

EXPANDING WARFIGHTER CAPABILITIES

ANNUAL REPORT 2008



Delay

Deny

Defeat

DOD NON-LETHAL WEAPONS PROGRAM



Imagine yourself manning one of the countless checkpoints throughout Iraq or Afghanistan since the beginning of the Global War on Terror. The driver of the vehicle approaching during the hours of dusk doesn't seem to recognize that he is approaching a U.S. military checkpoint. You know he should clearly understand he must slow down for the inevitable vehicle and identification check. The ambiguous indicators of the driver's intentions make it almost impossible to determine whether the occupants of the vehicle have hostile intentions or not. You must protect the warfighters at the checkpoint.

Clearly, if the only tools you have are lethal weapons, you must act decisively. However, if your team has escalation of force tools at their disposal, that vehicle could be compelled to stop with less risk to its occupants. All the while, a lethal over watch can be maintained to ensure adequate force protection.

Minimizing civilian casualties is a sound practice that will prove critical in winning the support of those we seek to help in Pakistan and Afghanistan. The routine news articles about civilian casualties resulting from attacks against terrorists illustrate how we can lose the support of the local population, which is critical to our efforts in Pakistan and Afghanistan and in our Global War on Terror.

The DoD Non-Lethal Weapons Program has been helping the Services identify their non-lethal capability gaps since 1996 and helping to stimulate technologies to cover those gaps. New and developing capabilities offer increased range, more precise effects, longer duration and higher operational effectiveness. Investments continue to support training at the Interservice Non-Lethal Individual Weapons Instructor Course (INIWIC) to train non-lethal weapons (NLW) instructors. NLW classes are provided to leaders at the War Colleges and Staff Colleges. Finally, demonstrations and support are provided to the Combatant Commands to ensure their tactical and regional engagement requirements are met.

Our warfighters need new and more effective tools to meet their warfighting needs in support of their commanders' missions. In this edition of the Non-Lethal Weapons Program's annual report, you'll read how we are postured to provide that support.



LtGen Joseph F. Dunford, Jr.

A handwritten signature in black ink, appearing to read "J. Dunford". The signature is fluid and cursive.

Joseph F. Dunford

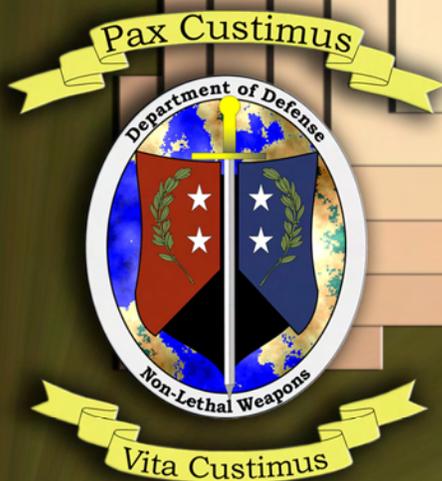
Lieutenant General, USMC

Chairman, Joint NLW Integrated Product Team

Expanding Warfighter Capability

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Progress:

Impacting the Warfighter

In today's uncertain operating environment, it is often difficult to distinguish the enemy from the civilian population. Non-lethal weapons provide a less-than-lethal option that give warfighters the time and distance to better determine someone's intent or make individuals comply without having to resort to deadly force.

A vehicle checkpoint in an urban setting provides one example of the importance of having NLW as an option. Imagine a U.S. military checkpoint in a foreign city. A car filled with people approaches, but does not appear to be slowing down. What are the intentions of the vehicle's occupants? Could they be innocent civilians, unfamiliar with military checkpoint procedures, or terrorists with explosives? Early determination of the driver's intent could give military personnel more time to consider the use of lethal options and help prevent wounding or killing innocent civilians.



An Iraqi army soldier from 4th Brigade, 9th Iraqi Army Division controls vehicle traffic at a checkpoint in Tarmiya, Iraq, Feb. 19, 2008.



Long Range Acoustic Hailing Device

Warfighters can use NLW to help determine the driver's intent and possibly defuse a dangerous situation before using lethal force. Among options available, the warfighter could use a laser distractor or a long-range acoustic hailing device. These devices can warn a driver approaching entry into a "lethal force authorized" area. The laser distractor, a green laser, can temporarily reduce visual acuity at a distance beyond 100 meters. A long-range acoustic hailing device can send warning tones or voice commands. Another option is the Vehicle Lightweight Arresting Device M2 Net. This pre-set net has barbed spikes that can stop a vehicle, even if it is traveling at a high rate of speed. Used alone or together, these and other NLW provide options that are more effective than shouting and less lethal than shooting.

The warfighter's need for non-lethal weapons is evident throughout the world. The Department of Defense actively pursues the development and fielding of NLW to meet the needs of warfighters. During this past year education efforts have helped to enhance familiarity with NLW, leading to



Vehicle Lightweight Arresting Device M2 Net



Laser Distractor

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Progress:

Impacting the Warfighter

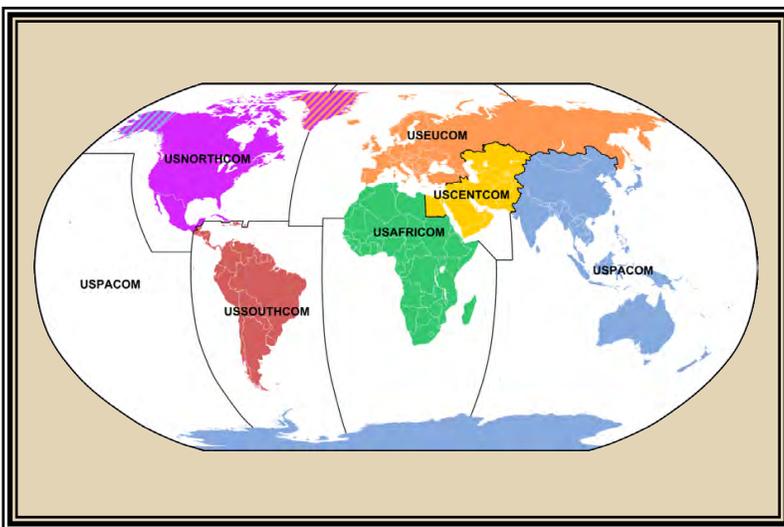
further incorporation of non-lethal capabilities into planning, exercises and operations by Combatant Commanders (COCOM).

The DoD NLW Program is comprised of the Joint Non-Lethal Weapons Program (JNLWP) and Service-unique NLW programs. The Joint Non-Lethal Weapons Directorate (JNLWD), located at Marine Corps Base Quantico, Virginia, serves as the central focal point for DoD NLW activities. The Directorate provides technical and program guidance for developmental weapons. The JNLWD supplies program recommendations and supports the funding of weapons systems that meet warfighter requirements.

The Directorate also supports the warfighter through Combatant Command Liaison Officers (CLO). CLOs assist with developing and executing COCOM NLW programs and serve as direct connections between the DoD NLW Program and the warfighters. Today, CLOs at CENTCOM, EUCOM, PACOM, NORTHCOM, SOCOM and JFCOM are providing expertise in planning and identifying warfighter NLW needs. Over the past 12 months CLOs assisted in raising awareness of NLW capabilities through education programs. When the Combatant Commanders relayed capability gaps to the Chairman of the Joint Chiefs-of-Staff in their Integrated Priority Lists, three of the five COCOMs listed NLW.

“...Military Departments will incorporate employment of non-lethal capabilities into existing and future doctrine and will develop a Joint Integrating Concept for Non-Lethal Capabilities with enhanced joint training, education, war gaming, and exercises. Combatant Commanders will include the employment of non-lethal capabilities in training and exercises. Military Departments will ensure that domestic response forces are equipped, trained, and ready to employ non-lethal capabilities.”

