HIGH MOBILITY ARTILLERY ROCKET SYSTEM: ITS ROLE IN THE RAPID FORCE PROJECTION INITIATIVE

A MONOGRAPH
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ABSTRACT

HIGH MOBILITY ARTILLERY ROCKET SYSTEM: ITS ROLE IN THE RAPID FORCE PROJECTION INITIATIVE by Major E.J. Degen, USA, 53 pages.

As the Cold War becomes a memory, the United States Army finds itself facing a monumental challenge. The Army must transition from a "forward deployed" organization to a "force projection" organization. There are many constraints to overcome during this transition. The Army has seen cutbacks in its manpower and money while simultaneously redefining its role and designing its structure to succeed in the next century. The Rapid Force Projection Initiative (RFPI) is one of the programs being used to help with this transition. The Rapid Force Projection Initiative is oriented on getting more firepower with less weight for the future light infantry units that must deploy from the continental United States. The High Mobility Artillery Rocket System (HIMARS) is one of the cornerstones of this program. This monograph examines the HIMARS to see if it is the right system for the future of long-range fires in light infantry units.

This study begins with some general background information about the RFPI and the origin of the HIMARS program. The monograph then takes an in-depth look at the characteristics and capabilities of HIMARS and how they compare to other systems that already exist in the inventory. To understand the future impact of HIMARS on the battlefield a look at both present and future munitions is necessary before studying the environment that the system most likely will have to perform in. Results of past exercises on future war are analyzed to examine the effects that HIMARS or similar systems had on the simulated battlefield. This is followed with an examination of what the Field Artillery branch has stated their future artillery systems will be.

The monograph concludes with an analysis based on the Tenets of Army Operations as stated in FM 100-5, *Operations* (Jun 93). These tenets are critical to the Army's success on the battlefield. If HIMARS does not have a positive impact on a majority of the five tenets it may not be the right system for the future. In conclusion, the monograph identifies possible alternatives for the future of long-range fires and recommends which option looks to be the best as presented in this document.

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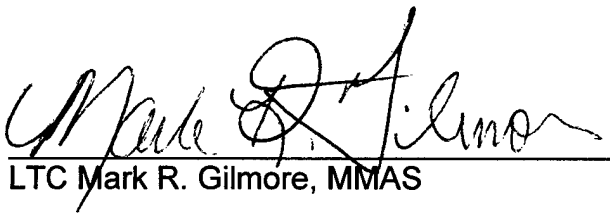

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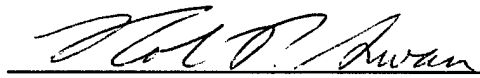

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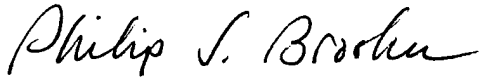

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I. Introduction

The Army has evolved into a force projection Army since the end of the Cold War. Many of the forces that were available in forward, deployed areas such as Europe are now based in the continental United States. The mission of the Army has grown to involve many more Stability and Security Operations (SASO) throughout the world. As with force projection, the Army must also evolve into a flexible force that can deploy quickly with the greatest amount of combat power to react to these missions. This monograph focuses on a small part of that evolution, the High Mobility Artillery Rocket System (HIMARS).

HIMARS is one weapon system of many that is being developed and fielded as part of the Rapid Force Projection Initiative (RFPI). RFPI focuses on getting the most combat power forward in a quick fashion while maintaining or improving the effectiveness of the projected task force. This monograph answers the question: Is the HIMARS' increased combat power contribution to the Light Infantry Division worth its costs in weight and logistical requirements?

Background information on the HIMARS begins the discussion followed by the capabilities and characteristics of the system. Following this discussion, the monograph discusses in depth the present and future characteristics of HIMARS and Multiple Launch Rocket System (MLRS) munitions. This discussion is necessary to understand the implications of how HIMARS could be used in future contingencies.

The monograph highlights the future world and war as seen by a couple of different authors, then leads into some scenarios of future warfare that have been run by both the Training and Doctrine Analysis Center (TRAC) and the Arroyo Center of RAND. This

discussion will show what the future requirements on the battlefield will be for long-range precision munitions platforms similar to HIMARS and MLRS. Discussions conclude with what the Arroyo Center and the Field Artillery branch see as critical to the future of fires on the modern battlefield.

The final chapter analyzes the HIMARS against a set of criteria from *FM 100-5, Operations, June 1993.* The criteria used for the analysis portion will be the Tenets of Army Operations; Agility, Initiative, Depth, Synchronization, and Versatility. In the words of FM 100-5, "All training and leadership doctrine and all combat, combat support, and combat service support doctrine derive directly from, and must support, the fundamental tenets. The U.S. Army believes that its five basic tenets are essential to victory."[1] If HIMARS does not prove necessary under these tenets, HIMARS may not be the system of the future for light force projection.

II. Background

In the December 1995 issue of Field Artillery magazine, BG Randall L. Rigby, the then Chief of Field Artillery stated, "The weapons systems we have in support of our light forces are aging--we need to update them as well."[2] This emphasis further propelled the development and future fielding of two new fire support systems designed to support light forces. The first being a light weight 155mm howitzer with a thirty kilometer or greater range, and the second system is the High Mobility Artillery Rocket System (HIMARS). On the surface both systems look like they will greatly improve the combat power of force projection light forces, but there are critics that believe that the HIMARS is not a long term solution to the light force's fire support problems.

Many opponents of HIMARS criticize the weight of the system as being too heavy for the Light Infantry Division's lift allocations. They also criticize the cost of the system along with the logistical requirements to sustain the system. Proponents of the system counter the critical argument with historical examples of MLRS success, low costs of the developmental phases of the project, live fire testing results, and the fact that it takes thirty percent less lift assets to transport the system as opposed to MLRS. These facts coupled with the future of MLRS and HIMARS delivered munitions make the future of rocket artillery look very good.[3]

A lack of combat power in light infantry units is nothing new and is only amplified now that the United States has a force projection army. During the early entry portion of force projection operations light forces are very vulnerable to counterattack by heavy forces. Light units do not possess the combat power to fight and win against this threat, rather they rely on air and possibly naval support for assistance. Army leaders do not

believe that reliance on weather dependent air assets for force protection is prudent. They are striving to make the light force a self-sufficient combat force that can rely on its own combat assets to fight and win against most enemies.[4]

Through the Rapid Force Projection Initiative (RFPI), the Army is developing a very lethal, survivable, and rapidly air deployable early entry task force. By using advanced technologies and systems, this early entry task force will be able to defeat larger armor forces. The RFPI will reduce timelines for target acquisition, real-time target data transfer, improved situational awareness, enhanced weapon-target pairing, and standoff engagement of targets. RFPI testing and implementation is presently being done with the 101st Airborne Division in Fort Campbell, Kentucky.

The basic concept of RFPI is to form a rapidly deployable task force in an airlift constrained environment. This task force will be both highly lethal and survivable. RFPI is built around a series of advanced sensors and weapons that will be linked by a vigorous command, control, and communications system (C3). Sensors will be capable of detecting targets well forward of friendly units by today's standards. Weapons will be precision, long-range systems that can kill enemy armor threats long before these threats can effect the ground components of the force projected task force. The command, control, and communications systems will be digitized systems that relay near-real time target locations from sensors to shooters for rapid fire and effects.

The purpose of RFPI is to allow early entry forces to engage and defeat armor forces that would normally overwhelm them. This initiative becomes even more critical in today's force projection Army. RFPI reduces timelines for target acquisition, gives the commander real-time target data transfer, improves the situational awareness for both the

commander and the staff, matches the proper weapon with the proper target, and gives the commander the ability to engage targets at standoff ranges. There are numerous components to this RFPI initiative, with HIMARS as one of the cornerstones of the program.

There are major pieces to each of the three cornerstones of the RFPI; sensors, weapons, and C3. The sensors include, Hunter Sensor Suite (HHS), Remote Sentry (RS), Aerial Scout Sensors Integration (ASSI), and the Advanced Acoustic Array (AAA). The weapons being developed and implemented are the HIMARS, Autonomous Intelligent Submunitions (AIS), Automated Howitzers (Fire Control System), Precision Guided Mortar Munitions (PGMM), Intelligent Minefield (IMF), Enhanced Fiber Optic Guided Missile (EFOGM), and Guided Multiple Launch Rocket System (MLRS). The RFPI Command and Control (C2) will be designed using similar technology employed by the 4th Infantry Division in Fort Hood, Texas.[5] All these systems, plus or minus a few, will make up the future light task force that may be projected forward from the continental United States (CONUS) to possibly very remote and very hostile locations throughout the world.

The Field Artillery's real role in the RFPI is to devise the best mix of fire support systems to support light forces in the rapidly changing military environment. The Field Artillery has chosen to do this with a mix of newly designed lightweight 155-millimeter howitzers that can deliver all present 155-millimeter projectiles up to thirty kilometers, and the HIMARS to provide the lightweight, deployable rocket and missile launcher to support light forces.

The Field Artillery branch envisions that during initial operations the HIMARS and

lightweight howitzer will "protect the projected force from threats ranging from harassment by mortars to ballistic missiles carrying weapons of mass destruction."[6] HIMARS will give the commander the flexibility in fire support that he needs to react to changing situations while increasing his firepower. These systems coupled with the other elements discussed earlier will assist the commander in shaping his battlespace from the very beginning of the operation.

