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NEW HORIZONS

Canada's Future Operating Environment and the Need for Non-Lethal Weapons

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Abstract

The trend of ever increasing lethality of weapons will most probably continue

Introduction

History has shown that since the beginning of warfare the trend has been to generally increase the lethality of weapons and their destructive effects on humans and structures. This trend will most probably continue into the future; however, now more than ever, new Non-Lethal (NL) technologies will allow the disabling of the enemy without necessarily destroying him. This age-old tendency of seeking evermore destructive power will require a major paradigm change in the way we conduct military operations if Non-Lethal Weapons (NLW) are to make a significant contribution on the future battlespace.

The former Chief of Land Staff, Gen Hillier, has recently stated in its Force Employment Concept for the Army[1], that the Land Forces must be prepared to operate in urban terrain. He has acknowledged that cities will have a significant impact on the future battlespace and that the Army must be prepared to conduct operations in the context of the "three-block war".[2] This future battlespace, when compounded with the complex nature of asymmetric threats, will require that the Canadian soldier be better prepared and equipped to fight and succeed.

Further, the Federal Government, in its 2005 Federal Budget, committed $12.8 billion over five years for Canada's military, the biggest increase to the defence budget in

[1] Canada. Department of National Defence. *Purpose Defined, The Force Employment Concept for the Army*, available from: http://ducimus.com/The%20force%20employment%20concept%20for%20the%20army.pdf; Internet; accessed 13 March 05.

[2] Ibid, p 4.

the last 20 years. This increase in military spending is a strong indication that the Prime Minister favours a stronger military and wishes to elevate Canada's stature internationally. This position was made clear during the last Liberal Party convention with the adoption of "a commitment to increase support for Canada's peacekeeping initiatives."[3] This influx of new monies and clear intent from the Federal Government will most likely result in a sustained commitment of the Canadian Forces (CF) abroad to conduct international stability missions in failed or fragile states.

This paper contends that the Canadian Land Forces leadership must promulgate a clear policy as to the development and fielding of NLW and related technologies in order to fully exploit NL capabilities beyond Crowd Confrontation Operations. These NL capabilities must become part of the soldier's warfighting tools and enable him to effectively minimize, whenever possible, casualties, fratricide and collateral damage during combat operations. This paper will first address the essential aspects of the future-operating environment. It will then provide a summary description of current and future NL capabilities that are or could be available in the near future. It will then follow with a description of the benefits and the major legal considerations of NL capabilities. Finally it will address current Land Forces NL capabilities and conclude with recommendations for a way ahead.

[3] Liberal Party of Canada - Official Web Site. Available from: http://www.liberal.ca/news_e.aspx?site=news&news=945. Internet; accessed 13 March 05.

The Future Operating Environment

The world is now more inter-connected than it has ever been and globalization will continue to be one of the main trends in the future international system.[4] The recent and rapid advancement of information and communication technology will continue to accelerate this trend in the years to come. Further, this globalization trend will be compounded by a marked increased in global urbanization. According to the United Nations, it is estimated that "urban dwellers in developing countries are increasing by 150000 people per day."[5] The majority of this growth will occur in developing countries where 25 to 50 percent of urban dwellers live in impoverished slums.[6]

The current urbanization trend will play an important part in the determining the future operating environment. Future potential threats, from weak or failed states or non-state actors, will likely make best possible use of urban centres to mitigate Western military technological advantages.[7] This should not come as a surprise, as Dr Legault points out. Having to conduct operations in urban areas is not new; however, " ...combat is increasingly taking place in urban areas: of the last 250 missions of the US Marine Corps, 237 have involved urban combat operations."[8] Hence, it is almost certain, given

[4] Canada. Department of National Defence, Directorate of Land Strategic Concepts, Future Force: Concepts for Future Army Capabilities, 2.

[5] Canada. Department of National Defence. Dispatches - Lessons Learned for Soldiers - Training for Urban Operations. Vol 9 No 2, May 2002, 1.

[6] Canada. Department of National Defence, Directorate of Land Strategic Concepts, Future Force: Concepts for Future Army Capabilities, 7.

[7] Ibid, p 20.

