CDTS Title	
CDTS#	Date CDTS # assigned

URGENT UNIVERSAL NEED STATEMENT (UUNS)

PURPOSE

ISO Marine Forces participating in Combat and Contingency Operations, the Deputy Commandant for Combat Development and Integration (DC, CD&I) accelerated the Expeditionary Force Development System (EFDS) by expediting the processing of Universal Need Statements (UNS). The accelerated UNS are known as Urgent UNS (UUNS). The nature of the UUNS process is to provide rapid acquisition of a capability in order to meet an urgent requirement. To date, the UUNS process has been employed directly in support of deploying USMC units for OEF, OIF, and HOA.

All Urgent Universal Need Statements are entered into a web-based format for tracking purposes. The link for the Combat Development Tracking System (CDTS) web site is https://www.cdts.marcorsyscom.usmc.mil. Please ensure the letter "s" is included in the URL (https). For access to the web site, or if further information is required regarding this processing and status of your submission, please contact the JCIDS Capabilities Harmonization Branch (JCHB), CDTS representative.

Personnel assigned to JCHB, phone numbers, and e-mail addresses can be found under http://www.hqmc.usmc.mil/ by clicking on the JCHB link. Information about the EFDS may be found by clicking on the EFDS link.

CDTS Title	
CDTS#	Date CDTS # assigned

URGENT UNIVERSAL NEED STATEMENT (UUNS)

Name (Last, First, Initial) Gayl, Franz J.		Rank/Grade GS-15	Phone 318 3405 912			Date submitted: 24 Nov 2006	
Available for phone or personal follow-up?	X	Interested in participation on Solution Course of Action IPT?	X	Request UNS status updates by e-mail?	X	E-mail gayl.franz@cemnf-wiraq.usmc.smil.mil	RUC

THIS IS AN URGENT UNS ISO OPIF 05-07

Type of Capability Needed

Describe the nature and the cause (if known). Explain how the need was identified (e.g. operational deployment, training exercise, experimentation, formal study, mission area analysis, observed operating deficiencies, vendor demonstration, etc.) and explain the planned implementation of the proposed solution.

(FOUO) General Description:

(FOUO) Overview. MNF-W has an urgent operational need for a Precision Airborne Standoff Directed Energy Weapon (PASDEW). The PASDEW needs to be capable of engaging targets from a tactical airborne platform in the active low altitude air threat environment of the MNF-W Area of Responsibility (AOR). The non-kinetic DEW component of PASDEW needs to be capable of destructively engaging targets that have emplaced themselves on, near, or within protected structures such as religious shrines and hospitals. The PASDEW also needs to be capable of ultra-precise strike against adversaries operating in immediate proximity to innocents. Ultra-precision strike capabilities of PASDEW also apply to anti-material missions where a range of fixed and mobile ground targets are susceptible to its destructive effects while simultaneously avoiding or minimizing collateral damage. Finally, the PASDEW needs to be capable of engaging non-ballistic airborne threats that may come to threaten (Coalition Forces) CF in the MNF-W AOR and the Iraqi Theater of Operations (ITO) as emergent insurgent Tactics, Techniques, and Procedures (TTPs). Specifically, these include Unmanned Aerial Vehicle (UAV)-delivered munitions of the sort that recently appeared during Hezbollah's confrontation with Israeli Defense Forces (IDF).

(FOUO) Operational Relevance. Each month MNF-W Forces face dozens of situations where an extremely precise lethal weapon, for stand off engagement of Positively Identified (PID) insurgents that allows for near total confinement of damage and injury to the engaged adversary, is needed. This requirement is particularly poignant in the more cluttered and intermixed human settings associated with urban operations. Presently, there are no standoff weapons in the U.S. military inventory that possess the combination of limited collateral damage with ultra-precise lethality.

(FOUO) The ROE permit CF to return fire in self defense if fired upon once a PID of targetable combatants is established. CF are permitted to employ appropriate force, whether or not hostile fires originate from within a protected structure. Similarly, if the fires of a PID insurgent originate in an area where non-combatants are interspersed, measured force in self defense is authorized. Nevertheless, while the ROE allow such CF kinetic self-defense, collateral injury and damage can often impede local and theater Information Operations (IO) and Public Affairs (PA) campaigns, political-military objectives, and social-economic recovery/restoration goals. In fact, collateral damage from defensive return fire is in many cases the primary objective of terrorists and insurgents when they

decide to engage CF in the AOR. Independent of the permissive ROE, CF find themselves in urgent need of most accurate and ultra-precise direct fire weapon capabilities that are extremely discriminate and able to quickly neutralize hostile forces and underlying sympathetic support. This need is further coupled to a requirement for precision engagements against several targets in rapid succession, and over wider geographical areas.

(FOUO) Tactical aircraft are frequently called upon due to the over-matching tactical advantages of these platforms to maneuver quickly and respond with superior fire power against an enemy. The AC-130, AH-1W Cobra and the A-10 Warthog are capable of providing extraordinary direct fire capabilities to destroy hostile forces. However, in spite of their superior precision, ballistic ball and explosive munitions, rockets, and missiles of kinetic gunships are by their nature area weapons. Point of aim is not the exact point of kinetic impact from an airborne platform. Additionally, automatic weapons experience cones-of-fire that result in increasingly larger impact areas as stand-off distance is increased. Further munitions that hit their intended targets have residual momentum in the form of kinetic energy which is not absorbed in the target interaction and passes through to objects on the far side. Finally, rocket and missile weapons have kill enhancement devices in the form of blast, explosively formed penetrator, and fragmentation that may increase collateral casualties. While amassed force-on-force confrontations often require the lateral and in-depth destruction noted above, there is also an urgent need for a PASDEW with scalable, controlled, precision lethality.

