STUDY PROJECT

IS THERE A REQUIREMENT FOR HEAVY MORTARS IN AIRLAND BATTLE FUTURE (ALB-F)?

BY

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Faced with constrained budgets and force reductions, can the U.S. Army afford to continue pouring dollar after dollar into weapon systems that are ineffective? This study seeks to examine the heavy mortar and answer that question along with others: Is there a requirement for heavy mortars to support ALB-F? Do heavy mortars support the basic tenants of ALB-F? Can this weapon survive in a medium to high intensity conflict given the current Soviet threat? Can we afford the future programmed heavy mortars? Heavy mortars are included in the current Conventional Forces Europe (CFE) negotiations; will heavy (continued on back)

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USAWC MILITARY STUDIES PROGRAM PAPER

IS THERE A REQUIREMENT FOR HEAVY MORTARS IN AIRLAND BATTLE FUTURE (ALB-F)?

A GROUP STUDY PROJECT

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ABSTRACT

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CHAPTER I

INTRODUCTION

Is there a requirement for heavy mortars to support ALB-F doctrine? Do heavy mortars support the basic tenants of ALB-F? Can they survive in a medium to high intensity conflict given the current Soviet threat? Can we afford heavy mortars? Heavy mortars are included in the current Conventional Forces Europe (CFE) negotiations. Will heavy mortars survive CFE or CFE II? This Military Study Project (MSP) will seek to answer these questions and many more. We will discuss the history of the heavy mortar in the U.S. Army from World War I to the present. Next, the change in force structure leading to our current J-series Tables of Organization and Equipment (TOE) will be discussed. Current Soviet doctrine, both maneuver and counter mortar, will then be examined. A brief synopsis of possible requirements and uses of heavy mortars by maneuver commanders, directed by ALB-F (2004) will set the stage for an in-depth analysis of the utility of heavy mortars in an ALB-F (2004) battlefield environment which is the heart of this study.

Research clearly leads to the conclusion that the heavy mortar system in the U.S. Army is broken. Further, it is not worth fixing! The U.S. Army can no longer afford the mortar in our heavy forces. The remainder of this paper will give the reader a thorough understanding of how and why we reached these conclusions and our recommendations.

CHAPTER II

A HISTORICAL LOOK AT THE HEAVY MORTAR

MATERIEL

Heavy mortars were developed for static warfare--wars of position with relatively narrow and well-defined fronts, where switching arms and equipment from one position to another was a rare occurrence and planned well ahead of time.1

During World War I, heavy mortars were used primarily for trench warfare. The four inch smooth bore Stokes mortar firing a twenty five pound shell at a maximum range of 1,100 yards, was the U.S. Army's heavy mortar from 1917 to 1927. In 1927, the first successful rifled mortar, with an expanding base shell was fired at Edgewood Arsenal. This preliminary model led to the 4.2-inch mortar, which became the standard mortar for the Army's Chemical Warfare Service troops with its range of 2,400 yards. In 1942 improvements in powder increased the range to 3,200 yards.2

WORLD WAR II

Early in WW II, the Chief of the Chemical Warfare Service, General Porter, suggested to the Army Chief of Staff, General Marshall, that the 4.2-inch high explosive shell be standardized and that chemical mortar units fire in support of infantry soldiers. In March 1943, the 4.2-inch mortar was officially approved as a high explosive fire support weapon. The 4.2-inch proved its worth during

the invasion of Sicily, bombarding dismounted enemy infantry and their support vehicles. In the Pacific Campaigns, the 4.2-inch was first used in support of infantry units on Guadalcanal in September 1943.3 The first reported self propelled mortar was used in combat when the 4.2-inch was mounted on an M-7 tank chassis for a mission at San Pietro.4 They were also mounted in Infantry Landing Craft for the invasion of the Paulan Islands in September 1944. 5

The 4.2-inch mortar was continuously improved throughout World War II. By 1944 improved powder and igniter had increased its range to 4,400 yards. Then in 1947 a twelve inch extension was added to the length of the barrel, which not only increased the range to 5,000 yards but also improved its accuracy and decreased the flash.6

