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1. REPORT DATE (DD-MM-YYYY) <b>14-02-2005</b>		2. REPORT TYPE <b>FINAL</b>		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE <b>Airpower's Emasculation? -- Non-lethal Weapons in Joint Urban Operations</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)  <b>Nisbett, Donald A., LCDR, USN</b>  Paper Advisor (if Any): <b>Burns, John C., COL, USA</b>				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  Joint Military Operations Department Naval War College 686 Cushing Road Newport, RI 02841-1207				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution Statement A: Approved for public release; Distribution is unlimited.					
13. SUPPLEMENTARY NOTES A paper submitted to the faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.					
14. ABSTRACT  The Presidential declaration of a Global War on Terror (GWOT) ensured that the future battlespace will occur in urban environments, in search of terrorist operatives and networks. Advancements in precision weapons have done much to allay concerns over minimizing collateral damage and reducing noncombatant casualties in Joint Urban Operations (JUO), however, the consideration in proposing airpower's use of non-lethal weapons (NLW) is the improvement in capability. This paper considers the efficacy of airpower in JUO with the addition of NLW, given the GWOT and future operations, proposing that overall capability could be enhanced. Considerations include costs, hearts and minds, and stability and support operations (SASO).  Airpower with NLW capability could stem the tide of rising costs by reducing munitions and rebuilding expenses. Additionally, intelligence gathered from captured vice killed terrorists could lead to operations concluding sooner, thereby indirectly reducing the overall cost for a particular operation. The second consideration looks at how utilizing airpower with NLW could reduce the footprint of U.S. forces, while minimizing noncombatant casualties and collateral damage, and deprecate the negative effects of media coverage. The third position is as the future of likely military intervention points to conducting SASO in urban environments; NLW capability would mean a broader application of airpower in these missions.  In contrast, standing treaties and the Law of Armed Conflict (LOAC) represent a substantial impediment to the development and military application of some NLW technology, particularly with airpower. Current measures seem to be more in favor of conventional lethal fires over the less conventional non-lethal fires. With a vast array of NLW technology currently available, it is worth investing in to validate its effectiveness in improving airpower and overcoming some of the legal impediments. As a result, two recommendations for the NLW Directorate include: (1) increase overall funding, to provide for fielding current, incorporating off the shelf systems, and future NLW technology in manned and unmanned aircraft, and (2) engage the LOAC debate in an effort to gain greater acceptability of NLW and ease its implementation.					
15. SUBJECT TERMS <b>Non-Lethal Weapons, Airpower, Joint Urban Operations</b>					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES  <b>29</b>	19a. NAME OF RESPONSIBLE PERSON <b>Chairman, JMO Dept</b>	
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED			c. THIS PAGE UNCLASSIFIED	19b. TELEPHONE NUMBER (include area code) <b>401-841-3556</b>

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Airpower's Emasculation? -- Non-lethal Weapons in Joint Urban Operations

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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

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14 February 2005

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## Abstract

The Presidential declaration of a Global War on Terror (GWOT) ensured that the future battlespace will occur in urban environments, in search of terrorist operatives and networks. Advancements in precision weapons have done much to allay concerns over minimizing collateral damage and reducing noncombatant casualties in Joint Urban Operations (JUO), however, the consideration in proposing airpower's use of non-lethal weapons (NLW) is the improvement in capability. This paper considers the efficacy of airpower in JUO with the addition of NLW, given the GWOT and future operations, proposing that overall capability could be enhanced. Considerations include costs, hearts and minds, and stability and support operations (SASO).

Airpower with NLW capability could stem the tide of rising costs by reducing munitions and rebuilding expenses. Additionally, intelligence gathered from captured vice killed terrorists could lead to operations concluding sooner, thereby indirectly reducing the overall cost for a particular operation. The second consideration looks at how utilizing airpower with NLW could reduce the footprint of U.S. forces, while minimizing noncombatant casualties and collateral damage, and deprecate the negative effects of media coverage. The third position is as the future of likely military intervention points to conducting SASO in urban environments; NLW capability would mean a broader application of airpower in these missions.

In contrast, standing treaties and the Law of Armed Conflict (LOAC) represent a substantial impediment to the development and military application of some NLW technology, particularly with airpower. Current measures seem to be more in favor of conventional lethal fires over the less conventional non-lethal fires. With a vast array of

NLW technology currently available, it is worth investing in to validate its effectiveness in improving airpower and overcoming some of the legal impediments.

As a result, two recommendations for the NLW Directorate include: (1) increase overall funding, to provide for fielding current, incorporating off the shelf systems, and future NLW technology in manned and unmanned aircraft, and (2) engage the LOAC debate in an effort to gain greater acceptability of NLW and ease its implementation.

## **I. INTRODUCTION**

Our war on terror begins with al Qaeda, but it does not end there. It will not end until every terrorist group of global reach has been found, stopped and defeated.

President Bush, 20 September, 2001 address

In prosecuting the Global War on Terror (GWOT), the future promises that an increasing number of military operations will be conducted in urban areas in search of these terrorist operatives and networks. The speed, range, precision weapons, communications, command and control, information gathering, and transportation capabilities of U.S. military aircraft enable airpower to play a vital role in urban operations.<sup>1</sup> Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF) bear witness to this fact, notwithstanding the inherent “jointness” of current combat operations. Joint Pub 3-06, “Doctrine for Joint Urban Operations (JUO)”, defines JUO as all joint operations planned and conducted across the range of military operations on, or against objectives within, a topographical complex and its adjacent natural terrain, where manmade constructions or the density of non combatants are the dominant features.<sup>2</sup> The synchronization and integration of airpower improves balance of forces and functions, extends operational reach, and increases the tempo to react to events and take action.

Without question a great strength of the U.S. military is its precision strike capability, enabled by costly, high-technology weapon systems and powerful information management tools. JUO, however, does present unique challenges to the effective use of airpower. Operational considerations in urban operations include the effects on noncombatants, acceptable friendly casualties, and the amount of physical destruction anticipated and allowable. The historical progression towards improving airpower’s precision has been the

answer to minimize some of the unique challenges presented in JUO, yet collateral effects persist.