III. HIMARS Capabilities

Before analyzing the HIMARS against the requirements of the future battlefield, a thorough examination is required of the capabilities of both the system and the munitions that it may employ in the future. After this examination, the results of that study must be applied to the future battlefield that the system may encounter.

The High Mobility Artillery Rocket System (HIMARS) will be a more strategically deployable indirect fire rocket/missile system than the current Multiple Launch Rocker System (MLRS). It will be designed to provide contingency forces the rapid fire, high volume, long-range rocket launcher capable of firing the complete MLRS family of munitions (MFOMs) as currently packaged. HIMARS will also be capable of firing the MFOM that are currently under development for future implementation.

The launcher will be able to drive on and drive off a C-130 and larger cargo aircraft, fully combat loaded and in combat configuration. Range, lethality, effectiveness, response times and reload times will be the same or better than those currently achieved with the M270 MLRS launcher. Fire control and communication system/capabilities will inter-operate and be compatible with the current MLRS launcher.[7] HIMARS will be equipped with only one six-pack of rockets or a single Army Tactical Missile System (ATACMS) as opposed to the MLRS which can equip with two six-packs of rockets or two missiles.

The overview as stated above gives a good general description of what the Army is looking for in the HIMARS, but what really drove the Army to this point is the original "Statement of Need" for the system:

> "US light and heavy division do not have the organic assets to effectively perform battle tasks on a worldwide basis. While corps level assets can provide supporting 155mm howitzer and M270 Multiple Launch Rocket System (MLRS) fires to accomplish these missions, the lack of strategic deployability resources may limit or even preclude the introduction of these weapons into the theater in time to affect the battle. There is a need to increase airlift capacity for these corps level assets by extending airlift platforms to include C-130 aircraft."[8]

This "Statement of Need" led to the awarding of a contract to develop and build four prototypes of the HIMARS. The contract for the four HIMARS was awarded to Lockheed Martin Loral Vought Systems at a cost $23.2 million. Three of the four launchers are presently assigned to the 18th Field Artillery Brigade at Fort Bragg, North Carolina. The Army organizes these launchers into a single HIMARS Platoon for a two-year hands-on test. For testing the contractor maintains the fourth launcher. This launcher has successfully fired numerous test rounds of the MFOMs at White Sands, New Mexico with positive results.[9]

Origins of the program seem clear, but what does the Army see as the mission for the HIMARS? The mission resembles that of the M270 MLRS launcher units. As per the System Training Plan document, HIMARS will be used to engage and defeat tube and rocket artillery, air defense concentrations, trucks, light armor and personnel carriers, as well as support troop and supply concentrations.[10] This mission pertains to today's munitions. Munitions of tomorrow will increase this mission to include heavy armor forces. Munitions and their effects will be discussed in detail in the following chapter. Presently and in the future the mission of HIMARS will closely resemble that of the MLRS. The only real exception will be the HIMARS' ability to deploy with less lift requirements into a more austere environment.[11]

HIMARS will have profound effects throughout the battlefield framework. In the close fight HIMARS augments cannon fire with indirect fires to enhance force protection. HIMARS can be used for counterfire, raids, suppression of enemy air defense (SEAD), and engaging targets beyond the forward line of own troops (FLOT) that may have a detrimental impact on the close fight.

In the deep fight HIMARS can presently reach a depth of 165 kilometers with the ATACMS Block I missile. In the near future HIMARS will be able to reach a depth of 300 kilometers with the fielding of the ATACMS Block IA missile. The depth of these systems alone can have a profound impact on the commander's deep fight, allowing him to shape the close fight to facilitate victory. HIMARS is an excellent system for attacking long-range, High Payoff Targets (HPTs). Presently these HPTs should be soft targets because of the limitations of the munitions that will be used for the attack. The system also is an excellent system for attacking HPTs with relatively short dwell times. Dwell time is the amount of time that a target will be in a stationary position. Sensor to shooter response time is very short with HIMARS as opposed to the response time of aircraft or naval support. The range of HIMARS also makes it the weapon of choice for long-range SEAD targets to allow aircraft more freedom of action and a higher probability of survival during deep air strikes.

HIMARS is not well suited for rear operations fires. HIMARS with its present munitions is very much an area weapon system, therefore it does not have the accuracy required for safe rear area fires. HIMARS may be used in the rear area in support of division or corps response operations and/or tactical combat force operations.

Because of HIMARS' unique capabilities, the Army's Decide, Detect, Deliver, and

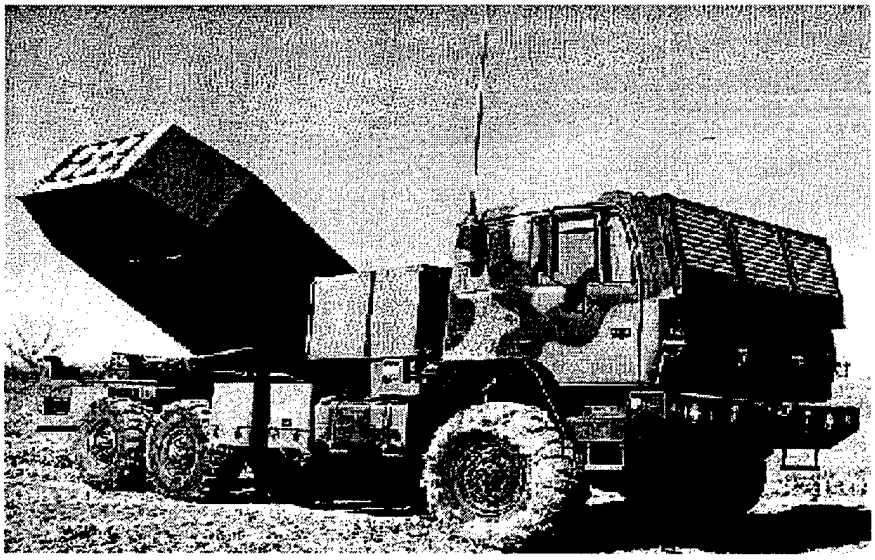
Assess methodology (D^3A) for targeting becomes critical for the efficient employment of the system. There are a number of constraints that could limit HIMARS' effectiveness on the future battlefield. Because of the limited lift capabilities, the number of HIMARS present in the theater of operations will most probably be limited. HIMARS has the ability to only equip the launcher with one six-pack of rockets or one ATACMS at a time. Reload time will slow its ability to fire numerous mission in short periods of time. HIMARS may be logistically demanding for re-supply of ammunition within light units. The more missions assigned to HIMARS units, the more logistical assets the commander will be required to dedicate to re-supply them. By using the Army's D^3A targeting methodology, the commander and staff can wisely and judiciously allocate HIMARS missions to the High Payoff Targets (HPTs) that will gain them the greatest results. The biggest challenge will be to use HIMARS and its munitions where they can gain the greatest effect most efficiently.

HIMARS is being built with technology that is already present today. These technologies are being brought together to form this system. HIMARS will be produced with the Improved Launcher Mechanical System (ILMS) and the Improved Fire Control System (IFCS). The ILMS will enable the launcher to lock onto targets quicker than the old mechanical system. It is estimated that the launcher can now lock onto target in 16 seconds from receipt of the mission, saving up to half the time as the old system. The ILMS will simplify the fire control procedures in the launcher.[12] This will enable the crew to continue operations under maximum stress without degrading their effectiveness. HIMARS is also equipped with an onboard land navigation system and global positioning system to facilitate ease of navigation and rapidity of fire control solutions. The launcher

design will also enable one crewmember to operate the system if the tactical situation dictates, in lieu of the normal crew of three soldiers.

HIMARS is mounted on the Stewart & Stevenson Family of Medium Tactical Vehicles (FMTV) five-ton truck. This FMTV five-ton truck is the new series of trucks that will be fielded to the Army in the future to replace the existing and aging 800 and 900 series' of five-ton trucks. The new truck required some minor modifications for the HIMARS system to protect the crew during launch, enhance crew communications, and facilitate launch firing from inside the cab of the truck. The picture below shows the new system in launch configuration.

As discussed earlier, the major difference between the HIMARS and M270 MLRS



launchers is the weight and transportability of the systems. HIMARS is forty-four percent lighter than the MLRS. This weight difference clearly gives the HIMARS an advantage in deployability. With the savings in weight firepower is diminished because of the loss of six rockets or one missile per system. The weights of the systems are compared in the table below. These weights are based on the systems with munitions loaded to replicate the speed in which the system will be ready for combat once deployed into an area of operations. One of the key factors

in the deployability of the HIMARS is its ability to not only enter an austere environment with less lift requirements, but also the speed in which it is ready for combat operations upon arrival into that environment.