(FOUO) General Characteristics:

(FOUO) The PASDEW needs to be able to support CF in the complex combat environment of the MNF-W AOR and the ITO, where combatants are routinely intermixed with non-combatants and protected structures. The IO and PA campaigns demand extraordinary efforts at graduated response and precise target discrimination. This challenge calls for advanced weapons systems that complement and compensate for the limitations of traditional air delivered direct fire kinetic energy munitions. Gunship mounted directed energy weapons (DEWs) capable of speed-of-light effects delivery and extreme precision in which tactical point-of-aim is exact point-of-impact are urgently needed. These advanced gunship weapons will provide CF enhanced surveillance/situation awareness, and with PID the capability to engage threats more freely with required lethality, desired instantaneous effects, and with less risk of unwanted damage and collateral injury to innocents nearby.

(FOUO) Specific Required PASDEW Capabilities:

(FOUO) The Precision Airborne Standoff Directed Energy Weapon (PASDEW) requires the following capabilities. All capabilities are to be considered threshold unless they are specifically noted as being threshold or desired:

- PASDEW needs to be capable of being programmed to selectively destroy, damage, or disable targets in support of ground missions in both open terrain and urban operations, and in an air defense mode against low altitude UAVs.

- PASDEW needs to be capable of destroying, damaging, or disabling targets without residual blast or fragmentation damage other than the secondary self-destructive effects of the engaged target.

- PASDEW needs to deliver energy to a target virtually instantaneously with minimal operationally relevant delay between trigger-pull and the desired effect on target.

- PASDEW needs to deliver energy to target by means of a silent engagement which has no acoustic report from the PASDEW, no audible supersonic shock wave, and little engagement noise at target, with the exception of noise associated with the secondary self-destruction of the engaged target.

- PASDEW needs to deliver energy to target by means of a virtually invisible engagement, resulting in little to no observable visible signature along the engagement path using only an unaided eye or binoculars.

- PASDEW needs to be a point-of-aim point-of-impact capability that eliminates any requirement for target lead, ballistic solution, or missile kinematic flight envelope.

- PASDEW needs to be capable of confining the delivery of its energetic effects to the intended target, with negligible energy delivery to the sides of the target

- PASDEW needs to be capable of employing active energy delivery control to mitigate energy penetration of, and propagation beyond the target.

- PASDEW needs to be capable of precision destructive anti-material and lethal anti-personnel engagements at the following slant stand-off ranges:

    - Threshold:
        - Steel melting: 5,000 meters
        - Cloth and wood spontaneous ignition: 10,000 meters
        - Lethal anti-personnel: 10,000 meters
    - Desired:
        - Steel melting: 10,000 meters
        - Cloth and wood spontaneous ignition: 15,000 meters
        - Lethal anti-personnel: 15,000 meters

- PASDEW needs to be capable of engaging over a wide field-of-regard (FOR) without course maneuver, to include port and starboard engagements from dead-ahead and in a wide arc proceeding aft of the beam:

    - Threshold: Engagement arc from relative 0-degrees to 120-degrees (port and starboard), and elevation 0-degrees to minus 70-degrees.
    - Desired: Engagement arc from relative 0-degrees to 180-degrees (port and starboard), and elevation +5-degrees to minus 90-degrees.

- PASDEW needs to be capable of instantaneously acquiring (in response to ground cueing), positively identifying, and engaging targets throughout the greater portion of a hemisphere defined by the airspace below the fuselage.

    - Threshold: Initial detection with panoramic staring surveillance (360-degree elevation, 0-to-minus 90 elevation) potentially at

coarse resolution, handover to slewed intermediate surveillance with wide (>15-degree) field-of-view at medium resolution, handover to gimbaled surveillance in dual purpose aperture that permits both precision track and PID in frequent tasking.

  - Desired: Initial detection with panoramic staring surveillance (360-degree elevation, plus 90-to-minus 90 elevation) potentially at medium resolution, panoramic detection of target designation by forward controller, handover to slewed intermediate surveillance with wide (>20-degree) field-of-view at medium-high resolution, handover to gimbaled surveillance in dual purpose aperture that permits both precision track and PID in continuous tasking.

- PASDEW needs to possess corrective optics to optimize DEW effects on target under operational conditions:
  - Threshold: Local tilt and optical corrections to enable threshold effects on target.
  - Desired: Addition of adaptive optics to control both beam diffraction-divergence and correct beam-front errors.
- PASDEW needs to possess pointing, tracking, and stabilization systems capable of insuring that beam dwell time on target is effectively maintained.
- PASDEW needs to possess infrared and visible cameras to record all cycles of engagement.
- PASDEW needs to be integrated into and compatible with aircraft operational capabilities and safety-of-flight requirements:
  - Threshold: C-130 aircraft.
  - Desired: Designated fixed-wing, tilt rotor aircraft, and rotary wing aircraft.
- PASDEW needs to be capable of flying throughout the MNF-W AOR and the ITO to support operational sortie requirements:
  - Threshold: Fly to the MNF-W AOR from an airfield at least 250 miles distance, and then loiter on station for a minimum of two (2) hours without undergoing aerial refueling.
  - Desired: Fly from extra-theater reaches and support sustained operations with large magazine, loiter on station, and with mid-air refueling.
- PASDEW needs to have scaleable engagement effects options that are controlled by the weapon operator.
  - Threshold: Limited controls to select the nature of the damage to be done to a target by choosing a specific aim-point and laser shot duration.
  - Desired: Easily operator used and/but refined controls to control engagement effects including target marking/tagging, enemy target utility denial, minor target damage, major target damage, and target kill.
- PASDEW needs to be able to acquire and PID targets handed-over by ground operators:

- Threshold: Based on GPS coordinates provided by radio or by laser designation from ground operators or other tactical aircraft.
- Desired: Based on the addition of target tasks, computer aided systems, and communications.