It is not clear as to the duration of the GWOT, but given ever shrinking budgets and the current investiture in aircraft projects (FA-18E-G, F-22, F-35, etc.), figuring out how airpower can play a role in JUO and effects-based operations (EBO) makes fiscal sense. From the outset, airmen have always aspired to conduct EBO.<sup>3</sup> An example of this could be seen in an interpretation of the beliefs of one of airpower's earliest advocates, Giulio Douhet:

Civilians were not prepared for the effects of war and the bombing of population centres would create psychological dislocation among the people. People would then apply pressure on the government to negotiate for peace.<sup>4</sup>

EBO, as defined by U.S. Joint Forces Command, are a set of actions planned, executed, and assessed with a systems perspective that considers the effects needed to achieve policy aims via the integrated application of various instruments of power.<sup>5</sup> Effects-based joint operations would increase strategic options by permitting US personnel to achieve success faster, more efficiently, and with less risk in the close battle to defeat enemy land forces.<sup>6</sup>

To paraphrase General Merrill A. McPeak, former Air Force Chief of Staff, “air warfare is so plainly the centerpiece of modern combat, it would be far more productive to figure out how to fight it better.”<sup>7</sup> A more modest position would certainly agree with airpower being integral to modern combat operations, and as such, improvements in capability and integration throughout all aspects of military operations should be a priority. Given our joint operations seek to achieve a desired effect and that airpower can play a role in that, this paper focuses on the impact of including NLW in the current arsenal carried by aircraft today. Does this proposal of adding NLW capability emasculate airpower?

As advancements in precision weapons reach their apparent technological limits, integration and implementation of non-lethal weapons (NLW) on aircraft could provide more capability to U.S. forces in JUO. Soaring aircraft operational and developmental budgets make targeting weapons development an option in achieving this goal of effective utilization of airpower. Improvements to weapons accuracy have resulted in a trend of using smaller munitions to mitigate their effects in urban environments. When compared to current precision weapons capability in JUO, this paper considers the efficacy of airpower with the addition of NLW given three parameters: costs, hearts and minds, and stability and support operations (SASO). The first measure considers the potential reduction of munitions expense. Additionally, it considers how the use of NLW indirectly affect the price of conflict with respect to post-hostility rebuilding costs and early conflict termination. The second parameter views the potential effect of winning hearts and minds when NLW is used. Finally, with NLW, it considers airpower's improved capability in SASO.

## II. COSTS

Urban warfare, a subject that many military professionals would prefer to avoid, is still with us. Moreover, it may be the preferred approach of future opponents.

Major General Robert H. Scales, Jr., USA

Trends in world demographics indicate a significant increase in the number and size of urban areas throughout the world, ensuring that many future military operations will take place in urban environments.<sup>8</sup> An overriding characteristic of urban battlespace is that of density – density of structures, density of noncombatants, density of infrastructure, density of adversary forces, and density of targets.<sup>9</sup> The urban environment represents one of the greatest challenges to conducting operations spanning the levels of war and operational art.

Planners must consider weapons in order to produce the desired weapons effects on a target while minimizing collateral damage. The desired effect protects noncombatants and property, facilities for future operations, and reduces the cost of rebuilding. Increasingly, close air support and certain strike missions call for surgical precision beyond the capabilities of heavy weapons, especially in urban environments.<sup>10</sup> Considering warhead technology and per unit costs, the point of diminishing returns may have arrived.

Currently one-third of the DOD annual budget (\$85 billion per year) supports aircraft expenditures.<sup>11</sup> In considering rising airpower costs, this section focuses on munitions expense, and indirectly on airpower's ability with NLW to affect post-hostility rebuilding costs and early conflict termination, thereby lowering the monetary price for conflict.

A brief description of NLW is warranted here. NLW are weapon systems 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.<sup>12</sup> Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, NLW employ means other than gross physical destruction to prevent the target from functioning.<sup>13</sup> Their core capabilities fall into two categories: counterpersonnel (crowd control, incapacitation of individual personnel, denial of access to an area, and clearing facilities and structures of personnel) and countermaterial (eliminate the enemy's ability to use his equipment through area-denial, or the ability to disable or neutralize specific types of equipment and facilities).<sup>14</sup> When considering NLW the preconceptions are often defensive minded (e.g., law enforcement, crowd control, and force protection). In an effort to remove that stigma, operational commanders should

consider the offensive capabilities of NLW, as they would provide commanders a more extensive continuum of options.

Counterpersonnel NLW include the Pulsed Energy Projectile (PEP) and the Active Denial System (ADS). The object of the PEP program is to develop and demonstrate the technology necessary to produce a crew served, counter personnel non-lethal directed energy weapon providing controllable bio-effects to deter, disable, and distract individuals.<sup>15</sup> This technology would need to be further refined for aerial delivery. The ADS projects a millimeter-wave beam of energy that induces an intolerable heating sensation on contact with the skin to repel an individual without causing injury or long-term side-effects.<sup>16</sup> Concepts for the Joint Unmanned Combat Air Vehicle (UCAV) contain counterpersonnel and countermateriel capability.<sup>17</sup> While these and other NLW are not currently available, increases in research and development funding will be required to implement into aircraft inventories. Once fielded, the economic advantage of some of these weapon systems is that they will be reusable, thereby effectively reducing per unit costs.

While the existing Joint Nonlethal Weapons Directorate has a budget for fiscal year 2004 of \$43.4 million--up from an annual \$22 million or so for the past seven years--the Council on Foreign Relations Task Force saw a need for a sevenfold increase, amounting to a \$300 million annual program, still less than \$1 for every \$1,000 spent on defense.<sup>18</sup> As a reminder, once fully developed and fielded, some of these weapons will be reusable. For comparison, the average price per Joint Direct Attack Munitions (JDAM) costs almost \$23,000. With the aid of Global Positioning System (GPS), this upgraded general purpose bomb is capable of accurate delivery in adverse weather conditions. It is still only good for a “one time” use.

During the 1991 Gulf War, around 20 percent of the munitions were guided.<sup>19</sup> In comparison, precision weaponry accounted for 69 percent of the total employed in the NATO air campaign (Deliberate Force) in Bosnia.<sup>20</sup> A report from the Center for Strategic and Budgetary Assessments (CSBA), during Operation Allied Force in 1999, estimated that coalition strike planes released \$520 million worth of ordnance of various types during the 11-week campaign over Kosovo.<sup>21</sup> More impressively, according to the Office of Management and Budget, the \$62.6 billion fiscal 2003 supplemental spending request included up to \$3.7 billion to replenish weapons expended during Operation Iraqi Freedom.<sup>22</sup> In most cases where airpower is used and the desired effect is not annihilation, a less lethal option would be nice to have. As NLW become available, more costly, conventional weapons could be selectively utilized in JUO.

