at impact.				R&D?		
Projectile, Sponge Grenade. 40 mm nonlethal projectile developed for the M203 grenade launcher made out of spongy material. Can either be used as a kinetic weapon or with the inclusion of a CS or marking dye wafer. Potentially fatal within 25 meters or if an eye shot occurs. Successor to the discontinued Soft/Sting Airfoil Grenade System.						
Projectile, Water Stream. Mobile unit which projects a continuing stream of water for riot control purposes.					Size	

- While the shotgun (with the myriad shotgun munitions developed) is a useful lethal weapon for intimidation purposes as well as deadly force at close range, the 40 mm munitions require only that a 40 mm launcher be mounted on the automatic weapons to which our forces are already accustomed.
- Muzzle Launched Ordnance (MLO) munitions are fired from a rifle barrel with an adapter at the muzzle (JNLWD, CD-ROM), which excludes lethal capability if immediately required. Therefore, the MLO failed to pass.

REACTANTS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Reactant, Acetylene, Grenade. One pound bomb containing calcium carbide and water. Upon detonation, forms a bubble of acetylene gas seven feet in diameter. When sucked into the air intake of a diesel at concentrations as little as one percent, the gas would cause the fuel in each cylinder to ignite prematurely, with enough force to break piston rods.				R&D?		
Reactant, Chemical Compounds. Chemical compounds which are magnitudes more powerful than hydrofluoric acid. A mixture of hydrochloric acid (HCl) and nitric acid (H_2NO_3) will dissolve most noble metals, such as gold and platinum, and organic compounds. Could be delivered by binary weapons to attack structures, armored fighting vehicles, roads, rooftops and optical systems. Also known as supercaustics, superacids, supercorrosive bases, C+, and tire eaters.				R&D?		
Reactant, Cloud Seeding. Silver iodide dropped into clouds over the Ho Chi Minh trail during the Vietnam War in order to promote additional rainfall which would degrade Viet Cong logistics. See also Reactant, Operation Popeye.						
Reactant, Combustion Alteration. This technology consists of chemical additives that either contaminate or change the viscosity characteristics of fuel to degrade standard engine performance. The additives may be ingested as a vapor through air intakes, mixed with fuel during the intake cycle or applied directly to a fuel source causing almost instant engine failure.				R&D?		
Reactant, Liquid Metal Embrittlement [LME]. Agents operate by altering the molecular structure of base metals or alloys and could significantly interfere with the operation of the aircraft, vehicles, metal treads and bridge supports to which they were applied. LMEs are clear and have little or no perceptible residue, whether sprayed on or applied with felt-tip markers. Some ambiguity exists because LMEs may refer to both liquids and liquid metals.				R&D?		
Reactant, LME Graffiti. Graffiti used to mask an LME strike against a bridge or other target. Great potential for terrorist use. Example, phone call to law enforcement stating that an LME strike has been conducted against one of a number of bridges in a city using red LME graffiti.				R&D?		
Reactant, Operation Popeye. The cloud-seeding campaign conducted by the US military during the Vietnam War. Over 2,600 Popeye flights were flown through 1972 in hopes of interdicting the flow of Communists troops and supplies along the Ho Chi Minh Trail.						
Reactant, Pyrophoric Particles. Particles which when ingested in a combustion chamber give off heat and thus overheat the chamber which causes thermal failure. Cesium would be one likely candidate. Also known as polystyrene peanuts.				R&D?		

RIOT CONTROL AGENTS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Riot Control Agent, Area Dispensers. RCA dispensers mounted in the walls and ceilings of prison facilities. They provide law enforcement personnel the ability to move groups out of or from one area to another through CS and OC disbursement.						
Riot Control Agent, CA. 4-Bromobenzylcyanide. CA was one of the first tear agents used. It is not as effective as CN or CS and is obsolete. CA produces a burning sensation of the mucous membranes and severe irritation and tearing of the eyes with acute pain in the forehead. Also known as BBC, larmine, and camite.						
Riot Control Agent, Chemical Mace. Small spray can containing a 0.9 percent solution of agent CN in a variety of petroleum-based carriers including a mixed freon/hydrocarbon solvent. First introduced in 1966. CS-Mace then developed in 1968 via suggestion of the US Army.					Not optimal	
Riot Control Agent, CN. Chloroacetophenone. A lacrimator that causes irritation to the upper respiratory passages and may cause irritations to the skin. On average, it incapacitates for approximately 3 minutes. Discovered by the German chemist Graeber in 1869. Replaced for most purposes by CS.					Not optimal	
Riot Control Agent, CR. Dibenz-(b,f)-1,4-oxazepine. Newer riot control irritant developed in England in 1962 by the British chemists Higginbottom and Suchitzsky. About 5 times more effective than CS. In addition, CR is much less toxic than CS. CR is not used in its pure form (a yellow powder) but dissolved in a solution of 80 parts of propylene glycol and 20 parts of water to form a 0.1-percent CR solution. It is used in solution as a riot control agent. Eye pain, discomfort, and excessive tearing occur with sometimes painful sensitivity to strong light or temporary blindness. Symptoms can persist for 15 to 30 minutes. Dubbed "fire gas" by the media because of the burning sensation it caused to the skin of rioters when used in Northern Ireland from 1973-1974. Authorized US Army use in 1974.					Not optimal	
Riot Control Agent, CS. Ortho-chlorobenzalmalononitrile was made the standard riot control agent by the Army in 1959. The term "CS" is derived from the two scientists, B.B. Carson and R.W. Sloughton, who first prepared it in 1928. First used by US civilian law enforcement in 1968 during the riots in Washington D.C. While an effective riot control agent, which incapacitates on average from 5 to 10 minutes, decontamination and cross-contamination is a considerable problem in urban environments.					Not optimal	
Riot Control Agent, CS1. Specially formulated to prolong persistency and increase the effectiveness of CS. Unlike CS, CS1 is a free-flowing (micropulverized) agent powder consisting of 95 percent crystalline CS blended with 5 percent silica aerogel. This formulation reduces agglomeration and achieves the desired respiratory effects when dispersed as a solid aerosol.					Not optimal	

