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Through an analysis of past, current, and future fire support development, the Marine High Mobility Artillery Rocket System (HIMARS) is one of several assets that can feasibly fill the Navy's current Naval Surface Fire Support (NSFS) gap. Although ongoing testing and software upgrades may create a new maritime capability for HIMARS, it is likely that HIMARS may only be employed as a temporary solution to fill the Navy's NSFS gap.

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MASTER OF MILITARY STUDIES

Maritime HIMARS: The Potential Marine Artillery Mission of Naval Surface Fire Support

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Executive Summary

Title: Maritime HIMARS: The Potential Marine Artillery Mission of Naval Surface Fire Support

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Thesis: Through an analysis of past, current, and future fire support development, the Marine High Mobility Artillery Rocket System (HIMARS) is one of several assets that can feasibly fill the Navy's current Naval Surface Fire Support (NSFS) gap. Although ongoing testing and software upgrades may create a new maritime capability for HIMARS, it is likely that HIMARS may only be employed as a temporary solution to fill the Navy's NSFS gap.

Discussion: The emergence of HIMARS into the Marine Corps' fire support assets in 2005 marked the introduction of a unique, expeditionary rocket artillery capability. Its all weather, long range, and precision fires capabilities provided fires beyond the scope of standard cannon artillery. Since 2005, technological improvements on the weapon system have been shaped to meet the changing operating environment. As the Marine Corps returns its focus to the maritime domain as outlined in *Expeditionary Force 21*, HIMARS was identified as the fire support asset that will be employed aboard naval vessels for the purpose of projecting fires both ashore and afloat. Currently, the Navy lacks the capability to provide NSFS outside of the adversary's Anti-Access Area-Denial threat range. This gap may eventually be filled by the Navy through the fielding of future capabilities such as the Advanced Gun System, the Hypervelocity Projectile, or the Electromagnetic Rail Gun. Future NSFS solutions currently remain in the research and development phase. Although the maritime HIMARS capability is emerging, some claim that HIMARS will not fill the NSFS gap due to resource shortfalls and alternative operational commitments. Additionally, HIMARS operating aboard naval vessels poses significant issues including maintenance, support, exposure to the environment, and ammunition considerations. Whether or not HIMARS is employed for the Navy by the Marine Corps as a NSFS solution, the Marine artillery community and those who depend on HIMARS fires must be prepared for the emerging maritime HIMARS capability and should anticipate incorporating this capability into the training and operating environments. The importance in researching this topic is to highlight that the Marine Corps maintains a unique and developing fire support asset that is capable of employment across standard and non-standard domains.

Conclusion: HIMARS may be employed as a ship to shore fire support asset during distributed operations and could be utilized on an advanced base against the A2AD threat. Although HIMARS is projected to gain the capability to execute fires from naval vessels, it is only a temporary solution for the NSFS gap.

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Preface

The general audience for this research paper includes Marine artillerymen, naval personnel who deal with Naval Surface Fire Support, as well as those military personnel who rely on fire support during amphibious operations. HIMARS is typically well known as a powerful indirect fire support asset but its capabilities and limitations are not as well understood. Due to the developing employment methods of HIMARS in the maritime domain, it is important to discuss the history and future of this unique fire support asset as there is little research information available on this subject. This research paper will examine the HIMARS weapon system, its history, current capabilities, and potential future integration as a Naval Surface Fire Support asset. This topic provides a greater understanding of HIMARS to the audience and should prepare those who may be assigned to or interact with HIMARS units for future operations.

I received exceptional assistance from my civilian faculty advisor, Dr. Jonathan Phillips, as well as my military artillery advisor, LtCol Jarrod Stoutenborough, as they provided guidance to shape my research and development of this unique topic. Additionally, I would like to thank CDR Russell Evans from the Marine Corps University, Mr. Ben Collins from the Marine Corps Warfighting Laboratory, and Major Sean Wright from the Marine Corps Combat Development Command for providing their professional knowledge and opinions on this topic. The ability to interact with naval and Marine Corps experts during my research on this topic was invaluable.

Introduction

Within the Marine Corps' arsenal of fire support assets, the High Mobility Artillery Rocket System (HIMARS) is arguably the most versatile, responsive, and sought after capability. Its ability to execute fires beyond the range of cannon artillery as well as its application during times of aviation limitations makes the HIMARS platform an essential element of fire support within combined arms operations. The success of HIMARS was evident during recent operations in Iraq and Afghanistan as HIMARS provided a precision, deep strike, and all-weather indirect fires capability. As the Marine Corps shifts its focus back to the maritime environment, the requirement for precise and responsive fires remains a critical aspect of both Marine Corps and Navy operations.