NLW, by design, also serves to mitigate collateral damage as an effect. The destruction of essential urban infrastructure can complicate the post-hostilities transition period as military forces may be required under international law to provide post-hostilities support, not to mention the animosity created within the local population. Likewise, there is an urgent need to study, train, and practice techniques and procedures for operating in urban terrains, where the goal is not to take over or destroy, but rather to stabilize, rebuild and keep functioning vital economic and social infrastructures as is undergoing today in Iraq and Afghanistan.<sup>23</sup> A plausible scenario could involve a strike aircraft releasing a laser-guided soft and lightweight sticky foam bomb could burst in a room and kill or disable a sniper without damaging or endangering the surrounding structure or building inhabitants.<sup>24</sup> Assuming that airpower will be used, NLW would help drive down operational costs and minimize reconstruction expenses.

A potential strategy of terrorist organizations could seek to dissuade, delay, or disrupt military intervention by the U.S. while raising the political, economic, and military costs.<sup>25</sup> The political, fiscal, and military sustainability of GWOT remains to be seen, however, it is generally agreed that GWOT will be a protracted and costly undertaking.<sup>26</sup> Therefore, reducing defense expenditures, while maintaining or improving capability, becomes critical to overall mission accomplishment.

Disrupting and destroying terror networks, as one of the strategic objectives of the GWOT, would be more achievable with key intelligence. Captured vice killed terrorist would be valuable in providing greater insight in terrorist tactics, techniques and procedures, and valuable intelligence on current and future operations. Airpower's ability to rapidly project power and disrupt the adversary's decision cycle through a combination of surprise, speed, tempo, and precision, make it a valuable asset; and with armed with, for example counterperssonel NLW, its use could assist in more arrests resulting in greater intelligence. Additionally, with less collateral damage concerns, culturally sensitive sites, like mosques, would no longer be safe havens. Understanding how networks operate is critical to devising a strategy to deal with them.<sup>27</sup> An advantage of capturing an insurgent [or terrorist] rather than killing him is the intelligence that can be garnered from the prisoner, a critical element in defeating an insurgency [or the GWOT].<sup>28</sup> Intelligence gathered from captured vice killed terrorists could potentially result in achieving operational objectives sooner and early conflict termination, thereby indirectly reducing overall operational costs.

In contrast, however, lower costs are not guaranteed. Despite the encouraging aspects of NLW, weeding through the vast number of promising programs and fielding operational systems could require substantially more money initially than regular production costs.

When you consider the requisite training associated with this new technology, the price could further skyrocket. With limited funds, this munitions alternative could result in cuts or loss of funding to other projects. By design NLW seek to mitigate, not guarantee zero collateral damage. Also, depending upon the category of NLW, the delivery mechanism, like conventional munitions, will have some collateral effect associated with its use. There will most likely be some associated reconstruction costs during the transition phase of operations. Finally, captured adversaries could pose a financial burden of additional fees (legal, incarceration, etc.) which may outweigh any beneficial information which may not lead to early conflict termination.

Despite some of these obvious limitations, aerial delivered NLW should be pursued for its potential impact on cost reduction. We will now turn to the ability to win hearts and minds.

### **III. HEARTS AND MINDS**

Resentment towards the United States and ambivalence towards acts of terrorism within the Muslim community domestically and abroad is building and the United States is in danger of losing the hearts and minds campaign just as it did in Vietnam.

D.W. Craig, “Asymmetrical Warfare and the Transnational Threat”

It is conceivable that this resentment can be directly attributed to the misery suffered by a population withstanding the collateral effects of aerial bombing (e.g. Fallujah) by U.S. forces, in an effort to eliminate insurgents and/or terrorists. Winning the hearts and minds would involve gaining and maintaining the support of, not only the affected population, but also the local and international community. One of the major considerations for JUO is the large numbers and density of noncombatants among the population in urban areas and

minimizing noncombatant casualties and excessive collateral damage. Insurgents often garner the support of apathetic citizens who have suffered the heavy handed approach of “invaders.” To defeat the insurgency, it is essential that government forces be oriented towards winning the hearts and minds of the population and asserting control over the population and winning support away from the guerrillas.<sup>29</sup>

In winning the hearts and minds, the intent is to create conditions whereby the local population is more accepting of military operations and quell the prerequisite conditions that create the fertile environment for future terrorists. Beginning in the mid-1980s, the USAF and USN began development of “next generation” weapons to fulfill the shortcomings of the earlier weapons (e.g., Joint Stand-off Weapon (JSOW), Wind Corrected Munitions Dispenser (WCMD) and Joint Direct Attack Munitions (JDAM)).<sup>30</sup> This next generation of weapons, through improved precision, would mitigate much of the collateral effects of more conventional munitions, since we would now be able to hit “exactly” what we were targeting. More recent efforts involve the use of small diameter bombs. Despite the use of our best weapons and intentions, we can still make progress toward winning the hearts and minds in Iraq as terrorism expert Jessica Stern in August 2003 warned:

The bombing of the U.N. headquarters in Baghdad was “the latest evidence that America has taken a country that was not a terrorist threat and turned it into one.” How ironic it would be that a war initiated in the name of GWOT ended up creating “precisely the situation the administration has described as a breeding ground for terrorists: a state unable to control its borders or provide for its citizens’ rudimentary needs.”<sup>31</sup>

The overall objectives regarding the civilian populace in JUO should be to minimize their interference with military operations while observing the necessary legal, moral, and humanitarian obligations toward them. Minimizing fires effects in JUO would lead to less of the civilian population disenfranchised and less rebuilding required during the post hostilities

phase. JUO contain the potential for tactical events to quickly become elevated to the operational or strategic level. Contributions from airpower armed with NLW to winning hearts and minds include: greater reduction in the footprint of U.S. forces, while minimizing noncombatant casualties and collateral damage, and depreciating the negative effects of media coverage.

The synchronization and integration of airpower improves balance of forces and functions, and increases the tempo to react to events and take action. As U.S. armed forces undergo transformation and pursue the GWOT; smaller and more dispersed and decentralized units will benefit from the responsiveness and operational reach that airpower brings to joint operations as a force multiplier. The local population should be more accepting of smaller contingent of foreign troops that are more capable of achieving their military objective when coupled with more capable airpower. NLW on manned aircraft (currently) or UCAVs (in the future) will add flexibility to combat operations and enhance force protection by limiting exposure of friendly forces to hostile elements, while limiting the risk of noncombatant casualties and collateral damage.

