Lasers Are Lawful as Non-Lethal Weapons

Mr. Richard B. Jackson
Special Assistant for Law of War Matters, International and Operational Law Division
Office of the Judge Advocate General
Rosslyn, Virginia

Mr. Jason Ray Hutchison
Intern, International and Operational Law Division
Office of the Judge Advocate General
Rosslyn, Virginia

Deployed Soldiers are often faced with the dilemma of how to warn vehicles approaching checkpoint or convoy operations, particularly at night, to avoid having to use deadly force. Lasers are a novel means for achieving that end. Consider, for example, Lieutenant General (LTG) Pete Chiarelli's remarks in a 19 May 2006 Department of Defense (DOD) news briefing:

> [W]hen you consider the alternative, which is a bullet, I honestly believe we can use [lasers]; we can use them effectively. We can use them in ways that don't necessarily even, quote, unquote, "light up" the individual, but provide a marker so individuals realize that they are approaching a danger point. And we will do everything possible to inform the Iraqi people of their use, so when they see them, they react appropriately.[1]

In LTG Chiarelli's estimation, "[lasers will] provide a very, very important additive to our way of helping Iraqis avoid situations where we have to apply deadly force."[2] In response to recent requests from Soldiers in the field, the Office of The Judge Advocate General, International and Operational Law Division (OTJAG-IO), issued several opinions on the use of lasers to warn or deter approaching vehicles or individuals. All of these opinions were coordinated with the DOD Law of War Working Group and accepted by the service representatives.[3]

The Requirement for a Legal Review

Various regulations require a review of the legality of all weapons that will be procured to meet a military requirement of the U.S. armed forces.[4] The United States is one of a handful of nations that has implemented the requirements of Article 36 of Additional Protocol I, which provides the following:

> In the study, development, acquisition or adoption of a new weapon, means or method 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.[5]

---

[1] News Release, U.S. Department of Defense, *DOD News Briefing with Lt. Gen. Chiarelli from Iraq* (19 May 2006), http://www.defenselink.mil/Transcripts/Transcript.aspx?TranscriptID=252 [hereinafter *DOD News Briefing with Lt. Gen. Chiarelli from Iraq*]. Lieutenant General Chiarelli is the Commander of Multi-National Corps Iraq.

[2] *Id*.

[3] The DOD Directive established the DOD Law of War Working Group, which includes service representatives, Joint Chiefs of Staff Legal Counsel, and DOD General Counsel representatives. *See* U.S. DEP'T OF DEFENSE, DIR. 2311.01E, DOD LAW OF WAR PROGRAM para. 5.1.3 (9 May 2006). Office of the Judge Advocate General, International and Operational Law Division opinions are not generally available to the public, as they are pre-decisional advice under Freedom of Information Act Exemption No. 5. *See* U.S. DEP'T OF ARMY, REG. 25-55, THE DEPARTMENT OF THE ARMY FREEDOM OF INFORMATION ACT PROGRAM para. 3-200 (1 Nov. 1997).

[4] U.S. DEP'T OF DEFENSE, DIR 5000.1, THE DEFENSE ACQUISITION SYSTEM para. E1.1.15 (12 May 2003) [hereinafter DOD DIR. 5000.1]; U.S. DEP'T OF ARMY, REG. 27-53, REVIEW OF LEGALITY OF WEAPONS UNDER INTERNATIONAL LAW para. 4.c (1 Jan. 1979) [hereinafter AR 27-53]; U.S. DEP'T OF NAVY, SEC'Y OF THE NAVY INSTR. 5711.8A, REVIEW OF LEGALITY OF WEAPONS UNDER INTERNATIONAL LAW (29 Jan. 1988); U.S. DEP'T OF AIR FORCE, INSTR. 51-402, WEAPONS REVIEW (13 May 1994).