KOREA

The Korean war was fought with the same 4.2-inch mortars which had been fielded by the end of World War II.7 The problems of transporting the heavy mortar and its ammunition experienced during World War II continued to plague mortarmen during the fighting in Korea. Additionally, repair parts were in short supply throughout the war. However, the 4.2-inch mortar was used extensively against the massive dismounted enemy infantry in the rugged terrain of Korea. It was also effectively used as a counter mortar weapon.8

VIETNAM

The 4.2 inch mortar provided close fire support for the maneuver

forces again in Vietnam. They were primarily used to penetrate the jungle canopy, against dismounted enemy troops, and as a counter mortar weapon. The 4.2-inch was now mounted on a modified M113 chassis, which provided significantly improved mobility. However, many felt that the 4.2-inch was of little or no use in operations which required that they be dismounted from the weapon-carrier, even though they could be broken down into three separate loads.9

ORGANIZATIONAL

A June 1946 post World War II after action conference, conducted at Fort Benning, recommended that a heavy mortar (4.2-inch) company be placed to each infantry regiment. But, the heavy mortar remained assigned to the Chemical Warfare Service until after the Korean War.10 After the fighting in Korea stopped the army decreased the chemical forces. Only then did the heavy mortar transfer to the maneuver force.

The 4.2-inch heavy mortar was first assigned to the infantry regiments. However, because of its range and projectile size, the 4.2-inch mortar was organized into "mortar batteries", which were manned by artillerymen.11 These mortar batteries were organized into three firing platoons (each with 4 tubes); they were capable of supporting each of the three infantry battalions in the regiment. Additionally the 4.2-inch was given to Armor Cavalry units, down to platoon level, with one squad (one tube) assigned to each reconnaissance platoon.

The heavy mortar organizations remained essentially unchanged

through the "pentomic" division and the infantry battle group era. Only after the U.S. Army reorganized its divisions under the "Reorganization Objective Army Division," (the ROAD Division) concept that the heavy mortars were given to the maneuver battalions.12 Each maneuver battalion (Tank and Infantry) was assigned a platoon of 4.2-inch mortars (4 tubes). These platoons were initially organized as part of the battalion's Headquarters and Headquarters Company (HHC). However, because of the growing size of the HHC, the heavy mortars--along with the battalion scout platoon and anti-tank platoons--were reorganized into a Combat Support Company (CSC). With the exception of a few supporting equipment up-grades, the Army's heavy mortar platoon organizations continued unchanged through most of the 1960s, all of the 1970s and over half of the 1980s.

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1. Lt Col P. Crevecoeur, "What Role for Mortars in the Nineties?" Armada International, Sep-Oct 1984. p. 96.

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11. Interview Raphael J. Hallada, MG, Commandant, U.S. Army Field Artillery School and Fort Sill, Carlisle Barrack, PA. 4 January 1990.

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CHAPTER III

TODAY'S HEAVY MORTARS

MATERIEL

From a materiel standpoint, the current heavy 4.2-inch mortar has some significant problems. This is understandable, since it is the same mortar that has been used for over thirty years.

In an effort to increase the mortar's range, a new high explosive (M329A2) round was procured. The round provided a slight increase in range, however it presented some new problems The new round has lands and groves which must be aligned with the rifling in the tube. In addition to reducing the rate of fire, the round has a history of related incidents caused by its sticking in the tube.1 The other two munitions used with the 4.2-inch heavy mortar are also having adverse affects on its mission performance. The M328A1 white phosphorus (smoke) round, because of the obsolete M48A3 fuze and uninterrupted in-line detonator, is considered unsafe for troop use and as such is currently suspended.2 The M335A2 illumination round failed nine of thirty-three 1986 production lot tests due to excessive duds. The excessive dud rate for the rounds has been attributed to problems with the M565 fuse. Currently, there is no other authorized fuse for the illumination round.3

Currently the 4.2-inch mortar has a high explosive round that sticks in the tube, a white phosphorus (smoke) round that is unsafe to fire, and an illumination round with a high dud rate. There are ways to work around all of these problems to a certain extent, but

for every ineffective round that our force carries, there is one less effective round available for a target.