Munitions	HIMARS w/Loaded Pods	MLRS w/Loaded Pods
M-26 Rockets	34,755 lbs.	50,047 lbs.
Extended Range Rockets	**34,838 lbs.**	**50,167 lbs.**
ATACMS, Block I	33,409 lbs.	48,109 lbs.
ATACMS, Block II	**32,648 lbs.**	**47,013 lbs.**

Weights based only on system with munitions loaded. Other associated equipment not included in total weights[13]

These weights coupled with the height, weight, and system configurations become critical to the deployability of each system by United States Air Force lift assets. The idea behind the HIMARS is to not only be deployable by all the lift assets below, but to also be ready for operations almost immediately once off the aircraft. HIMARS will be able to roll on and roll off of all lift aircraft with little or no requirement for reconfiguration. Presently the MLRS must be reconfigured (broken down and subsequently rebuilt) to roll on and off most lift aircraft.[14] The chart below lists the characteristics of the major United States Air Force lift assets. It is clear that the weight factors of the systems alone has advantages and disadvantages for the HIMARS and the MLRS.

Table 3-1. U.S. Air Force Transport Aircraft Capabilities[15]

WEIGHT (lbs.) (wartime)	C-130E/ C-130H	C-141B	C-5 A/B[4]	C-17
EMPTY	76,469	218,725	374,000	267,000

MAXIMUM USABLE FUEL	60,112	153,352	332,500	
GROSS TAKE OFF WEIGHT (wartime)	173,700	334,475	769,000	
MAX PAYLOAD (allowable cabin load - floor loaded)[1]	47,000/ 46,000	89,000	291,000	172,200
MAX PAYLOAD 500 NM	47,000/ 46,000	-	-	-
MAX PAYLOAD OVERSIZE CGO 500 NM	25,400	-	-	-
MAX PAYLOAD 1000 NM	47,000/ 46,000	-	-	-
MAX PAYLOAD OVERSIZE CGO 1000 NM	25,400	-	-	-
MAX PAYLOAD 2000 NM	41,400/ 41,600	88,520	225,400	150,400[2]
MAX PAYLOAD OVERSIZE CGO 2000 NM	25,000	53,000	155,400	-
MAX PAYLOAD 3000 NM	-	66,600	174,600	-
MAX PAYLOAD OVERSIZE CGO 3000 NM	-	53,000	138,200	
MAX PAYLOAD 3500 NM	-	53,200	151,400	-
MAX PAYLOAD OVERSIZE CGO 3500 NM	-	49,000	133,000	-
MAIN CABIN DIMENSIONS (inches)				
WIDTH (horizontal clearance for vehicle)	105	123	228/144	216/116
HEIGHT (max usable) (reduced 3"/463l pallets)	108	109	114/162	128
LENGTH (max usable)	470	1120	1453	1056/1075
MAX NUMBER OF 463L PALLETS	6	13	36	18

Notes: 1. Payloads - for movement planning of USMC and USA units, use outsized load limits for C-5 and oversize for all other A/C
2. Range - 2400 NM
3. Range - 3200 NM
4. Loads shown as oversize cargo are for outsize cargo

Weight factors become even more of a constraint the further the aircraft must fly for the deployment. The longer the deployment, the less weight the aircraft can carry. The height and weight obviously become less of a constraint with the size of the aircraft. MLRS requires extensive breakdown to deploy on a C-141, but requires much less breakdown on the C-5 and the newer C-17 aircraft. HIMARS requires no breakdown on any current United States Air Force lift aircraft. The telling factor in a deployment will be the total number of lift aircraft available for the deployment. There are limited numbers of C-141, C-5, and C-17 aircraft in the inventory. Depending on the size of the

force deploying, there may not be the required number of aircraft to get M270, MLRS units into the theater where and when they are needed. The size of the HIMARS gives the commander much more flexibility in the design of the force packages deploying into any given theater of operations.

The present fielding plan would assign HIMARS units to corps field artillery brigades. Corps commanders will allocate the firing units and assign them their tactical missions as required. HIMARS may still require assistance from MLRS later in the deployment to assist with the deep fire missions. Once MLRS entered the theater, HIMARS and MLRS would compliment each other until completion of the operation.[16]

The Army plans to purchase 363 launchers, enough to field a minimum of sixteen HIMARS battalions with eighteen launchers and one maintenance float. Eight launchers will be purchased to support institutional training at Ft. Sill, Oklahoma. The fielding plan should facilitate enough HIMARS units to satisfy multiple simultaneous contingencies.

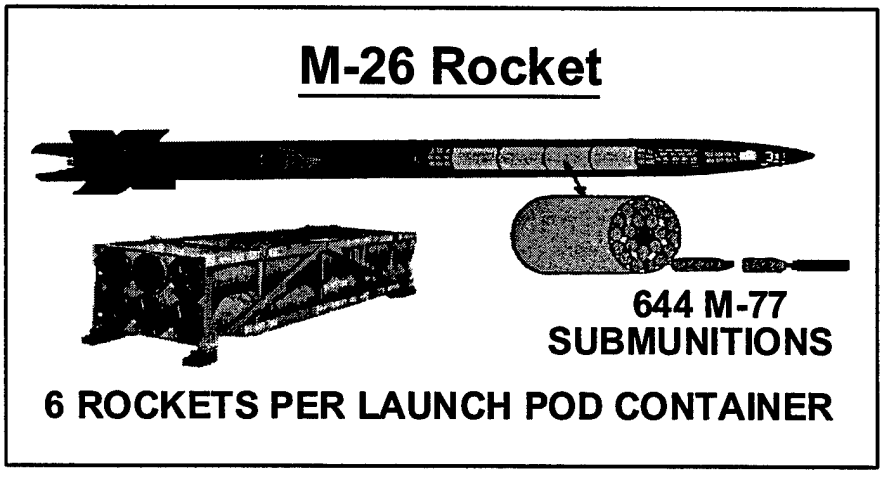
The Initial Operational Capability (IOC) is scheduled to occur before the end of Fiscal Year 2006. The IOC is when the first unit fielded with the HIMARS has received all of its equipment, all support and test equipment is in place, is trained, and can perform all mission essential tasks in the HIMARS Mission Training Plan (MTP). Once these criteria are met, the first HIMARS battalion will be able to support a contingency force with what the Army deems "a critical long-range capability."[17]

IV. HIMARS Munitions

The study of the munitions that HIMARS will have now and in the future is critical to the overall study of the system. The introduction of Army Tactical Missiles (ATACMS) Block II, ATACMS Block IIA, and MLRS Smart Tactical Rocket (MSTAR) munitions are becoming increasingly intelligent and versatile. This portion of the study explains the capabilities of each type of munition presently in the Army's inventory and those that will be fielded in the future, thereby demonstrating the present and future capabilities of the HIMARS. Munition capabilities coupled with the deployability of the HIMARS will paint a clearer picture of what the HIMARS will do for the commander on the future battlefield.

M-26 Rocket

The common MLRS ammunition in use today is the M-26 Basic Rocket. The M-26 is a free flight, single stage, solid propellant rocket capable of delivering conventional

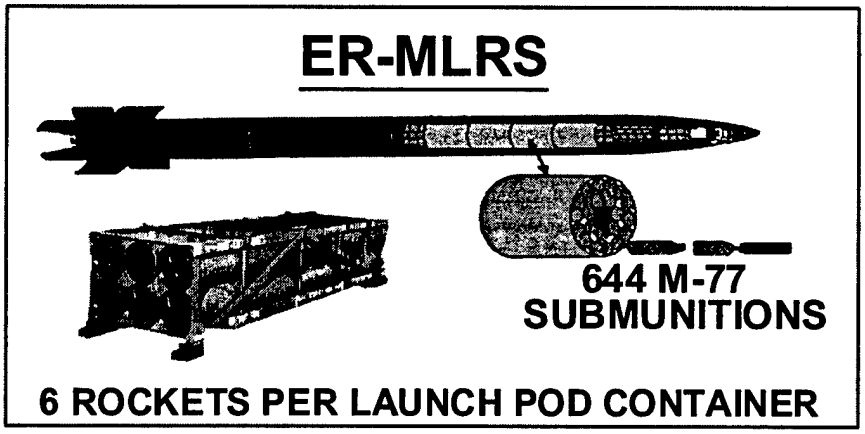


munitions to ranges between ten kilometers to thirty-two and one half kilometers. The M-26 rocket is a high volume area fire weapon system that is effective against personnel and lightly armored targets. It has a large impact footprint and should not be fired within two kilometers of friendly troops

except under extreme conditions. The M-26 rocket has 644 M-77 Dual Purpose Improved Conventional Munitions (DPICM) submunitions. The M-77 submunition has a propensity to dud. Tactical maneuver plans should reflect the restrictions to movements that will occur if M-26 rockets are used in areas where later friendly maneuver may be required by the tactical situation. Presently M-26 rockets are not a logical choice to attack hard targets, moving targets, and point targets because of accuracy and munitions effect. Improvements are constantly being made on the accuracy of the round, which someday may make this rocket effective against these types of targets. There are presently over 400,000 M-26 rockets deployed in the field.[18]