[8] Roch Legault, The Urban Battlefield and the Army: Changes and Doctrines, Canadian Military Journal, Autumn 2000. p 40, available from: http://www.journal.forces.gc.ca/engraph/Vol1/no3/pdf/39-44_e.pdf, Internet; accessed 13 March 05.

the increased rate of urbanization throughout the world, that Canadian soldiers will also inevitably be required to operate more frequently in urban centres.

The Canadian Army doctrine defines urban operations as, "operations undertaken within a battlespace primarily comprised of a built up area, regardless of the type of activity or level of conflict."[9] In recent years, Canadian soldiers have conducted operations in urban areas in Bosnia, Croatia, Haiti and Kabul to name a few. Given the nature of peacekeeping missions, urban centres cannot be avoided, as these centres form an integral part of their area of operations. Further, to assume that they will not be involved in combat due to the fact that they are conducting peace support operations is a very dangerous assumption as past operations, such as the Medak pocket in 1993, have demonstrated.

Urban operations are very unique due to several factors. Most urban centres are the focal point for government and industrial power as well as being the cultural centre of the societies that inhabit them. For this reason cities may quickly become the centre of gravity for a given conflict, which immediately makes them an integral part of the operating environment. Past urban conflicts have demonstrated that urban combat normally results in higher number of casualties both for the attacker and the defender. As well, significant damage to buildings and infrastructure also occurs. Further, the presence and density of the non-combatant population and infrastructure, and the

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[9] Canada. Department of National Defence. Dispatches - Lessons Learned for Soldiers - Training for Urban Operations. Vol 9 No 2, May 2002, 3.

possibility of collateral damage gives urban combat a whole new political, social and ethical dimension.

The proliferation of communication technologies has created what has been named the CNN effect. The media can quickly galvanize the masses. Truesdell, in her study of *The Ethics of NLW*, writes, "People were transfixed by the images of the Persian Gulf War and the remarkable success that the allies achieved with extraordinarily few casualties."[10] In another example, images of US soldiers being dragged through the streets of Mogadishu, in October of 1993, also galvanized American public opinion. More than ever the public wants to win with minimal bloodshed and casualties as possible. This strong pressure to reduce casualties and collateral damage "undermines the national will and restricts the means of engagement."[11] Belligerents using the cover of urban areas may use the CNN effect to their advantage. NL technologies may offer ways to mitigate the CNN effect by reducing the visual impact and by gaining the moral high ground by using alternate means to lethal force.

Recent urban conflicts have highlighted the difficulties of applying traditional military force and highlighted the need for options in the application of force. Too often, commanders on the ground are faced with very limited options to enforce compliance; either by deterring the enemy with threats of using lethal force or by the application of

[10] Amy Truesdell, *The Ethics of Non-Lethal Weapons*, The Strategic and Combat Studies Institute, The Occasional, UK , 6.

[11] Non-Lethal Technologies: Implication for Military Strategy. Accessed from: http://www.fas.org/man/dod-101/sys/land/docs/occppr03.htm, Internet; accessed 12 March 05, 14.

lethal force.[12] Often, the later, especially in peacekeeping missions, is not possible, due to restrictive Rules of Engagement (ROE).

Non-Lethal Weapons Defined

The term "Non-Lethal" has the potential to create some confusion and false expectations of bloodless battles. Canadian and US doctrine define Non-Lethal Weapons as:

> … weapons, munitions and devices 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.[13]

The US definition adds the following:

> Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning. NLW are intended to have one, or both, of the following characteristics: they have relatively reversible effects on personnel or material and they affect objects differently within their area of influence.[14]

[12] US, NLW Multiservice Procedures for the Tactical Employment of Nonlethal Weapons. Accessed from: http://www.globalsecurity.org/military/library/policy/army/fm/90-40/fm_90-40_NLW.pdf, Internet; accessed 13 March 05.

[13] Canada, Department of National Defence, Firepower – B-GL-300-007/FP-001, 1999, 101.

[14] US Department of Defence Directive, Number 3000.3, July 9 1996; available from: http://www.dtic.mil/whs/directives/corres/html2/d30003x.htm. Internet; accessed 13 March 05.