The U.S. Army Infantry School (USAIS) has estimated that the cost of fixing the 4.2-inch mortar munitions problem could be well over $175,000,000. Possible fixes for the high explosive round problem include development of a new tube at an estimated cost of $18.300,000, or reverting to the M329A1 round, which means disposing of $157,000,000 inventory of M329A2 rounds. To fix the white phosphorous round, would require fitting the shell body with a modified nose adaptor at a cost of $902,000 to rework 200,000 rounds. The dud rate problem with the illumination round will require the production of a new fuse at a cost $167 per round plus $669,000 for RDTE.4

Based on these estimates, USAIS concluded that it was more cost effective to field the 120mm heavy mortar than to generate any fixes to the 4.2-inch mortar.5 A comparison of the two mortar's characteristics are:

	4.2-inch	120mm
Max Range (HE)	6,840m	7,240m
Max Range (Smk & Illum)	5,650m	7,240m
Min Range (HE)	770m	170m
Min Range (Smk & Illum)	850m	170m
Max Rate of Fire	18 Rnds/1 Min	15 Rnds/3 Min
Sust Rate of Fire	3 Rnds Min	4 Rnds Min
Weight	674 Lbs	318 Lbs

The Army's 120mm mortar program can be traced back to a Quick Reaction Program (QRP) document submitted in January 1982. It was based on the 9th Infantry Division evaluation of an Israeli 120mm mortar system.6 Since that time the 120mm mortar has been thoroughly studied and analyzed. Source selection testing was completed in November 1987, and the Israeli (Tampella) system was selected in April 1988. Martin Marietta/Salgad, Israel was awarded the base contract for delivery of 14 towed and 14 carrier systems, for Initial Operational Testing and Evaluation.7 The 1985 Army Mortar Master Plan calls for the 120mm mortar to replace the 4.2-inch mortar on a one for one basis. A total of 2,606 systems would be phased in during the 1989-1992 time frame. However, because of funding constraints, the Chief of Staff of the Army decided in March 1988 to reduce the 120mm mortar buy to the selected M+10 force only, for a total of 840 systems at a cost of $300,000,000. Even though it was included in the DOD budget submission for FY89/90, current distribution of the 120mm has not yet begun awaiting funding from Department of the Army and Congress.8

What is the status of the mortar carrier? It's basically the same modified M113 armored personnel carrier which the 4.2-inch mortar was mounted in during Vietnam. Even though the M106A2 mortar carrier has been up-graded with a more powerful diesel engine, it still lacks the mobility of the supported Bradley and Abrams forces.9 It provides only limited protection against small arms and shrapnel. The open hatch makes it particularly vulnerable to overhead artillery

fire. To make matters worst, current plans call for mounting the 120mm mortars in the M106A2 when they are fielded.

In order to bring the heavy mortars into the world of automated fire direction, the M23 mortar ballistic computer was developed. While the current capabilities of the M23 are considered adequate from the standpoint of providing technical fire direction, there are two major shortcomings: First, the M23 interface with the TACFIRE system precludes the digital routing of fire missions from TACFIRE to the mortars, or for the mortars to submit requests for additional fires to the artillery. Second, the M23 is unable to accept a computer meteorological message.10

ORGANIZATIONAL

The heavy mortars are not any better off organizationally than they are materielly. When you walk into an infantry or tank battalion and start looking for the mortars, you finally get down to a single platoon - a platoon commanded by a young, inexperienced infantry or armor lieutenant.

Beginning in late 1985, in an effort to increase the number of active duty divisions, the army executed the Division 86 "Army of Excellence" organizational concept. The Division 86, J-series TOEs mandated major changes in heavy force mechanized infantry battalions. These battalions were reorganized into four rifle companies, an anti-tank company, and a headquarters and headquarters company (HHC). The heavy mortar platoon, along with the scout platoon, were again assigned to HHC. While the scouts continue to receive the glory

because of their more visible position out in front of the battalion, the mortars all too many times have become the HHC step-children/ detail platoon.12

As a result of the elimination of medium (81mm) mortars from the rifle companies, J-series heavy 4.2-inch mortar platoons were up-gunned to six tubes and two M577 Fire Direction Center (FDC) tracks, enabling them to operate in split sections.13 However, we still have not fixed a problem the heavy mortars has been plagued with since the very beginning--ammunition hauling. FM 7-90, Tactical Employment of Mortars (June 1985), calls for the mortar platoon to submit requests for supplies and other support through the HHC executive officer or first sergeant.14 In other words, the mortars get their sole ammunition hauling capability (aside from what's on the carrier) from the same trucks that haul tank, infantry fighting vehicle, and small arms munitions.