ER-MLRS

The Multiple Launch Rocket System Extended Range Rocket (ER-MLRS) is an evolution of the current M26 Dual Purpose Improved Conventional Munition (DPICM) rocket. ER-MLRS is a free flight, single stage, solid propellant rocket capable of delivering a variety of conventional munitions to greater ranges than the M26 rocket. ER-MLRS provides the commander greater flexibility by providing expanded cross boundary fires capability and giving the force the ability for continuous fires during fast paced offensive operations. Survivability is greatly improved during defensive operations because the commander



can now range enemy long-range cannon and rocket artillery systems. ER-MLRS can be fired from MLRS M270 and High Mobility Artillery Rocket System (HIMARS) launchers. Range of the rocket will be increased to forty-five kilometers, a fifty percent improvement over the current M-26 DPICM rocket. ER-MLRS not only increases the range of MLRS and HIMARS, but also has a significant effect on accuracy and reliability of the submunitions. The rocket also replaces the M-77 submunition found in the M-26 rocket with the XM-85 DPICM submunition that possesses a self-destruct fuse mechanism. This mechanism will decrease the dud rate to one percent or less as opposed to the M-77 which can have a dud rate upwards of five percent. The Army will field 4000 of these rockets in Fiscal Year 1999.[19]

GMLRS

Multiple Launch Rocket System Guided Rocket (GMLRS) is a modification of the Extended Range Rocket (ER-MLRS). GMLRS is an inertially guided, single stage, solid propellant rocket capable of delivering a variety of conventional munitions to significantly greater ranges with much greater accuracy than both the M-26 or the ER-MLRS free flight rockets. GMLRS with a DPICM warhead will provide division and corps commanders the organic capability to attack enemy air defense systems, fire support systems, and soft materiel and personnel targets at extended ranges with significantly fewer rockets. Fewer rockets will be needed because the accuracy of the system will be so much greater than free flight rockets, resulting in more survivable launchers since they will spend less time on any one firing point. Fewer rounds fired also equate to a decreased logistical burden for an already logistically intensive system. In

addition to enhancing survivability and decreasing logistical burdens, increased accuracy will enhance effectiveness against point targets and reduce collateral damage. The minimum range of the rocket will be somewhere between ten to fifteen kilometers, with a maximum range of between sixty to seventy kilometers. Fielding will begin in Fiscal Year 2004.[20]

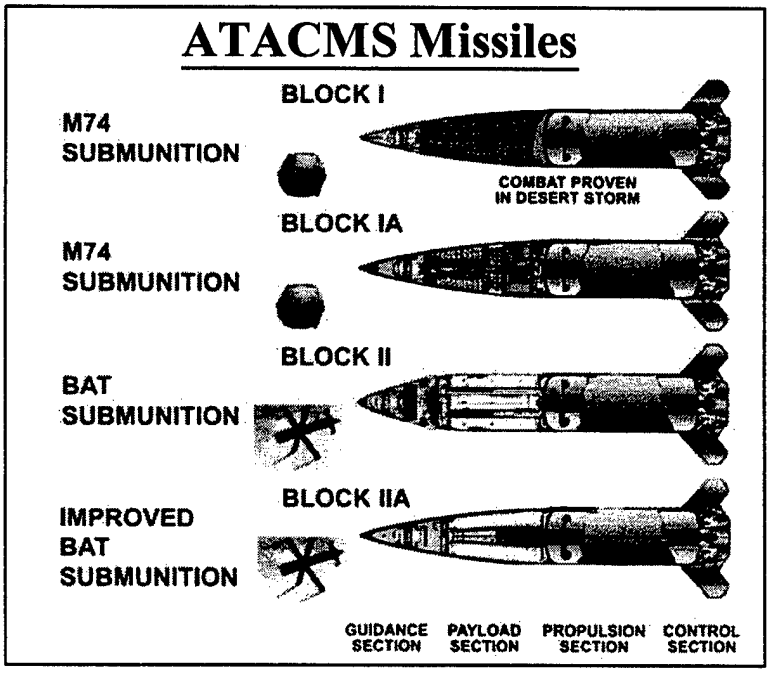
MSTAR

The Multiple Launch Rocket System (MLRS) Smart Tactical Rocket (MSTAR) will be an inertially guided, single stage, solid propellant rocket capable of delivering smart, multi-capable submunitions to significantly greater ranges with much greater accuracy than either the basic M26 or the Extended Range MLRS free-flight rockets. MSTAR is a modification to the MLRS Guided Rocket (GMLRS) program that will integrate smart, multi-capable submunitions into the warhead while utilizing the same guidance, control section and rocket motor. MSTAR gives commanders an organic, fire and forget, multiple engagement capability to attack a wide variety of high value counterfire, air defense and maneuver targets at the division and corps level. MSTAR will also be very effective against multiple rocket launchers (MRLs) and tactical ballistic missile transporter-erector launchers (TELs) at attainable depths without using sparse long-range missile assets. MSTAR will transport one to four multifaceted, smart submunitions to ranges over fifty kilometers. Submunitions will have the ability to detect, attack and subsequently defeat hard or soft targets, whether moving or stationary. It will truly be an all-weather, day or night capable system, currently scheduled for fielding around the year 2010.[21]

ATACMS Block I and IA

Army Tactical Missile System (ATACMS) Block I is a conventional, long-range, surface-to-surface, guided, semi-ballistic missile with an anti-personnel, anti-materiel (APAM) warhead. ATACMS missiles are deployed throughout the world within the ammunition loads of corps Multiple Launch Rocket System (MLRS) battalions. They can be fired from any MLRS M270 or HIMARS launcher. The missiles are totally autonomous (fire and forget) after launch. Block I missiles deliver 950 M-74 APAM grenades to a maximum range of 165 kilometers. ATACMS Block I was first fielded in September of 1990, and was used successfully during combat operations in the Gulf War. There are 1545 ATACMS Block I missiles deployed today.[22]

The Army Tactical Missile System (ATACMS) Block IA is a modification of the ATACMS Block I missile. ATACMS Block IA missiles have a global positioning system (GPS) receiver that updates the missile's position during flight. This feature increases accuracy to maintain effectiveness at greater ranges. It delivers approximately 300 M-74 APAM grenades to a maximum range in excess of 300km. The Eighth United States Army in the Republic of South Korea fielded this system in February of 1998. The Army plans on positioning approximately 754 missiles



throughout the world by the end of 1998.[23]

ATACMS Block II and IIA

Army Tactical Missile System (ATACMS) Block II is also a conventional, long-range, surface-to-surface, guided, semi-ballistic missile. It integrates the ATACMS Block IA missile with the Brilliant Anti-Tank (BAT) Submunitions. ATACMS Block II propulsion, guidance, and control sections will be the same as for the Block IA. The ATACMS Block IA warhead will be modified to transport and deploy thirteen BAT submunitions to a range of 140 kilometers. BAT submunitions give the commander tremendous flexibility because of the precision and depth he can reach on the battlefield. Commanders now have the organic assets to shape the armor battlefield at great depths not possible prior to the development of BAT submunitions. This system should provide protection against enemy armor forces for the commander of the early entry light task force. Later generations of ATACMS Block II will incorporate BAT P3I submunitions instead of the basic BAT design model. BAT P3I is an improved BAT submunition that has three main important modifications. BAT P3I will enhance performance in reduced visibility conditions, have the ability to attack stationary targets as effectively as moving targets, and have an improved capability against surface-to-surface missile launchers. The first units should field this system in Fiscal Year 2001.[24]

ATACMS Block IIA is a compilation of the ATACMS Block IA program and the BAT P3I submunition program. ATACMS Block IIA missile propulsion, guidance, and control sections will be the same as the ATACMS Block IA missile. It will deliver at least six BAT P3I submunitions to a range of at least 300 kilometers. Like the ATACMS

Block II, the Block IIA gives the commander the ability to shape the armor battlefield, but at greater ranges. The expected fielding date for ATACMS Block IIA is Fiscal Year 2005.[25]

Fully understanding the capabilities of both present and future munitions for HIMARS is critical to analyzing the possible effects on the future battlefield. As is shown in the following chapters, there will be an increased emphasis on the deployability, lethality, and precision capabilities of new systems entering the Army's inventory. As the Army strives to find the proper mix for Force XXI and the Army After Next (AAN), HIMARS and a myriad of other systems become the building blocks. If the blocks are wrong, the building could fall in the next war with terrible repercussions.

V. Future War

Clearly defining the future of conflict and the exact direction that the military and the United States Army should take to meet that threat is a very complex task. Many people have given their best effort to envision what the future threat will look like and what type of military the United States should possess to meet that threat. The historian Michael Howard has stated that the military has a tough time properly preparing for war in peacetime. The U.S. Army has been challenged in the past decade to develop a vision of the type of a force that will be required to meet the worldwide challenges of the next twenty-five years and beyond.

This chapter examines the factors that drove and gave direction to Force XXI and the Army After Next (AAN). It will concentrate on General Gordon R. Sullivan's vision of the future battlefield and what he feels the Army must do to meet those challenges. Understanding the rationale that drives Force XXI and AAN are critical to analyzing the potential solutions to fulfilling the requirements of the next century.

The building block of Force XXI and Army After Next (AAN) comes from a White Paper published in October of 1994 entitled *Decisive Victory, America's Power Projection Army*. It is signed by the then Chief of Staff of the United States Army, General Gordon R. Sullivan and the then Secretary of the Army, The Honorable Togo D. West, Jr. This document called for change in the Army to meet the challenges of tomorrow.