Noncombatant casualties and excessive collateral damage can result in the loss of perceived legitimacy and severely limit the utility of military force as a policy option in the furtherance of national interests.<sup>32</sup> Although civilians, noncombatants, and civilian property may not be specifically targeted, incidental injury and collateral damage are not unlawful. Precision weapons with smaller warheads, sometimes inert weapons, have been the answer to mitigating noncombatant casualties and collateral effects. Noncombatant casualties, to include serious injuries and fatalities, will continue to be a regrettable but unavoidable outcome when military power is employed, whether or not NLW are available.<sup>33</sup> Pursuing a

“less” lethal approach could do more towards winning the hearts and minds of the affected population, as minimized fires effects on the urban environment would lead to less of the civilian population disenfranchised and less rebuilding required during the post hostilities phase. Less visible damage and destruction could also result in greater support for the GWOT, both at home and in the international community.

The importance of the media can not be overstated. The focus of the international media was so concentrated in Sarajevo that the Commander in Chief [Allied Forces, South] stated, “Every bomb was a political bomb.”<sup>34</sup> Images of destroyed homes, damaged churches, and injured civilian casualties may have severe operational consequences, especially if this damage is exacerbated by world wide media reports and enemy attempts at unlawful characterization. Those media reports and claims may affect strategic decision making and lead to the loss of international and public support.<sup>35</sup> Given the support role of airpower in JUO, NLW would minimize the visual impact on the urban environment thereby lessening any negative press coverage.

Despite the potential, real limitations hampering the use of NLW and negatively affecting hearts and minds, include the Law of Armed Conflict (LOAC), loss of support, and the lethal potential. The biggest hindrance for further development of NLW is the LOAC. While this topic alone could generate numerous paper topics, the intent here is to present a sample of obstacles to implementation and integration of NLW on aircraft. Some legal experts question whether the existing body of international laws, some of which are more than 100 years old, are too antiquated to deal with non-lethal weapons and in need of revision, saying new technologies may demand new treaties.<sup>36</sup> Discussion is definitely warranted when you consider the “present day” conditions affecting the drafting of many of the treaties, and their

failure to account for the technological advancements of today. It is ironic that although it is permitted to kill combatants under the law of war, and thus to put them permanently out of action, it is not permitted to use methods or means of warfare exclusively designed to injure soldiers with injuries lasting not only the duration of the conflict but for the rest of their lives.<sup>37</sup> While injuries suffered as a result of electromagnetic weapons are typically less severe than those injuries resulting from conventional weapons, acoustical weapons run the risk of being an indiscriminate weapon.<sup>38</sup>

Numerous convention agreements and LOAC interpretations pose ethical problems with the development and use of NLW: 1925 Geneva Protocol (condemns the use in war of asphyxiating, poisonous or other gases, and of analogous liquids, materials or devices), 1972 Biological Weapons Convention (prohibits the development, production, stockpiling or retention of microbial or biological agents for use as weapons), 1980 Certain Conventional Weapons Convention (prohibits or restricts weapons which are deemed to be excessively injurious or to have indiscriminate effects), 1993 Chemical Weapons Convention (precludes the use of toxic chemicals as a method of warfare), and 1995 Blinding Laser Ban (prohibits the use of lasers specifically designed to cause permanent blindness of unenhanced vision).<sup>39</sup> The international Committee of the Red Cross has issued a statement reminding the world that the use of chemical agents – whether riot control or lethal – in warfare is prohibited under the 1993 Chemical Weapons Convention.<sup>40</sup> Nonetheless, each newly developed weapon must be designed and used in compliance with international law.<sup>41</sup>

The danger is as the Sunshine Project and other nonprofits have warned since late 2001 that the “War on Terrorism” may result in the United States using prohibited biological and chemical armaments, thereby violating the same treaties it purports to defend.<sup>42</sup> In

testimony before the House Armed Services Committee on 5 February 2003, Defense Secretary Donald H. Rumsfeld confirmed that the Pentagon has been trying to write ROE that would permit U.S. military forces to use riot control agents in Iraq.<sup>43</sup> Before the War on Terrorism began, British officials stated that they would not cooperate with the U.S. military in missions where U.S. troops used incapacitating chemicals.<sup>44</sup> Clearly, this issue of NLW is a contentious one among allies, potentially leading to a loss of support.

Another limiting factor with NLW, is even if properly employed severe injury or death are still a possibility. In October 2002, Russian Special Forces used a so-called “non-lethal” incapacitating biochemical weapon when storming the Palace of Culture Theater in Moscow, resulting in the deaths of over 100 hostages.<sup>45</sup> Peter Herby, of the International Red Cross’s legal division, said traditional weapons have a lethality rate of approximately 25 percent in combat, and also noted that about 15 percent of the people inside the Moscow theater died.<sup>46</sup>

NLW, just like conventional weapons, may be forbidden by law or policy and must meet the test of social acceptability. Consequently, such weapons have not been subjected to the same level of scrutiny as have most other families of weapons in our inventory.<sup>47</sup> A vast array of NLW technology is currently available and worth investing in to validate its effectiveness in improving airpower while overcoming some of the legal impediments. Clearly, more debate and dialogue on future capability and application would be beneficial. Despite these limitations NLW, many of which employ relatively new technologies, have not been fully tested in war or military operations other than war, such as SASO, and thus warrant further investigation in aerial implementation and application.

#### **IV. STABILITY AND SUPPORT OPERATIONS**

NLW may prove useful across the range of operation, which includes both conventional combat operations and the many categories of military operation other than war.<sup>48</sup> While the first two sections focused around the GWOT, this section considers the efficacy of airpower with NLW in SASO, as well as, other similar future operations at the other end of the continuum. As the mission states, crucial for SASO is minimizing the use of lethal force. As the future of likely military intervention points to conducting SASO in urban environments, NLW capability would mean a broader application of airpower in these missions. One question to address is how can airpower effectively promote stability and provide support with current capability?

Stability in urban areas tends to be tenuous at best, making the threat of some type of hostile action real in nearly all JUO. Currently tactics involving low altitude, high speed, “shows of force” passes or the use of the aircraft gun are most effective in SASO, as rules of engagement are typically most restrictive and the emphasis is usually on maintaining stability. The most important near term application of non-lethal technology appears to be in areas such as operations in “failed states,” as a counter to the non-Western form of warfare that is emerging globally, as a defense against the specter of further terrorists assaults upon our homeland, and as a means of responding to civil unrest in many of our inner cities.<sup>49</sup>

In early 1995, USMC LtGen Anthony Zinni was charged with protecting the final withdrawal of UN forces from Somalia and explored the prospects of using NLW. Although the NLW effects were marginal, LtGen Zinni’s aggressive support added credibility to the NLW effort.<sup>50</sup> Ten years later, that prospect remains the same, with an added proposal of NLW capability on aircraft.