Several important points come out of this definition:

- NLW are designed to neutralize personnel and material, hence reduce the lethal effect on personnel and damage to materiel.

- NLW reduce the chances that fatalities will occur; this does not imply that NLW will have a zero probability to produce fatalities or permanent injury to personnel. For example, NLW such as pepper spray have contributed to an estimated 113 deaths according to the International Association of Chiefs of Police.[15]

- NLW are not limited to peacekeeping missions. And as suggested by a report from the US Office of the Assistant Secretary of Defence for Special Operations and Low-Intensity Conflict,[16] are applicable throughout the full spectrum of conflict.

- NLW include elements of relative reversibility of effects to humans unlike traditional military weapons that are designed to inflict indiscriminate and permanent effects on their target.[17]

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[15] Non-lethal Force. Internet accessed : http://en.wikipedia.org/wiki/Non-lethal

[16] Margaret-Anne Coppernoll, The Nonlethal Weapons Debate, available from: http://www.nwc.navy.mil/press/Review/1999/spring/art5-sp9.htm. Internet; accessed 13 March 05, 3.

[17] Joint Concept for Non-Lethal Weapons. Available from: http://www.fas.org/man/dod-101/sys/land/docs/NONLETH.HTM; Internet; accessed 14 March 05.

The main difference that distinguishes lethal weapons from NLW is the intent in use of these weapons. When a lethal weapon is used the intent is to apply lethal force to a specific target with sufficient high probability that it will cause catastrophic failure of the target. However, NLW do not seek to kill an adversary but to incapacitate him with short-term reversible effects. The term non-lethal underscores the intent not the possible outcome of its effect on the target.

Non-Lethal Capabilities.

Due to the limits in scope and length of this paper, only NL capabilities applicable to urban operations will be discussed summarily. There exists many different ways to classify the numerous current and potential NLW; however for sake of simplicity and clarity this paper will classify NLW capabilities into the six following categories.[18]

- Kinetic-Energy Technologies. Examples of NLW using this technology are rubber bullets for crowd dispersal, 40mm foam rubber baton round, 12 gauge rubber round, sting ball grenade to name a few. These kinetic munitions target people with non-destructive means in order to incapacitate target momentarily. Kinetic-Energy technologies can be combined with other NLW capabilities such as delivery of electric shock or pepper spray. One major limiting factor that is common with most Kinetic-Energy technologies is their short range. However, for an urban environment where 95% of potential targets are within 50m, many current Kinetic-Energy weapons offer sufficient stand off range to be effectively

[18] An Assessment of NLW Science and Technology, National Research Council of the National Academies, National Academic Press, Washington DC, 24.

employed. Of major concern, with the employment of Kinetic-Energy projectiles, is the control of blunt trauma injuries, especially at very close range, as some of these injuries can be fatal.

- Chemical Technologies. These technologies fall into two broad sub-categories: anti-personnel and anti-materiel. Anti-personnel chemical technologies are not new and have been used in the past military and police forces. Chemical anti-personnel NLW can make use of calmative, neural inhibitors, irritants, and odour producing chemicals to temporarily impede or incapacitate individual or crowds. Anti-material chemical technologies are intended to destroy or disrupt the use of equipment, supplies, vehicles or other material combat resources. One of the main concerns with the use of these chemical technologies is the legal implication of developing and using such chemical technologies. This aspect will be addressed later in this paper.

- Directed Energy Weapons. These weapons can further be divided into three sub-categories:
    - Low-Energy Lasers and Incandescent Devices. These devices work by disrupting human vision. They range from flash grenades that temporarily disorient and blind a person to low power laser dazzlers than can blind momentarily or damage permanently human sight or even electro-optical devices. [19]

[19] An Assessment of NLW Science and Technology, National Research Council of the National Academies, National Academic Press, Washington DC, 28.

- High Energy Lasers. These lasers are described as having "sufficient energy to ablate, melt, or burn material."[20] These lasers could be mounted on an aircraft platform and used to target vehicles or other selected material targets. This capability is not developed yet and is only in the conceptual development stage.