The Army of the Cold War succeeded, but that Army is not what is needed for the next generation. The Army has become a power projection force (force projected from the continental United States rather than forward deployed overseas) that must be more

agile and complex than its predecessor of the Cold War.[26]

With the collapse of the Soviet Union and the fall of the Berlin Wall the strategic landscape of the world changed dramatically. The former Soviet Union is no longer the one big threat faced by the nation. The U.S. is now focused on protecting its interests globally. With this global focus comes a much wider range of military missions. Conventional warfare on a large drawn out scale has become less likely, while operations other than war are becoming more and more prevalent. While peacekeeping and humanitarian assistance missions are becoming more common, the Army must remember that its main focus is still to fight and win the nation's wars.[27]

The threats to national security may have changed, but the Army's role will essentially remain the same. People of the United States depend on the Army to conduct prompt and sustained land warfare and win. The Army will remain an integral part of the joint team, but the Army also has the unique ability to dominate on land and impose the will of the United States people on the enemy. This belief is reinforced by quote from T.R. Fehrenbach's *This Kind of War*:

> You can fly over a land forever; you may bomb it, atomize it, pulverize it and wipe it clean of life but if you desire to defend it, protect it, and keep it for civilization you must do this on the ground, the way the Roman Legions did, by putting you young men into the mud.

General Sullivan and Secretary West understood that the Army must change to be a viable entity in the Twenty First Century, but they also did not want to lose focus on what the Army has done for over 200 years and must possibly do in the future - win conventional wars.[28]

The White Paper continues by discussing what the Army needs to do in the future to

be strong and successful in future operations. A key point of the paper is, "...the essential characteristics of the Army must be readiness, deployability, versatility, and sufficiency."[29] Deployability and sufficiency have a direct correlation to the HIMARS.

Because the Army is now a force projection Army, the ease of deploying each combat system becomes critical. That system must then be sufficient on the other end of the deployment to do the job required of it. The United States cannot afford to trade combat power capabilities for ease of deployability. New combat systems being developed must not only be lighter, but they must have equal or greater capabilities than the systems they are replacing.

Also discussed in the White Paper are the capabilities required of the future Army. They are dominate maneuver, the ability to conduct precision strikes, winning the information war, protection of the force, and the ability to project and sustain combat power.[30] HIMARS can play a positive role in three of these capabilities. With the advent of the new munitions, precision strikes will be the norm for the system. HIMARS will be able to assist in the force protection because it can accurately range targets throughout the operational depth of the battlefield, and will be projected with less lift than the M270 MLRS.

Decisive Victory, America's Power Projection Army, gives a general background of what thoughts and ideas drove much of the Force XXI and the Army After Next initiatives. The White Paper gathers these thoughts, melds them, and gives one cohesive direction for the next twenty-five years. The next step in developing a picture of the future is to discuss what land warfare will possibly look like in the twenty-first century.

General Sullivan, along with Lieutenant Colonel James M. Dubik, wrote a short

pamphlet on their vision of future warfare. The pamphlet is entitled *Land Warfare in the 21st Century.* The document sites three changes in the international landscape that will have the greatest impact on the Army in the future. These changes are:

> First, the international system is undergoing its major transition of the 20th century in response to the end of the cold war. Second, changes in military technology are culminating in what many believe will be a military-technical revolution that brings unprecedented depth and transparency to the battlefield. Finally, this paper cautions that change will inevitably coexist with at least three constants-- the root causes of war, the nature of war, and the essence of fighting power.[31]

The first and last changes were discussed in depth in the first portion of this chapter. The second change requires further discussion as it relates directly to HIMARS and other new systems being developed for the Army of the future. According to Sullivan and Dubik the five most important technological developments of this "military-technical revolution" are "lethality and dispersion; volume and precision of fire; integrative technology; mass and effects; and invisibility and detectability."[32]

HIMARS and its associated munitions have an impact on many of these developments. The lethality of the HIMARS/MLRS munitions will be greatly increased as discussed in the previous chapter. Volume of fires for HIMARS will decrease as opposed to the MLRS, but with the capability of precision rockets and missiles this may not be a critical factor in future conflicts. Precision rockets and missiles will enhance the effects achieved on the future battlefield by inflicting more kills on the enemy with much less expenditure of munitions, and the HIMARS will be less detectable because of its "shoot and scoot" capability. Sullivan and Dubik believe that these technologies will allow a smaller force to achieve the desired effects if the they are used properly by well qualified soldiers, but they also acknowledge that there is a line below which technology

cannot compensate for extreme cuts in the force structure.[33]

Sullivan and Dubik envision the Army being used much the way that the Army has been used since DESERT STORM. Political leaders will continue to use the military in conjunction with other elements of national power to promote stability abroad. As has been seen over the past few years since DESERT STORM, all major military deployments have been to support stability operations.

The new technologies being developed may not have an apparent impact on these types of operations, but there is always the possibility that these situations could escalate into conventional war. Sullivan points out that the Army would be prudent to remember that "decisive use of military force does not necessarily entail total war."[34] In a case of escalation the Army must still be able to employ military force in an overwhelming fashion. The goal is to use as much precision as possible to rapidly complete the mission as quickly as possible with the smallest cost of lives and resources.[35] The Army must be prepared for all levels of war wherever they are deployed. This is a daunting task for planners of both the future composition of the Army and future military operations. HIMARS may lessen the complexity of this task by giving the planner a lighter yet capable fire support system that is easily deployable as opposed to the MLRS.

The Army is faced with a monumental task in deciding the force and weapons structure for the future. Politicians are requiring the military to get smaller in "both size and budget, contribute to the domestic recovery, participate in global stability operations, and retain its capability to produce decisive victory in whatever circumstances they are employed."[36] Of course all of these requirements are happening concurrently. The Army must do four tasks well to succeed in the future world of conflict. First, the Army must

balance these requirements with technology to offset the loss in manpower. Then the Army must take advantage of its ability to maneuver and dictate the tempo of an operation in conjunction with firepower. It must also maximize its effectiveness in joint operations. Finally, the Army must maintain flexibility and balance in force structure and capabilities. These four tasks read like a laundry list for the Rapid Force Projection Initiative - get a light force with a big punch capability in quickly while being able to decisively engage and defeat any enemy force arrayed against it. Clearly a monumental tasks facing not just the Army, but the other services as well.

Sullivan and Dubik state that the strategists should essentially try to keep the best of today, take it forward into the future, and adapt rapidly to the revolutionary changes of tomorrow.[37] Martin van Creveld recognizes this fascination with technology and war in the following quote;

> When the chips are down, there is no 'rational' calculation in the world capable of causing the individual to lay down his life. On both the individual and collective levels, war is therefore primarily an affair of the heart. It is dominated by such irrational factors as resolution and courage, honor duty and loyalty and sacrifice of self. When everything is said and done, none of these have anything to do with technology, whether primitive or sophisticated.[38]

It is important to remember that all the technology known to man at this point of time will not induce a hollow and untrained Army to fight and win on the modern battlefield.

VI. A World Vision for the Next 25 Years

The following discussion focuses on what the TRACOC Analysis Center and RAND feel are viable visions for the state of the world and possible conflict scenarios for the next twenty-five years. The studies included in this chapter generate situations that could help lend solutions to the future design of the Army and the other services, and in the process help define the possible role that HIIMARS could play in these future conflicts.

An example of what the TRADOC Analysis Center (TRAC) feels the world could look like over the next twenty-five years provides a vision of the possible future strategic and operational implications of force projection. Some of these ideas will be discussed further in a few scenarios that have been conducted by both TRAC and the Arroyo Center at RAND. The scenarios play a very important role in the decision making of what systems and force designs the Army will adopt for the future. These scenarios will show whether HIMARS or some other type of organic deep strike system is needed by a force projection Army. Finally the chapter concludes with a more in depth look at what Field Artillery leaders and thinkers believe are the right solutions for the future of the Field Artillery to compliment the other combat systems in the future force. This information will lead to the analysis of the HIMARS and its impact on the future force.

State of the World

The *State of the World, 1998-2021* document published by TRAC to facilitate the Army After Next Spring Wargame paints a vivid estimate of what could happen in the world in that time period. Although the scenario is speculative and fictitious, it does depict some possible contingencies that the United States armed services may face over

the next twenty-five years. The future portrayed in the document is based on a wide variety of government and government-sponsored papers that attempt to predict future worldwide events. The chart below sets forth a timeline of the major events that shape the world stage over the next twenty-five years.[39]