Wider integration of NLW into the U.S. Army and Marine Corps could have reduced damage, saved lives, and helped to limit the widespread looting and sabotage that occurred after the cessation of major conflict in Iraq.<sup>51</sup> In this case, integration with airpower equipped with NLW could serve as a force multiplier, reducing the requirement to field more conventional forces. More significantly, in our nation-building endeavors in Iraq, Afghanistan, or Haiti, our troops need to be able to shift roles, on a block-by-block basis, serving as diplomats one moment, peacekeepers the next, and warfighters when under ambush, in order to win the peace and not just the battle.<sup>52</sup> The Unmanned Combat Air Vehicle (UCAV), while not anticipated to be fielded before 2007, has a concept for a directed energy weapon, such as a high-powered microwave.<sup>53</sup> In the process of transforming the way that we fight, we should emerge with a force that is more expeditionary, agile, and lethal than the present force and more capable of employing operational maneuver and precision effects capabilities to achieve victory.<sup>54</sup> This applies, as well to airpower, as an integral factor in increasing combat power.

What kind of message does the pursuit of NLW send to our adversaries? The international community? Martin Stanton argues, "...nonlethal weapons further convey to our potential adversaries that we are too squeamish to hurt even our enemies, let alone take casualties ourselves."<sup>55</sup> He further reiterates, "There could be nothing more damning than having someone shot dead with a sticky foam projector in his hand or having a water-cannon truck hit by a rocket-propelled grenade."<sup>56</sup> Without the threat of death and destruction, less die hard terrorists could be more willing to take up the cause. Best put, war is serious business, and it is not antiseptic, it is not risk-free, and it is not about sending signals.<sup>57</sup> As a condition of implementation, NLW would augment, not replace, current capability. NLW

would add to and compliment the conventional arsenal of airpower today as well as in the future.

## V. CONCLUSION

Senior leaders face a new level of public sensitivity concerning the proper role of military power as an element of national security.<sup>58</sup> In the course of fighting the GWOT, as well as future conflicts, U.S. forces will increasingly find themselves conducting JUO. U.S. military forces regularly perform their missions in an operational environment that would have been nearly inconceivable just a few decades ago.<sup>59</sup> With advancements in aircraft technology and precision weapons, airpower has historically demonstrated its worth. Despite that the density of the urban environment may severely limit the effective utilization of airpower, especially when considering noncombatant casualties and collateral damage.

Advancements in precision targeting and improvements in precision weapons have appeared to peak. Even in cases where precision weapons are used, there is, of course, some risk of collateral damage and consequent public outcry.<sup>60</sup> To mitigate these undesired effects in JUO smaller, more precise and less explosive munitions have been used. While not guaranteed, incorporation of NLW represents a potential capability increase when coupled with effective utilization of airpower, especially considering the following parameters: costs, hearts and minds, and SASO.

Because some NLW technology possess the potential of being reusable, conventional weapons could be selectively used and overall munitions cost could be lowered. Reduced collateral effects of NLW could result in less rebuilding required post conflict, as well as, the information garnered from captured vice killed terrorists, indirectly resulting in attaining operational objectives sooner. The net result potentially is lowered defense expenses. The

second objective in pursuing NLW for airpower is the notion of winning hearts and minds. The cumulative effect and, more importantly, media portrayal of less death and destruction, coupled with a smaller footprint of U.S. forces contribute more in gaining legitimacy and popular support for action. The future ability of airpower, in effect serving as a force multiplier, to participate in SASO and other military operations other than war is also improved with NLW. UCAV, although not scheduled to be operational until 2007, represents the future solution.

Standing treaties and LOAC represent a substantial impediment to the development and military application of some NLW technology, particularly with airpower. Current measures seem to be more in favor of conventional lethal fires over the less conventional non-lethal fires. With a vast array of NLW technology currently available, it is worth investing in to validate its effectiveness in improving airpower and pursue the debate in overcoming some of the legal impediments.

The Commandant of the Marine Corps, as the Executive Agent for the Department of Defense (DoD) Joint NLW Program, has the responsibility for providing program recommendations and for stimulating and coordinating Joint NLW requirements.<sup>61</sup> Two such recommendations for the NLW Directorate include: (1) increase overall funding, to provide for fielding current, incorporating off the shelf systems, and future NLW technology in manned and unmanned aircraft, and (2) engage the LOAC debate in an effort to gain greater acceptability of NLW and ease its implementation.

We must insure that our armed services retain the capability to dominate the battlefields of the 21<sup>st</sup> century. Our ability to use NLW effectively will be a critical component of our future capabilities.<sup>62</sup> The presence of non-lethal capability in no way

abrogates the option to employ deadly force, and as such, should always be backed up by a lethal system. As always, a lesson that bears reminding is that military leaders need to be able to make military decisions. Airpower's increased NLW capability simply provides the commander increased options in achieving his military objectives.

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<sup>1</sup> "FM 3-06.1/MCRP 3-35.3A/NTTP 3-01.04/AFTTP (I) 3-2.29 -- Aviation Urban Operations, Multiservice Procedures for Aviation Urban Operations," I-1, Air Land Sea Application Center, 15 April 2001, <<http://atiam.train.army.mil/portal/atis/adlsc/view/public/297176-1/fm/3-06.1/fm3-06.1.htm>> [December 2004].

<sup>2</sup> Joint Chiefs of Staff, "Doctrine for Joint Urban Operations," Joint Pub 3-06 (Washington, DC: 16 September 2002), I-1, Joint Electronic Library CD-ROM. Washington, DC: Joint Chiefs of Staff, August 2004.

<sup>3</sup> Phillip S. Meilinger, "The Origins of Effects-Based Operations," Joint Force Quarterly (October 2004): 116.

<sup>4</sup> Lim Tian Sing, "Air Power in the Gulf War and Kosovo Conflict," Journal of the Singapore Armed Forces (January-March 2001), 8 December 2003, <[http://www.mindf.gov.sg/safti/pointer/back/journals/2001/Vol27\\_1/2.htm](http://www.mindf.gov.sg/safti/pointer/back/journals/2001/Vol27_1/2.htm)> [19 January 2005].

<sup>5</sup> Phillip S. Meilinger, "The Origins of Effects-Based Operations," Joint Force Quarterly (October 2004): 116.

<sup>6</sup> Price T. Bingham, "Transforming Warfare with Effects-Based Joint Operations," Aerospace Power Journal (Spring 2001), 21 February 2001, <<http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/spr01/bingham.htm>> [14 December 2004].