In the May 12, 2008 *Guidance for the Development of the Force*, the Secretary of Defense recognized the importance of NLW and gave clear guidance for both foreign and domestic missions.



AFRICOM, the sixth regional command, was established in 2008.

In 2008, the JNLWD received formal requests for placement of CLOs at SOUTHCOM and the newly formed AFRICOM. In November a CLO was placed at SOUTHCOM. An AFRICOM CLO will soon join fellow liaison officers in providing non-lethal weapons expertise to increase NLW education and awareness.

NORTHCOM	October 2004
EUCOM	April 2005
PACOM	April 2005
JFCOM	July 2007
CENTCOM	October 2007
SOCOM	June 2008
SOUTHCOM	November 2008
AFRICOM	Requested 2008

Awareness of NLW capabilities continues to expand with the addition of CLOs.

Progress:

Impacting the Warfighter



CENTCOM

The use of non-lethal devices at vehicle checkpoints in Iraq has resulted in reduced casualties. U.S. Central Command warfighters continue to request non-lethal options with increased range and accuracy for counter-personnel and counter-materiel operations.

In August, a successful demonstration of Active Denial System 2, the DoD's first long-range directed energy system, was held at CENTCOM. The Deputy Commander and the Command Group were able to ask questions during the hands-on demonstration of the system. These experiences led to increased awareness of the weapon's capabilities. Leadership is now better prepared to consider the potential contribution of ADS to on-going operations in the CENTCOM Area of Responsibility.



ADS "System 2"



EUCOM

U.S. European Command has a need for NLW. During 2008, a NLW Program Educational Contact Team (ECT) provided NLW familiarization and education to an Army National Guard brigade before it deployed in support of NATO's Kosovo Force. The ECT sharpened the brigade's existing skills. Instruction focused on riot control, NLW munitions and lessons learned from past missions. Practical exercises with role players added realism to the training. In the end, the guardsmen left with more confidence in both the equipment and their ability to use it. The brigade was ready to perform a wide variety of missions in a highly complex environment.



U.S. Marines demonstrate fielded NL counter-materiel systems for Moroccan Soldiers

For the first time since the creation of the NLW Program, an ECT conducted operations in Africa. This was the first step in support of AFRICOM. The ECT supported Exercises Shared Accord in Ghana and African Lion in Morocco. Both exercises focused on NLW tactics, techniques and procedures. The successful exercises helped build common ground

2008 A Year of Progress



Progress:

Impacting the Warfighter

for future operations and may lead to further participation in United Nations and African Union Peace Support Operations.

PACOM

U.S. Pacific Command continues to coordinate with region nations to increase cooperation and awareness on military matters. This year NLW were an important part of several outreach efforts.



U.S. Marines and Ghanaian soldiers conduct crowd control training

Dignitaries from Thailand, Singapore, Japan, and the United States were introduced to NLW during exercise Cobra Gold 2008. Briefings and live fire events raised awareness of NLW capabilities. Knowledge gained will enable planning and execution of complex operations in joint and multinational environments.

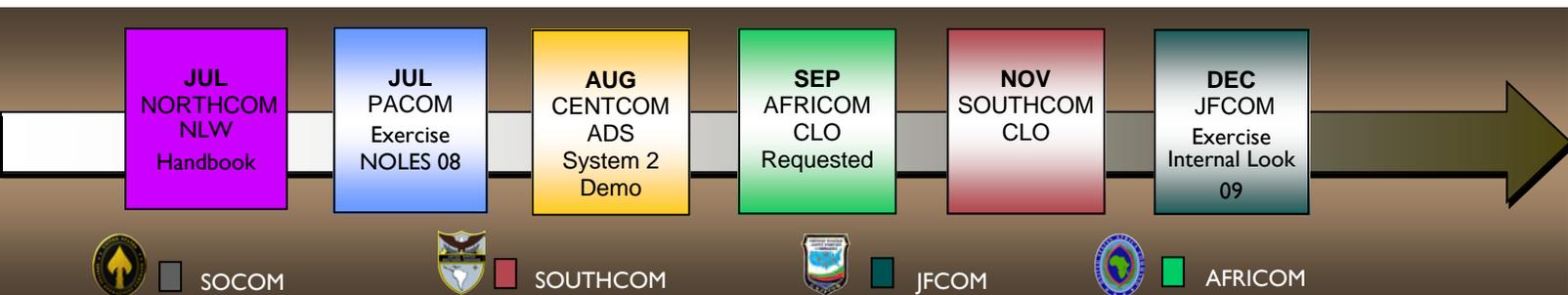


Cobra Gold 08 Opening Ceremony

Non-Lethal Weapons Executive Seminar 2008 (NOLES 08), a bilateral exercise designed to promote the use of non-lethal weapons to 15 countries including the United States, was held in Dhaka, Bangladesh. The seminar included hands-on NLW training for the Bangladesh military. An escalation of force exercise and a vehicle checkpoint demonstration were held for visitors. The executive seminar was attended by field grade and general officers from 15 Pacific region nations. Information on current and future NLW and the Law of Armed Conflict was presented. United Nations missions where NLW were or could have been effectively used were featured. Attendees commented that interaction with peers from other countries was a valuable part of NOLES 08.

SOUTHCOM

U.S. Southern Command strengthened regional partnerships, fostered cooperation and built trust among nations who participated in exercise Tradewinds. SOUTHCOM marked its 23rd year in sponsoring this cooperative effort between the Regional Security System Caribbean, U.S. Marine Corps Forces South and U.S. Coast Guard Atlantic Area. Exercise Tradewinds provided training opportunities to improve the coordination and cooperation between the United States and forces throughout the region.



Progress:

Impacting the Warfighter

In 2008, Tradewinds focused on counter-terrorism response and crowd or riot control. NLW capabilities were a major feature. Approximately 500 U.S. military personnel from all Services and the U.S. Coast Guard took part in the exercise. They were joined by more than 1,000 participants from the region and the United Kingdom.



NORTHCOM

As the combatant command responsible for DoD homeland defense, U.S. Northern Command coordinates defense support of civil authorities. NORTHCOM protects our people, national power, and freedom of action.

This year, the commands and staff of NORTHCOM were briefed on NLW policy, requirements, and current and developing NLW. Senior staff concluded that NLW play an important role in Homeland Defense and Civil Support missions. The "USNORTHCOM NLW HANDBOOK" published in July 2008, provides Homeland Defense and Civil Support personnel a non-technical explanation of DoD NLW policies and capabilities. NLW capabilities are applicable for many of the Department of Homeland Security (DHS) missions. The DoD continues to coordinate with DHS to take advantage of common opportunities and overcome common challenges.



Dominican Republic soldiers use smoke to screen their movement during basic urban skills training with Bravo Co, 1st Bn, 24th Marines, during exercise Tradewinds 2008.



JFCOM

U.S. Joint Forces Command planned and organized Internal Look 09, a Joint Task Force exercise for Navy Component Central Command (NAVCENT). Event planners, together with CENTCOM personnel, included exercise events that would force the staff to consider NLW effects. In an actual disaster relief operation, the lessons learned will better prepare the staff to consider non-lethal options. The exercise highlighted how NLW can be used to protect and defend forces while avoiding measures that could alienate the population they are deployed to assist.



A continuum of capabilities, including NLW, is required for every mission.

Progress:

Impacting the Warfighter

Internal Look 09 was the first time non-lethal effects were intentionally included in a major exercise. The main purpose was to educate senior leaders on the value of non-lethal technologies. This effort is the first step toward including NLW and effects in all applicable joint exercises.