The Navy and Marine Corps enjoy a historical partnership within the maritime environment that includes not only maritime transportation, but additionally Naval Surface Fire Support (NSFS) for land and amphibious operations. The Navy's ability to provide shaping and precision fires for the Marine Corps through NSFS is a critical capability during amphibious operations. The Navy and Marine Corps' future integration was highlighted by General Amos within *Expeditionary Force 21* which called for "sea and advance basing" outside the adversary's Anti-Access Area-Denial (A2AD) threat means.¹ Due to the increased range and precision of the adversary's A2AD capabilities, the Navy's NSFS capabilities were assessed within the scope of the requirements outlined in *Expeditionary Force 21*. The results of this evaluation identified that the Navy's current NSFS capabilities do not meet the necessary requirements to support amphibious operations and sea basing outside of the adversary's threat range. While several emerging NSFS assets exist, the Navy is currently either limited in the quantity of those assets or the assets remain in the research and development phase.

Consequently, HIMARS was selected as the means to assist in achieving long range NSFS aboard naval vessels during sea basing operations as well as future employment for power projection ashore.²

HIMARS is still a nascent technology as its history and employment as a Marine artillery asset is less than a decade old. The refinement of tactics, techniques, and procedures for this weapon system is an ongoing process as its potential capabilities expand beyond the scope of cannon indirect fire platforms. HIMARS is continuously upgraded to meet new employment requirements due to the needs of both the Navy and Marine Corps. A historical review of HIMARS' inception into the Marine Corps is important as the depth of experience with HIMARS, as well as the full understanding of the employment capabilities is fairly limited throughout the service.

This document will analyze the potential integration of HIMARS into the Navy's NSFS capability and will address how and why HIMARS was selected to fill this nonstandard mission. The use of HIMARS aboard naval vessels during sea and advance basing operations is a groundbreaking capability that extends Marine Corps artillery capabilities outside of the confines of standard land-based operations. For some, the application of HIMARS aboard naval vessels has the potential to be interpreted as the Marine Corps taking over the Navy's NSFS mission.³ Why is the Marine Corps being called upon to employ a typically land based artillery asset aboard naval vessels? The basis for this opinion is linked to both fiscal and bureaucratic reasons as alternative means exist for achieving the required NSFS capability. For others, the Navy's use of HIMARS is a temporary solution to fill the gap in long range precision fire support while the Navy waits for the introduction of future fire support systems that are currently undergoing research and development.⁴

Ultimately, this paper will address the potential capabilities and limitations of HIMARS as a shipboard NSFS asset. Through the analysis of historical fire support development, current and future capabilities of the U.S. Navy's fire support platforms, and current HIMARS employment procedures, HIMARS proves to be a feasible asset that can potentially fill the Navy's current gap in NSFS. Several considerations exist that may limit the application of HIMARS in this domain as this weapon system was developed as a land based asset. The overarching importance of analyzing this topic is to emphasize the emergence of a new method of artillery employment for the Marine Corps that will positively expand future Marine artillery capabilities in the maritime domain. Although current ongoing testing and software upgrades may prove to create a new maritime capability, HIMARS will at most be employed as a temporary solution for filling the Navy's NSFS gap.

EXPEDITIONARY FORCE 21 AND HIMARS IN THE LITTORALS

Within the vision of *Expeditionary Force 21*, General Amos highlighted what the term expeditionary means for the Marine Corps today. Expeditionary was defined as "a strategically mobile force that is light enough to get to the crisis quickly, yet able to accomplish the mission or provide time and options prior to the arrival of additional forces."⁵ As the Marine Corps shifts its focus from the long standing land battles of Iraq and Afghanistan, General Amos looked to the littoral environment and the Marine Corps' mission to shape how the Marine Corps will be postured for the future. Being expeditionary does not only encompass the mindset of operating under projected austere conditions that the Marine Corps may operate in, but it also focuses on the appropriate equipment necessary to execute the mission. Within the scope of fire support, the employment of an asset that is easily deployable and capable of ranging A2AD targets in the littorals is critical to the success of future operations.

NSFS and air fires are vital to conducting amphibious operations. General Amos' concept of sea basing within *Expeditionary Force 21* focuses on maintaining appropriate all-weather fires capabilities that extend beyond the current capabilities of NSFS. Specifically, General Amos called for the "enhancement of naval surface fires to protect and support maneuver from 65 nautical miles out to sea to inland objectives (including exploration of rail gun and laser technology)." ⁶ While there are currently capabilities that exist to support NSFS beyond the 65 nautical mile requirement within the Navy's fleet, they are limited by financial constraints and quantities of emerging assets such as the DDG-1000 and the Tomahawk Land Attack Missiles (TLAM). In order to achieve General Amos' goal, the Navy and Marine Corps needed to identify an asset that is expeditionary, fiscally appropriate, and capable of achieving NSFS from 65 nautical miles.