- PASDEW needs to have the capability to rearm in support of mission taskings:
  - Threshold: Shipping, mixing, and handling of PASDEW chemical energetics, weapon system loading, and disposal of residual byproducts that support five (5) “magazines” (i.e., 5 ATL full fuel loads) per week.
  - Desired: Shipping of salts (non-energetic), followed by initial mixing/handling, engagement use of magazine, and regeneration by using electricity.
  - Desired: Process supporting indefinite cyclical rearm and inventories supporting approximately 2-3 magazines per day.
- PASDEW needs to possess adequate spares and maintenance/repair processes and capabilities to support in-theater and depot level activities for:
  - Threshold: Limited duration theater operations, i.e. for the duration of the Advanced Tactical Laser (ATL) Extended Users Evaluation (EUE) (see later discussion).
  - Desired: Extended deployment in theater operations, i.e. beyond the termination of the ATL EUE.
- PASDEW needs to possess the adequate approval of policy, legal, treaty, and medical reviews permitting its employment in-theater prior to deployment.
  - Threshold: PASDEW needs to be conducive to Force Integration in a way that is compatible with existing Joint Air Tasking Orders, ROE, Command and Control, communications, navigation and GPS links, common situation awareness displays, and IFF.
  - Desired: PASDEW needs to add a network interoperable Common Operating Picture having 2-D and 3-D enhancements, along with a capability to record and downlink imagery to supported ground.
- PASDEW needs to be capable of supporting ground forces with air-to-ground DEW fires in a semi-continuous on-call/on-station capacity:
  - Threshold: Five (5) sorties per week.
  - Desired: Two (2) to four (4) sorties per day.

Requested Quantity (if a materiel solution)

Identify the total quantities required, broken down by unit or activity. Include the vendor name/model of any identified material solutions.

(FOUO) Total PASDEW quantities required for MNF-W:

(FOUO) The total quantity of PASDEW that is required for MNF-W is four (4). One (1) in spiral 0, one (1) more in spiral 2, and two (2) more still in spiral three. Future spirals would require more only when the PASDWES capability transitions to a program of record.

(FOUO) Vendor names and models of identified material solutions:

(FOUO) There are several categories of light-speed DEW that could be considered as candidates for the PASDEW. Lasers, radio frequency (RF) devices, and particle beams all come to mind. Within each category there are further subdivisions and energy generation technologies. All categories may have distinctive advantages and disadvantages for weapons in the future. However, for the earliest fulfillment of this Time Critical UUNS, maturity is the driving criteria. Chemical high energy laser (HEL) based weapons systems are the only DEWs that can meet the need in the near-term. HEL weapon beams also lend themselves to achieving high energy density on target, a key requirement to achieve stand-off lethality for DEW or kinetic weapons. With HEL maturity as the governing criteria, the PASDEW needs to be developed and fielded as a spiral capability:

(FOUO) PASDEW Spiral 0:

(FOUO) The Advanced Tactical Laser (ATL) Advanced Concept Technology Demonstration (ACTD) is producing a single ACTD residual capability that can be deployed and readily enhanced to fulfill the threshold PASDEW capabilities. The ATL ACTD is a currently ongoing demonstration of the operational utility of airborne ultra-precision strike missions using a HEL weapon mounted in a tactical aircraft. This USSOCOM demonstration program is scheduled to be completed in 2007. It is noteworthy that immediately following the ATL ACTD, the U.S. Air Force is planning an Extended Users Evaluation (EUE) that operationally exercises/demonstrates capabilities that closely correspond with the near-term urgent need (threshold) described in this time critical UUNS. It is therefore the ATL EUE that is suggested as the initial PASDEW material solution for this time critical MNF-W need. The proposed ATL EUE is framed as a two-year EUE.

(FOUO) As currently envisioned the ATL EUE would be supported by two in-stride "build and test" upgrades that enhance the basic ATL ACTD capability and which might help fulfill threshold needs. The EUE will also support military operational experimentation, and should demonstrate capabilities in operational missions. CF in MNF-W, as well as CF throughout the larger ITO have an urgent need for this capability and can provide the ATL EUE an operational theater and mission tasking that directly support the extended user evaluation objectives.

(FOUO) The following discussion provides an introduction to the basic ATL ACTD capability, which constitutes the initial spiral (Spiral 0) of PASDEW:

- (FOUO) For the purpose of the ACTD, the ATL has been installed in a C-130H aircraft from the U.S. Air Force 46th Test Wing. The ATL employs a closed-cycle, chemical oxygen-iodine laser (COIL) as the high energy laser

(HEL) weapon source. In addition to the COIL HEL source the ATL hardware includes an integrated beam control system. This is composed of the beam director, optical control bench, and weapon system consoles. The entire weapon system encompasses a package of several modules that are installed on the aircraft and integrated to provide a functional weapon system capability.