- High-Power Microwave and Millimetre-Wave Technology. This category of NLW can further be divided into two subcategories: anti-material that acts to destroy or disrupt electronic equipment and counter-personnel that is designed to produce pain or disorientation on human. In the anti-material role High Power Electromagnetic Pulse (EMP) generators or Electromagnetic bomb technology has matured to become more and more technically feasible. EMP bombs produce a single intense pulse that can destroy non-shielded electronic devices.[21] The Active Denial System (ADS) technology demonstrator is one such counter-personnel system that "projects a focused, speed-of-light milli-meter-wave energy beam to induce an intolerable heating sensation on an adversary's skin…"[22]

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[20] Ibid, p 29.

[21] Carlo Kopp, The Electromagnetic Bomb – a Weapon of Electrical Mass Destruction, available from: http://www.airpower.maxwell.af.mil/airchronicles/kopp/apjemp.html. Internet; accessed 16 March 05.

[22] United States Air Force, Active Denial System. Available from: http://www.de.afrl.af.mil/factsheets/activedenial.html, Internet; accessed 16 March 05.

- Acoustic Technologies. Acoustic NLW use audible frequencies or very low frequencies (below 50 HZ) to either induce high levels of pain or disorient individuals or disperse hostile crowds. This technology, however, is considered somewhat immature and has several drawbacks such as fast attenuation with range, danger to friendly forces and inability to focus energy downrange, to name a few.[23]

- Electrical Technologies. These NLW discharge high voltage, high frequency and low currents into humans causing uncontrollable muscle contraction. These devices are commonly known as "stun guns" and are in high use with police forces and have been fielded to US troops in Iraq.[24] These electrical NLW can also disrupt vehicle engines by pulsing high currents through the engine to immobilize the vehicle.

- Barriers and Entanglements. Barriers such as concertina wire and Hesco bastions have been available for years; however some major drawbacks of barriers and entanglements are its volume, weight and deployment times. Some of the more novel barrier technologies include polymer adhesives to hold belligerents in place, low friction material that is used to impede personnel or vehicle movement, or vehicle nets. One main advantage of these novel approaches is their ability to

[23] An Assessment of NLW Science and Technology, National Research Council of the National Academies, National Academic Press, Washington DC, 31.

[24] Defence Tech, *G.I.'s in Iraq Get Tasers, Other "Non-Lethals"*, available from: http://www.defensetech.org/archives/000682.html, Internet; accessed 16 March 05.

deploy quickly and a small transportable volume.[25] Adhesive barriers are currently available and were used by the US Marines during operation United Shield in 1995.

Clearly, military forces may have at their disposal a broad spectrum of NL technologies from which they can employ in urban areas. Some of these technologies are more mature than others, some have already been fielded and others will not be fielded for several years to come, while some of them may never be fielded at all. If these technologies are to play a major role in future conflicts they must be able to bring a distinct advantage to the soldier in the urban battlefield.

Benefits of NLW in the Future Operating Environment

NLW have several appealing attributes that can benefit the conduct of military operations in the urban environment. As mentioned earlier, one of the characteristics of the urban environment is the density and proximity of its non-combatant population. NLW provide an alternative to the use of lethal force. More and more modern democracies are demanding to win wars with less blood and less casualties. This added flexibility will reduce the inherent risk to non-combatants. Less collateral damage would also hinder the ability of potential belligerents to use the CNN effect to their advantage. NLW would allow us to maintain a moral high ground based on the fact that we would be doing all that is feasibly possible to reduce the number of casualties. NLW have already

[25] An Assessment of NLW Science and Technology, National Research Council of the National Academies, National Academic Press, Washington DC, 29.

demonstrated their effectiveness in Operation Iraqi Freedom and are having "a major impact in cordon and search operations."[26]

NLW offer the possibility to limit collateral damage to urban infrastructure thus reducing post-conflict costs and human suffering. NLW that use EMP technology have the advantage of destroying the electronics that enable the Command and Control (C2) of an adversary without risking the physical destruction of the surrounding infrastructure. Recent wars have demonstrated the effectiveness and advantages of precision-guided munitions in reducing collateral damage; however, these conventional precision-guided munitions still function by physically destroying everything within their effective radius, regardless of what is in that radius. NLW would take precision munitions a step forward and transform *location precision* into *effect precision*.[27] These weapons are highly discriminate since they offer the possibility to match the weapon with the exact desired target effects, i.e. no need to physically destroy infrastructures to disable the C2 capability of an adversary if what we want to achieve is the destruction of the network that enables his C2 capability. This decrease in physical collateral damage will not only minimize human suffering and fatalities but also enable easier reconstruction in the post-conflict phase.