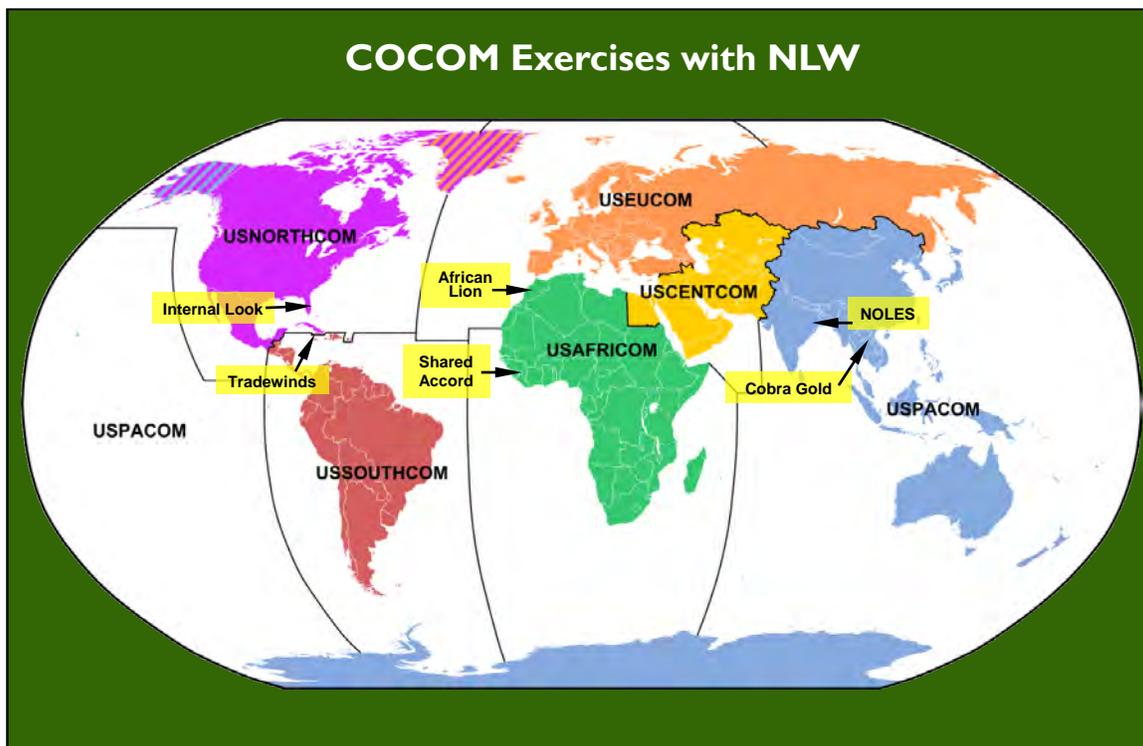
SOCOM

U.S. Special Operations Command has recognized the value of non-lethal capabilities and continues to stress the importance of NLW for Special Operations Forces. SOCOM's participation in the Capability Based Assessment contributed to identification of gaps. To assist with planning and the identification of warfighter requirements, a CLO was added to the SOCOM staff in 2008. NLW initiatives such as the Improved Flash Bang Grenade and other efforts in the ocular warning and distractor realm are actively being pursued to address SOCOM requirements.



U.S. Special Operations Command
IFBG Flash Test

In 2008, NLW training and education increased non-lethal awareness and led to expanded integration in COCOM planning, exercises, and operations.



Gaps and Desired Effects

Joint Capability Integration and Development System (JCIDS)

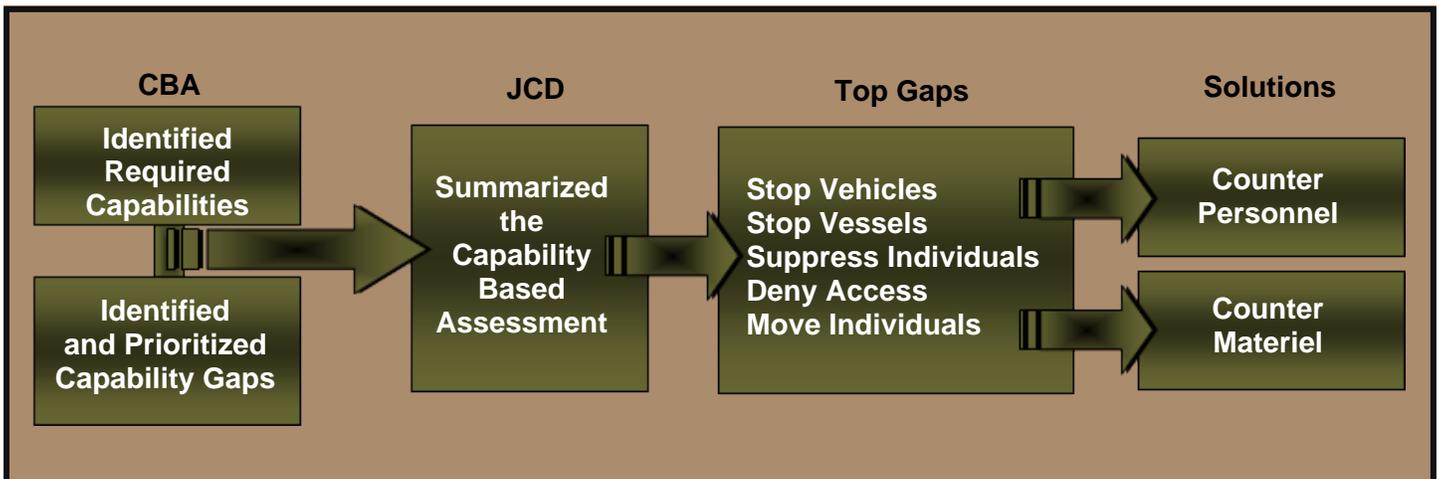
JCIDS is the process used to determine warfighter requirements. As part of the process, a Capability Based Assessment identified NLW capability requirements, found gaps in our ability to meet those requirements and prioritized the capability gaps. The results of this Defense Department-wide analysis is explained in the Joint Non-Lethal Effects Joint Capabilities Document (JCD). The Joint Requirements Oversight Council approved the JCD in February 2008.



Joint Non-Lethal Effects Capability Based Assessment meeting

The JCD identified gaps in two areas:
 1) gaps in our ability to counter personnel and
 2) gaps in our ability to counter materiel.
 The counter-personnel gaps occur primarily in range, coverage and duration of effects. The counter-materiel gaps occur mainly in the ability to stop vehicles or vessels at greater distances.

The JCD concluded with a recommendation that the JNLWP conduct an analysis to generate recommended solutions to resolve or mitigate the identified capability gaps. In 2008, the resulting JCIDS analysis recommended 28 counter-personnel solutions and eight counter-materiel solutions that help to either mitigate or resolve gaps. These recommendations will help the JNLWP to focus its investments on resolving these capability gaps.