[5] Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts art. 36, June 8, 1977, 1125 U.N.T.S. 3 [hereinafter AP I]. The United States signed AP I on 12 December 1977, with declarations; however, the United States has not ratified AP I and is not likely to do so due to disagreements with several of its provisions regarding the definition of lawful combatants. Letter of Transmittal from President Ronald Reagan, Protocol II Additional to the 1949 Geneva Conventions, and Relating to the Protections of Victims of Non International Armed Conflicts, S. Treaty Doc. No. 2, 100th Cong., 1st Sess., at III (1987). The United States, however, has agreed that certain of provisions of AP I constitute a codification of customary international law. *See* U.S. DEP'T OF STATE, CUMULATIVE DIGEST OF UNITED STATES PRACTICE IN INTERNATIONAL LAW, 1981-1988, at 3434-35 (1993). The United States approach to this requirement pre-dates AP I. The first DOD instruction outlining

The purpose of the legal review is to ensure that the intended use of the weapon, weapon system, or munition is consistent with customary international law and the international law obligations of the United States, including law of war treaties and arms control agreements to which the United States is a party. The definition of "weapons" includes, "[c]hemical weapons and all conventional arms, munitions, instruments, mechanisms, or devices which have an intended effect of injuring, destroying, or disabling enemy personnel, materiel, or property."[6] The definition of "weapons systems" provides for, "The weapon itself and those components required for its operation, but is limited to those components having a direct injuring or damaging effect on individuals or property (including all munitions, such as projectiles, small arms, mines, explosives, and all other devices that are physically destructive or injury producing)."[7]

Non-lethal weapons should also be reviewed to "ensure consistency with the obligations assumed by the U.S. government under all applicable treaties, with customary international law, and, in particular, the laws of war."[8] Non-lethal weapons 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."[9] Unlike conventional weapons, non-lethal weapons "employ means other than gross physical destruction to prevent the target from functioning."[10] In accordance with DOD directives and Army regulations, the laser devices and weapons systems recently reviewed for employment in theater were reviewed under the criteria of Article 36.

Laser Target Designator Reviews: Beamshot 2000 and Surefire Lasers

In the first opinion, which Multi-National Corps—Iraq (MNC-I) requested, OTJAG-IO reviewed the use of the Beamshot 2000 and Surefire Lasers as aiming or targeting devices, which are used to advise approaching vehicles or individuals that they are being targeted. The Beamshot "Greenbeam" 2000 consists of a Class 3a laser, 532 nanometer (nm) green laser diode, which is mounted on various weapon systems as an aiming device. It has a one-mile nighttime range and is visible in broad daylight with a dot size of 1.75 inches at 100 yards. The Surefire L72 Visible Red Laser Sight is also a Class 3a laser with a power of up to 5 milliwatts (mW) and a red light wavelength of 635 nm. Both lasers are classified as "eye-safe" and are not intended to be used to "dazzle" or otherwise disorient the individual being targeted.[11] The MNC-I intends to authorize use of the laser target designator to warn approaching persons or vehicles that they are being targeted.[12]

Effects

These lasers, under standard conditions of use, would not cause eye injury. Direct exposure of the eye, even momentary exposure through the ocular pupil, to a Class 3a continuous wave laser aiming device would appear very bright under low luminance conditions (e.g., dawn, dusk, or night). Exposure incidents of this nature usually result in rubbing of the eyes and concern about whether injury occurred because the laser appeared so bright. The aversion response, which includes head and eye movements, pupil constriction, and a blink and squint response, would limit the exposure of any one area of the retina and prevent eye injury.[13] Prolonged and deliberate staring into a Class 3a laser, where all five mW enter through the pupil for

---

this approach was dated 1974. *See* U.S. DEP'T OF DEFENSE, INSTR. 5500.15, REVIEW OF LEGALITY OF WEAPONS UNDER INTERNATIONAL LAW (16 Oct. 1974). In addition, the United States has participated in frequent discussions with the International Committee of the Red Cross and other nations to assist them in developing their own weapon review programs. *See also* INT'L COMM. OF THE RED CROSS, A GUIDE TO THE LEGAL REVIEW OF NEW WEAPONS, MEANS, AND METHODS OF WARFARE: MEASURES TO IMPLEMENT ARTICLE 36 OF ADDITIONAL PROTOCOL I OF 1977 (2006).