[26] USMC, JNLWD Newsletter, available from: https://www.jnlwd.usmc.mil/documents/Newsletter5_3_04.pdf, Internet; accessed 5 March 05, 6.

[27] Non-Lethal Technologies: Implication for Military Strategy. Accessed from: http://www.fas.org/man/dod-101/sys/land/docs/occppr03.htm, Internet; accessed 12 March 05.

NLW provide soldiers on the ground with the ability to apply a graduated military response to resolve a situation before having to resort to potential lethal force. By the proper application of NLW effects, soldiers will be able to show resolve and increased deterrence before having to resort to deadly force. The use of NLW must abide by the same principles of necessity and proportionality as when applying any level of force under the ROE; however NLW will allow for alternative recourses before resorting to lethal force.

Legal Considerations of NLW

A legal review of the major principles and conventions that are relevant to NLW will be discussed next. The international law of armed conflict, Article 36 of 1977 Protocol I Additional to the 1949 Geneva Convention, stipulates that:

> In the study, development, acquisition or adoption of a new weapon, means or methods of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.[28]

This article requires states to have the legal obligation to ensure that any new weapon, lethal or NL that is introduced into its arsenal is compliant with the above protocol or any other international agreement.

[28] Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol 1), Art 36. available from: http://www.unhchr.ch/html/menu3/b/93.htm, Internet; accessed 24 March 05.

Article 35 of the above protocol, prohibits weapons, munitions, means, and methods of warfare, which have for effect the "superfluous injury or unnecessary suffering… [and that]… may be expected, to cause widespread, long-term and severe damage to the natural environment".[29] Further, article 51 of the same protocol also prohibits indiscriminate effects of weapons or methods of warfare.[30] These articles reflect the principles of just war theory of proportionality, discrimination, humanity and necessity. Hence, the design and use of NLW must be analysed against the following criteria:

- They must not cause suffering that is needless or disproportionate to the military necessity. More precisely, they should not cause major, long-term, or irreversible physiological effects (blindness, cancer, paralysis, etc);

- They must be able to discriminate between non-combatants and combatants;

- They must not adversely affect the environment.

[29] Ibid, Art 35.

[30] Ibid, Art 51.

NLW must also comply with several international treaties and conventions such as:

Many, however, still content that this protocol has many potential loopholes and still does not address all the dangers to the human eye from lasers that are targeting other optical devices. Also, this protocol does not limit the use of legitimate lasers such as range finders that might accidentally result in blinding the eye. Further, the US military has developed dazzling lasers that do not necessarily blind the eye but dazzle the eye momentarily. However, as Rappert has argued, it is difficult to establish "[w]here does dazzling ends and blinding begins…"[33]

The second example will be the use of chemical agents in NLW. The 1993 Chemical Weapons Convention (CWC) prohibits the development, production, or retention of chemical weapons, "…which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals."[34] No distinction is made with regard to the chemical weapons being lethal or non-lethal. Article 1 of the CWC also restricts states to "…not to use riot control agents as a method

NLW that use calmative technologies, neural inhibitors, irritants, and malodorants to temporarily impede or incapacitate, could fall under the restrictions of the CWC. The US, however, has labelled some of these technologies as riot control agents in order to pursue development of these anti-personnel non-lethal technologies.[36] As argued by Rappert, "the prohibitions of the CWC might be side-stepped"[37] by nations that label chemical technologies as riot control agents in order to allow their development and potential use in military operations other than war.

The same arguments could be made for numerous other non-lethal technologies, such as: microbial agents that degrade materials, super lubricants or anti-personal NLW that induce gastrointestinal convulsions. Different interpretations by different nations could simply side step the prohibitions of the current treaties and conventions. These examples show some of the complexities and potential failures of current treaties in dealing with new and emerging non-lethal technologies.