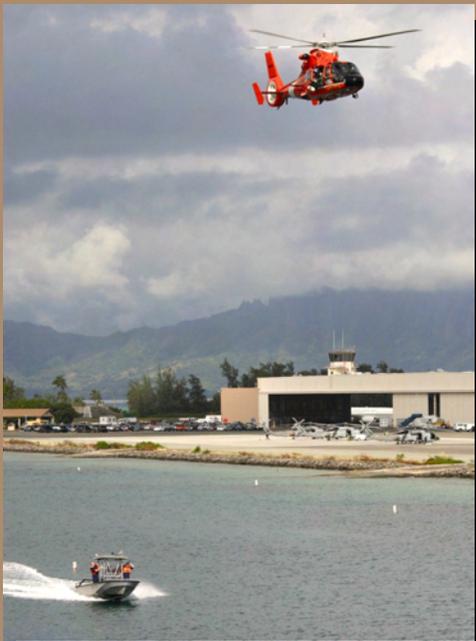


Gaps and Desired Effects

Capability Gaps



Move Individuals



Stop Vessel



Stop Vehicle



Suppress Individual



Deny Access

Finding

Solutions

To ensure investments go to the most critical technologies identified in the Capabilities Based Assessment, the JNLWP organizes NLW funding efforts into portfolios that are aligned with the two capability areas: counter-personnel and counter-materiel. These portfolios describe the current and future funding levels for each of the capability gap solutions areas. Portfolios also aid in the identification of shortfalls, show the growth paths of various technologies, provide common groupings and aid in evaluation of investments.

The Services have urgently fielded a number of NLW to meet warfighter requirements. Urgently fielded counter-personnel weapons include the GBD-III C Laser Distractor, 12-gauge Joint Non-Lethal Warning Munitions, the NICO BTV-1 Flash-Bang Grenade, the Acoustic Hailing Device, the FN-303 Less-Lethal – Launcher, the GG04 NL Bursting Hand Grenade, and the X26 TASER®. Urgently fielded counter-materiel weapons include the M2 Vehicle Lightweight Arresting Device and Running Gear Entanglement System.

Urgently Fielded



FN 303



Acoustic Hailing Device



GBD III C Laser Distractor

Weapons and projects to mitigate the capability gaps are arranged within the counter-personnel and counter-materiel portfolios as near-, mid-, or long-term solutions on the following pages. Additionally, the following information includes current Human Effects and Effectiveness studies that will contribute to solutions within the counter-personnel portfolio.

NEAR-TERM solutions have been urgently fielded or are scheduled to be fielded within two years.

MID-TERM solutions are under development and projected to be fielded within two to five years.

LONG-TERM solutions are under development and projected to be fielded beyond five years.

Finding

Solutions

COUNTER-PERSONNEL

Improved Acoustic Hailing Device (IAHD)

The IAHD can issue either voice commands or warning tones up to a range of 300 meters. Improvements over similar systems ensure that background noise near the target does not interfere with the target's hearing and understanding the sound. The effects can assist in denying access to areas and moving or suppressing individuals or groups. The IAHD can operate from the ground or while mounted on vehicles or vessels.



IAHD



JNLWM

Joint Non-Lethal Warning Munitions (JNLWM)

Twelve-gauge shotguns and 40mm launchers can fire Joint Non-Lethal Warning Munitions that emit an airburst warning of light, sound and smoke. The munitions deliver these non-lethal effects out to ranges of 100 to 300 meters. Military personnel can use these munitions for boarding suspicious vessels, for crowd dispersal and for convoy security applications.

Mk 19 Non-Lethal Munitions (NLM)

Mk19 Non-Lethal Munitions use a ring airfoil plastic projectile to apply blunt trauma when fired from the Mk19 rapid-fire Automatic Grenade Machine Gun. For the first time, our troops will have munitions that deliver rapid-fire non-lethal rounds, providing a way to maintain a standoff distance with a range of up to 100 meters from crowds or individuals. Production and deployment of Mk19 Non-Lethal Munitions is scheduled for 2010.



Mk19 Non-Lethal Munitions



X26E TASER®

X26E TASER®

The X26E TASER® launches two tethered barbs that deliver an electric charge that temporarily disrupts an individual's electro-muscular system. The effect can disable an adversary for several seconds per trigger pull and is currently the only existing NLW that allows our troops to incapacitate a target. Military personnel have successfully used the X26E for military law enforcement, detainee security, access control, checkpoint security and force protection operations.

Advanced Non-Lethal Projectiles

Researchers are studying new materials to replace rubber in non-lethal blunt-impact munitions. Results suggest these new projectiles will be effective at longer ranges without increasing the minimum safety range, making them useful in a greater variety of missions. Additional testing will be needed to confirm these improvements.



Advanced Non-Lethal Projectiles

Finding

Solutions

Distributed Sound and Light Array (DSLAs)

The DSLA is a state-of-the-art system in hailing and warning technology. Still in the development stage, the DSLA delivers high output sound plus a powerful green laser, and focused intense bright white lights. The combined effect of the sound and light is far greater than either effect used independently. The DSLA has an effective range up to 5,000 meters, greater than any other hailing and warning system currently available. This NLW will create a greater standoff from the target than is possible today. The DSLA can assist in clearing individuals from an area, managing crowds and providing area denial.



DSLAs

Improved Flash Bang Grenade (IFBG)

Research and development efforts indicate the Improved Flash-Bang Grenade, which is scheduled to be fielded in FY11, is more effective and safer than current flash-bang grenades. The design of the IFBG includes significant improvements over its predecessors. The IFBG now produces a louder and more resonant bang and a longer and brighter flash. In addition, the removal of salts used to create the explosion has made the IFBG safer for the environment than previous flash-bang munitions. These design improvements are making the IFBG effective for room clearing and crowd-dispersal situations.



IFBG



Airburst Non Lethal Munitions (ANLM)

ANLM are low-velocity munitions that delivers an airburst flash-bang effect with a range between 35 and 300 meters. This range is well beyond currently fielded systems. In addition, these munitions are fully compatible with existing grenade launchers. The ANLM's features make it effective for moving or suppressing individuals or denying access to designated areas. ANLM is scheduled to be fielded in FY11.

ANLM

FINDING SOLUTIONS TIMELINE

NEAR TERM (FY09-10)

DEVELOPING CAPABILITIES

Improved Acoustic Hailing Device
 Joint Non-Lethal Warning Munitions
 MK 19 Non-Lethal Munitions
 X26E TASER®
 Vehicle Lightweight Arresting Device Single Net
 Solution & Remote Deployment Device

POTENTIAL TECHNOLOGIES

Advanced Non-Lethal Projectiles
 Distributed Sound and Light Array

HUMAN EFFECTS STUDY DATA

NLW Effectiveness
 Thermal Laser Bioeffects
 Underwater Acoustic Bioeffects
 Optical Non-Lethal Driver Defeat

Finding

Solutions

Mission Payload Module - Non-Lethal Weapon System (MPM-NLWS)

Researchers are testing the delivery of non-lethal payloads from two tube launcher systems. The MPM-NLWS multiple tube design allows the firing of several caliber and types of payloads. The system can operate from the ground or while mounted on vehicles or vessels. Potential non-lethal payloads include illumination, warning and disabling flash-bangs, smoke, blunt-impact munitions and training rounds. Because it can launch multiple non-lethal rounds over a large area, the MPM-NLWS is well suited for convoy security, crowd dispersal, maritime security, homeland defense, urban environments and area denial.



MPM-NLWS

Active Denial System (ADS)

The ADS is a directed-energy long-range non-lethal weapon that uses millimeter waves to produce an intense heating sensation on the surface of skin, causing an immediate response and movement by target personnel.

The ADS concept was originally developed and demonstrated as part of a DoD Advanced Concept Technology Demonstration program from 2002 to 2007.

In 2008, the Services worked together to develop an ADS Capabilities Development Document (CDD) - a positive step forward to the future establishment of a formal program of record. The CDD, which will be finalized in 2009, documents Army and Air Force interest in a mobile ADS, as well as Navy interest in maritime applications.