- (FOUO) The closed-cycle COIL HEL system is key to ATL being operationally suitable as the first PASDEW. It captures chemical reaction by-products, making it suitable for tactical employment within the manned confines of the tactical aircraft. The ATL is required to be a sealed exhaust COIL so as to eliminate the aircrew's exposure to chemical effluents. The compact sealed COIL technology meets these requirements amongst chemical-class HELs, and it uniquely met the Government's key human factors requirements, ultimately meriting ACTD approval. Additionally, the by-products of the spent COIL reactions are captured and can be subjected to electro-chemical (EC) rejuvenation on the ground. The rejuvenation process can provide for the replenishment of the laser fuel repeatedly for an indefinite cyclical period without degradation of the PASDEW magazine re-charge, readiness or power. The EC COIL process requires only electricity and de-ionized water. An entire ATL magazine of laser fuels can be rejuvenated in approximately eight (8) hours on the ground using equipment that fits in a single shipping container. The rejuvenation CONEX box can potentially be located at the expeditionary airfields within the MNF-W AOR, such as Al Assad or Al Taqqadum, or elsewhere in the ITO.

- (FOUO) The ATL's on-board visible and infrared surveillance and acquisition sensors provide the weapon operator scene images of increasing resolution for finding, identifying, and engaging targets. A readily enhanced ATL is capable of engaging stationary or moving ground targets to the satisfaction of the threshold requirements. The intense optical fluence of the beam on target will possess the heating power of a blowtorch capable of slicing through metal on distant targets for up to 40 seconds per fuel magazine. Depending on weather and operator selection of aim-point/target-effects the 40 second magazine can be parsed into sub-second engagements (e.g. dwells of 0.3 second) or longer duration engagements (e.g. >5-seconds) to support neutralization of harder targets at greater standoff range. Anti-personnel engagements against PID enemy combatants can be conducted at significant range. At shorter ranges, the dwell times for target effects are reduced and magazine readiness can be preserved.

- (FOUO) The ATL will operate from outside of the range of all those small arms fires and shoulder-launched anti-aircraft missiles that are projected to be existent in the MNF-W AOR at the time of the EUE. The ATL can be far enough away from the target in terms of stand-off that its action could be considered covert with respect to both counter-personnel and counter-material applications. The HEL beam makes no sound such as those associated with AC-130 gun reports and supersonic munitions shock waves. Nor is the beam visible without infrared (IR) viewing assistance, as the COIL wavelength is slightly longer than 1.3 microns, and thereby invisible to the naked eye.

- (FOUO) The ATL will generally operate below layered clouds. In the MNF-W AOR, the ATL might nominally fly at altitudes around 10,000 feet in a

look-down shoot-down mode of operation. If the pilot and crew choose to employ oxygen the ATL can operate at 15,000 to 20,000 feet and engage targets while operating well above enemy MANPAD engagement envelopes. The ATL can also operate down to an altitude of 2,500 feet, however below 2,500 feet altitude the operational horizontal-range becomes increasingly limited with further altitude reduction. Localized weather cells and fronts may be avoided by maneuvering around them. In the MNF-W AOR, temperatures are generally high, humidity is moderate, cloud ceilings are high, and visibility can be limited by blowing sand and dust. Therefore, in the MNF-W AOR the baseline ATL design of the initial spiral can be anticipated to exceed threshold capabilities.

- (FOUO) During the initial spiral (Spiral 0) of PASDEW composed of an in-theater enhanced EUE, ATL capabilities will be integrated with AC-130 (Spectre) and helicopter gunship operations to the maximum extent possible. In the spirit of combined arms direct fire, when support is requested, the ATL and a fixed-wing or helicopter gunship can be dispatched. The operator having PID of a target on the ground can choose the optimal weapon for the particular target and circumstances. This will insure that ATL CONOPS and TTPs become highly-refined without exposing mission risk or creating unrealizable operational demands for the ATL EUE experiment. This complementary combination of kinetic and directed energy gunships is a practical application of the mix that will eventually become standard for all gunship operations.

- (FOUO) There are several ATL enhancements that will be needed in order for the ATL to be operationalized as the initial spiral of PASDEW. These enhancements are not currently part of the ATL ACTD program and need to be funded immediately. They include enhancements such as tactical data links and communications, situation awareness, common operating picture integration, wide-area surveillance, and controls to manage a full spectrum of target vulnerabilities for engagement of applicable targets.

Figure 1. The ATL Gunship as the Spirals 0 and 1 of PASDEWS.

(FOUO) PASDEW Spiral 1:

(FOUO) In the first spiral of PASDEW a clone of the ATL needs to be built and fielded in support of on-going operations that are being supported by the initial PASDEW. It is anticipated that the Spiral-1 will be supported by enhanced capabilities and advancing technologies. Enhancements will not involve technology insertion for its own sake. Rather, these enhancements will be reliability-based, considering both operational needs and demonstrated technology readiness at a time in advance of the Spiral-1 critical design review. As for supporting the urgent need for a PASDEW, upon fielding the second ATL, an Initial Operational Capability (IOC) of the PASDEW will be met.