OPERATIONAL

How are the heavy mortars doing today operationally? Since we are not currently engaged in a war with our heavy forces, we could only rely on the National Training Center (NTC) for an assessment of the heavy mortar's performance.

As early as 1986, after action reports prepared by the U.S. Army Infantry School reveal how ineffective the heavy mortars are in a fast-moving battle fought at the NTC, if they managed to get into the fight at all. Reports indicate that the heavy mortar platoons were often out of range or many times completely lost.15 In other cases

task force commanders and their S-3s failed to plan for the use of the heavy mortars. So when their fires were called for, they were neither timely or accurate.

A study conducted by the U.S. Army Research Institute (ARI) of NTC Performance Trends for Mortar Fire Support (May 1986), fully supported the findings reported by the Infantry School. Of the fourteen battalion rotations that were observed by ARI, fire planning for the mortars was not adequate throughout: " Most Task Force commanders do not interface with their mortar platoons."16

The heavy mortars' performance at the NTC has not improved with time. After action reports from 1988 and 1989 rotations continue to report problems with the heavy mortars. Fire support observer controllers report that the heavy mortars are not integrated during the planning process. They are not effectively utilized. The heavy mortars are often left to fend for themselves. Of the one hundred and thirty-two battles observed starting in early 1988, command and control of the heavy mortars was left solely in the hands of the platoon leader for over a hundred of them.17 As a result the heavy mortars are not being resupplied, or they are being overrun by the OPFOR, as after action reports repeatedly point out. An effective heavy mortar platoon at the NTC is an exception not the rule.

When you ask what the problem with heavy mortars is, most commanders will give the same answer: It is merely a training problem.18 The heavy mortars definitely do have a training problem. In fact, if you trace the history of the heavy mortar in maneuver units, you'll find that it not only is a training problem, it has

always been a training problem. This problem has been recognized year after year for decades. It doesn't seem to go away. To be sure, there are spurts of activity in selected units which bring the heavy mortars up to standard for a while - or at least until the command changes. Why does this training problem persist? Probably the biggest reason is that we have an indirect fire system organic to maneuver units whose primary focus is on direct fire systems.19 Expecting a heavy mortar platoon in an infantry or tank battalion to be well trained is about like expecting a tank platoon in a field artillery battalion to be well trained.

But the issue is even more complex. We must go beyond asking ourselves how we can better train the heavy mortars. We must ask ourselves why they are not well trained. The answer is simply that they are not looked upon as a primary combat system. If a tank battalion commander knew his success on the battlefield depended on the heavy mortars, they would be the best trained platoon in the battalion. But in fact commanders recognize that they can get along without their heavy mortars, so they don't train them or really integrate them into the fight. This has been proven with each NTC rotation.20

ENDNOTES

1. Cpt Kenneth W. Arnold, "Justification for the 120mm Mortar," ATSH-CD-MLS-F Fact Sheet, Fort Benning, GA. 28 September 1989. p. 2.

2. Ibid.

3. Ibid.

4. Ibid. p. 3.

5. Ibid. p. 1.

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11. Cpt Terry L. Duran, "Heavy Mortar Platoon - Stepchild or Hip-Pocket Artillery?" Infantry, May-June 1987. p. 18.

12. Ibid. p. 20.

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16. Ann N. Hamza and Maj Richard K. Williams Jr., "National Training Center Performance Trends for Mortar Fire Support: Relationship to Training Doctrine," U.S. Army Research Institute, May 1986. p. 5.

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18. "Close Support Study Group IV" p. 5-6.