ADS

MID TERM (FY11-13)

LONG TERM (FY14 and BEYOND)

<p>Improved Flash Bang Grenade Airburst Non-Lethal Munitions Mission Payload Module - Non-Lethal Weapon System</p>	<p>Active Denial System Radio Frequency Vessel Stopping Multi Radio Frequency Vehicle Stopper Pre-Emplaced Electrical Vehicle Stopper</p>
	<p>Next Generation Active Denial Technology Improved Optical Driver Defeat Technologies Laser Windshield Obscuration</p>
<p>Human Electro-Muscular Incapacitation Bioeffects</p>	

Finding

Solutions

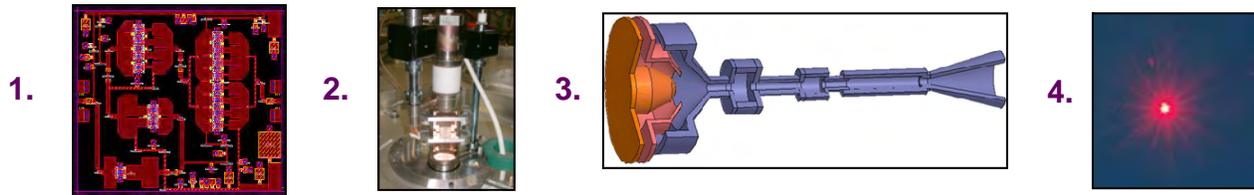
Next Generation Active Denial Technology (ADT)

Research and development efforts are focusing on making advancements to the components used in active denial technology to enable development of future systems that are smaller, lighter and less costly than current prototypes. These efforts include the following:

1. **Solid-State:** Use of solid state technology to generate millimeter waves. Will be light, compact, efficient and transportable.
2. **Sheet Beam Klystron:** Advanced amplifier technology with the potential to increase system power by six-fold.
3. **Harmonic Gyrotron:** An advanced gyrotron that will eliminate the need for super-cooled magnets, which could lead to a compact, mobile transmitter.
4. **Small Spot Analysis:** Experiments to determine the correlation between beam diameter and effectiveness.



Sheet Beam Klystron



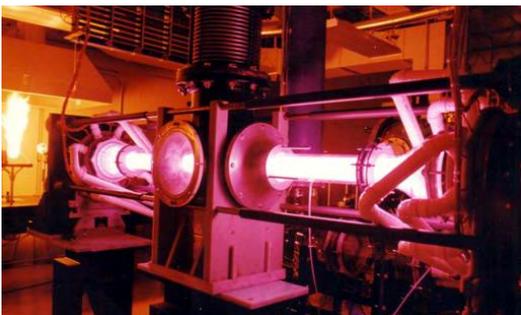
Laser Windshield Obscuration

The goal of this project is to develop a prototype laser system capable of obscuring a vehicle windshield at long ranges. This capability would cause drivers to slow or stop their vehicles, thus giving troops the time and distance they need to determine a driver's intent. Current project objectives include overcoming the challenges of windshield absorption and transmission of the laser through the atmosphere. Technology development during FY09-11 will incorporate mature laser technology and could potentially lead to a fielded capability by FY14.



Windshield Obscuration

HUMAN EFFECTS AND EFFECTIVENESS

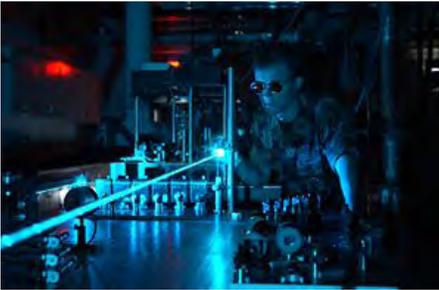


Conducting Light Tests

NLW Effectiveness (on-going project)

This project involves tests to determine the effects of non-lethal technologies. Experiments to determine the effects of red, green, blue, and white lights have produced data and conclusions that support the use of NLW in checkpoint and crowd simulations. Outcomes of these studies are important because they help with system comparisons and refinement of concepts, tactics, techniques and procedures. Results will aid in the development of modeling and simulation tools. Researchers are conducting specific tests associated with checkpoint security, convoy security, target discrimination and accuracy.

Finding Solutions



Thermal Laser Research

Thermal Laser Bioeffects

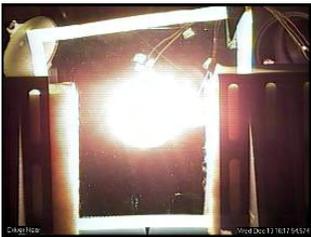
Researchers are studying the effects of exposure to infrared (thermal) laser systems on the skin and eyes. Research is also examining pulse durations and the best wavelengths and spot sizes to cause repel effects within safety margins. Although infrared lasers currently produce safe and effective non-lethal effects in humans, additional data will enhance safety and reliability and will aid in the development of other NLW applications. Thermal laser development has the potential to fill at least two capability gaps: suppressing few individuals in the open and suppressing many individuals in the open.

Underwater Acoustic Bioeffects

Researchers are studying the human effects of underwater sound, which will aid in the development of non-lethal systems designed to counter swimmer threats. The Navy plans to use the results of impulse sound studies to support fielding of the Integrated Swimmer Defense Program, a system with the capability to force threat swimmers to the surface. Additionally, studies of continuous-wave sound have identified sound pressure levels necessary for non-lethal deterrence. These studies will support the development of a system designed to prevent swimmers from entering designated areas. Both systems will have a larger coverage area and more intense effects than current methods used to deter swimmers. Both will be useful for port security or in areas near high-value assets.



Underwater Acoustics



Driver Defeat

Optical Non-Lethal Driver Defeat

The purpose of this project is to design, build and test a system capable of sustaining focused, intense light on a target. Current efforts involve identifying design specifications. The project will evaluate laser glare using red and green laser systems and combine pulsed and continuous-wave lasers. Field-testing of the product designs will include situations similar to real-world scenarios.

Human Electro-Muscular Incapacitation (HEMI) Bioeffects

Exposure to HEMI devices causes muscle contractions that temporarily disable an individual. Research efforts are underway to develop a longer-duration of this effect than is currently available. Additional research is necessary to understand the effects of HEMI electrical waveforms on the body. Researchers are also examining the effects of exposure on breathing. Further research will help determine the effects on nerves and muscles in humans. Results of this research will aid in improving the capability to disable individuals with minimal risk of injury.



Potential 12 gauge HEMI candidate

Finding

Solutions

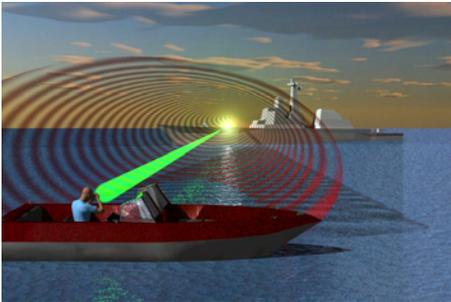
COUNTER-MATERIEL

Vehicle Lightweight Arresting Device (VLAD) Single Net Solution (SNS) and Remote Deployment Device (RDD)

The VLAD SNS will help fill the capability gap of vehicle stopping, the top priority identified in the Capabilities-Based Assessment. The SNS is a portable, barb-spiked net designed to entangle the tires and lock the axles of vehicles. It can stop an increased array of vehicles traveling at a larger range of speeds than the currently fielded VLAD. The RDD is a mechanical system capable of pulling the VLAD net across a road. The rapid deployment of the VLAD SNS makes it effective at stopping vehicles attempting to access restricted areas or at vehicle checkpoints.



VLAD



RF Vessel Stopper

Radio Frequency Vessel Stopping

Research and development is ongoing to design a system that uses high-power radio-frequency energy to disrupt the engine electronics of small vessels. Researchers are testing various frequencies, bandwidths, power levels and use of modular parts. They are also exploring electromagnetic transmission to help determine the effectiveness and operational usefulness of the system.