(FOUO) PASDEW Spiral 2:

(FOUO) In the second spiral of PASDEW, two more ATL systems will be constructed and fielded. By the time of this spiral, solid state high energy laser (SS HEL) technology may indeed have progressed to compact 100 kilowatt-class sources that are comparable in average/Continuous Wave (CW) power to the COIL-based ATL. The subsystems of the third and fourth ATL systems would be clones of the earlier ATLs in terms of beam control and fire control technologies. This direct leveraging will enable the rapid increase of the PASDEW fleet to four (4) systems. It will also permit the full integration of ATL into the CONOPS and tables of equipment (TEs)/tables of organization (TOs) of composite C-130 gunship squadrons. The full integration of the PASDEW into the AC-130 CONOPS and TTPs is worthy of further discussion:

- (FOUO) Current Capabilities: Currently, the AC-130U Gunship is the state of the art in terms of an instantaneous stand off tactical precision kinetic capability. It is frequently called upon by CF in the MNF-W AOR who have established target PID, and desire to achieve precision kinetic lethality from an overhead vantage point to minimize collateral damage. Currently, the AC-130U armament includes a port side-firing 25 mm GAU-12/U Equalizer Gatling gun, a 40 mm L60 Bofors cannon, and a 105 mm M102 howitzer. These weapon systems confine the Effective Casualty Radius (ECR) of the gunship to the lateral fragmentation radius of the point detonating munitions and the cones of fire of the individual automatic weapons. A new program has been initiated to upgrade the armament of existing AC-130s that are still in service. The 25 mm GAU-12/U and 40 mm Bofors are to be replaced with two Mk 44 30 mm Bushmaster II cannons. There are also plans to replace the M102 howitzer with a breech-loading 120 mm mortar, and to give the gunship a greater standoff capability using either the AGM-114 Hellfire missile, the Hydra 70 rocket, or the Viper Strike glide bomb. As a result, kinetic engagement stand-off and accuracy will be improved.

- (FOUO) The AC-130U also benefits from a sensor suite that includes a television sensor, infrared sensor, and radar. These sensors allow the gunship to visually or electronically identify friendly ground forces and targets in most conditions. The AC-130U is also equipped with the AN/APQ-180, a synthetic aperture radar for long-range target detection and identification. The gunship's navigational devices include the inertial navigation systems and Global Positioning System. The existing kinetic gunship also includes a Magnetic Anomaly Detector (MAD). The MAD is a highly sensitive passive device which picks up localized deviations from earth's magnetic field that allow the C-130 to detect such subtle changes caused by the ignition coils of an enemy truck hidden from view under light concealment, alerting the aircraft crew to their presence.

Figure 2. The AC-130U Gunship.

Figure 3. ATL as first PASDEW.

- (FOUO) Limitations of DEWs will reveal themselves in operational practice, and the legacy strengths of KEWs are already well established:

    - Inevitable PASDEW Gunship Limitations: For DEWs weapon effectiveness an atmospheric window is needed for propagation in a tactical environment, and that may not always exist. Weather and battlefield obscuration may compound thick-air challenges and

occasionally render the DEW beam impotent at the ranges it normally exhibits threshold effectiveness. The DEW beam must also couple with the target so as to produce operationally relevant destructive effects. Lethality mechanisms can be defeated through interrupted dwell time, complex target surface geometry, and (in the future) deliberate countermeasures.

- Legacy KEW Gunship Strengths: KEWs possess mutually exclusive, mutually complimentary effects to those exhibited by DEWs that compensate for DEW limitations. The atmosphere through which bullets, penetrators, and warheads pass is essentially transparent for the purpose of their transit to the target. They deliver energy in discrete packets of momentum-activated kinetic energy, and are unhindered by atmospheric obstructions to electromagnetic radiation propagation (with the exception of missile sensors). Furthermore, energy is delivered in discrete packages of bullet, blast, shaped charge, or fragment delivered energy that has always and will likely continue to confound and drive armor and hardening requirements. Similarly, dwell time is not an issue for a ballistic KEW munition that has already been dispatched down-range on a true or guided trajectory. Finally, KEW munitions penetrate lighter cover virtually instantaneously, and generate severe acoustic shock-shattering and spalding in impacted materials when halted. Explosive warheads further magnify destructiveness. Though the comparative lack of KEW munitions range, accuracy, velocity, kinematic constraints, and flexibility can be seen as a drawback in an age of DEWs, their mature, demonstrated qualities of assured destructiveness, given target impact, are needed in the combined arms gunship concept.

(FOUO) In summary, the second spiral of PASDEW needs to begin to incorporate combined arms kinetic and directed energy weapons principles, if only through the composite squadron CONOPS and TTPs.

(FOUO) PASDEW Objective Spiral:

(FOUO) In the later, objective spiral of PASDEW, the gunship capability must evolve into a combined arms weapons suite that integrates a HEL weapon with the most advanced, precision kinetic energy weapons aboard a single platform for full spectrum effects. In essence, with the ATL capability as the primary weapons system, the objective gunship spiral needs to incorporate the best aspects of the ATL and the best aspects of the AC-130. As discussed above, DEWs and kinetic energy weapons (KEWs) are fully complimentary.

(FOUO) The objective iteration of this UUNS recognizes that a complementary combined arms approach under the control of a single crew aboard a single aircraft platform is ideal. It provides both individual tailored engagement options as well as the non-linear synergies of simultaneous employment. Additionally, the objective spiral should address miniaturization of systems so that the gunship capability is not limited to larger airframes such as the AC-130. This will require an investment in solid state DEW sources, as well as electrically driven direct fire projectiles. This technology development-dependent gunship need is stated in the Marine Corps Gunship Advanced Combined Arms Weapon Suite (GACAWS) Universal Need Statement dated 13 May 2002. Once mature, compact combined arms gunship weapons suites may lend themselves to integration with remotely controlled, semi-autonomous, and fully autonomous Combat UAVs.