[6] AR 27-53, *supra* note 4, para. 3.a.

[7] *Id.* para. 3.b.

[8] U.S. DEP'T OF DEFENSE, DIR. 3000.3, POLICY FOR NON-LETHAL WEAPONS para. 5.6.2 (9 July 1996) [hereinafter DOD DIR. 3000.3].

[9] *Id.* para. 3.1.

[10] *Id.* para. 3.1.1.

[11] Dr. Bruce Stuck, Detachment Director of USAMRD/MCMR (the U.S. Army Medical Research Detachment-Walter Reed Army Institute of Research, a U.S. Army agency responsible for researching laser safety), provided an e-mail detailing the parameters for eye-safe lasers (under 5 mW of power). According to Dr. Stuck, exposure to these lasers would not result in injury without prolonged exposure (about five seconds). See below for a detailed description of the effects. E-mail from Dr. Bruce Struck, Detachment Director of USAMRD/MCMR, to author (5 Dec. 2005) (on file with author).

[12] *See DOD News Briefing with Lt. Gen. Chiarelli from Iraq*, *supra* note 1. United States Army Sergeant Brendan Woolworth tried the Beamshot 2000 on a vehicle approaching his convoy in Iraq in February 2006. "He pulled off to the side of the road and stopped," Woolworth said. "He got the message. It looked like he just hadn't been paying attention." James Rainey, *A Safer Weapon, With Risks*, L.A. TIMES, May 18, 2006, at 1. *See also* E-mail from MNC-I Operational Law Attorney, subject: Request for Laser Use (Dec. 2, 2005) (on file with author); Memorandum, C3, Coalition Forces Land Component Command, subject: Use of Lasers for Traffic Control onConvoy Routes (6 Nov. 2005) (on file with author).

[13] Lund, et al., *Transient Visual Effects*, Walter Reed Army Institute of Research, U.S. Army Medical Research Detachment, Brooks AFB, Texas (1999).

approximately five seconds, could result in minimal retinal injury or maculopathy (temporary spots or obscured vision). In addition, direct, intra-beam exposure to low powered lasers (like the Class 3a) appears bright and will disrupt ocular performance, particularly of vision-critical tasks like driving a vehicle. These are temporary effects that have more impact in low-light conditions since the effect is exacerbated by the difference between the laser light and ambient light.[14]

Analysis

As long as the aiming devices are not used to subject individuals to "dazzling" effects, they will not be considered weapons under the provisions of *Army Regulation* (*AR*) *27-53*. "Dazzling" effects refer to temporary incapacitation of individuals by flash blindness and glare.[15] "Dazzler" lasers are designed for this purpose; in contrast, laser target designators can only produce such effects through significantly prolonged exposure, which contradicts laser target designators' standard conditions of use. This intended use is reflective in the "dazzler" laser's Class 3b label, compared to the Class 3a label for laser target designators. Paragraph 3(a) of *AR 27-53* defines weapons as "devices which have an intended effect of injuring, destroying, or disabling enemy personnel, materiel, or property."[16] Likewise, the non-lethal weapons directive defines non-lethal weapons as being "explicitly designed and primarily employed so as to incapacitate personnel or materiel."[17] The intended use of the Beamshot 2000 and Surefire Lasers, even considering potential collateral effects or unintended consequences, does not meet these definitions of a weapon and accordingly, does not require a legal review under either set of directives.