Multi Radio Frequency Vehicle Stopper

Preliminary designs are under development for a prototype to stop any size vehicle at greater distances than currently possible. The goal will be to disrupt engine electronics with radio-frequency energy. Increased range will improve security of denied areas, checkpoints and convoys. In addition, by developing designs that use multiple frequencies and modular parts, engineers will be able to customize the system for specific missions and vehicles.



Multi RF Vehicle Stopper



Pre-Emplaced Electric Vehicle Stopper

Pre-Emplaced Electrical Vehicle Stopper

The goal of this project is to design and develop a pre-set vehicle stopping system for entry control points and checkpoints. The objective of the prototype is to disrupt engine electronics by sending an electric current into the vehicle body. Testing will determine the effectiveness on small, medium and large vehicles. Plans are also underway to analyze risks and effects on vehicle occupants.

Education

and Training

Professional Military Education

Strong Service support for NLW education has resulted in a growing number of Professional Military Education electives. These classes include lectures from recognized subject matter experts on a variety of relevant topics. Classes are hosted at the Army War College, Air War College, Navy War College, National Defense University, Industrial College of the Armed Forces, and the Marine Corps Command and Staff College. Beginning in FY09-10, the JNLWD plans to expand the program further.

NLW Online Course

The Non-Lethal Weapons: Policies, Practices and Technologies course, which was developed for and sponsored by the JNLWD, is provided both on-line (www.nonlethalweaponscourse.com) and via DVD . A 2008 winner of the University Continuing Education Association Award, this course provides personnel the opportunity to apply decision-making skills to real-world situations. Although the certificate course involves independent study, content reinforces the hands-on instruction students receive during their military training. The JNLWD is currently working with Penn State to develop interactive video and animation-based escalation-of-force simulation tools. Once completed, the simulations may be incorporated into a scenario-based instruction section of the online course.

Since its inception, 2178 students have enrolled in the course. In fiscal years 2007-2008 enrollment exceeded 1,000 new registrants, dramatically demonstrating course success. The majority of the students are E-5 through E-7 and the number of officers enrolled in the course has increased. Individuals interested in participating may contact either Pennsylvania State University or the JNLWD.

Hands-On Experiences

In June 2008, the JNLWP provided hands-on exposure to NLW for senior foreign military officers during the World Wide Conference of Marine Leaders in Quantico, Virginia and the NATO Defense College Non-Lethal Weapons Symposium in Rome, Italy. The JNLWP has also increased support to a number of COCOM training and exercise events. As previously discussed, JNLWP personnel participated in several COCOM sponsored events, including the Non-Lethal Executive Seminar (NOLES 08) and exercise Tradewinds. These opportunities expanded training, awareness and acceptance of NLW for U.S. forces, as well as partners and other friendly nations.

Education Integrated Process Team (IPT)

In 2008 an Education IPT was formed to provide a forum for the Services and COCOMs to discuss current and future education initiatives. In the first meeting on April 4th, discussion stemmed from a Penn State report, "Non-Lethal Weapons Training and Education Review: Building an Investment Strategy." The report mapped out numerous strategies to increase education for all levels of warfighters in all branches of the military. Future meetings will continue to address topics such as a more flexible curriculum for various audiences, increased course availability, mobile Education Contact Teams and Non-Lethal Leadership Symposiums.

The Joint Non-Lethal Weapons Directorate has continued to expand its education program to make current non-lethal weapons and technology information available to more warfighters.

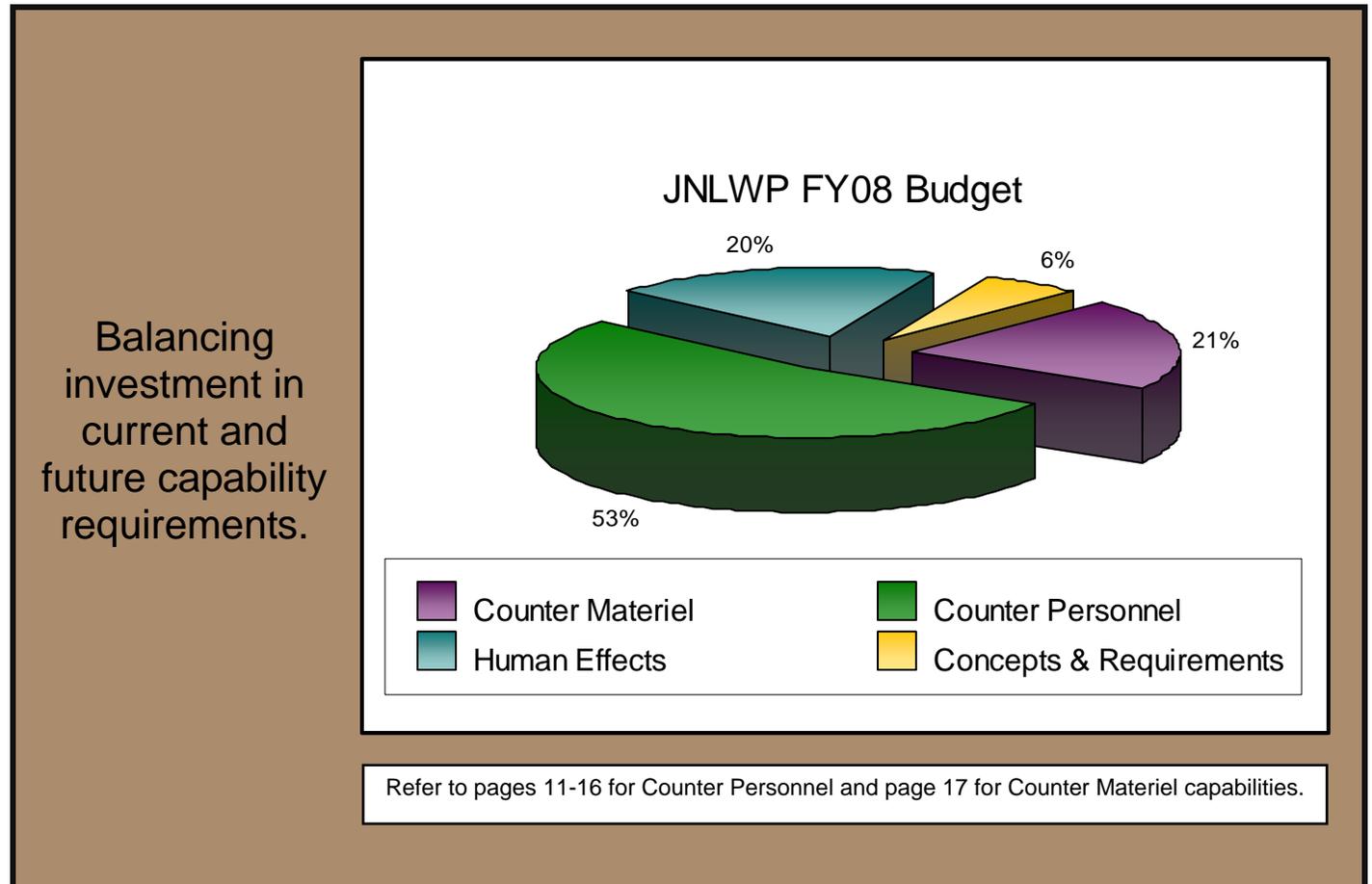
FY08

Budget

Earlier sections of this report highlighted improvements in the way the program determines warfighter non-lethal needs and progress in identifying capability gaps. Also discussed were increased education efforts that have resulted in greater awareness of the value of NLW. This progress is complimented by an increase in investment for non-lethal science and technology and an increase in research and development funding to address the CBA identified gaps.