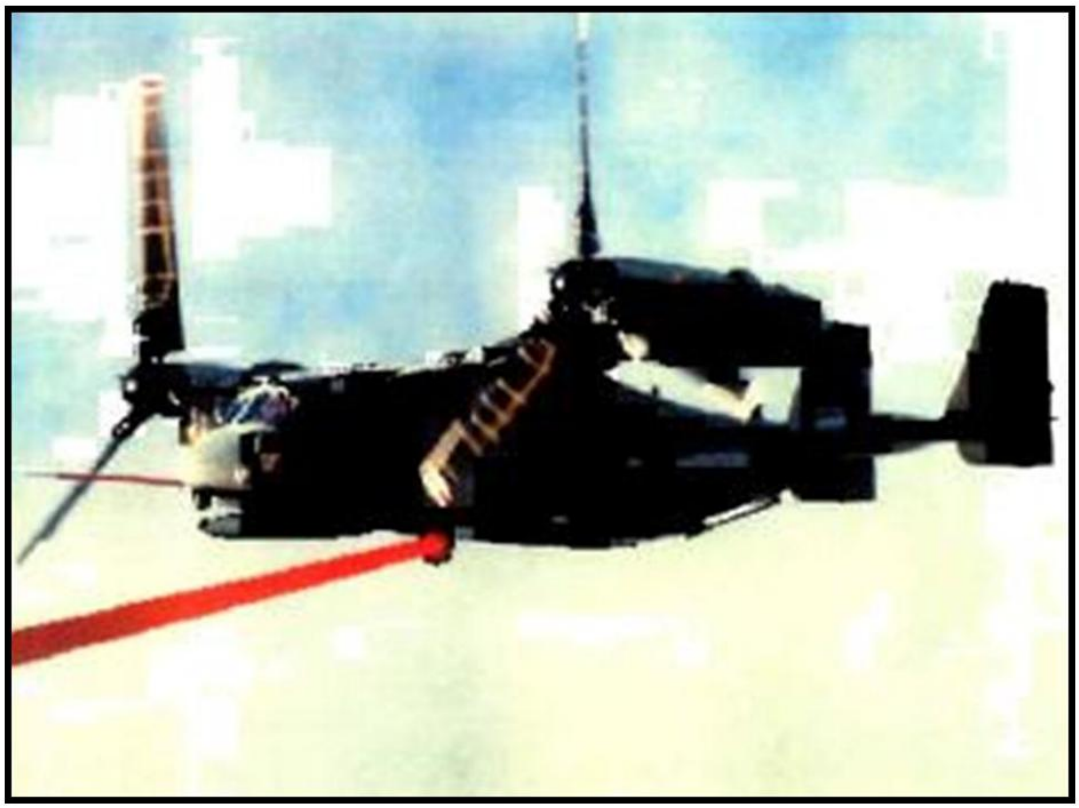

Figure 4. A V-22 Gunship Advanced Combined Arms Weapon Suite (GACAWS).

Objective Delivery Timeline (CONUS and/or AOR)

Provide your desired delivery timeline for pre-deployment and post-deployment fielding. Identify unit location (Conus/AOR), priority, and proposed use (e.g. training, operational, support).

(FOUO) Due to the time critical urgent necessity for the PASDEW capability, following a limited assessment of operational effectiveness and suitability in CONUS, the single existing ATL capability of the initial spiral should be shipped directly to MNF-W. Also, support for in theater training and field maintenance should be contracted immediately. ATL represents the initial spiral for PASDEW, and like other advanced weapons that have matured sufficiently in the laboratories, it needs to be considered for operational employment. Despite obvious limitations and its less-than-optimal form-fit, early PASDEW capabilities like the ATL will only find useful employment when CONOPS and TTPs are carefully defined for operational experimentation in the MNF-W AOR and the ITO.

Concept of Employment

Describe your proposed method of employment and how implementation of this UUNS will improve your combat effectiveness.

(FOUO) Structures and locations that are protected from destruction under the Law of Land Warfare are frequently used as safe havens and weapons launch points by insurgents. In reality the restrictive fire measures that protect these structures will not protect insurgents under the ROE if they engage in hostile acts and are PID. Still, the insurgent tendency is to tempt heavy handed CF actions, and indeed the result of CF return fire often harms IO objectives. Insurgents exploit the known CF reluctance to undermine IO campaign objectives. Traditional CF lethal kinetic engagements against

combatants that are using those locations to shield-preserve their weapons and capabilities against CF attack are often stymied as a result.

(FOUO) The PASDEW represents a more flexible lethal tool for destroying the enemy in those places which he previously equated with safe sanctuary. The PASDEW will help close that insurgent option, allowing CF to return fire immediately as a function of hot pursuit, self defense, or force protection in a way that does little or no collateral damage, yet presents the enemy with sobering consequences. PASDEW engagement opportunities include neutralizing enemy positions that have been intentionally located atop or adjacent to religious shrines, hospitals, schools, or residential areas, while avoiding collateral damage, both laterally and in-depth.

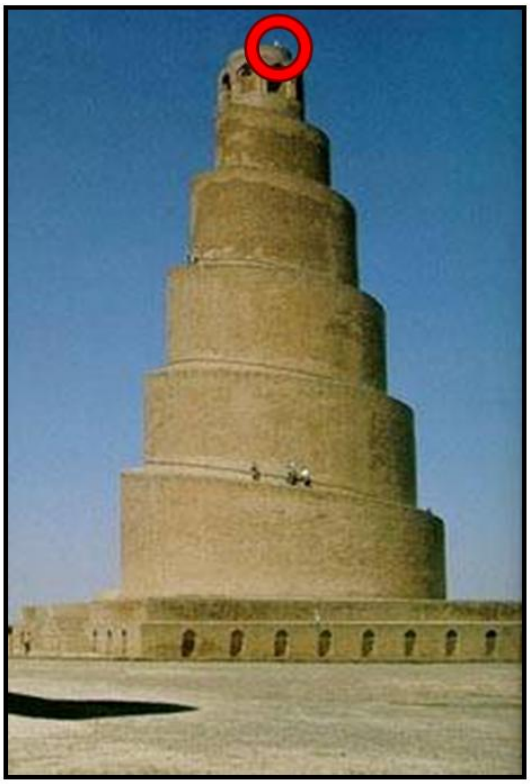

Figure 5. A protected mosque.