19. Interview with MG Rapheal J. Hallada, Commandant, U.S. Army Field Artillery School and Fort Sill, Carlisle Barracks, PA. 4 January 1990

20. Hamza and Williams. p. 3.

CHAPTER IV

THE THREAT

Although the most likely threat to U.S. forces is involvement in a low to mid-intensity conflict in a third world country, Soviet forces will continue to be the most capable, if not the most dangerous threat. The September 1987 Fire Support Mission Area Threat indicates that Soviet forces have attained near technological parity with U.S. forces, and in some cases they have achieved superiority. Soviet modernization of fire support include the increased use of self-propelled artillery, conversions to 3X8 battery organizations, and the development of automated command and control systems. In the near future, the Soviets can be expected to employ substantial quantities of improved conventional munitions as well as fire and forget (or smart) munitions. The Soviets have chosen not to modernize their heavy mortars.

The Soviets will concentrate firepower in specific areas designated for the main attack. The Soviets have historically relied on heavy volumes of field artillery support. Their current doctrine calls for massive artillery preparations during an attack, rolling their fires in front of mounted infantry/armor forces. Fires will be shifted from the objective within thirty to forty-five seconds of the infantry dismounting. The infantry will dismount no further than five hundred meters from their objective.1

Numerous mortar studies from 1973 to the present have continually shown that our heavy mortars are effective killers of threat dismounted personnel, but they are relatively ineffective in

damaging, disrupting, delaying or disorganizing threat combat vehicles. During the attack our heavy mortars will be vulnerable to the rolling artillery fires. Because of their range limitations, the heavy mortars will be close to the ground battle and thus vulnerable to both direct observation by reconnaissance units and direct fire from attacking forces.

Soviet attacking forces will be supported by echeloned artillery groups capable of delivering intensive counterfire against friendly fire support assets. Thus, target acquisition and counterfire pose a danger to our heavy mortars. Target acquisition resources available to the Soviets range from aerial observation platforms to radar sensors and to ground observers. The primary reasons the Soviets have so many types and such great numbers of observers are redundancy and weighting the battlefield. In addition to detection by reconnaissance units, our heavy mortars can be located by aerial observers, unmanned aerial vehicles, sound ranging, and radar. If a 4.2-inch mortar platoon is located, Soviet doctrine calls for immediate counterfire of over two hundred twenty 122mm rounds, or over one hundred and forty 152mm rounds, or over three hundred rockets fired from the BM-21 multiple rocket launcher.2 Given these counter-mortar plans, survivability of our heavy mortar is questionable at best.

CFE negotiations are currently underway. All mortars over 100mm are captured in these negotiations as artillery weapons. If the CFE negotiations are successful, parity will exist between WARSAW Pact and North Atlantic Treaty Organization (NATO) forces from the

Atlantic to the Urals. Each side will be limited to 16,500 tubes of artillery of 100mm and larger, with the U.S. limited to 1,700 tubes.3

There are currently over two hundred and fifty tubes of U.S. 4.2-inch (107mm) mortars assigned to units stationed in the area under negotiation. Additional 4.2-inch mortars are in POMCUS. Of the 1,100 tubes that the U.S. must destroy, in the event CFE becomes policy, it is our belief that the 4.2-inch mortars should be the first tubes given up by the U.S.

ENDNOTES

1. Interview with Robert Campos, U.S Army Foreign Science and Technology Center (AIFRCA), Charlottsville, VA. 28 November 1989.

2. Ibid.

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CHAPTER V

AIRLAND BATTLE-FUTURE REQUIREMENTS

Airland Battle-Future (ALB-F) (Heavy) describes operational concepts that will drive the evolution of our heavy forces to the year 2004. It concentrates on a European scenario and describes the concept for fighting heavy forces in the central region. It refines Airland Battle Doctrine and gives direction for development of future doctrine, organization, training, material and leadership for heavy units from corps to battalion. ALB-F provides the baseline for fielding not only heavy forces doctrine and organizations but also for equipment for the 1990s and into the next century.1

Appendix D of ALB-F describes the organizational and operational employment of the heavy battalion to implement the Airland Battle-Future (Heavy) operational concept. ALB-F anticipates that the increased lethality, volume, and range of direct-fire weapons; the increased precision of indirect-fire systems; and the improved capabilities of obstacle employment will create an intense level of destruction at the battalion task force level. Engagements probably will be measured in minutes--seldom of more than a half-hour in duration. Task force commanders must be able to concentrate fires to attack the full depth of the enemy formation and reposition forces within extremely short time frames.2 The task force commander will be primarily concerned with the close Front Line of Our Troops (FLOT) battle, which extends from his battalion rear to the rear of

the opposing first echelon regiment--generally between twenty-five to forty kilometers in depth.