Risks of NLW

As seen previously NLW may provide an advantage to the soldier in the future battlespace, however, non-lethal technologies have also inherent risks. Countries, such as the US have used ambiguities concerning the definition of calmatives non-lethal

[36] Margaret-Anne Coppernoll, The Nonlethal Weapons Debate, available from: http://www.nwc.navy.mil/press/Review/1999/spring/art5-sp9.htm. Internet; accessed 13 March 05, 4.

[37] Brian Rappert, *Non-Lethal Weapons as Legitimizing Forces? : Technology, Politics, and the Management of Conflict*. London, Frank Cass Publishers, 161.

technologies and loopholes in the CWC in order to pursue research and potentially use similar chemical non-lethal technologies in armed conflicts.[38,39]

Clearly, the potential to transgress the Laws of Armed Conflict (LOAC) and the international conventions limiting the development and use of certain weapons or capabilities is real. One can easily see how the use of these chemical NLW may inadvertently create confusion on the battlefield and encourage an opponent to use conventional chemicals weapons as a counter reaction, hence having the opposite intended effect and escalating the conflict to an unacceptable level.

Others will content that NLW will "serve only to increase the vulnerability of the affected people to other forms of injury."[40] Soldiers that are incapacitated or immobilized by NLW such as sticky foams will be easy targets to lethal weapons. Actions such as these are clearly prohibited under the LOAC. Even the Canadian Army's doctrinal manual on Firepower suggests that NLW be used to "enhance the effectiveness of lethal weapons in warfighting situations. For example, a position might be engaged with NLW designed to neutralize personnel prior to an attack with conventional weapons…"[41] This position is clearly contrary to the spirit and intent of NLW. It also contradicts Article 41 of the Geneva Additional Protocol 1 1977, which

[38] Kerry Boyd, Rumsfeld Wants to Use Riot Control Agents in Combat; available from: http://www.armscontrol.org/act/2003_03/nonlethal_mar03.asp, Internet; accessed 23 March 05.

[39] The Sunshine Project, Non-Lethal Weapons Research in the US: Calmatives and Malodorants; available from: http://www.sunshine-project.org; Internet; accessed 24 March 05.

[40] Robin Coupland, No nonlethal chemical weapons; available from: http://www.findarticles.com/p/articles/mi_qa3622/is_200310/ai_n9343846, Internet; accessed 24 March 05.

[41] Canada, Department of National Defence, Firepower – B-GL-300-007/FP-001, 1999, 116.

stipulates that a person who is "*hors de combat* shall not be made the object of attack." [42] The above views demonstrate the legal confusion and the potential issues with the use of NLW in regard to their application with lethal force.

Organizations such as Amnesty International warn that various countries commonly use commercially available NLW such as stun guns, which use high voltage electroshocks to temporarily incapacitate a person and inflict severe pain, as a torture device.[43] Amnesty International contends that the widespread use of NLW, if unchecked and unregulated, will in essence provide easily accessible tools to the torturers across the world. International awareness of misuse of certain NL technologies is certainly a good thing; however, one cannot easily make a direct link that NLW are promoting torture in many countries throughout the world. Any device or tool not used for its original purpose can easily be used as a torture device when in the hands of a malicious person.

The risk of going doing down the 'slippery slope' is often associated with the use NLW. The prospect of few casualties, low collateral damage and a 'bloodless war' may influence governments to engage in conflicts more easily.[44] Such expectations could increase the frequency that governments engage in other's nations affairs. Governments and military commanders must clearly understand that NLW must always be backed up

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[42] Canada, Office of the Judge Advocate General. *Collection of Documents on the LOAC*, 2004 Ed. Edited by Directorate of Law Training. Ottawa: DND, 2004. Art 41 of the Geneva Additional Protocol 1 1977, 157.

[43] Amnestry International, Arming the Tortures – Electro-shock Torture and the Spread of Stun Technology, available from: http://web.amnesty.org/library/Index/engACT400011997, Internet; accessed 24 March 05.