Even if laser target designators were considered weapons, Beamshot 2000 and Surefire Lasers are not prohibited by the Blinding Laser Protocol, Protocol IV to the 1980 Convention on Conventional Weapons (CCW), which prohibits laser weapons that are "specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to unenhanced vision."[18] Although the United States is a party to the CCW, it is not a party to Protocol IV.[19] The U.S. government has, nonetheless, implemented its own proscription on use or transfer of laser weapons "specifically designed to cause permanent blindness."[20] Neither of the lasers described above are designed to cause permanent blindness nor will they inflict such an injury during normally usage.

"Dazzler" Laser Reviews: XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST Laser Systems

The second set of lasers that OTJAG-IO reviewed are intended to be deployed by the Rapid Equipping Force, an Army element established by the Army Chief of Staff to quickly respond to field requirements and provide innovative or improved equipment to Soldiers in the field. "Dazzler" lasers are intended to temporarily disorient individuals, including drivers of approaching vehicles, and deter them from approaching U.S. military or coalition forces. Because they are intended to be

---

[14] Stamper, et al., *Human Pupil and Eyelid Response to Intense Laser Light: Implications for Protection*, *in* PERCEPTUAL & MOTOR SKILLS 775-82 (2002).

[15] Information in this article about lasers, their types, uses, and effects, was obtained generally from the following sources: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, NON-IONIZING RADIATION PROTECTION STUDY NO. 25-MC-04ZU-06, LASER RADIATION HAZARD EVALUATION OF THE B.E. MEYERS & CO. INC., MINIGREEN LASER POINTER/DAZZLER, MODEL 532-M (4-6 Apr. 2006) (DRAFT); U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE, NON-IONIZING RADIATION PROTECTION STUDY NO. 25-MC-04Y7-06, LASER RADIATION HAZARD EVALUATION OF THE PROTOTYPE HANDHELD OPTICAL SURVEILLANCE AND TARGETING LASER SYSTEM (21-23 Mar. 2006) (DRAFT); U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, NON-IONIZING RADIATION PROTECTION STUDY NO. 25-MC-04G0-06, LASER RADIATION HAZARD EVALUATION OF THE PROOF OF PRINCIPLE LASER WARNING DEVICE—THE HELIOS (5 Dec. 2005); U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, NON-IONIZING RADIATION PROTECTION STUDY NO. 25-MC-04JS-06, LASER RADIATION HAZARD EVALUATION OF THE B.F. MEYERS & CO. INC., GREEN BEAM DESIGNATOR, GBD III LASER, (Nov. 2005); U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, NON-IONIZING RADIATION PROTECTION STUDY NO. 25-MC-04A1-05, LASER RADIATION HAZARD EVALUATION OF THE XTREME ALTERNATIVE DEFENSE SYSTEMS, LTD. (XADS), PHOTONIC DISRUPTER/GREEN (PD/G-105), (30 Aug. 2005).

[16] AR 27-53, *supra* note 4, para. 3(a).

[17] DOD DIR. 3000.3, *supra* note 8, para. 3.1.

[18] *See* Protocol IV on Blinding Laser Weapons art. 1, annexed to Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, Oct. 13, 1995, 35 I.L.M. 1218 (1996) [hereinafter Blinding Laser Protocol] (prohibiting the use or transfer of blinding laser weapons). The above treaty is also known as the 1980 Convention on Conventional Weapons.

[19] The President submitted Protocol IV to the United States Senate on 7 January 1997 for its advice and consent. Protocol IV on Blinding Laser Weapons, S. Treaty Doc. 105-1, 105th Congress, 1st Session (7 Jan. 1997). When Protocol IV was drafted, it contained no provision for signature by CCW parties. Senate action remains pending.