The decision for an all-weather, long range, precision fires system to support the intent of *Expeditionary Force 21* was HIMARS. Specifically, HIMARS was chosen for its capability to be employed "from distributed locations and naval platforms or surface connectors to support distributed maneuver" as well as "from austere and expeditionary bases." ⁷ Although HIMARS was selected for this new role of NSFS, its current capabilities as a maritime fire support asset remain in the testing phase. It currently lacks the proven technology to be employed from a naval vessel or surface connector, but the successful enhancement of this weapon system will increase the combatant commander's capabilities for employing this asset. HIMARS is a possible solution for the NSFS gap but in order for HIMARS to be employed successfully in the maritime domain, integration in amphibious exercises must be at the forefront of commander's planning for fire support.

The lack of universal knowledge regarding this weapon system is understandable as it was transitioned into the active duty Marine Corps less than a decade ago.⁸ There is very minimal knowledge across the Marine Corps regarding the capabilities and employment of HIMARS which often leaves this asset as an afterthought in the training environment. Even leading up to operations in Afghanistan and Iraq (due to safety considerations and ammunition costs in the training environment), HIMARS was rarely actively planned for during large scale exercises. Additionally, request for HIMARS support in the training environment is often difficult to fulfill due to both the limited quantity of HIMARS units within the Marine Corps as well as the high operational tempo as well as the lack of available ammunition authorized for the training environment. This factor affects the knowledge base of HIMARS throughout the artillery community as there are fewer units available for artillerymen to gain and maintain proficiency on HIMARS.

Within the combat environment, HIMARS provided timely and accurate fires to the requesting organizations and is now more sought after and requested for integration within the training environment. In addition to standard training exercises that are organic to the HIMARS battalions, HIMARS has more recently been utilized in large scale training exercises such as Talisman Sabre 15 in Australia and Rim of the Pacific (RIMPAC) 14 in Guam and Hawaii in order to display the flexibility and responsiveness of this fire support asset. Further technological enhancements to HIMARS must increase its capabilities as a maritime fire support asset in order to meet General Amos' intent, but the limited availability and quantities of this asset could identify HIMARS as a feasible but not plausible long-term solution.

THE HISTORY OF HIMARS

HIMARS is a fairly new technology whose capabilities have continuously changed in order to adapt to its prescribed mission Within the U.S. Army and Marine Corps. HIMARS was introduced to the U.S. Army in 1993 by Lockheed Martin as a lightweight, more mobile version of the Army's M270 Multiple Launch Rocket System (MLRS).⁹ The development of HIMARS presented the unique capability to transport a MLRS asset via a C-130 and execute fire missions within minutes of offloading. This would increase the Army's ability to provide timely and accurate deep strike rocket and missile fires with the benefits of mobility and operational cost savings.

The most prominent differences between the Army's M270 MLRS and the HIMARS include chassis changes, munitions capacity due to a new launcher module, and a smaller logistic footprint to transport each HIMARS platform. The chassis difference between the two platforms is significant as HIMARS is built on the Army's Family of Medium Tactical Vehicle (FMTV) 6 x 6 wheeled truck versus the M270 tracked chassis.¹⁰ The transition from a tracked MLRS to a wheeled FMTV enhanced the speed, range, and overall mobility of the weapon system while lowering the operating costs.¹¹ With regards to ammunition, HIMARS carries 50 percent less ammunition as it is capable of carrying one pod of six rockets or one missile versus the two rocket or two missile pods that the M270 MLRS is capable of carrying.¹² Finally, the logistics footprint to move a full battery decreased due to HIMARS being C-130 lift capable vice being limited to the C-5 or C-17 aircrafts that the M270 MLRS is restricted to.¹³ Although the HIMARS launcher module is only capable of loading one rocket or missile pod, the advantage of an MLRS asset to be transported by a C-130 enables more flexibility through less air support needed to transport a HIMARS unit.