To achieve the objectives of ALB-F (Heavy) operational concepts, the battalion task force must possess certain defensive and offensive capabilities. In the defense, the battalion task force will be expected to destroy an attacking motorized rifle regiment. Heavy mortars could partially provide the following defensive capabilities:

a. Destroy or disable with organic weapons fifty percent or more of the combat vehicles of the first echelon battalion before they form into assault echelons.

b. Suppress with organic weapons all direct-fire systems closing within four kilometers of the battalion's designated FEBA.

c. Destroy or disable with organic weapons one hundred percent of any vehicles continuing the attack within five hundred to two thousand meters in time frames not to exceed ten minutes.

d. Destroy or disable with either supporting or organic weapons sixty percent of the vehicles in regimental second echelon battalions and anti-tank reserves before they can close within five kilometers of the battalion's FEBA.

e. Provide multispectial large area and projectile smoke to degrade enemy target acquisition and shorten enemy direct-fire engagement ranges.3

During offensive operations as part of an army group counterattack, the battalion task force will be expected to destroy a fully prepared tank or motorized rifle company defense. Heavy mortars could partially provide the following offensive capabilities:

a. Destroy with organic weapons one hundred percent of all direct-fire weapons overwatching the battalion's point of penetration.

b. Penetrate within five minutes five hundred meters of Soviet defensive obstacles employing either organic or supporting resources.

c. Destroy or capture one hundred percent of the defending Soviet company's equipment and personnel, consolidate all organic combat companies into a defense, and rearm and refuel all combat systems within thirty minutes of the battalion main body closing within direct-fire range of its objective.4

To support higher unit operations in ALB-F, the battalion task force must be capable of moving four hundred miles on improved roads and two hundred miles cross-country in not more than eighteen hours and be fully prepared for combat within six hours.5

ENDNOTES

1. "Airland Battle-Future (Heavy) 2004 U.S. Army Operational Concept," Final Draft, U.S. Army Combined Arms Center, Fort Leavenworth, KS. 10 January 1989. Forword.

2. Ibid. pp. D1-D3.

3. Ibid. pp. D6-D7

4. Ibid. p. D7

5. Ibid. p. D8

CHAPTER VI

UTILITY OF HEAVY MORTARS ON THE BATTLEFIELD

As we have seen, the battlefields of the future will be very different from those of the past. Soviet forces, will increasingly rely on mounted operations. Indications are that in a heavy scenario, we won't see the enemy dismounting until he has closed to within about five hundred meters. We also noted a vast improvement in the enemy's ability to acquire and kill our mortar systems. On our side, there have also been some significant changes. The Bradley for example, is not merely a carrier which brings soldiers forward; it is an infantry fighting vehicle which joins in the battle. The fight itself has moved deeper. We no longer rely on simply using high explosive munitions to suppress the enemy when he closes; rather we are looking at more lethal and sophisticated munitions to actually destroy him before he closes.

Analytical modelling of the contribution of the heavy mortar has been done over and over. Invariably the results show that the system's contribution is at best marginal. Such negative findings are always met with emotionalism which challenges the credibility of modelling heavy mortars. Perhaps we can look at the heavy mortars' contributions more objectively: What does the heavy mortar do which no other system can do? Can heavy mortar requirements be met elsewhere in the force structure? Is the heavy mortar cost effective? Is the heavy mortar essential to winning the battle?