[20] Memorandum, Secretary of Defense, subject: DOD Policy on Blinding Lasers (17 Jan. 1997) [hereinafter DOD Policy on Blinding Lasers]. Several programs for stronger "blinding" lasers have actually been cancelled in adherence to Protocol IV. *See* News Release, U.S. Dep't of Defense, DOD Announces Policy on Blinding Lasers (12 Oct. 1995), http://www.defenselink.mil/releases/1995/b090195_bt482-95.html.

employed as non-lethal weapons, "dazzler" lasers are subject to review under the non-lethal weapons directive.[21] As with the above set of opinions on laser target designators, opinions on "dazzler" lasers were also reviewed by the other military services and the DOD Law of War Working Group.

Description and Mission

The XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST weapon systems are 532 nm lasers, which are intended for use by Soldiers as warning devices at checkpoints to determine an oncoming vehicle driver's intent.[22] All five systems are green laser devices that deliver a limited amount of force, at a distance, without causing injury. They are an easily transportable means to temporarily blind or disorient groups or individuals. The systems are designed to be used by operators with little or no technical background and can be hand-carried or mounted on individual- and crew-served weapons.[23] In most cases, only a few hours of training are required for new operators to be qualified to use the weapons. These weapon systems can be used as an alternative to lethal force to temporarily incapacitate, confuse, delay, or restrain an adversary in a variety of situations. They can be used as a discretionary or disorienting device on operational roadblocks and checkpoints and by mounted or dismounted patrols. Such lasers can also be used for stopping vehicles. Techniques, tactics, and procedures (TTP's) developed for the weapon systems suggest their use when:

- Lethal force is not appropriate;
- Lethal force is justified and available for back-up but lesser force may subdue the aggressor;
- Lethal force is justified but could cause collateral effects such as injury to bystanders or damage to property and the environment; or,
- Otherwise justified by unit SOP and/or Rules of Engagement.[24]

These weapon systems are intended to augment, but not replace, lethal weapons within the use of force continuum and are designed to deter and dissuade civilian vehicles from encroaching on a specified area or security zone established during convoy and vehicle checkpoint operations.[25] The asymmetric threat facing deployed Soldiers, including vehicle-borne improvised explosive devices (VBIED's), requires a non-standard, aggressive means of mitigating the threat while deterring innocent vehicle drivers and determining driver's intent at a safe distance. These "dazzlers" will help prevent the death of innocent civilians while providing Soldiers extended range and reaction time to destroy threat vehicles.

Effects

The XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST are Class 3b lasers with sufficient power (100, 75, 250, 465, and 120 mW, respectively) to cause ocular injury at short ranges (17, 18, 10, 10, and 8.2 meters, respectively, based on a 0.25-second unaided exposure) and temporary visual disorientation or flash-blindness at longer ranges. The hazard classification for a laser is based on the most restrictive Maximum Permissible Exposure (MPE) calculated. The MPE for a 0.25-second unintentional exposure to a 532 nm continuous wave laser is 2.6m W/cm.^{2} To classify a laser, an accessible emission limit (AEL) is calculated by multiplying the MPE by the area of the limiting aperture, based on the laser wavelength and 0.25-second exposure duration. The Class 3b laser upper limit is 500 mW.[26] The output (or AEL) of the XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST lasers are all under that limit [150 mW, 125 mW, 235 mW, 465 mW (with all seven lasers combined), and 120 mW (with two of four lasers combined), respectively]. All five weapons have a disorienting or flash-blinding effect on targeted personnel up to at least 200 meters in daylight and 370 meters at night. These effects are temporary and have more impact in low-light conditions since the effect is exacerbated by the greater difference between the laser light and ambient light.[27]

---

[21] DOD DIR. 3000.3, *supra* note 8, para. 5.6.

[22] *See e.g.*, Memorandum, Department of the Army, Rapid Equipping Force, subject: Request for Legal Review, GBDIII Laser System (Feb. 7, 2006) (on file with author).

[23] Memorandum, Marine Corps Combat Development Command, subject: Concept of Employment for the B.E. Meyers Laser Dazzler, Model GBD-III C (undated). The Marine Corps is the executive agent for development of non-lethal weapons.