The advantages that HIMARS introduced to the MLRS community sparked the Army to begin tests with HIMARS and eventually attracted the Marine Corps' attention to the weapon system. From 1996 to 2003, the Army and Lockheed Martin conducted testing on HIMARS prior to the Army's first fielding of the weapon system in 2003.¹⁴ During this testing and procurement phase, the Marine Corps also sought interest in incorporating HIMARS into its fire support assets and ordered three HIMARS for testing in 2004.¹⁵

HIMARS was officially introduced into the Marine Corps in 2005 with the fielding of Fox Battery 2nd Battalion, 14th Marines Regiment (2/14).¹⁶ HIMARS was later integrated into the active duty Marine Corps in 2008 when Tango Battery, 5th Battalion, 11th Marine Regiment (5/11) transitioned from the M777 Howitzer to the M142 HIMARS.¹⁷ 5/11 is the only active duty HIMARS battalion in the Marine Corps and initially was established with three HIMARS batteries. HIMARS, being a low density artillery asset within the Marine Corps, is a widely sought after capability. Due to this high operational tempo, Quebec Battery was activated in 2012 and remains the fourth active duty HIMARS battery. Each of the HIMARS batteries supported recent operations in Afghanistan and 5/11 continues to remain active in training exercises around the world. In addition to 5/11, there are three reserve HIMARS batteries in 2/14. Currently, the U.S. Army, U.S. Marine Corps, Jordan, Singapore, and the United Arab Emirates maintain HIMARS within their artillery arsenal.¹⁸

THE CURRENT ROCKET ARTILLERY MISSION AND EMPLOYMENT OF HIMARS

The current mission for Marine Corps rocket artillery, specifically HIMARS, is “to provide timely, accurate rocket and missile fires in support of expeditionary and land-based Marine Air Ground Task Force (MAGTF) operations.”¹⁹ HIMARS is an asset that meets the vision of *Expeditionary Force 21* as it is both expeditionary (C130 transportable) and scalable to

meet the combatant commander's requirements. A HIMARS battery typically provides general support or general support reinforcing fires to a MAGTF but the determination of the size and organization of the firing unit is based on the needs of the commander and ability for firing platoons to mutually support fires. An essential element to the success of utilizing HIMARS is the range capability that each rocket or missile provides.

Long range precision fire support capabilities are split between the two variants of ammunition that HIMARS can fire which include the Guided Multiple Launch Rocket System (GMLRS) and the Army Tactical Missile System (ATACMS). Within the planning ranges for HIMARS ammunition, GMLRS rockets have a minimum range of 15 kilometers and a maximum range of 80 kilometers.²⁰ The ATACMS missile is capable of ranging targets from its minimum range of 70 kilometers to the maximum range of 300 kilometers.²¹ Ultimately, the expeditionary design and ammunition capabilities of HIMARS provides the combatant commander with an all-weather, precise, accurate, and lethal indirect fire support asset whose capabilities are greater than all other indirect fires assets in the Marine Corps.

The employment of HIMARS as an expeditionary asset is constantly refined as a full HIMARS battery in its full Table of Equipment (T/E) takes up a significant footprint. The T/E for a standard HIMARS battery is a total of 56 vehicles. Each battery contains six HIMARS with fire direction assets as well as organic security and logistic support. There are two standard configurations for a HIMARS battery that include either two platoons operating with three HIMARS each (2x3) or three platoons operating with two HIMARS each (3x2).²² Although the 2x3 and 3x2 battery configurations are the unit's doctrinal configuration, HIMARS batteries are capable of being tailored to meet the commander's requirements by decreasing the support assets if the size of the unit is an issue. In recent operations in Afghanistan, HIMARS batteries

conducted distributed operations and utilized both configurations. The dispersed platoon positions provided overlapping range rings and mutually supported firing positions to cover the most area within the area of operations. Non-standard formations and employment also exist as HIMARS has supported requesting units with the appropriate gear set to meet the expeditionary nature of the required mission. While not necessarily expeditionary with all 56 vehicles, a HIMARS battery can condense its assets by supporting with a platoon or smaller sized element. The minimum requirement for the employment of a HIMARS unit can be discussed with the requesting unit in order to meet their overall mission but redundant HIMARS capabilities are always suggested in the event of any malfunction that may limit the ability to execute fire missions.

An example of HIMARS being employed as an expeditionary resource is the utilization of HIMARS in an artillery raid. In December of 2015, Delta Battery, 2/14 conducted a HIMARS raid at White Sands Missile Range New Mexico.²³ The HIMARS artillery raid typically consists of the necessary amount of launchers needed to execute the directed mission that are embarked on C-130 aircrafts. The C-130 delivers the launchers to the directed firing position and fire missions are executed within minutes of landing. In this recent example, Delta Battery was capable of landing two launchers and effectively firing rounds on target within ten minutes of landing. This method of employment is representative of the versatility that HIMARS provides to the combatant commander as long range precision fires are executed within a short amount of time and firing assets are displaced from the firing position upon the completion of the raid.