<sup>7</sup> McPeak, Merrill A., "Leave the Flying to Us," WashingtonPost.com, 5 June 2003, <<http://pqasb.pqarchiver.com/washingtonpost/343997461.html?did=343997461&FMT=ABS&FMTS=FT&date=Jun+5%2C+2003&author=Merrill+A.+McPeak&desc=Leave+The+Flying+To+Us>> [20 December 2004].

<sup>8</sup> Joint Chiefs of Staff, "Doctrine for Joint Urban Operations," Joint Pub 3-06 (Washington, DC: 16 September 2002), I-1, Joint Electronic Library CD-ROM. Washington, DC: Joint Chiefs of Staff, August 2004.

<sup>9</sup> Ibid, II-7.

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<sup>10</sup> Hunter C. Keeter, ed., “Precision Strike Weapon Advances Create Mythology of Infallibility,” Navy League, July 2004,  
<[http://www.navyleague.org/sea\\_power/jul\\_04\\_19.php](http://www.navyleague.org/sea_power/jul_04_19.php)> [19 January 2005].

<sup>11</sup> “Airpower Overview,” 7, Global Security, 5 April 2004,  
<<http://www.globalsecurity.org/military/systems/aircraft/overview.htm>> [13 January 2005].

<sup>12</sup> Joint Chiefs of Staff, “Doctrine for Joint Urban Operations,” Joint Pub 3-06 (Washington, DC: 16 September 2002), B-2, Joint Electronic Library CD-ROM. Washington, DC: Joint Chiefs of Staff, August 2004.

<sup>13</sup> Robert J. Bunker, ed, “Nonlethal Weapons: Terms and References,” 5, USAF Institute for National Security Studies Occasional Paper 15, July 1997,  
<<http://www.usafa.af.mil/inss/OCP/OCP15.pdf>> [14 December 2004].

<sup>14</sup> “Joint Concept for Non-Lethal Weapons,” 10, Joint Concept for Non-Lethal Weapons, 5 January 1998, <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].

<sup>15</sup> “Pulsed Energy Projectile,” Global Security, 2 March 2004,  
<<http://www.globalsecurity.org/military/systems/ground/pep.htm>> [14 December 2004].

<sup>16</sup> Michael Sirak, “U.S. Air Force, Navy Eye Non-Lethal Weapon,” Jane’s Defence Weekly, 27 October 2004,  
<[http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jdw/history/jdw2004/jdw09302.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28non-lethal+%3CAND%3E+weapon+%29%29&Prod\\_Name=JDW&](http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jdw/history/jdw2004/jdw09302.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28non-lethal+%3CAND%3E+weapon+%29%29&Prod_Name=JDW&)> [15 January 2005].

<sup>17</sup> “X-45 Unmanned Combat Air Vehicle (UCAV),” Global Security, 30 June 2004,  
<<http://www.globalsecurity.org/military/systems/aircraft/ucav.htm>> [13 January 2005].

<sup>18</sup> “Lack of Nonlethal Weapons Capabilities Hinders U.S. Efforts in Postwar Iraq; Experts Urge Department of Defense to Increase Spending Seven-Fold,” Council On Foreign Relations, 26 February 2004, <<http://www.cfr.org/publication.php?id=6794>> [19 January 2005].

<sup>19</sup> “PGMs Could Reduce Collateral Damage in Iraq War,” Jane’s Defence Weekly, 9 April 2003,  
<[http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jdw/history/jdw2003/jdw04421.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28PGMS+%3CAND%3E+COULD+%3E+REDUCE+%3CAND%3E+COLLATERAL+%3CAND%3E+DAMAGE+%3CAND%3E+IN+%3CAND%3E+IRAQ+%3CAND%3E+WAR+29%29&Prod\\_Name=JDW&](http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jdw/history/jdw2003/jdw04421.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28PGMS+%3CAND%3E+COULD+%3E+REDUCE+%3CAND%3E+COLLATERAL+%3CAND%3E+DAMAGE+%3CAND%3E+IN+%3CAND%3E+IRAQ+%3CAND%3E+WAR+29%29&Prod_Name=JDW&)> [15 January 2005].

---

<sup>20</sup> Richard P. Hallion, “Precision Guided Munitions and the New Era of Warfare,” 12-13, Air Power Studies Centre Working Papers, 1995, <<http://www.fas.org/man/dod-101/sys/smart/docs/paper53.htm>> [14 December 2004].

<sup>21</sup> Hunter C. Keeter, ed., “Precision Strike Weapon Advances Create Mythology of Infallibility,” Navy League, July 2004,  
<[http://www.navyleague.org/sea\\_power/jul\\_04\\_19.php](http://www.navyleague.org/sea_power/jul_04_19.php)> [19 January 2005].

<sup>22</sup> Ibid.

<sup>23</sup> Department of Defense, Elements of Defense Transformation (Washington, DC: October 2004), 12.

<sup>24</sup> Richard P. Hallion, “Precision Guided Munitions and the New Era of Warfare,” 14-15, Air Power Studies Centre Working Papers, 1995, <<http://www.fas.org/man/dod-101/sys/smart/docs/paper53.htm>> [14 December 2004].

<sup>25</sup> Scott E. Jasper, “Transforming Joint Warfighting Capabilities,” Joint Force Quarterly (October 2004): 71.

<sup>26</sup> Jeffrey Record, “Bounding the Global War on Terrorism,” 33, Strategic Studies Institute, December 2003,  
<<http://www.carlisle.army.mil/ssi/pubs/display.cfm/hurl/PubID=207>> [15 December 2004].

<sup>27</sup> Transnational Terrorism: The Threat to Australia, Chapter 2,” 3, Australian Government-Department of Foreign Affairs and Trade, 15 July 2004,  
<<http://www.dfat.gov.au/publications/terrorism/chapter2.html>> [14 December 2004].

<sup>28</sup> “Non-Lethal, Subdue the Enemy Without Killing,” 14, US Military Non-Lethal Weapons, 10 November 1997,  
<<http://www.geocities.com/Area51/Shadowlands/6583/project035.html>> [15 December 2004].

<sup>29</sup> D. W. Craig, “Asymmetrical Warfare and the Transnational Threat: Relearning the Lessons from Vietnam,” 4, Advanced Military Studies Course-AMSC 1, 9 September 1998,  
<<http://198.231.69.12/papers/amsc1/006.html>> [14 December 2004].

<sup>30</sup> “What’s New With Smart Weapons,” Global Security, 5 April 2004,  
<<http://www.globalsecurity.org/military/systems/munitions/intro-smart.htm>> [13 January 2005].