[24] *Id.*

[25] Presentation, U.S. Army Rapid Equipping Force, Laser Warning Device Techniques, Tactics and Procedures (18 Oct. 2005) (on file with author).

[26] *Id.*

[27] Stamper, et al., *supra* note 14, at 775-82.

These lasers, under standard conditions of use, would not cause eye injury. A momentary direct exposure of the eye, even momentary exposure through the ocular pupil, to a Class 3b continuous wave laser would appear very bright under low luminance conditions (e.g., dawn, dusk, or night). Exposure incidents of this nature are similar to laser target designators and usually result in rubbing of the eyes and concern about whether injury occurred because the laser appeared so bright. The aversion response, which includes head and eye movements, pupil constriction, and a blink and squint response, would limit the exposure of any one area of the retina and prevent eye injury.[28] Prolonged and deliberate staring into a Class 3b laser could result in retinal injury or maculopathy, but the danger of immediate or permanent injury is minimal outside the nominal ocular hazard distance (NOHD). The NOHD for enhanced vision (i.e., glasses, binoculars, and night vision devices) is 116 meters for the XADS PD/G-105, 120 meters for the MiniGreen, 69 meters for the GBD III, 95 meters for the HELIOS, and 56 meters for the GHOST.[29] These limitations are largely based on safety standards established by the American National Standards Institute, *American National Standard for Safe Use of Lasers*.[30] The most likely type of injury caused by this wavelength of laser is photochemical damage, causing cumulative retinal damage. The available research, however, indicates that initial eye damage lessens over time during healing. Based on the scientific data accumulated during tests of these and related systems in 2005, the standard conditions of use for these lasers will not cause permanent blindness to enhanced or un-enhanced vision.[31]

The main and intended effects of these systems are flash-blindness and glare. A subject will experience temporarily intense, non-injurious light in his eyes. In addition, direct, intra-beam exposure to these lasers appears bright and will disrupt ocular performance, particularly in vision-critical tasks like driving a vehicle. When correctly employed, "dazzlers" produce a temporary loss of clear sight by affecting the central field of vision, similar to other intense light sources, such as a bright photographic flash or an oncoming vehicle's high-beam headlights. An individual without enhanced vision who is illuminated or dazzled by the laser's beam would suffer no permanent injury when engaged at the distances provided in the systems' capabilities and limitations documents. That individual may experience some residual color images or visual spottiness lasting a matter of seconds. In general, the impairment effect will rapidly dissipate, with a minimum recovery time of one second.[32]

Law of Armed Conflict Considerations

In accordance with DOD and Army policy, the following three law of armed conflict issues must be addressed whenever any weapon is reviewed: (1) whether the weapon causes unnecessary suffering that is disproportionate to the military advantage reasonably expected to be gained from the use of the weapon; (2) whether the weapon may be controlled in such a manner that it is capable of being directed against a lawful target (i.e., it is not indiscriminate in its effect); and (3) whether there is a specific rule of law or treaty prohibiting the use of the weapon.

Unnecessary Suffering

The primary relevant treaty for the first issue is the Hague Convention (IV) Respecting the Laws and Customs of War on Land of 18 October 1907.[33] Article 23(e) of its Annexed Regulations prohibits the employment of "arms, projectiles, or material calculated to cause unnecessary suffering."[34]

There is no agreed-upon definition for unnecessary suffering. Whether weapons or munitions cause unnecessary suffering is ascertained by determining whether the injury, including injuries resulting in death, to combatants is manifestly

---

[28] Lund, et al., *supra* note 13.

[29] *See* sources cited *supra* note 25.

[30] AMERICAN NATIONAL STANDARDS INSTITUTE, AMERICAN NATIONAL STANDARD FOR SAFE USE OF LASERS, Z136.1-2000 (2000).