All current employment methods for HIMARS are based off of land operations. Although HIMARS units conduct training with surface connectors for ship to shore movements, all training exercises and previous combat operations were limited to the land-based firing

capabilities of the HIMARS platform. Prior to the vision of *Expeditionary Force 21*, the focus for HIMARS was preparation for and employment in the long standing land battles in Iraq and Afghanistan. NSFS assets were capable of ranging A2AD targets as a 65 nautical mile sea basing standoff range was not prescribed. In the advent of a maritime requirement for HIMARS, the development of new tactics, techniques, and procedures (TTPs) is necessary. Artillerymen and Marines throughout the service continue to learn about the advantages that HIMARS brings to the battle space as employment considerations constantly change. Ongoing technological advances continue to transform the platform's overall flexibility to meet new mission requirement. Integration into training and universal knowledge for maritime HIMARS TTPs is necessary for Navy and Marine Corps personnel to employ this new capability. The emerging capability for HIMARS to fire from a naval vessel will enhance the NSFS capabilities in support of both Navy and Marine Corps operations.

THE NAVAL SURFACE FIRE SUPPORT PROBLEM

As the Marine Corps shifts its focus back to the maritime domain, the Navy and Marine Corps' partnership is growing continuously, specifically within the mission of NSFS. Mutual support for amphibious and land operations has changed as the Marine Corps is now being called upon to provide organic artillery assets to conduct NSFS from naval vessels. The definition of NSFS is "fires provided by naval surface guns, missiles, and electronic warfare systems in support of a unit (or units) tasked with achieving the commander's objectives."²⁴ Although aviation and ground-based indirect fires assets are a significant resource to the combatant commander, NSFS is essential to the success of future operations in the littorals where adversary capabilities limit air superiority and the use of land-based indirect fire assets. A gap in NSFS

capabilities currently exists in the form of insufficient long range, all weather, and precision fires.

Prior to the HIMARS considerations listed within *Expeditionary Force 21*, NSFS was provided primarily by the Navy's Mark 45, 5 inch gun. This weapon system is found on the Ticonderoga Class Guided Missile Cruiser (CG-47) as well as the Arleigh Burke Class Destroyer (DDG-51). There are currently 22 CG-47 class cruisers and 51 DDG-51 class destroyers within the Navy that are capable of providing NSFS.²⁵ Although the NSFS capacity exists through over 70 naval vessels, the long range capability is lacking as the maximum planning range for the Mark 45 is 12.4 nautical miles; substantially below the new requirement.²⁶ While the TLAM is capable of executing targets outside of the adversary's threat range, the Navy needs a fire support asset that is capable of attacking targets at distances shorter than the TLAM until future technology such as the Electromagnetic Rail Gun and DDG 1000 are fully fielded.

Within the emerging maritime environment and the new focus on operations in the littorals for the Marine Corps, the Navy needed to evaluate new standoff distances against the reach of the adversary's A2AD threats while maintaining NSFS capabilities. This evaluation began in 2009, well before *Expeditionary Force 21* was introduced through *The Joint Fires in Support of Expeditionary Operations in the Littorals* (JFSEOL) Initial Capabilities Document.²⁷

Four NSFS capability gaps were identified within JFSEOL:

Gap 1: The ability to transmit and receive required targeting information from ISR sources to fires command and control systems.

Gap 2: The ability to engage moving and area targets under restricted weather conditions (i.e. cloud cover).

Gap 3: The ability to engage known/identified targets in restricted conditions (i.e. when

friendly forces are in close contact or when collateral damage is a concern)

Gap 4: The ability to provide volume fires to suppress targets. This gap is exacerbated at extended ranges.²⁸

Through the identification of these gaps, potential solutions were identified to include an extended range projectile for the Mark 45 5 inch gun, the Advanced Gun System, the Hypervelocity Projectile, and finally Guided Multiple Launch Rocket System (GMLRS).²⁹ At the time of this assessment, all potential solutions minus the use of GMLRS were developmental assets while GMLRS was already being employed within both the M270 MLRS and HIMARS. Currently, NSFS capabilities lack the ability to defeat the A2AD threat from extended ranges (minus the use of the TLAM). The advent of emerging naval platforms such as the DDG-1000 Zumwalt Class Destroyer and advanced weapon systems highlight that the Navy will eventually achieve NSFS superiority from extended standoff distances. The DDG-1000 would fill the NSFS gap (although production is discontinued) as it is equipped with the Advanced Gun System, the MK57 Vertical Launch System that is adaptable to new missile technology, and the Integrated Power System whose capabilities support the addition of future weapon systems.³⁰ While the Navy waits on the development and full fielding of future weapon systems, a gap currently exists for the required range for NSFS. If HIMARS is successfully developed into a maritime capable platform, it can provide a short-term solution for the NSFS gap as the timeline is unclear for when the Navy will achieve its organic long-range NSFS capability.