Currently, what support can the heavy mortar provide? They can provide illumination, smoke and high explosive munitions. Aside from the problems with the 4.2-inch illumination round, they can do a good job of illumination. However, there are some other considerations. Although illumination is still required on the battlefield, reliance on it is not what it was before the proliferation of night vision devices. Further, the field artillery can also provide illumination. If we could totally eliminate illumination from the field artillery, the case for heavy mortars might be stronger. But there are always going to those cases when the heavy mortars cannot put the illumination out to the necessary ranges. In fact, we could probably make a better case for eliminating illumination from the heavy mortar, leaving it entirely to the field artillery. It goes without saying that we cannot justify the heavy mortar for illumination alone.

The heavy mortars have long been touted as an excellent provider of smoke. Right now, that's not really the case. They only have white phosphorus (WP) which has currently been declared unsafe to fire. Although it provides quick smoke, it does not have the duration necessary to build smoke screens.1 This capability lies mainly with the field artillery hexachloroethane (HC) smoke. From a range standpoint, the heavy mortars are limited to under six thousand meters. Smoke really becomes more important during the offense, and experience is showing that the mortars can't meet the requirement because of their limited range, mobility, and survivability.2 We can't rely on the heavy mortars for the total smoke role. If we

could, we would eliminate smoke from the field artillery and make a better case for the heavy mortar. But, we can't do that: Heavy mortars lack sufficient range, and they don't deliver HC smoke. Could the field artillery do it without the heavy mortars? Yes, there is nothing unique about the heavy mortar smoke capability; the field artillery can do all the smoke heavy mortars can--and more.

But the bottom line is lethality. Are heavy mortars effective killers? Certainly, the heavy mortars have the high explosive (HE) round, which is useful for the suppression of combat vehicles and the defeat of dismounted forces. It is in these roles that the heavy mortar must defend its utility on future battlefields. We have relied heavily in the past on suppression of combat vehicles as a means of reducing the enemy's direct fire capability. The depth of the battlefield is being extended further and further. Through the use of more sophisticated acquisition systems and more accurate lethal munitions, we are looking at placing greater reliance on actually killing enemy combat vehicles deep, rather than merely delaying or disrupting them. We will thus probably have less of a requirement for suppression of combat vehicles in the future close battle. Defeating enemy combat vehicles is a task split between destruction deep and a combination of suppression and destruction close. Every combat vehicle destroyed deep is one less which must be suppressed and then destroyed close. The utility of suppression has been argued over and over again. Modelling does not take suppression into account very well, but it is safe to assume that suppression of combat vehicles does contribute to the success of the close battle.

The real question, however, is whether suppression is a cost effective means of reducing the enemy's combat power. The alternatives are the use of more lethal systems which actually destroy the enemy - whether it be close or deep. Destruction deep is surely the preferred option. Certainly there will always be a requirement to cope with enemy combat vehicles in the close battle. But then we must consider whether to use the heavy mortar to suppress and direct fire to kill, or to use a single more efficient and highly lethal system to destroy. While the use of heavy mortars to suppress combat vehicles may contribute to the battle, it does not justify the system from a cost effectiveness standpoint.

This brings us to the defeat of dismounted forces - the task for which heavy mortars have traditionally been justified. Let's first look at exactly what we are talking about with these dismounted forces - keeping a heavy Soviet threat in mind. According to the latest Soviet doctrine, we can expect the Soviets to stay mounted if at all possible, dismounting only at the last possible moment. Specifically, we can expect the Soviet infantry to stay mounted until they close to within about five hundred meters.

There are two ways to defeat dismounted infantry. We can, of course, take them under fire when they close and dismount. However, we can also consider that defeating the enemy's personnel carriers while he is still mounted has the same effect as defeating the dismounted force once they close. From an efficiency standpoint, we are probably better off pursuing the destruction of the carriers. Defeating the carrier is a more complex and demanding task. However,

it is less time sensitive. Further it favors the force which, while perhaps numerically inferior, is capable of fielding and managing more technically advanced systems. In determining the best method for countering dismounted forces, we must take into account the efficiencies of defeating enemy carriers deep or defeating the enemy once he dismounts.