<sup>31</sup> Jeffrey Record, “Bounding the Global War on Terrorism,” 18-19, Strategic Studies Institute, December 2003,  
<<http://www.carlisle.army.mil/ssi/pubs/display.cfm/hurl/PubID=207>> [15 December 2004].

---

<sup>32</sup> Ibid, 4.

<sup>33</sup> “Joint Concept for Non-Lethal Weapons,” 7, Joint Concept for Non-Lethal Weapons, 5 January 1998, <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].

<sup>34</sup> Joint Chiefs of Staff, “Doctrine for Joint Urban Operations,” Joint Pub 3-06 (Washington, DC: 16 September 2002), III-20, Joint Electronic Library CD-ROM. Washington, DC: Joint Chiefs of Staff, August 2004.

<sup>35</sup> “FM 3-06.1/MCRP 3-35.3A/NTTP 3-01.04/AFTTP (I) 3-2.29 -- Aviation Urban Operations, Multiservice Procedures for Aviation Urban Operations,” I-6, Air Land Sea Application Center, 15 April 2001, <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/297176-1/fm/3-06.1/fm3-06.1.htm>> [December 2004].

<sup>36</sup> Michael Sirak and Kim Burger, “The Promise And The Peril of Non-Lethal Weapons,” Jane’s Defence Weekly, 6 August 2003, <[http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jpr/history/jpr2003/jdw05563.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28THE+%3CAND%3E+PROMISE++%3CAND%3E++THE+%3CAND%3E+PERIL+%3CAND%3E+OF+%3CAND%3E+NON-LETHAL+%3CAND%3E+WEAPONS+%29%29&Prod\\_Name=JDW&](http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jpr/history/jpr2003/jdw05563.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28THE+%3CAND%3E+PROMISE++%3CAND%3E++THE+%3CAND%3E+PERIL+%3CAND%3E+OF+%3CAND%3E+NON-LETHAL+%3CAND%3E+WEAPONS+%29%29&Prod_Name=JDW&)> [15 January 2005].

<sup>37</sup> “Non-Lethal, Subdue the Enemy Without Killing,” 10-11, US Military Non-Lethal Weapons, 10 November 1997, <<http://www.geocities.com/Area51/Shadowlands/6583/project035.html>> [15 December 2004].

<sup>38</sup> Ibid, 11.

<sup>39</sup> Robert J. Bunker ed, “Nonlethal Weapons: Terms and References,” 22-23, USAF Institute for National Security Studies Occasional Paper 15, July 1997, <<http://www.usafa.af.mil/inss/OCP/OCP15.pdf>> [14 December 2004].

<sup>40</sup> Elisa D. Harris, “Nonlethal Chemical Weapons Pose Different Threat,” Baltimore Sun, 27 March 2003, <[http://www.clw.org/control/eharris\\_rca.html](http://www.clw.org/control/eharris_rca.html)> [15 December 2004].

<sup>41</sup> “Non-Lethal, Subdue the Enemy Without Killing,” 15, US Military Non-Lethal Weapons, 10 November 1997, <<http://www.geocities.com/Area51/Shadowlands/6583/project035.html>> [15 December 2004].

<sup>42</sup> “US Plans for Use of Gas in Iraq,” The Sunshine Project, 7 February 2003, <<http://www.sunshine-project.org/publications/pr/pr070203.html>> [15 December 2004].

---

<sup>43</sup> Elisa D. Harris, “Nonlethal Chemical Weapons Pose Different Threat,” Baltimore Sun, 27 March 2003, <[http://www.clw.org/control/eharris\\_rca.html](http://www.clw.org/control/eharris_rca.html)> [15 December 2004].

<sup>44</sup> “US Plans for Use of Gas in Iraq,” The Sunshine Project, 7 February 2003, <<http://www.sunshine-project.org/publications/pr/pr070203.html>> [15 December 2004].

<sup>45</sup> Ibid.

<sup>46</sup> Michael Sirak and Kim Burger, “The Promise And The Peril of Non-Lethal Weapons,” Jane’s Defence Weekly, 6 August 2003, <[http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jpr/history/jpr2003/jdw05563.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28THE%3CAND%3E+PROMISE++%3CAND%3E++THE+%3CAND%3E+PERIL+%3CAND%3E+OF+%3CAND%3E+NON-LETHAL+%3CAND%3E+WEAPONS+%29%29&Prod\\_Name=JDW&](http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/janesdata/mags/jpr/history/jpr2003/jdw05563.htm@current&QuerryText=%3CAND%3E%28%3COR%3E%28THE%3CAND%3E+PROMISE++%3CAND%3E++THE+%3CAND%3E+PERIL+%3CAND%3E+OF+%3CAND%3E+NON-LETHAL+%3CAND%3E+WEAPONS+%29%29&Prod_Name=JDW&)> [15 January 2005].

<sup>47</sup> “Joint Concept for Non-Lethal Weapons,” 8, Joint Concept for Non-Lethal Weapons, 5 January 1998, <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].

<sup>48</sup> Ibid, 9.

<sup>49</sup> Robert J. Bunker ed, “Nonlethal Weapons: Terms and References,” 5, USAF Institute for National Security Studies Occasional Paper 15, July 1997, <<http://www.usafa.af.mil/inss/OCP/OCP15.pdf>> [14 December 2004].

<sup>50</sup> “Non-Lethal Weapons,” Global Security, 9 June 2004, <<http://www.globalsecurity.org/military/systems/munitions/non-lethal.htm>> [13 January 2005].

<sup>51</sup> “Lack of Nonlethal Weapons Capabilities Hinders U.S. Efforts in Postwar Iraq; Experts Urge Department of Defense to Increase Spending Seven-Fold,” Council On Foreign Relations, 26 February 2004, <<http://www.cfr.org/publication.php?id=6794>> [19 January 2005].

<sup>52</sup> Department of Defense, Elements of Defense Transformation (Washington, DC: October 2004), 7.

<sup>53</sup> “X-45 Unmanned Combat Air Vehicle (UCAV),” Global Security, 30 June 2004, <<http://www.globalsecurity.org/military/systems/aircraft/pep.htm>> [14 December 2004].

<sup>54</sup> Department of Defense, Elements of Defense Transformation (Washington, DC: October 2004), 8.

---

<sup>55</sup> Martin N. Stanton, “What Price Sticky Foam?,” 65, Parameters, U.S. Army War College Quarterly, Autumn 1996, <<http://carlisle-www.army.mil/usawc/Parameters/96autumn/stanton.htm>> [19 January 2005].