RIOT CONTROL AGENTS **Weapon Categories and Descriptions**	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Riot Control Agent, CS2. CS blended with silicone-treated silica aerogel, which causes it to repel water. This treatment improves the physical characteristics of CS by reducing agglomeration and hydrolysis. This form of CS prolongs the effectiveness for both immediate and surface contamination effects. When disturbed, CS2 reaerosolizes to cause respiratory and eye effects. A cloud of waterproofed CS can be kicked up by people walking in the street or grass two months after it has settled.					Not optimal	
Riot Control Agent, CSX. A form of CS developed for dissemination as a liquid rather than as a powder. One gram of powdered CS is dissolved in 99 grams of trioctylphosphite (TOF). As with CS, CSX stings and irritates the eyes, skin, nose, throat, and lungs of exposed personnel.					Not optimal	
Riot Control Agent, Disperser-Fogger. Conventional insecticide blower adopted for CS and CN dispensing in Vietnam. Produces a fog-type emission for up to a 15 minute period. Conceptual basis was to fill Viet Cong tunnel complexes with large amounts of the CS agent. Another fogger was a handheld gasoline-operated device which dispenses either CS, CN or inert fog at 0.7 gallon/hour. Also known as mighty mite (M-106) and pepper fogger.					Not optimal	
Riot Control Agent, Disperser-Liquid. An Army riot-control agent dispenser visually resembling a man-carried flamethrower. Fully loaded weight is approximately 55 pounds. Disperses CS mixed with a trioctylphosphate solvent. Also known as liquid stream projector.					Size	
Riot Control Agent, Disperser-Powder. Modified Dry-Powder Fire Extinguisher. Powdered CS and CN dispersal.					Tactics	
Riot Control Agent, Grenade Electrically Activated. A riot control grenade with a male, electrically activated screw-in socket connection in place of a standard fuse. This enables the grenades to be incorporated into electrical systems, in fixed installations, where they can be activated at will by a trip device or switch. This is of special importance in building security, and vital installations, providing a dependable, economical protective system that can be locally installed. This system, with variations, is now in use in commercial security systems, as well as in US government and embassy installations.						
Riot Control Agent, Grenade-M73A. Army riot control grenade in use prior to the M47-Type CS Grenade. As of 1992, the M73A was still in use because of technical problems with the M47.						OC version
Riot Control Agent, Grenade-M47 CS. Basic riot control grenade employed by the Army. Its contents are expelled as a vapor from a taped-over port in the grenade body, causing the grenade to "skitter" around on the ground, making it difficult for rioters to throw back. As of 1992, it has not seen tactical action.						OC version

RIOT CONTROL AGENTS Weapon Categories and Descriptions	DoD Definition	Crowd Control	Legal Review	Supportability	Crowd Control in NEOs	Failed to Pass the Filters
Riot Control Agent, Homemade Face Filters. Wet rags and other devices made by prison inmates to counter the effects of riot control agents.						
Riot Control Agent, Lacrimator. A riot control irritant that will cause blinding tears upon contact with the eyes. Also see Riot Control Agent, CN.					Not optimal	
Riot Control Agent, Launcher-Handy Andy. US Army handheld type throwaway munition consisting of an aluminum tube with a hand-activated striker in the base. On ignition, the E24 propels a cylindrical rubber projectile containing 50 grams of CS burning formulation to distances of 70-100 yards.					Extra weapon	
Riot Control Agent, Launcher-Riot Gun. A weapon designed specifically to fire tear gas munitions of 37 mm diameter Also known as 1½″ gun, 38 mm gun, gas gun, and tear gas launcher.				Incompatible		
Riot Control Agent, Mine. An anti-personnel mine filled with a riot control agent. For perimeter use around detention camps or secured facilities.						
Riot Control Agent, OC. Oleoresin Capsicum. A food product obtained from chili peppers which are dried and ground into a fine powder. When mixed with an emulsifier such as mineral, vegetable, soy oil, or water, it may be sprayed from a variety of dispensers and used as an irritant for safely controlling violent persons or vicious animals and/or restoration and maintenance of order.						
Riot Control Agent, Tear Gas-Invisible. Invisible tear-gas clouds are produced by blast munitions loaded with dust or liquid agents. Invisible tear gas cannot be seen by rioters once it first emerges from a grenade or mechanical dispenser and therefore produces a greater psychological panic-producing effect than tear smoke.					Tactics	
Riot Control Agent, Tear Gas-Visible. Visible tear-gas clouds (tear smoke) emanate from burning grenades and projectiles. Tear smoke is highly visible and plainly indicates the area covered to police and rioter alike.					Tactics	

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