[44] Canada, Department of National Defence, Firepower – B-GL-300-007/FP-001, 1999, 120.

by lethal means. As well, the use of non-lethal means may be seen by another nation as an invitation to escalation or give the perception that they put our troops under unnecessary risk. Hence, the ROEs to employ NL or lethal means must be clearly stipulated and understood by all.

One can easily see from the above risks that the development and use of NL technologies is not as clear-cut as it might seem at first glance. Nations will have to carefully assess the risks involved in the development and use of NL technologies against the potential benefits in the application of military force to resolve a conflict.

Current Land Forces NLW Capabilities

Canadian Forces doctrine assesses that "NLW have the potential to be employed across the spectrum of conflict from operation other than war (OOTW) to general warfighting."[45] However, its use of NLW in past operations has been extremely modest and mainly restricted to NL capabilities such as pepper spray in peace support operations for self-defence. Only recently, did the CF procure additional NL capabilities in support of operations for OP ATHENA ROTO 2 in Afghanistan. In August 2003 the Director of Land Requirements (DLR) procured the following non-lethal munitions: 40mm sponge and CS (irritant) powder round, sound and flash distraction grenades, 12 gauge 'rubber' and 'bean bag' rounds, and crowd confrontation CS grenades.[46]

[45] Ibid, p 113.
[46] Capt S. Dufour, Project Director for Crowd Confrontations Non-Lethal Systems, Director Land Requirements 5-3, E-mail 5 Apr 05.

These non-lethal munitions were procured as part of a Non-Lethal Capability Set (NLCS) through an Unforecasted Operational Requirement (UOR) to augment the force protection capability of our deployed troops and were to be specifically used for the conduct of Crowd Confrontation Operations (CCO)[47] only. These NLCS are comprised of individual protective equipment, NLW, ancillary equipment and training devices,[48] to properly equip an infantry company. Unfortunately, at the time of writing this paper, no information was available from the Army's Lessons Learned Centre in Kingston[49] on the benefits or lessons learned with regard to the introduction of less-lethal munitions in Afghanistan.

The principle document outlining the Canadian perspective with regard to NLW is found in B-GL-300-007/FP-001 *Firepower.*[50] This document outlines the types and capabilities of NLW and provides general employment principles of NLW. Even though the document recognizes the potential benefit that NLW may have across the spectrum of conflict, it falls short of providing any near or long term vision as to where the CF is going in regard to the introduction of NLW into its arsenal of capabilities.

At present there seems to be a genuine interest in the potential capabilities that NLW may provide to the CF. However, this interest has not translated into any form of clear acquisition strategy of new NLW capabilities other than for force protection during

[47] Ibid.

[48] Canada. Unique Operation: Crowd Confrontation Operations, B-GJ-005-307/FP-090, 2003.

[49] Telcon with SO Operations maj M. Boulé dated 23 March 05.

[50] Canada, Department of National Defence, Firepower – B-GL-300-007/FP-001, 1999.

Crowd Confrontation Operations outside Canada. The Crowd Confrontation Non-Lethal System (CCNLS) project is the only capital project in the Land Forces that is currently considering the acquisition of NLW capabilities. The CCNLS project, which has a total budget of $14.4M, is planning for an initial implementation in 2009 of a NL CCO capability set for operations outside Canada;[51] however, it is only in the identification phase and has not received preliminary project approval. No other additional acquisitions of NLW capabilities, other than for CCO, are currently planned to augment the NL capabilities of the Land Forces.

Other high level papers such as the Strategic Capabilities Investment Plan (SCIP),[52] which identifies the long term CF capabilities required to meet the CF objectives as set out by strategy 2020, and the Strategic Capability Planning paper for the CF which provides a mechanism for outlining priorities and assessment methods for Long Term Capital Plan programmes,[53] make no mention of any new NLW capabilities. The recent acquisitions for NL capabilities for OP ATHENA seems to be a bottom up approach based on field user demands to have greater flexibility in the application of force in the conduct of operations, however, the use of these new NL capabilities are restricted to CCO only.

[51] Capt S. Dufour, Project Director for Crowd Confrontations Non-Lethal Systems, Director Land Requirements 5-3, E-mail 5 Apr 05.

[52] Canada, DND, Strategic Investment Capability Plan: available from: http://www.vcds.forces.gc.ca/dgsp/pubs/rep-pub/ddm/scip/intro_e.asp, Internet; accessed 2 Apr 05.