FUTURE NAVAL SURFACE FIRE SUPPORT CAPABILITIES

Future capabilities that will achieve the range for NSFS outlined within *Expeditionary Force 21* and fill the current NSFS gap include the Electromagnetic Rail Gun, the Hypervelocity Projectile, as well as the Advanced Gun System. The Electromagnetic Rail Gun has a projected

range of over 100 nautical miles and is not fielded as it is within the research and development phase.³¹ The Hypervelocity Projectile is additionally projected to achieve a range of over 100 nautical miles and will be capable of being employed in both the Mark 45, 5 inch gun and the Electromagnetic Rail Gun.³² The DDG 1000 will carry two Advanced Gun Systems which includes two 155 mm guns that are capable of firing the Long Range Land Attack Projectile (LRLAP).³³ The LRLAP is capable of striking targets beyond 60 nautical miles which makes the Advanced Gun Systems a suitable solution to the NSFS problem.³⁴ While the Electromagnetic Rail Gun, the Hypervelocity Projectile, and the Advanced Gun System remain in the research and development phase, the only feasible and timely solution to the NSFS problem is through the employment of HIMARS.

Although *Expeditionary Force 21* prescribes 65 nautical miles as the range necessary to maintain sea basing, the Navy would operate closer than that range as there are limits to the range for ship to shore connectors.³⁵ Additionally, if 65 nautical miles was upheld for sea basing as well as NSFS, HIMARS would only be capable of employment through the use of ATACMS long range missile.³⁶ Financially, this would not be a recommended solution to the NSFS gap as the cost of an ATACMS is close to the cost of a Tomahawk missile. Naval operations in the future will most likely be conducted closer than the suggested 65 nautical miles. The value of the HIMARS platform is through the employment of the launcher ashore as it was designed.³⁷ The employment of HIMARS ashore allows for distributed fires from both land indirect fires and NSFS assets. Additionally, an alternative application for HIMARS being utilized on a naval vessel is as supplement for the vertical launch system. Specifically, during sea basing operations, HIMARS could provide NSFS during naval resupplies while the vertical launch system is incapable of being utilized.³⁸ This approach to utilizing HIMARS in the maritime environment is

realistic as it focuses on HIMARS' ground employment capabilities while recommending a supplemental NSFS use during naval ammunition resupplying operations.ⁱ

There are additionally financial reasons for selecting HIMARS as the appropriate NSFS asset. The selection of current fire support assets versus the cost of ammunition for an interim fire support capability is a relevant reason for HIMARS filling the NSFS gap. Funding is already allocated to the development of new systems that will eventually achieve long range NSFS superiority; therefore the focus for the Navy is to incorporate an existing asset into NSFS and to invest in the appropriate amount of ammunition to achieve the mission.³⁹ Although HIMARS is not currently employed as a NSFS capable asset, it is closer to being fielded in the maritime environment than the previously mentioned technologies. In relation to achieving a NSFS capability that requires nominal development to incorporate aboard naval vessels, HIMARS provides the Navy with a cost effective and timely solution to the NSFS problem.

ALTERNATIVE MEANS OF FILLING THE NAVAL SURFACE FIRE SUPPORT GAP

The selection of HIMARS as the indirect fire support system to fill the NSFS gap was in addition to several alternative solutions. According to the Indirect Fires Subject Matter Expert at the Marine Corps Warfighting Laboratory, it was noted that over the last two decades, there has been a significant amount of research and development regarding alternative NSFS capabilities.⁴⁰ In the late 1990s, Lockheed Martin developed technology that would support the Navy's Mark 41 VLS aboard naval vessels.⁴¹ This system was specifically designed to employ either the ATACMS missile or GMLRS rockets through a canister that is compatible with the Mark 41 VLS.⁴² Although Lockheed Martin's research and development was conducted in the 1990s for this system, it remained a potential and feasible solution to the current NSFS gap.

ⁱ Commander Evans' opinion adds significant value to the naval perspective of HIMARS being employed as a maritime asset through his experience as a surface warfare officer as well as his interaction in wargaming *Expeditionary Force 21* concepts.