The World of Tomorrow

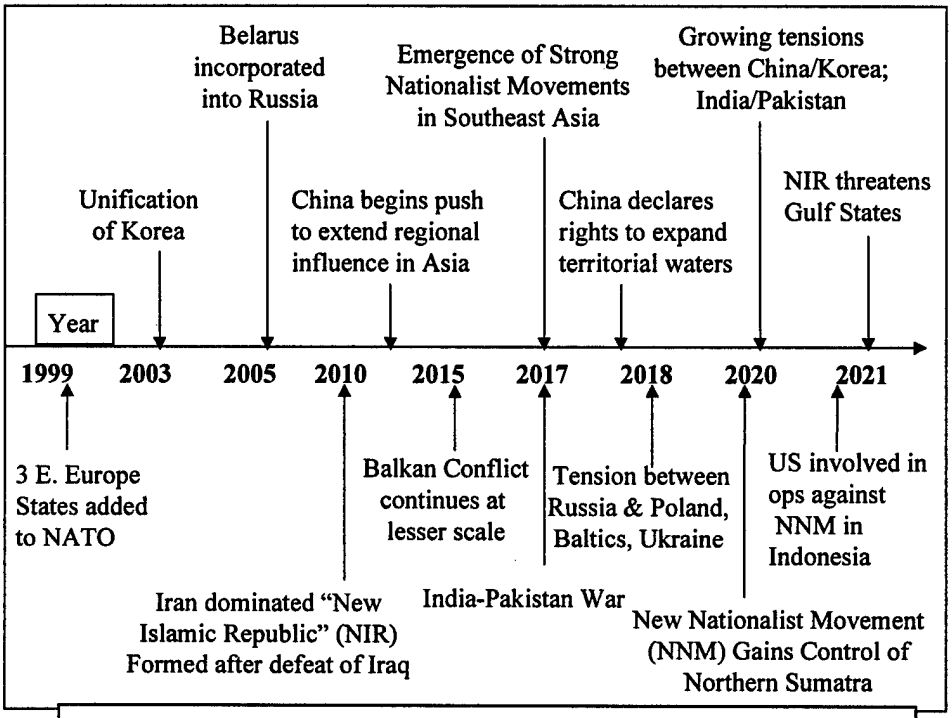


Chart is a reprint from *State of the World: 1998-2021* (TRAC)

This study states that there will be continued tensions in the Balkans although at a lesser degree than today. Tensions between Russia and some of its former satellite states will escalate over competition for resources. China will continue to attempt to expand their influence in East Asia, taking advantage of the demise of the Soviet system and the void of Soviet influence in the region. Iran will ride the strength of the Shiia religious elements to consolidate power in Southwest Asia under the guise of the New Islamic Republic (NIR). The NIR will use any force necessary to build and consolidate power

and resources in that region of the world. A sweeping nationalist movement in Indonesia will establish a de facto state in Northern Sumatra. Pakistan and India will continue their longtime feud that will escalate into a minor cross-border war early in the next century. Minor events shaping the early part of the next century include the inclusion of three more former Soviet Bloc states into the North Atlantic Treaty Organization (NATO), the reunification of the Koreas, and Belarus once again becoming part of Russia.[40]

There are five major trends that may affect the political stability of the world over the next twenty-five years. The first potential trend is the resurrection of Russian power and influence, the continued escalation of Chinese influence, and the birth of the NIR or some similar coalition. All three of these forces may emerge as direct competitors to the U.S. Secondly, the world will transition into the information age. This trend is based on the futurists Alvin and Heidi Toffler's three waves of civilization as described in their book *War and Anti-War.* This trend will see the armies of the world falling into basically three models or waves. Third wave countries will be like the United States. Their armies will be equipped with state of the art equipment and capitalize on information. Second wave countries will be less equipped and attempt to deprive any third wave opponent of their information dominance. First wave armies could fight with equipment ranging from carbine rifles to limited numbers of high tech systems. They will fight as to not give the information dominant opponent any advantages due to their information capability.[41]

The third trend will be an increased competition for the world's resources. This increased demand will create new economic worldwide partnerships to capitalize on the resources available. Significant shifts in the social and demographic patterns will be the fourth trend over the period, highlighted by the continued migration to urban areas in the

third world countries. Lastly, there will be continued escalation of political instability and turmoil due to the reasons stated above.

These trends will continue to cloud the world picture and possibly ignite violent outbursts throughout the world. In essence, the world will become multi-polar with no clear lines dividing east and west or north and south. Rapid projection of military power will become an even more critical requirement in this world as the United States tries to shape this world and protect the interests of itself and its allies throughout the world.[42]

Future Scenarios Played Out

Four possible scenarios that have been examined on the future of warfare depict a relatively good picture of the needs of the future Army. The four scenarios all lend some insight on the path the Army should follow to maximize its ability to rapidly deploy and dominate the foes of the future battlefield. Three of the scenarios were run by TRAC during their wargames on future war, while the fourth was a study done by the Arroyo Center at RAND.

In the *Army After Next Winter Wargame, 1997,* a predominately Continental United States (CONUS) based military force was used in the year 2020. This force was projected into the Ukraine to support an allied, but supplanted Ukrainian government against a hostile enemy (Red force) that had overthrown the legitimate government. Two different options for the U.S. and allied forces (Blue force) were played in the game. Initially the Blue forces rapidly deployed a robust light force composed of the newest technological systems available at the time and succeeded in defeating the Red force in rapid fashion.

The Blue force commander won by using multiple precision engagements with standoff weapons systems that created an incapacitating shock effect on the enemy. The Blue force then exploited that shock with the precision maneuver of close combat forces, destroying the enemy's fighting divisions. Red forces disintegrated rather than being attrited. Disintegration is much more rapidly decisive than attrition in that it uses controlled applications of force throughout the depth of the battlefield that are designed to take advantage of the effects of information dominance and deep precision fires. Disintegration enabled a rapid conclusion to the campaign, which may prove to be a very important element in any future conflicts.[43]

The second run of the game was not as successful. The Blue force was not as rapidly deployed into the region, thus allowing the Red force more time to prepare for the impending attack. The Blue force was piecemealed into the conflict and was not able to immediately impact the situation with any combined arms efforts throughout the depth of the battlefield. The disintegration option was not feasible, and the attrition option was attempted. The Blue force was overwhelmed with high casualty figures and the Red forces marched to a quick victory.

Questions about the design of future force structures arose after this exercise. The most important question was; what strategic mobility requirements must the U.S. military have to ensure that they have the global reach to deploy the air and ground forces simultaneously to create the strategic, operational, and tactical impact that they achieved in the successful run of the wargame? This question is important to the whole HIMARS issue. The reason for the success of the initial course of action was that all the major systems required for the projected force to succeed arrived in the theater and transitioned

to combat operations almost immediately. Thus, the Blue commander was able to create a synergy of all his combat elements throughout the operational depth of the battlefield to disintegrate the Red force. HIMARS does give the commander advantages in deployability, precision, and depth with this type of scenario.[44]

This scenario matches the type of roles that the U.S. military may face in the world as depicted earlier in the World of Tomorrow diagram. This mission could happen anywhere in the world, not just the Ukraine in the year 2020. Success in this type of mission lies in how fast the force can deploy, the amount of combat power projected, the ability to gain information dominance, the ability to conduct precision maneuver operations, and precision fires capabilities. All of these factors will feed of off each other and strengthen each other in future conflict.

The *Army After Next FY98 Tactical Wargame* generates many of the same questions and issues as the previous wargame but at the tactical level only. Two of the research issues being investigated in this wargame were the variables affecting force projection and how to best exploit information dominance with precision engagements. By doing this it will assist in early entry operations, shaping the battlespace, close fight, and lead to enemy disintegration as opposed to enemy attrition. Two vignettes were used for this wargame. The first was a European and the second was Southwest Asian. Both conflicts take place in the year 2021 and occur when one neighboring state invades another. Besides the natural geographic and demographic differences of the regions, the European scenario contained a more modern foe and a more mature theater.[45]

This monograph does not explain how the U.S. backed Blue force won in either vignette. The relevant issues are the two mentioned earlier, deployability of the force and

precision fires. In both vignettes the rapid deployment of the combined arms force was critical to the overall success of the commander. This wargame does introduce facets of long-range precision fires not earlier discussed. The first is that the commander needs at his disposal an organic, all-weather, long-range, precision fire system. An organic system will increase responsiveness while an all-weather system can affect the battle in the worst of conditions.

Responsiveness of the firing platform is a direct result of information dominance. With information dominance comes rapid and accurate targeting capability. The firing platform that can exploit this information dominance can be responsive and accurate. HIMARS or a similar system gives the Army this responsiveness as opposed to aircraft that will have a much longer reaction time.[46]

In the *Army After Next 1998 Spring Wargame* the scenario is driven by the *State of the World, 1998-2021* document. The New Islamic Republic (NIR) is forcibly expanding its influence in Southwest Asia and the Middle East. China is expanding its territorial waters while India and Pakistan are on the verge of war. In addition, the U.S. is already involved in suppressing a nationalist movement in Sumatra. In this scenario multiple possible contingencies are rising in numerous areas of the world. U.S. power projection and the speed in which the forces are projected become critical to the success of the missions.

The best way that the U.S. can counter the Red forces in all contingencies is by developing better, faster and more lift capability; reducing the size and weight of combat systems without losing any combat power; and prepositioning equipment throughout the world for quick and easy access.[47] The critical issue here for the HIMARS is the second

one; reduce the size and weight of combat systems without losing any combat power. HIMARS definitely relieves some of the lift requirements for long-range artillery systems, but does it maintain the combat power required for a wide range of contingency operations? The future generation of precision munitions may help maintain that combat power.

The fourth scenario used to analyze the future battlefield was the *Rapid Force Projection, Exploring New Technology Concepts for Light Airborne Forces.* This study was conducted by the Arroyo Center of RAND. It centers on light forces projected into two different regions of the world, Eastern Europe and Southwest Asia to gain and maintain a foothold until heavier forces arrive. The vignettes are very similar to the TRAC AAN FY98 Tactical Wargame. The major difference between the way the agencies ran the study is the way they adjusted the Blue force to succeed in the operations. While the TRAC scenario changed the speed of the deployment and the tactical reactions of the Blue force, the RAND study changed the make up of the Blue force itself by adding additional systems that make up the RFPI.