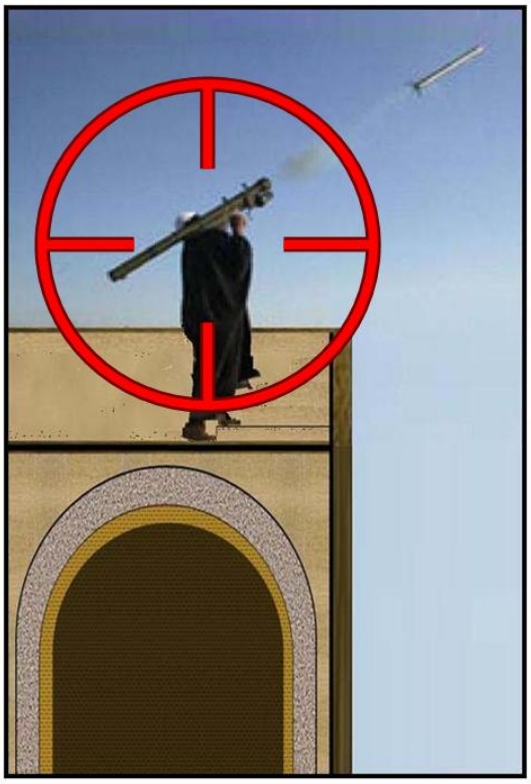

Figure 6. A PASDEW target.

(FOUO) Crowds of non-combatants, especially groups of children, are another favored means that insurgents employ to shield themselves from CF return fire following hostile acts. Kinetic return fires from the ground or from the air would almost certainly risk collateral injury to innocents under such circumstances. Even though the ROE permits CF return fire in self defense, frequently CF restrain themselves from such engagements because of the high risks. As noted in the earlier MNF-W AOR examples, the insurgents are keenly aware of this civilized CF conscientiousness, and take full advantage of it.

(FOUO) Here again, the PASDEW will help close that insurgent option. In particular, the psychological operations (PSYOPS) impact of a PASDEW is noteworthy. In an anti-personnel mode, DEWs can be compared to long range blow torches or precision flame throwers, with corresponding psychological advantages for CF. A precision engagement of a PID insurgent by a DEW will be a highly surgical and impressively violent event. Target effects will include instantaneous burst-combustion of insurgent clothing, a rapid death through violent trauma, and more probably a morbid combination of both. It is estimated that the aftermath of a sub-second engagement by PASDEW will

also be an observable event leaving an impression of terrifyingly precise CF attribution in the minds of all witnesses. The PASDEW capability will give CF an asymmetric psychological edge over the insurgency. It is a lethal capability they cannot readily counter and will not fully comprehend, particularly as the DEW is invisible to the unaided eye and the aircraft can engage from significant stand off. For all witnesses, it will be perceived that overt insurgency participation in the MNF-W AOR is less attractive due to the terrifying potential consequences.

Figures 7, 8, 9, and 10. Shielded insurgent targets for PASDEW.

(FOUO) DEWs will also permit the application of graduated effects through variations in aim point and dwell time. This variability will support the MNF-W IO campaign by allowing CF to selectively apply anti-material force whenever such variation is practical for mission accomplishment. With respect to the engagement of vehicles of all sorts, mobility kills may be preferable to outright destruction at times. In this case PASDEW destruction of the engine manifold or a tire may serve mission accomplishment more effectively that killing the vehicle and driver. Likewise immobilization of a weapon for subsequent recovery by CF may be better than its catastrophic destruction. Graduated anti-material effects options permit CF to consciously avoid permanent infrastructure damage or undesired evidentiary loss in ways that cannot be done with kinetic direct fire, thereby enhancing mission accomplishment.

Figures 11, 12, 13, and 14. Anti-material targets for PASDEW.

(FOUO) During the recent conflict between Hezbollah and Israeli Defense Forces (IDF), combat UAVs of Iranian-design (and possibly even remotely piloted by Iranians) made their appearance on the battlefield. Theater intelligence indicates that it is only a matter of time before combat UAVs appear as an insurgent TTP in the MNF-W AOR. These non ballistic targets present many of the same challenges as cruise missiles, and this is aggravated by the ability to swarm UAVs to overwhelm fixed site defenses. Their appearance in the ITO and MNF-W's AOR is therefore probable in the future.

(FOUO) To aid in countering this emerging threat, MNF-W is developing a passive optical UAV detection, direction and dissemination capability. This passive, networked day and night optical detection system will be employed by Forward Operating Bases, Combat Outposts, and Firm Bases in the MNF-W AOR. It will include an ability to cue and vector weapons to engage the threat. A PASDEW offers multiple airborne functions due to its direct fire range, precision, high-resolution optical PID and track, and the delivery speed of the DEW engagement. Contributing to the MNF-W defense against combat UAVs whenever the PASDEW is on station is a significant secondary mission. PASDEW can then be cued to destroy threat UAVs using its stand odd look-down/shoot-down capabilities.