[31] *See* sources cited *supra* note 25; Memorandum, Department of Defense, Force Transformation Office, to DOD General Counsel, subject: Full-Spectrum Effects Platform/Sheriff; Request for Legal Review (26 Sept. 2005). The data in this paragraph is primarily derived from the DOD memorandum and its supporting studies regarding the HELIOS system and other Green Laser systems. The data in the studies was augmented by e-mail discussion with Dr. Stuck of the U.S. Army detachment responsible for laser safety, which is collocated with the Air Force Research Laboratory at Brooks AFB, TX. E-mail from Dr. Bruce Struck, Detachment Director of USAMRD/MCMR, to author (on file with author). In order to prevent misuse of the systems, the opinion recommended that maximum exposure times be calculated for each device at the intended ranges and briefed to the operators.

[32] *See generally* WILLIAM KOSNIK & PETER SMITH, FLASH BLINDNESS AND GLARE MODELING OF OPTICAL RADIATION (2003).

[33] *See* Hague Convention No. IV Respecting the Laws and Customs of War on Land, Oct.18, 1907, 36 Stat. 2277, T.S. 539, *reprinted in* U.S. DEP'T OF THE ARMY, PAM. 27-1, TREATIES GOVERNING LAND WARFARE (Dec. 1956).

[34] *Id.* art. 23(e).

disproportionate to the weapon's or munition's stated purpose(s)—its intended use(s)—and the military advantage reasonably expected to be gained from its use.[35] This balancing test cannot be conducted in isolation. A weapon or munition's effects must be weighed in light of comparable, lawful weapons or munitions in use on the modern battlefield.[36]

Lethal conventional weapons may destroy targets lawfully through blast, penetration, or fragmentation, and may kill or seriously injure enemy combatants or other persons posing a threat or potential threat to life or limb of U.S. forces. Non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning.[37] Non-lethal weapons are to be employed to discourage, delay or prevent hostile actions, limit escalation, or take military action in situations where the use of lethal force is not the preferred action.[38] Non-lethal weapons are intended to provide an on-scene commander with additional means for accomplishing his mission, while providing effective alternative means for force protection. If necessary, non-lethal weapons may be used in conjunction with lethal weapon systems. There is no legal requirement to use non-lethal weapons where deadly force is warranted by the circumstances.[39]

Non-lethal refers to the intention of the user. Non-lethal weapons may be more accurately described as "less lethal," as they are not expected to have a zero probability of producing fatalities or permanent injuries.[40] Depending on the severity and type of injury, however, non-lethal weapons must still pass the unnecessary suffering test.

Discriminate Effects

A fundamental principle of the law of armed conflict is that combatants must be distinguished from noncombatants.[41] Only combatants and military objectives can be legitimately targeted.[42] Civilians are protected from indiscriminate attacks.[43] If a weapon cannot be controlled in such a manner that it is capable of being directed against a lawful target, then it fails the discriminate effects test.

Treaty Considerations

The United States is not party to any treaties that prohibit the possession or use of the XADS PD/G-105, MiniGreen, GBD III, HELIOS, or GHOST systems. Because these are laser-based systems, though, consideration of Protocol IV to the CCW and the DOD Policy on Blinding Lasers is appropriate. As stated previously, the United States is not a party to Protocol IV of the CCW, which prohibits the use and transfer of "laser weapon[s] specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to un-enhanced vision, that is to the naked eye or to the eye with corrective eyesight devices."[44] The United States has, nonetheless, implemented this proscription in the DOD Policy on Blinding Lasers, and the Secretary of Defense has extended the prohibition to laser weapons specifically designed to permanently blind either enhanced or un-enhanced vision.[45]

---

[35] *See, e.g.*, AP I, *supra* note 5, arts. 35, 57. Article 35(2) states, "It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering." *Id.* art 35(2).