[53] Canada, DND, Strategic Capability Planning for the Canadian Forces; available from: http://www.vcds.forces.gc.ca/dgsp/pubs/rep-pub/dda/strat/intro_e.asp, Internet; accessed 2 Apr 05.

Finally there are two areas were CF seems to be lagging behind. The first area is in regard to the legality on the use of NLW. To the knowledge of the author, the CF office of the Judge Advocate General has not conducted a full review of current and proposed non-lethal technologies and determined which of these technologies are acceptable for Canada under the LOAC and the various protocols that Canada is signatory to. A complete legal review would assist and educate users at all levels and help focus their efforts when introducing new NL capabilities.

The second area that needs to be developed further is in regard to the physiological and psychological effects of NL technologies. Lieutenant Colonel Dick, from the Directorate of Science and Technology, contents that "non-lethal technologies are not well understood because there is a scarcity of scientifically collected data."[54] Canada does not have an extensive research program of NL technologies. In order to help focus the non-lethal Research and Development (R&D) and gain a better understanding of these technologies, a top down holistic approach must be adopted. The Land Force leadership must provide clear direction where the CF is heading with regard NL technologies and its use. Obviously, the direction given must be an informed one and done in cooperation with all the stakeholders such as the R&D community and the legal advisers.

[54] LCol J.B. Dick, Directorate of Science and Technology Land 2, Defence R&D Canada, National Defence Headquarters, e-mail 31 March 05.

Conclusion

The range of operations the CF may undertake in the future may remain very broad; however, one invariable factor is clear, the prospect of Canadian soldiers conducting military operations in urban centres will remain high and likely increase from present levels. Operations in urban centres will inevitable expose Canadian soldiers to

NLW are not, however, without risks. As with any weapon, NLW, if used for the wrong intent, have the potential to increase the vulnerability of combatants as well as transgressing the LOAC and/or international treaties. Canada will have to carefully assess the risks involved in the development and use of NL technologies. Users must clearly understand the physiological and psychological effects human targets as well as the environmental effects of NL technologies in order for them to make an informed decision on which NL technologies are viable.

The Canadian Land Forces have very limited NL capabilities, and their use is only authorized for Crowd Confrontation Operations. In order to expand the NL capabilities in the Land Forces throughout the spectrum of conflict the following five recommendations are proposed.

Firstly, the Land Forces must take a holistic top down approach towards NL capabilities. The chain of command must promulgate a NL capability policy with clear vision and intent as to the development and fielding of NLW and related technologies. As the Army moves through its transformation, the Director General Land Combat Development[55] should be mandated to conduct a comprehensive capabilities-based assessment of NLW.

Secondly, the Land Forces must conduct a comprehensive legal review of all the NL technologies in order to determine which technologies, from a legal perspective, are

[55] DGLCD incorporates the Directorates of Strategic Concepts and Army Doctrine, the Director of Land Personnel Strategy and an operational research team. Its mandate is to guide and co-ordinate the development of operating concepts, capability requirements and validate design for force employment.

suitable for further development or use. This is crucial if users are to make informed decisions on NL capabilities and remain within the legal framework of the LOAC and International Treaties.

Further, the Land Forces must mandate the Defence Research community to conduct R&D on NL technologies. Understanding the technology and its effects on the desired targets and environment is crucial if users are to make informed decisions.

Additionally, once clear NL capability policy has been articulated, the Defence R&D community should establish joint programs with our allies R&D communities (mainly the US and UK) in order to benefit from their knowledge of NL capabilities.

Finally, create an overarching Joint NLW capability and employment concept. This concept will help educate and guide the Senior Leadership in the application of NL capabilities, and provide a clear framework on how we will integrate NL capabilities in the conduct of Canadian military operations.

NL technologies have a tremendous potential to increase the combat capabilities and the effectiveness of our military forces over the full spectrum of operations. These technologies will also reduce the inherent risks to non-combatants and reduce collateral damage. As a minimum, we have the moral obligation to seriously consider these NL technologies, and if found viable, implement them into our arsenal of military capabilities.

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