The overall DoD NLW budget includes funding for both JNLWP and Service efforts. Of the roughly \$130 million in DoD-wide NLW funding, approximately \$65 million supports the JNLWP. This funding is the primary source for non-lethal research and development, as well as science and technology activities. Together, these efforts are used to address top priorities that provide near-term benefits for our forces, develop prototypes to support challenging mission needs, and explore new concepts and technologies. Service funding is used to develop, purchase, operate and maintain current weapons.

In 2008, the JNLWP used funds to develop and invest in near-, mid- and long-term solutions to the capability gaps identified in the CBA. The intent is to balance investments for the identified warfighter requirements. The chart below reflects JNLWP resource allocation for FY08.



Noteworthy

News

University Continuing Education Association Award

Penn State's Non-Lethal Weapons: Policies, Practices and Technologies certificate program was selected as the 2008 University Continuing Education Association award recipient by the University Continuing Education Association (UCEA) Mid-Atlantic Region. The award recognizes the dedication, talent and proficiency this university-based continuing professional education program offered to U.S. military Service members. Upon completion of the course participants receive a certificate from Pennsylvania State University. The course is offered free of charge to active duty, reserve and government civilian employees.



Carolyn Callaghan, UCEA Mid-Atlantic Awards chair, congratulates Joe Segilia, Penn State's director of Continuing Education and Outreach

ADS 2 Suitable for Deployment

The JNLWP sponsored a Capabilities and Limitations Assessment (CLA) of the Active Denial System (ADS) 2 to assist with possible deployment decisions.

Data on ADS 2 was collected during a series of tests between February and June 2008 and incorporated with existing data into the CLA. Contractors conducted performance and initial government acceptance checks at China Lake, California. Extreme climatic testing to simulate potential field conditions was conducted at Eglin Air Force Base, Florida. Operator training, evaluation of loading and unloading the ADS 2 from a cargo plane, and final government acceptance checks were completed at Kirtland Air Force Base, New Mexico. System performance was assessed in real world scenarios at the Marine Corps Air Ground Combat Center in Twentynine Palms, California. Scenarios included crowd clearing at an entry control point, controlling sniper activities and handling suspicious activities around a perimeter.



Active Denial System 2

ADS 2's suitability for deployment was confirmed by test results. The system maintained a 90 percent availability rate during the operational assessment at Twentynine Palms. A field Service representative was able to resolve technical issues quickly. Operators successfully tracked, engaged, and repelled advancing targets. ADS 2 demonstrated its ability to deny, move and suppress adversaries without difficulty.

Results of the CLA support a favorable decision for operational deployment. In the interim, research efforts will continue to develop Active Denial Technology.

Noteworthy

News

North Atlantic Treaty Organization (NATO)

NATO's longstanding interest in non-lethal weapons is increasing. In 1999, the North Atlantic Council identified NLW as a "critical, additional capability needed in order to meet the demands of future operations." The past decade's peace support operations and anti-terrorism/counter-terrorism efforts have further reinforced this need.

Understanding NLW effectiveness is a common challenge, as well as an important factor in making decisions about system development, acquisition, and weapon employment. The SAS-060, a NATO study led by the U.S. with Colonel Kirk Hymes as Chairman, developed and tested a common, agreed methodology for assessing effectiveness. NATO's Research and Technology Organization recognized the high importance and quality of this work, selecting SAS-060 to receive the 2008 Scientific Achievement Award.

In recognition of the increased importance of NLW to the alliance and its member nations, NATO launched several new initiatives during 2008:

- NATO NLW Capabilities-Based Assessment will conduct an alliance-wide analysis of requirements, capability gaps, and potential solutions
- Non-Lethal Capabilities in Defense Against Terrorism will pursue rapid demonstration and fielding of NLW systems land-based anti-personnel, area denial, and anti-materiel applications
- NATO Army Armaments Group Topical Group 3 will develop a NLW Catalogue, and improve alliance coordination and standardization
- Allied Command Transformation efforts on NLW concept development and capability engineering



The Chairman of NATO's Research and Technology Board, Jacques Bongrand, presents the 2008 Scientific Achievement Award to Colonel Kirk Hymes and Mr. John Nelson of the JNLWP

Eaton Award

Purdue University's School of Electrical and Computer Engineering recognizes and encourages design excellence with its annual presentation of the Eaton Award. This year Air Force First Lieutenant Paul La Tour, a computer engineer for the Optical Radiation Branch, Air Force Research Laboratory at Brooks City-Base, Texas, was named the recipient for his work with laser technology. Lieutenant La Tour, with the support of his fellow researchers, developed a glare producing laser system that can optically defeat oncoming adversaries. The Joint Non-Lethal Weapons Directorate sponsored this research and development effort to support examination of laser technology applications for several JNLWD programs.

Excellence Award

On April 1, Susan LeVine, the Joint Non-Lethal Weapons Principal Deputy for Policy and Strategy, received the 2007 Excellence Award from the Air Force Research Laboratory Human Effects Directorate. Ms. LeVine was recognized for her consistent support of directed energy bioeffects research. A dedicated advocate of directed energy capabilities, she was instrumental in advancing the technology, securing adequate funding, and establishing policy that enabled research and development of innovative counter-personnel non-lethal weapons.

Leadership

Key Representatives

DoD NLW Program Executive Agent

The Department of Defense (DoD) NLW Program is composed of both Service-unique programs and programs under the direction of the Joint Non-Lethal Weapons Program (JNLWP). DoD Directive (DoDD) 3000.3 establishes the department's policy on non-lethal weapons and assigns responsibilities for the development and employment of NLW. It assigns principal oversight responsibility of the DoD Non-Lethal Weapons Program to the Under Secretary of Defense for Acquisition, Technology and Logistics, policy oversight to the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict and designates the Commandant of the Marine Corps as the Executive Agent. The first DoD Non-Lethal Weapon Capabilities Roadmap was published this year. Signed by the Executive Agent, the Vice Chairman of the Joint Chiefs of Staff and the Under Secretary of Defense for Acquisition, Technology and Logistics, the Roadmap provides an initial look at NLW technologies and is intended to serve as a framework for decision making, facilitating management of the Department's integrated non-lethal weapon capabilities portfolio.



General Conway , USMC
DoD NLW
Executive Agent

A Memorandum of Agreement between the Services, Special Operations Command (SOCOM) and the USCG established a Joint Integrated Product Team (JIPT) to assist the Executive Agent in executing his responsibilities. The Memorandum of Agreement also established and provided charters for a Joint Coordination and Integration Group (JCIG), and a Joint Non-Lethal Weapons Directorate (JNLWD). Their primary missions, as well as their members, are below.

Joint Non-Lethal Weapons Integrated Product Team (JIPT)

The Joint Integrated Product Team serves as a senior advisory group to the Executive Agent. The JIPT is chaired by the Marine Corps Deputy Commandant for Plans, Policies and Operations. Principal members of the team are general and flag officers for the Services, SOCOM and the USCG. The team collaborates on and coordinates non-lethal weapons activities, arbitrates policy issues and recommends approval of the Joint Non-Lethal Weapons Program budget. Team members also keep the Executive Agent and each other abreast of Service-unique programs. In addition to the principal members of the team, the JIPT includes non-voting representatives from the Department of State, Department of Justice, Department of Energy and other defense organizations and agencies.