Figure 15. Low altitude combat UAV swarms as PASDEW targets.

Training Requirements

Describe any additional, special, required, or proposed training that your Marines will need to ensure they are capable if implementing your proposed materiel solution as intended.

TBD.

Supportability Requirements

Describe any additional, special, required, or proposed support personnel (contractor/Marine) and/or equipment your will need to maintain the capability requested over the next 12 to 18 months. Include consumables (i.e. batteries, lubricants, fuel, etc.) to include any special considerations like hazardous materials and protective equipment.

TBD.

Does unit possess the T/O to operate the UUNS equipment or does the UUNS equipment require a T/O increase?

TBD.

Anticipated Unit Distribution (deployed UICS) and Fielding Plan

Describe your plan for distributing the equipment and manpower that will utilize the equipment in the field.

(FOUO) The planned sequential distribution of the total of four (4) PASDEW capabilities, by spiral, is as follows:

Unit Description	Quantity
MNF-W (Spiral 0)	1
MNF-W (Spiral 1)	1
MNF-W (Spiral 2)	2
Total	**4**

Impact (unclassified) to Mission Accomplishment

Describe the negative effects on the accomplishment of your mission if this UUNS is not fulfilled.

(FOUO) MNF-W will gain a standoff tactical airborne weapons capability that combines limited collateral damage with ultra-precise lethality. MNF-W Forces will then be able to engage in complex situations with an extreme precise lethal tool, for stand off engagement of Positively Identified (PID) insurgents that will permit the near total confinement of damage and injury to the engaged adversary. The MNF-W IO and PA campaigns will benefit greatly, as collateral damage and mission accomplishment will no longer be mutually dependent trade-offs.

MEF POC for Information Coordination

Who are your technical and tactical experts and advisors who may assist in the refining/defining of solution to this UUNS?

Col Martin E. LaPierre, USMC
AC/S G-9, MNF-W/I MEF (FWD)
NIPR: martin.lapierre@cemnf-wiraq.usmc.mil
SIPR: martin.lapierre@cemnf-wiraq.usmc.smil.mil
DSN: 318.3405.900

GS-15 Franz J. Gayl, USMC
Science Advisor, MNF-W/I MEF (FWD)
NIPR: franz.gayl@cemnf-wiraq.usmc.mil
SIPR: gayl.franz@cemnf-wiraq.usmc.smil.mil
DSN: 318.3405.912

Estimated Cost (if known)

Provide your estimated cost for the operation and support of the equipment in 6 month increments out to 18 months from the date of fielding.

(FOUO) Unknown. The number of PASDEW systems needed is significantly greater than what can be filled in the near term. As a consequence, given the small numbers of these gunships their individual costs will remain relatively high for the time being. However, this limited deployment of PASDEW represents the first operationally fielded configuration of a tactical HEL gunship weapon, in any form. Spiral development will help provide cost-effective and suitable families of PASDEW configurations which are broadly fielded and tailored to various tactical air platforms. The PASDEW capability will be of strategic benefit to the U.S. IO and PA campaigns, and significantly improve U.S. COIN capabilities. In order for this broader operationalization to take place, the initial transformational capability needs feedback based on an initial operational employment. This time critical UUNS is therefore the starting point for the spiral PASDEW process.

Program of Record Recommendation

Should this capability be continued and turned in to a Program of Record, after the urgent need is satisfied?

Yes.

T/O&E or Doctrinal Change Recommendation

Describe any proposed or required changes to T/O&E/s, doctrine, or TTP's.

TBD.

If the need is not satisfied, how will it affect your ability to perform the mission or task?

(FOUO) MNF-W will continue to lack standoff tactical airborne weapons that combine limited collateral damage with ultra-precise lethality. MNF-W Forces will continue to face situations where an extreme precise lethal tool, for stand off engagement of Positively Identified (PID) insurgents would benefit from the near total confinement of damage and injury to the engaged adversary. The MNF-W IO and PA campaigns will continue to suffer as a result, as collateral damage and mission accomplishment will continue to mutually dependent trade-offs.

Approval Authority – Regimental Level or as appropriate (Battalion, Squadron, etc.)

Command I MEF FWD	Name of Approval Authority (Last, First, Initial) LaPierre, Martin E	Rank/Grade Col/06
Mailing Address I MEF FWD G-9 UIC 42510 FPO AP 96426-2510	Phone DSN 318-3405-900	FAX N/A
	E-mail MARTINE.LAPIERRE@CEMNF-WIRAQ.USMC.MIL	
	Date Received NOV 24 2006	Date Forwarded NOV 24 2006
Approval Authority Comments (optional)	Signature Block	

Approval Authority – MEF Level or as appropriate (Division, Wing, Service Support Group, etc.)

Command I Marine Expeditionary Force FWD	Name of Approval Authority (Last, First, Initial) NELLER, ROBERT	Rank/Grade BGEN/07
Mailing Address DEPUTY CG, OPERATIONS I MEF FWD UIC 42510 FPO AP 96426-2510	Phone DSN 318-3401-103	FAX N/A
	E-mail ROBERT.NELLER@CEMNF-WIRAQ.USMC.MIL	
	Date Received DEC 03 2006	Date Forwarded DEC 03 2006
Approval Authority Comments (optional) PASDEW was originally submitted to Multi National Corps – Iraq (MNC-I) as a Time Critical Joint Urgent Operational Need (JUON). PASDEW is being submitted as an UUNS so that once OSD approves the JUON and resources the capability USMC will have the program foundation for execution through MCCDC and SYSCOM, as required.	Signature Block	