Key issues were highlighted during this study. Initially both forces failed to hold their objectives. As additional sensors and fire support assets were added to the mix, the Blue forces became more and more successful. The fire support asset added to the Blue force was HIMARS. To enable the Blue force to deploy HIMARS and other RFPI systems into the theater, the Blue commander had to leave behind other systems to stay within his lift allocation. The additional fire support kills were not due to adding additional weapons systems, but by adding what appeared to be more effective weapons systems. Precision munitions were used with the HIMARS to emulate the projected

systems capabilities in the year 2005. One of the major recommendations of the study is to increase the precision and size of the munition footprint of the artillery along with adding the sensors to give the commander the ability to see deep into the battlespace and shape the battle early.[48]

All four scenarios cited above compliment the conclusions of a study conducted by the Arroyo Center at RAND entitled *Future Army Long-Range Fires: Bringing New Capabilities to the Battlefield.* The study highlights the tremendous complimentary effects that can be achieved by massing long-range precision artillery fires with air power, but goes on to state that the ground commander cannot always depend on air to enhance his effects. Five limiting factors must be considered when planning the use of aircraft to effect the battlefield; a presence of a staunch and robust air defense threat, poor weather, support elements for the air may not be deployed or are not yet operational, aircraft and airfield availability constraints, and responsiveness. Keeping these constraints in mind, it would be prudent to have some degree of overlap between the capabilities of aircraft and long-range organic fires to ensure that the commander can shape the battle deep in the enemy's rear areas.[49]

Numerous advantages of long-range fires on the future battlefield were also cited in the study. Long-range systems can be placed further to the rear and closer to their re-supply points, thus making them more survivable and easing the logistics burden. These systems could support the battlefield laterally, mass fires deeper, and conduct multiple engagements simultaneously with precision strikes. The number of systems required to conduct the mission would be reduced because of the system range and the use of precision munitions.[50] This reduction in systems has a direct effect on the argument of

HIMARS versus MLRS in early entry operations. If the conclusions of this study are correct, the Army could use a system with half the launch capability (HIMARS) because the range and the precision will more than make up for the loss in the number of rockets or missiles being fired at any one time.

Long-range fires by whatever system the Army adopts in the future give the commander certain advantages on the battlefield. He now has the ability to mass fires deeper on the battlefield, allowing him to shape the battle early. Soon to be fielded Brilliant Anti-Tank (BAT) munitions will reduce the accuracy required for target location to kill armor on the battlefield. Commanders can reduce human exposure to enemy air defense networks by reducing the need to send aircraft to service targets he can now service with long-range precision fires. With the delivery system far behind friendly lines the system is much more survivable and has a high mission accomplishment rate. Delivery systems will also have a relatively high rate of sustained fires for many of the reasons discussed earlier. These advantages are fairly clear, but the Army must still have a system that is easily deployable to any theater in the world. To do this the authors of the study recommend that the Army make the force leaner and lighter without degrading its combat power.[51]

Field Artillery Roadmap

The vision of the Field Artillery closely mirrors what the scenarios and studies above recommend. The Chief of Field Artillery, Major General Leo J. Baxter conveys his thoughts about where the Field Artillery is heading for the next century in the opening paragraph of his latest vision statement:

> The Field Artillery Vision is a set of concepts that help us prepare for the future while giving us the agility to respond to the rapidly changing technological and political environments of today. We must prepare to deliver the full spectrum effects—from massed area fires to precision strikes to disabling equipment with non-lethal fires—whatever the force commander requires.[52]

This article continues to discuss in depth the actions that the Field Artillery is taking to ensure that it meets the needs of the Army well into the next century. It cites the critical need for the Field Artillery to better support light forces employed in force projection operations. To fill this need the Field Artillery is designing and fielding two major weapons systems, the Advanced Technology Light Artillery System (ATLAS) and the HIMARS.

ATLAS will be a towed 155-millimeter howitzer weighing no more than 5000 pounds. ATLAS will have all the capability of present 155-millimeter howitzer in regards to range and effects, but be much less cumbersome, much more maneuverable, and easier to deploy into austere environments. The capabilities and characteristics of HIMARS has been discussed in depth and needs no further discussion, other than to reiterate it is the system of choice of both the Field Artillery and the Army to provide the long-range precision fires for early entry, projected task forces. Each system is designed to minimize weight and maximize firepower potential, thus keeping in line with the studies discussed above.

VII. Analysis and Conclusion

As stated in the introduction, the Tenets of Army Operations as defined by *FM 100-5, Operations* were used to analyze the credibility of HIMARS as it pertains to light force projection operations. These tenets are initiative, agility, depth, synchronization, and versatility. If HIMARS does not prove to be an advantage using these criteria, it should not be considered as a viable option for future fire support to light infantry units.

"Initiative sets or changes the terms of battle by action and implies an offensive spirit in the conduct of all operations."[53] By gaining and maintaining the initiative commanders deprive the enemy of options while maintaining or increasing his own options. Commanders gain and maintain the initiative by affecting the enemy throughout the depth of the battlefield, anticipating events and reacting to those events quicker than the enemy.[54]

HIMARS can have both positive and negative effects on gaining and maintaining the initiative. On the negative side, each HIMARS can only maintain half of the firepower of one M270A1 MLRS. This is assuming that the Army has the MLRS upgraded to the M270A1 model by the time the HIMARS is fielded to the Army. This also makes the assumption that the projected task force had the dedicated lift assets to get the MLRS required into the fight early enough to affect the initiative. This leads to the positive effect of HIMARS on initiative. With its ease of deployment over MLRS, the commander is much more likely to have HIMARS at his disposal early in the fight. The rapidity in which the initiative is gained could be critical to mission success. HIMARS also has the ability to affect the fight at great depths with Block I and IA ammunition, and will be able to add precision to that depth with the fielding of MSTAR, Block II and IIA

ammunition. HIMARS has a positive impact on initiative. Its ability to rapidly deploy into even the most austere environments and be almost immediately ready for combat gives it a tremendous advantage.

"Agility is the ability of friendly forces to react faster than the enemy and is a prerequisite for seizing and holding the initiative."[55] By reacting quicker than the enemy the commander has the ability to rapidly mass his assets against enemy weaknesses. This allows a commander to defeat much larger formations. The key to agility is keeping the enemy off balance by upsetting his plans and forcing him to piecemeal his forces into the main battle.[56]

Many of the same points can be made concerning agility that were made for initiative because the two are closely linked. HIMARS gives the commander the ability to radically upset the enemy commander's plan by destroying or disrupting critical assets deep in the enemy's rear area. This will disrupt the enemy's tempo and take away any momentum he may have had for the close fight. Having a system like HIMARS on the ground early in any contested force projection operation will be critical to the friendly commander's success when faced with a heavy mechanized or armor force.

"Depth is the extension of operations in time, space, resources, and purpose...What is most important however, is the fact that in any operation the Army must have the ability to gain information and influence operations throughout the depth of the battlefield."[57] This criteria fit perfectly into the study by RAND cited earlier when they plugged in more sensors and shooters (HIMARS) to affect the enemy at greater depth. Once these additional sensors and shooters were input into the model the Blue force was much more successful than without these systems.

Depth requires the commander and his staff to anticipate, locate, and attack the enemy throughout the depth of the battlefield, thus enabling the commander to gain momentum and defeat the enemy. If the commander successfully attacks the enemy in depth he will limit the enemy's freedom of action, degrade his combat assets, and upset his plans.[58]

It is true that joint assets such as Air Force or Marine aircraft can also assist the joint force commander in achieving this depth, but as stated earlier these assets have numerous limitations. HIMARS gives the commander a responsive and organic system that can easily affect this depth if properly linked with the sensors. HIMARS has a positive impact in this category also. With HIMARS the Army gets an immediately deployable system that is more responsive than joint air or cruise missiles once it is in the theater.

"Synchronization is arranging activities in time and space to mass at the decisive point."[59] These activities range from intelligence to fire support, maneuver to logistics. These activities and more are arranged and synchronized through space and time to gain the commander's desired effects on the battlefield. HIMARS and MLRS lend much more depth to this synchronized effect.

On the surface it looks as though MLRS could be as effective, if not better than HIMARS in regards to synchronization because it has twice as many launchers to mass at the decisive point. This again comes down to the deployability issue between the two. *FM 100-5* continues on to state "In a force-projection army, the ability to synchronize operations becomes paramount."[60] This alludes to combining the aforementioned activities as soon as possible upon deployment, especially in an operation that may be contested. If a contingency operation is contested immediately it will be critical to the

commander to get a combined arms package on the ground quickly so that he can establish this synchronization.

"Versatility is the ability of units to meet diverse mission requirements."[61] Versatility gives the commander the ability to move forces or tailor forces in a rapid manner to meet the requirements of the mission. It also means that units must be able to quickly move from one region or one tactical mission to another. HIMARS has greater capability in this arena than MLRS. It is more limited than towed howitzers, but the advantage in firepower that HIMARS has over howitzers makes up for this shortfall.