LtGen Dunford,
Jr., Chairman



BGen Miller,
Marine Corps
Representative



BG Martz,
Army
Representative



MajGen Benes,
Navy
Representative



Brig Gen
Hertog, Air
Force
Representative



RADM Justice,
Coast Guard
Representative



RADM Pybus,
SOCOM
Representative

Leadership

Key Representatives

Joint Coordination and Integration Group (JCIG)

The Joint Coordination and Integration Group is comprised of colonel level representatives of the Services, SOCOM, and the USCG. The Director of the Joint Non-Lethal Weapons Directorate chairs the JCIG. The JCIG is responsible for reviewing the Joint Capability Integration and Development System requirement documents, along with research, development, technology and effects programs. The JCIG makes formal recommendations to the Joint Integrated Product Team on program priorities, the proposed budget and approval of the execution of joint NLW research, development, technology and effects programs. The JCIG also assists in developing doctrine and work statements.



Col Hymes,
Chair



Col Martynenko,
Marine Corps
Representative



COL Dennis,
Army
Representative



CAPT Coceano,
Navy
Representative



Col Ball, Air
Force
Representative



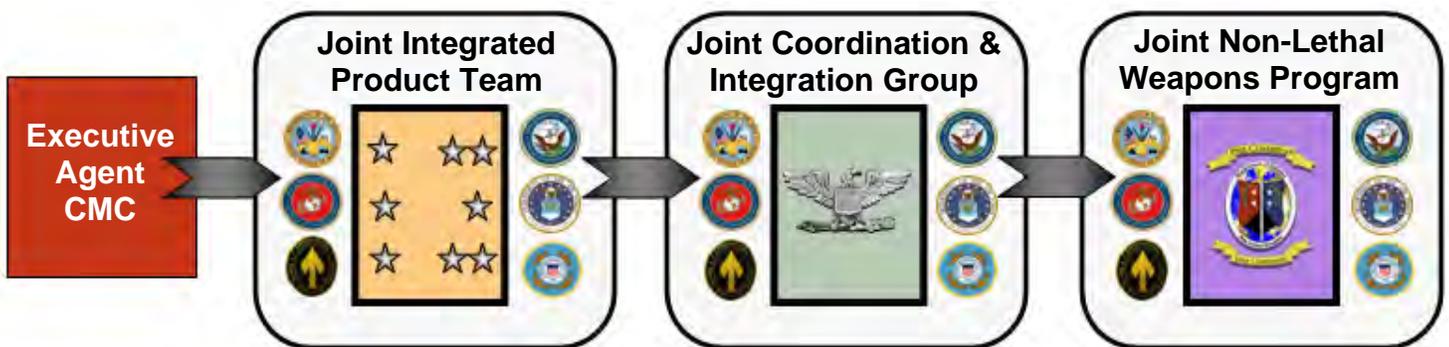
CAPT
Genovese,
Coast Guard



COL Colon,
SOCOM
Representative

Joint Non-Lethal Weapons Directorate (JNLWD)

The Joint Non-Lethal Weapons Directorate's primary responsibilities are the support of the Joint Integrated Product Team and the daily management of the Joint Non-Lethal Weapons Program. The Director, with the Deputy Director, Principal Deputy for Policy and Strategy, division chiefs and other personnel, perform the day-to-day functions of the Joint Non-Lethal Weapons Program. The Directorate manages funding and assists with budget development. The JNLWD monitors programs and facilitates exchange programs among agencies, Services and foreign countries. The Directorate maintains liaisons with the COCOM, Joint Staff, the Office of the Secretary of Defense and other crucial partners. Additionally, the Directorate conducts assessments, assists with requirements documentation, and coordinates acquisition, research, development, technology and effects. These and other efforts support the implementation and expansion of the Joint Non-Lethal Weapons Program.



Reflection

and Vision

The JNLWD has a clear vision —***to put operationally suitable and effective non-lethal weapons, devices and munitions into the hands of the warfighters.*** This means that our focus remains on assisting the Services in identifying non-lethal weapon (NLW) capability gaps and stimulating new and existing technologies to meet their current and future needs.

This past year, the DoD Non-Lethal Weapons Program has reached some exciting milestones. Most significantly, the DoD completed a NLW Capabilities-Based Assessment. There is now a jointly developed, validated and approved set of capability gaps that call for non-lethal effects to meet counter-personnel and counter-materiel requirements. This foundation will allow the Services to build requirements-based NLW capabilities.

One of the top JNLWD priorities has been to work hard to understand warfighter requirements. Our COCOM Liaison Officers (CLOs) have provided a critical interface to the combatant commands and their components to ensure they are well informed about current and developing NLW capabilities and receive effective support for regional NLW activities. CLOs also ensure the JNLWD is aware of theater concepts, plans, priorities, lessons learned and operational requirements. In 2009, our major efforts will include Roadmap development, CBA follow-through, and CLO expansion to AFRICOM.

The Joint Capabilities Document and other outputs of the CBA will guide DoD NLW activities, including technology investments. A key focus for 2009 will be the transition of science, technology and human effects research to Service-led programs of record. A specific objective for the coming year is to achieve an informed selection of the most promising Active Denial technologies to support next-generation Active Denial System development. Additional top-priority initiatives include vehicle or vessel stopping technologies, capabilities to deny areas to personnel, improved human effects modeling to save research dollars, support training and aid in effects-based design.

Acquisition and fielding priorities will remain driven by the demands of ongoing operations in Afghanistan and Iraq, with rapid response to all NLW-related Urgent Universal Needs Statements. We will ensure our warfighters have the tools they need to apply the right level of force to accomplish the mission.

With a firm understanding of the important purpose we serve, the DoD Non-Lethal Weapons Program will remain committed to investigating, developing and providing the NLW capabilities our warfighters need - now and in the future.



Col Kirk Hymes,
Director, JNLWD

Colonel Kirk W. Hymes
Director, Joint Non-Lethal Weapons Directorate

Non-Lethal Weapons

Resources

The Joint Non-Lethal Weapons Program interacts with numerous organizations. Listed below are some of the World Wide Web references and other resources.*

Websites and Sources

Air Force Research Lab Directed Energy Directorate

http://www.kirtland.af.mil/afrl_de/

Air Force Research Laboratory Human Effectiveness Directorate

<http://www.wpafb.af.mil/afrl/rh/>

Army Close Combat Systems (PEO AMMO PM CCS)

<http://www.pica.army.mil/pmccs/>

Defense Science Board Task Force - Directed Energy Weapons

http://www.acq.osd.mil/dsb/reports/2007-12-Directed_Energy_Report.pdf

Directed Energy Professional Society

<http://www.deps.org/>

Institute for Non-Lethal Defense Technologies (INLDT)

<http://www.nldt.org/>

Interservice Non-Lethal Individual Weapons Instructor Course (INIWIC)

<http://www.iniwic.net/>

Marine Corps Infantry Weapons System (IWS)

<http://www.marcorsyscom.usmc.mil/syscomorg/default.aspx?PG=5>

Non-Lethal Weapons Online Course (Free to DOD Personnel)

<http://www.fe.psu.edu/CE/23496.htm>

The Weapons Systems Technology Information Analysis Center (WSTIAC)

<http://wstiac.alionscience.com/>

United States Department of Justice

<http://www.ojp.usdoj.gov/nijtopics/technology/less-lethal/welcome.htm>

* The DoD Non-Lethal Weapons Program does not exercise any editorial control over content found on these sites or within the sources.

Contact

Information

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Principal Deputy Policy & Strategy — Ms. Susan LeVine

Science & Technology Program Manager — Mr. John Keenan

Budget Analyst — Ms. Linda Palmer

Acquisition Division Chief — Mr. Kevin Swenson

Capabilities & Requirements Division Chief — Col David Ptak (USAF)

Operation Division Chief — Ms. Mary Moody

Technology Division Chief — Mr. David Law



Pax Custimus



Vita Custimus

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3rd Infantry Division
Near Salman Pak, Iraq