The potential for a MLRS launcher module (the firing components of either a HIMARS or M270 MLRS without the vehicle) to be mounted on a naval vessel instead of the employment of a MLRS asset that is built for land operations was previously researched and tested. In 1995, the Army conducted a test firing of the M270 MLRS aboard a naval vessel to determine the feasibility of this asset to enhance NSFS which yielded positive test results but no incorporation into NSFS.⁴³ Similar to the Mark 41 VLS compatible canister, the MLRS launcher module was a Lockheed Martin concept that was not pursued.

Although the procurement of new military technology is not limited to one manufacturer, over twenty years of research and development suggests that there were bureaucratic reasons for the Navy not selecting previous technology to support the enhancement of their NSFS capability. The preponderance of ammunition and fire support technology for the Navy is contracted through Raytheon. Why would the Navy not select a technology that fits within their current VLS and supports the NSFS mission?⁴⁴ Although further research and development would be necessary in order to link the fire control system of the ship to either the Mark 41 VLS canister or the launcher module mount, Lockheed Martin solutions have been denied in the past. Although HIMARS is a Lockheed Martin product, it would not integrate with the Raytheon fire support systems such as the Mark 41 VLS and is only a temporary solution to the current NSFS gap. This opinion of a potential “Raytheon monopoly” is valid as it provides a look into the process for selecting solutions to the NSFS problem.⁴⁵

THE FUTURE OF HIMARS AS A NAVAL SURFACE FIRE SUPPORT ASSET

The future employment of HIMARS in the littorals for the purpose of NSFS is undetermined as the Navy and Marine Corps view the HIMARS solution very differently. Although HIMARS is a financially and timely selection for a temporary solution to the Navy’s

NSFS gap, the Marine Corps may not provide HIMARS as a solution due to the limited resources that are already allocated for future employment for the Unit Deployment Program as well as support for other initiatives.⁴⁶ Specifically, the limitations of one active duty and one reserve HIMARS battalion in the Marine Corps make the demand for this asset extremely high. The combination of deployed HIMARS batteries, batteries conducting pre-deployment training, and batteries integrating into exercises throughout each year, creates a limited pool of resources available to employ as a NSFS asset. Though the HIMARS maritime capabilities are currently within the research and development phase, this emerging capability may be applied for other aspects of Marine Corps operations.

According to the MAGTF Fires and NSFS CIO at the Marine Corps Combat Development Command, the future of HIMARS as a solution to the Navy's NSFS gap is undetermined due to ongoing HIMARS testing.⁴⁷ The Navy's Electromagnetic Rail Gun, Hypervelocity Projectile, and the Advanced Gun System are the bids for success for future NSFS.⁴⁸ Each system is currently undergoing research and development with the decision to fully fund each of these assets for employment undetermined at this time.⁴⁹ More importantly, with the Navy's decision to discontinue the funding for more than three DDG-1000s may delay the fielding of the selected fire support system up to a decade.⁵⁰ Although the Navy may believe that HIMARS is the interim resource to fill their NSFS gap, there is potentially no near term solution to meet the Navy's shortfall.⁵¹

If HIMARS is selected to support the NSFS mission, it should be employed from barges capable of providing preventative maintenance, ammunition storage, and contracted support in order to sustain this unique capability.⁵² In addition to the pending decision of HIMARS being employed to fill the NSFS gap, there are many issues to consider with the employment of a

maritime HIMARS platform including prolonged exposure to the maritime environment, safety (for both the launcher and naval vessel), and the overall space available for HIMARS ammunition and maintenance aboard the designated naval vessel.

POTENTIAL ISSUES

The author's experience as a HIMARS Battery Commander as well as the Battalion Logistics Officer for 5/11, illustrated a myriad of potential issues for the employment of HIMARS in the maritime domain. Issues such as the effects of the maritime environment (salt) on the launcher, preventative maintenance, mitigation of malfunctions, and ammunition handling and storage procedures are constant concerns for any HIMARS unit. In order for HIMARS to remain effective and operational, the weapon system requires extensive preventative maintenance, indisputable contracted support for all repairs, and a large logistic footprint including a parts block and all necessary equipment to repair both the chassis and the launcher module. Although operations on land do not negate maintenance requirements or potential issues, a robust motor transportation and launcher module maintenance team for HIMARS is typically available to sustain firing capabilities.

HIMARS, being a Lockheed Martin product, is contractually supported for all launcher module and universal fire control system maintenance through a civilian Field Service Representative (FSR). Although a HIMARS unit maintains 2171 Electro-Optical Ordnance Repairer Marines who are trained to repair the HIMARS launcher module, the FSR is contractually the only maintainer who can physically repair the launcher aspects of this weapon system. The FSR maintains a parts block that contains replacement parts and tools necessary to repair any launcher issue. Although the size of the parts block is dependent on the quantity of

HIMARS being maintained, the FSR would require dedicated space aboard a naval vessel to conduct maintenance and store the parts block.