Conclusion

Overall HIMARS stands up well against other systems presently in the inventory when analyzed using the Tenets of Army Operations. HIMARS cannot be considered a fire support weapon in the same sense as howitzers. Its range and lethality move it into a different league. Howitzers will still be critical to the close fire support fight, but HIMARS and similar systems have the ability to reach deep into the enemy's rear areas and shape the battle long before the howitzers get their chance to fight. This deep ability will compliment the present role of the howitzer in the close fight. HIMARS also does well versus MLRS and joint air assets. The weight and ease of deployment lend tremendous advantages over MLRS while its responsiveness and all-weather abilities give it advantages over joint air.

There are essentially four options for the Army to choose from for light infantry fire support. First, stay with the status quo and rely on towed howitzers, joint air, and late arriving MLRS for support. Second, preposition MLRS all over the world or dedicate

large amounts of early lift assets to ensure that MLRS is in the fight from the start. Third, devise a totally new system with equal or less weight and increased firepower than HIMARS, keeping in mind that this option would likely take years to do. Last, continue with the HIMARS program and integrate it into the fight with joint air, howitzers, and later in the fight with MLRS to maximize the effects on the enemy.

This monograph supports the last option. HIMARS looks to be a very good fit in the scenarios that have been run on future warfare. HIMARS, along with many of the other efforts being made for the Rapid Force Projection Initiative, will take the Army's light infantry forces well into the next century well equipped to successfully accomplish a wide array of missions.

Endnotes

[1] United States Department of the Army, *Field Manual (FM) 100-5: Operations* (Washington, D.C.: GPO, 14 June 1993), 2-6.

[2] Randall L. Rigby, Brigadier General, *Fires for Division XXI, State of the Branch 1995, Field Artillery* (December 1995): 4. Rigby discusses the future of light forces as they compliment the heavy forces for the future of the Army. This early discussion led much of the direction of the Field Artillery for Force XXI and Army After Next.

[3] Training and Doctrine System Manager (TSM), *HIMARS Firing Battery Organization, Fighting with Fires, HIMARS Office Briefing* (not dated): 4-9. Briefing details the scheduled fielding dates for the Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM) as well as the fielding dates of the Army Tactical Missile System (ATACMS) Family of Munitions (AFOM). These planned dates are critical to the HIMARS. Without these new munitions, HIMARS will not be the tank killer that was planned because it will not have the proper munitions to effects armor. Those munitions are ATACMS Block II and Block IIA with Brilliant Anti-Tank submunitions.

[4] Rigby, Ibid., 1.

[5] Redstone Arsenal, RFPI Technology Program, *RFPI, System of Systems. http://ippd.redstone.*army.mil/rfpipub/over.htm (28 August 1998), 1. This document and others from this source outline the systems that comprise the RFPI program. It also will give periodic updates as to the status of these systems.

[6] Rigby, Ibid., 4.

[7] United States Department of the Army, TSM Rockets and Missiles, *Operational and Organizational Plan for the High Mobility Artillery Rocket System (HIMARS),* (Fort Sill, OK, undated), 1-10. This O&O Plan explains all the Army's requirements for this system, from the statement of need through costs.

[8] United States Department of the Army, TSM Rockets and Missiles, *Operational and Organizational Plan for the High Mobility Artillery Rocket System (HIMARS),* Ibid., 1.

[9] Christopher F. Foss, *Contract News –HIMARS-, Jane's Defence Weekly, International Edition,* (London, 01 April 1996), 2. Numerous sources track successful firing of HIMARS up to the present. The Foss article gives you clear analysis of those munitions fired up to that point.

[10] United States Department of the Army, TSM Rockets and Missiles, *System Training Plan for the High Mobility Artillery Rocket System (HIMARS),* (Fort Sill, OK, March 1998), 1.

[11] United States Department of the Army, TSM Rockets and Missiles, *HIMARS Tactics, Techniques and Procedures* (Fort Sill, OK, undated), 28-40. The mission is derived from the text in this portion of the document and appropriate Field Artillery MLRS doctrinal manuals.

[12] Website for Defence Industries - Army Current Projects, *HIMARS. http:/www.*army-technology.com/projects/himars (28 August 1998), 1.

[13] United States Department of the Army, TSM Rockets and Missiles, *HIMARS Tactics, Techniques and Procedures* (Fort Sill, OK, undated), 32.
United States Department of the Army, *Field Manual (FM) 6-60: Multiple Launch Rocket System (MLRS) Operations* (Washington, D.C.: GPO, 16 September 1992), A-3.

[14] United States Department of the Army, *Field Manual (FM) 6-60: Multiple Launch Rocket System (MLRS) Operations* (Washington, D.C.: GPO, 16 September 1992), A-2.

[15] United States Department of the Army, TSM Rockets and Missiles, *HIMARS Tactics, Techniques and Procedures* (Fort Sill, OK, undated), 33.

[16] United States Department of the Army, TSM Rockets and Missiles, *Operational Requirements Document for the High Mobility Artillery Rocket System (HIMARS),* (Fort Sill, OK, w/changes 1 October 1998), 1-16.

[17] Rigby, Ibid., 1.

[18] Training and Doctrine System Manager (TSM), *HIMARS Firing Battery Organization, Fighting with Fires, HIMARS Office Briefing* (not dated): 6.
United States Department of the Army, *Field Manual (FM) 6-60: Multiple Launch Rocket System (MLRS) Operations* (Washington, D.C.: GPO, 16 September 1992), 1-8.

[19] Training and Doctrine System Manager (TSM), *HIMARS Firing Battery Organization, Fighting with Fires, HIMARS Office Briefing* (not dated): 7.
United States Army, Training and Doctrine Update, Third Quarter FY98 Part II, *Material Updates.* http://www-tradoc.army.mil/updates/tqu2.htm (28 August 1998), 3.

[20] TRADOC, *Material Updates*, Ibid., 3.

[21] Ibid., 3.

[22] Ibid., 4.

[23] Ibid., 4.

[24] Ibid., 4.

[25] Ibid., 4. Most of the information regarding the descriptions, material updates, and fielding dates of MFOMs were taken from the TRADOC Material Manager's published information. Other information was taken from various technological publications and the HIMARS manager at Ft. Sill, OK. The assumptions on the future effects of the munitions are mine coupled with the facts as given by the sources.

[26] Gordon R. Sullivan, and Togo D. West, Jr., *Decisive Victory, America's Power Projection Army, A White Paper,* (Washington, D.C.: GPO, October 1994), 1.

[27] Ibid.

[28] Ibid.

[29] Ibid. 12. The discussion focuses on what characteristics the Army must possess to succeed in the future.

[30] Ibid., 18.

[31] Gordon R. Sullivan, and James M. Dubik, *Land Warfare in the 21st Century,* (Strategic Studies Institute, Carlisle Barracks, Pennsylvania: February 1993), iii.

[32] Ibid.

[33] Ibid.

[34] Ibid., 7.

[35] Ibid., 6-7.

[36] Ibid., 8.

[37] Ibid., iv.

[38] Martin van Creveld, *Technology and War,* (New York, The Free Press, 1989), 314.

[39] United States Department of the Army, Training and Doctrine Command, *Army After Next Spring Wargame, State of the World, 1998-2021,* (Ft. Monroe, VA: Doctrine Directorate, TRADOC, April 1998), 1. The chart depicted and the ideas discussed are directly taken from this document. All of the events were generated to support the AAN Spring Wargame, but they are an educated estimate of what could likely happen in the world over the next 25 years.

[40] Ibid. 2.

[41] Gary B. Griffin, *Future Foes, Future Wars: Military Review,* (Leavenworth, KS, November 1994), 56.

[42] United States Department of the Army, Training and Doctrine Command, *Army After Next Spring Wargame, State of the World, 1998-2021.* Ibid., 2.

[43] United States Department of the Army, TRADOC TRAC, *AAN Winter Wargame 1997,* (Fort Leavenworth, KS, May 1997), 1-22.

[44] Ibid., 16.

[45] United States Department of the Army, TRADOC TRAC, *AAN FY98 Tactical Wargame,* (Fort Leavenworth, KS, April 1998), 1-20.

[46] Ibid., 15.

[47] United States Department of the Army, TRADOC TRAC, *AAN 1998 Spring Wargame,* (Fort Leavenworth, KS, May 1998), 6-13.

[48] Randall Steeb, John Matsumura, Terrell Covington, Thomas Herbert, Scot Eisenhard, *Rapid Force Projection, Exploring New Technology Concepts for Light Airborne Forces,* (Arroyo Center, RAND, Santa Monica, CA: 1996), viii-xii, 18-48.

[49] John Matsumura, E. Cardenas, K. Horn, E. McDonald, *Future Army Long-Range Fires: Bringing New Capabilities to the Battlefield,* (Arroyo Center, RAND, Santa Monica, CA: 1994), 15-21.

[50] Ibid., 27.

[51] Ibid., 32.

[52] Leo J. Baxter, *Meeting the Future: State of the Field Artillery 1998, Field Artillery* (November-December 1998), 1.

[53] United States Department of the Army, *Field Manual (FM) 100-5: Operations* (Washington, D.C.: GPO, 14 June 1993), 2-6.

[54] Ibid.

[55] Ibid., 2-7.

[56] Ibid.

[57] Ibid.

[58] Ibid.

[59] Ibid., 2-8.

[60] Ibid.

[61] Ibid., 2-9.

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