[36] Law of armed conflict issues related to lawful targeting should be addressed at the time of employment and should be determined by the on-scene commander based upon current circumstances. These issues are not determinative of the lawfulness of a weapon. The commander authorizing a weapon's use should consider a weapon or munition's characteristics when innocent civilians are present in order to ensure consistency with mission rules of engagement and law of armed conflict proscriptions on the direction of attacks against civilians not taking an active part in hostilities, or who otherwise do not pose a threat to U.S. forces.

[37] DOD DIR. 3000.3, *supra* note 8, para. 3.

[38] *Id.* para. 4.

[39] *Id.*

[40] *Id.*

[41] *See, e.g.*, AP I, *supra* note 5, art. 48.

[42] *See generally id.* arts. 48-52.

[43] *Id.* art. 51.

[44] Blinding Laser Protocol, *supra* note 17, art. 1.

[45] DOD Policy on Blinding Lasers, *supra* note 19. The DOD policy on laser weapons was the foundation for Protocol IV, as recorded in W. Hays Parks, DAJA-IO *Memorandum of Law:* Travaux Preparatoires *and Legal Analysis of Blinding Laser Weapons Protocol*, ARMY LAW., June 1997, at 33-41.

Analysis

The XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST systems use laser energy to dissuade individuals from approaching within a distance where resort to lethal force may be necessary. As described above, these laser systems are intended for use as non-lethal weapon systems. Non-lethal weapons, under standard conditions of use, are less lethal than conventional means available to a military commander. The risk of serious injury or loss of life to persons in range of a non-lethal weapon's effects is substantially less than it would be if a lawful, but lethal, weapon was employed. There appears to be no basis for concluding that the laser energy generated by either of these systems would cause superfluous injury or unnecessary suffering when used as designed and in accordance with approved TTP's.

The weapons are not indiscriminate; in fact, use of the weapons facilitates discrimination of targets and prevention of unnecessary civilian casualties. Determining the potential threat of oncoming vehicles has proven extremely difficult, and current methods of arm waving and flare firing to warn approaching vehicle drivers have had limited success. Soldiers need a means to determine the intent of an approaching vehicle operator at a sufficient range to wave-off innocent drivers, while also providing a margin of safe distance so that forces can determine hostile intent and engage and defeat the threat beyond the casualty radius of a VBIED. The XADS PD/G-105, MiniGreen, GBD III, HELIOS, and GHOST laser "dazzlers" will provide Soldiers the ability to communicate a visual signal to approaching vehicle driver's to stay back while concurrently assisting in the Soldier's determination of the driver's intent. Employment of laser dazzlers will provide a sufficient safe distance and time to neutralize a determined threat, minimizing the exposure of friendly forces and other individuals in the area. In doing so, laser dazzlers will both increase force protection and aid in the protection of innocent civilians. Use of laser dazzlers to warn or hail approaching vehicles will actually better enable Soldiers to fulfill their obligation to distinguish innocent civilians from combatants and military objectives. While all approaching vehicles may be duly warned with the visual signal provided by the dazzlers, only those vehicles that have failed to stop and have been determined to exhibit hostile intent will be engaged with the potentially lethal force of other weaponry.

Finally, the weapons do not violate the non-binding provisions of Protocol IV or the DOD Blinding Laser Policy. The negotiating record (or "*travaux preparatoires*") for Protocol IV[46] and the DOD policy establish that these systems are not prohibited. None of the discussed laser systems were "specifically designed" to cause permanent blindness, nor will standard circumstances of use inflict such injuries.

Conclusion

The law of armed conflict does not prohibit the acquisition, possession, use, or transfer of the XADS PD/G-105, MiniGreen, GBD III, HELIOS, or GHOST systems. There appear to be no legal impediments to the deployment and use of these non-lethal weapon systems. Rather, their use in the field, along with laser target designators—Beamshot 2000 and Surefire Lasers—will provide another lawful means of warning and deterring approaching vehicle drivers without resorting to the use of lethal force. The end result may be fewer unnecessary casualties in convoy and checkpoint operations.

[46] *See* Parks, *supra* note 45.