In addition to the requirement for a FSR and their associated repair assets to be aboard the naval vessel that HIMARS is employed on, similar capacity and repair space is necessary for chassis maintenance and repairs. The FMTV chassis is a critical requirement in order to operate HIMARS as it provides mobility and more importantly the power distribution necessary to operate the fire control system and the launcher module. Unlike the launcher and fire control system for HIMARS, motor transportation Marines are the maintainers for the FMTV as there are no restrictions or requirements for who is allowed to conduct maintenance on the chassis.

HIMARS was designed with the intent of being expeditionary through its ability to be transported to the area of operations via ground, surface connector, or air. Sustained operations in the maritime domain are not only foreign to the actual employment capabilities, but additionally to the physical components of the weapon system. Corrosion from sustained exposure to the elements within the maritime domain is a potential issue that must be addressed prior to employment. The risk of not addressing environmental factors on HIMARS could lead to catastrophic failures as well as degraded fire support capabilities.

In addition to potential maintenance issues and requirements, operational malfunctions are a significant consideration for HIMARS fire missions aboard a naval vessel. Issues such as a hang fire and other ammunition malfunctions could cause damage to the launcher, the crew, and the naval vessel. A hang fire is a common ammunition malfunction where a rocket is fired but it fails to leave the rocket pod (in most cases, the cause of this malfunction is the result of internal friction locks failing to disengage and release the rocket). The rocket engine will engage until all fuel is burned off while the rocket remains in the launcher module. Both manufacturing errors

and improper ammunition handling procedures are the source of a hang fire, therefore in some cases there is no method to prevent this malfunction. During land based operations, the author experienced several hang fires where the exhaust from the rocket created a large divot in the firing point while the thrust of the rocket moved the launcher several feet until the rocket fuel was expended. Deck considerations must be taken into account for not only standard firing situations but additionally hang fires. Potential damage to the naval vessel, the HIMARS launcher, and the launcher crew are significant issues that must be addressed prior to employing HIMARS aboard a naval vessel.

Inadequate ammunition storage and loading conditions are concerns during land based operations but these issues are exponentially greater aboard naval vessels. Factors such as sea state for reloading the launcher, the ammunition storage environment, and handling procedures can potentially cause damage to the rocket pods as well as the launcher. During a rocket pod ammunition reload, the HIMARS launcher module utilizes an internal boom and hoist pulley assembly to exchange rocket pods. During land operations, the launcher is required to reload on a level surface at no more than five degrees in order to ensure that the cables do not jump off of the pulley assembly due to the over 5,000 pound weight of the rocket pod.⁵³ A sea state can cause the pod to sway during reload operations and potentially cause damage the launcher and ammunition. Ammunition storage and handling procedures should also be taken into consideration as a potential issue as the damage to the pod from exposure to the maritime environment as well as damage due improper handling will limit the ability to execute fires from a naval vessel.

CONCLUSION

As a result of the research conducted, HIMARS is not the likely long-term answer to the NSFS problem. Given the changing combat environment, the Marine Corps may achieve the ability to employ HIMARS in the maritime domain, but the Marine Corps will not permanently assume the Navy's NSFS mission. Although the idea of being able to leverage an existing technology such as HIMARS and modifying it to operate in the maritime domain is being tested, additional issues exist that preclude the implementation of HIMARS as a NSFS resource.

HIMARS as a NSFS asset includes the cost of HIMARS equipment and personnel that do not exist within the Marine Corps unless other training or operational commitments are adjusted. If the Navy is interested in the interim solution of HIMARS as a NSFS capability while they wait for the fielding of the Electromagnetic Rail Gun, the Hypervelocity Projectile, or the Advanced Gun System, it is recommended that Navy procure the HIMARS weapon system or revisit alternative solutions to the NSFS problem. Alternative options are available for exploration as a solution such as the launcher module mount and vertical launch system that were developed throughout the last twenty years.

Further attention to this topic is necessary within the near future in order to validate the capabilities of HIMARS in the littoral environment and to understand the new employment means that may be available during amphibious operations. Although the employment of HIMARS as a NSFS asset is uncertain, the Marine Corps must remain flexible to assume a significant role in the Navy's NSFS mission if HIMARS is utilized. Artillerymen and the customers of Marine artillery fires must remain vigilant for the potential application of maritime HIMARS in order to effectively utilize this weapon system in the future operating environment.

End Notes

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