<sup>56</sup> Ibid.

<sup>57</sup> “Kosovo Conflict Shows Not About Limits of Airpower,” Air Force Association, 12 April 1999, <<http://www.afa.org/media/press/kosovo.asp>> [19 January 2005].

<sup>58</sup> “Joint Concept for Non-Lethal Weapons,” 12, Joint Concept for Non-Lethal Weapons, 5 January 1998, <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].

<sup>59</sup> Ibid.

<sup>60</sup> Richard P. Hallion, “Precision Guided Munitions and the New Era of Warfare,” 6, Air Power Studies Centre Working Papers, 1995, <<http://www.fas.org/man/dod-101/sys/smart/docs/paper53.htm>> [14 December 2004].

<sup>61</sup> “Joint Concept for Non-Lethal Weapons,” 1, Joint Concept for Non-Lethal Weapons, 5 January 1998, <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].

<sup>62</sup> Robert J. Bunker ed, “Nonlethal Weapons: Terms and References,” 6, USAF Institute for National Security Studies Occasional Paper 15, July 1997, <<http://www.usafa.af.mil/inss/OCP/OCP15.pdf>> [14 December 2004].

## Bibliography

- “Airpower Overview.” Global Security. 5 April 2004.  
<<http://www.globalsecurity.org/military/systems/aircraft/overview.htm>> [13 January 2005].
- Bingham, Price T. “Transforming Warfare with Effects-Based Joint Operations.” Aerospace Power Journal (Spring 2001). 21 February 2001.  
<<http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/spr01/bingham.htm>> [14 December 2004].
- Bunker, Robert J. ed. “Nonlethal Weapons: Terms and References.” USAF Institute for National Security Studies Occasional Paper 15. July 1997.  
<<http://www.usafa.af.mil/inss/OCP/OCP15.pdf>> [14 December 2004].
- Bush, George W. “President Declares ‘Freedom at War with Fear.’” Address to a Joint Session of Congress and the American People. 20 September 2001.  
<<http://www.whitehouse.gov/news/releases/2001/09/print/20010920-8.html>> [21 January 2005]
- Craig, D.W. “Asymmetrical Warfare and the Transnational Threat: Relearning the Lessons from Vietnam.” Advanced Military Studies Course-AMSC 1. 9 September 1998.  
<<http://198.231.69.12/papers/amsc1/006.html>> [14 December 2004].
- “FM 3-06.1/MCRP 3-35.3A/NTTP 3-01.04/AFTTP (I) 3-2.29 -- Aviation Urban Operations, Multiservice Procedures for Aviation Urban Operations.” Air Land Sea Application Center. 15 April 2001.  
<<http://atiam.train.army.mil/portal/atia/adlsc/view/public/297176-1/fm/3-06.1/fm3-06.1.htm>> [December 2004].
- Jasper, Scott E. “Transforming Joint Warfighting Capabilities.” Joint Force Quarterly (October 2004): 69-76.
- “Joint Concept for Non-Lethal Weapons.” Joint Concept for Non-Lethal Weapons. 5 January 1998. <<http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM>> [15 December 2004].
- “Joint Direct Attack Munition (JDAM).” Global Security. 30 June 2004.  
<<http://www.globalsecurity.org/military/systems/munitions/jdam.htm>> [13 January 2005].
- Hallion, Richard P. “Precision Guided Munitions and the New Era of Warfare.” Air Power Studies Centre Working Papers. 1995. <<http://www.fas.org/man/dod-101/sys/smart/docs/paper53.htm>> [14 December 2004].

“Lack of Nonlethal Weapons Capabilities Hinders U.S. Efforts in Postwar Iraq; Experts Urge Department of Defense to Increase Spending Seven-Fold.” Council On Foreign Relations. 26 February 2004. <<http://www.cfr.org/publication.php?id=6794>> [19 January 2005].

Meilinger, Phillip S. “The Origins of Effects-Based Operations.” Joint Force Quarterly (October 2004): 116-122.

“Non-Lethal Weapons.” Global Security. 9 June 2004.  
<<http://www.globalsecurity.org/military/systems/munitions/non-lethal.htm>> [14 December 2004].

“PGMs Could Reduce Collateral Damage in Iraq War.” Jane’s Defence Weekly. 9 April 2003.  
<<http://www4.janes.com/K2/doc.jsp?t=A&K2DocKey=/content1/jamesdata/mags/jdw/history>> [15 January 2005].

“Pulsed Energy Projectile (PEP).” Global Security. 2 March 2004.  
<<http://www.globalsecurity.org/military/systems/munitions/non-lethal.htm>> [14 December 2004].

Record, Jeffrey. “Bounding the Global War on Terrorism.” Strategic Studies Institute. December 2003. <<http://www.carlisle.army.mil/ssi/pubs/display.cfm/hurl/PubID=207>> [15 December 2004].

Stanton, Martin N. “What Price Sticky Foam?” Parameters, Autumn 1996 (21 August 1996): 63-68. Reprint, Proceedings, January 1996. <<http://carlisle-www.army.mil/usawc/Parameters/96autumn/stanton.htm>> [19 January 2005].

“Transnational Terrorism: The Threat to Australia, Chapter 2.” Australian Government-Department of Foreign Affairs and Trade. 15 July 2004.  
<<http://www.dfat.gov.au/publications/terrorism/chapter2.html>> [14 December 2004].

“What’s New With Smart Weapons.” Global Security. 5 April 2004.  
<<http://www.globalsecurity.org/military/systems/munitions/intro-smart.htm>> [13 January 2005].

Van Creveld, Martin. “The Rise and Fall of Air Power.” Military History Quarterly, Vol 8, No 3 (Spring 1996): 76-81.

Von Hippel, Karin. “Non-State Actors as Transnational Terrorists.” United Nations and Global Security. 10 February 2004. <[http://www.un-globalsecurity.org/pdf/Von\\_Hippel\\_paper\\_terrorism.pdf](http://www.un-globalsecurity.org/pdf/Von_Hippel_paper_terrorism.pdf)> [December 2004].

U.S. Department of Defense. Elements of Defense Transformation. Washington, DC: October 2004.

U.S. Joint Chiefs of Staff. "Doctrine for Joint Urban Operations." Joint Pub 3-06. Washington, DC: 16 September 2002. Joint Electronic Library CD-ROM. Washington, DC: Joint Chiefs of Staff, August 2004

Zakaria, Fareed. "Face the Facts: Bombing Works." Newsweek, (3 December 2001): 53.