Before we proceed with the subject of the heavy mortar role in defeating dismounted forces, it is probably best to address the one thing that everyone eventually cites when discussing the heavy mortar - the Final Protective Fire (FPF). Heavy mortars are touted as excellent for delivering the FPF - a high rate of fire, and the ability to bring their fire in close. But let's consider the FPF concept a little more closely. The front for a heavy task force can range anywhere from 5,000 meters to about 10,000 meters. Facing us across this front will probably be the equivalent of a motorized rifle regiment with about 180 armored combat vehicles - some 140 armored personnel carriers and about 40 tanks. Presuming a task force close battle depth of about 2,000 to 3,000 meters, this threat occupies from 10,000,000 to 30,000,000 square meters of area. Based on the J-series TOE and the current 4.2-inch, the heavy mortar platoon FPF is 300 meters wide and about 50 meters deep.3 Heavy mortars are inherently inaccurate, they habitually are not surveyed, and they seldom if ever apply meteorological data - the later having a particularly critical effect on the heavy mortar's high angle fire.4 Remember, Soviet forces do not dismount until they close within 500 meters. This means that the heavy mortar FPF must be

frequently fired, exposing our own positions and making the heavy mortars susceptible to acquisition and counter-fire, or we are going to have to move the FPF out and then adjust it back when it is time to fire it. We really don't foresee a great deal of time to adjust the fires back in after the enemy has closed to within 500 meters and dismounts.

For the sake of argument, let's assume that we cannot defeat sufficient numbers of the enemy force before he dismounts. Specifically, assume that we cannot defeat sufficient numbers of his personnel carriers to deter his attack. So we must defeat them after he has dismounted. How can we best do it? From 500 meters in front of our position to our own force is not a great distance. So we must have a very responsive system, and we must have a system capable of rapidly defeating his dismounted forces. In the 0 to 500 meter range, unquestionably the most effective systems are the small arms - rifles and machine guns. This is clearly brought out by the Close Combat Light Studies -- which revealed that small arms killed by far the greatest percentage of the dismounted forces.5 But what about that ravine out there? Every scenario in our classrooms has one of those ravines. They must have: How else would we know where to put the heavy mortar FPF? We concede the necessity of having to shoot at dismounted forces in those depressions. However, we are not sure we need the heavy mortar to do it with.

There are a couple of systems that we think are more cost effective. The M203 (40mm) grenade launchers, organic to each infantry squad, and the new MK19 40mm machine gun are both capable of

providing the necessary coverage of dead spaces. The latter has a maximum range of fifteen hundred meters for point targets and twenty-two hundred meters for area targets, with a cyclic rate of fire of three hundred twenty-five to three hundred seventh-five rounds per minute.

So far, we have traced where the heavy mortar came from, observed how it has been organized and how it's doing in today's training environment. We have also looked at what the heavy mortars can and cannot do to support future battles and what other systems might be able to meet the requirements. Now let's take a look at what the heavy mortar is costing us.

You may have heard the argument that since we already have the heavy mortars, and since we are short fire support systems - then why give them up? But the heavy mortars are not free. Even without fixing their materiel problems, they still cost us. There are some fifty-four hundred personnel spaces in the active army heavy mortar structure.7 This number is deceiving. It includes only the minimum personnel required to fire the heavy mortars. It does not account for any overhead beyond the platoon headquarters, and it does not account for any support or sustainment. Putting this number in perspective, we're talking about better than ten battalions worth of force structure. That's ten infantry battalions, ten tank battalions, ten artillery battalions, or some combination thereof.

If you look beyond the personnel, there are some other costs associated with the heavy mortars. They require some three hundred M577 command post carriers, which are critically short within the

army. There are also some nine hundred M106 tracked mortar carriers which consume maintenance dollars. Additionally, the heavy mortars account for about twenty-one hundred radios, not counting the planned fielding of future enhanced radios. Significantly, about 50% of these radios are required by the fire support teams to manage heavy mortar fires.8

The heavy mortars cost more than personnel spaces and equipment: There is an operational cost as well. When you examine the fire support command, control and communication structure within a heavy maneuver task force, it becomes obvious that the heavy mortars really complicate the system. Without the heavy mortars, we are talking straight shots from observers to the field artillery fire direction center. Throw in the heavy mortars, and you suddenly have added decision points requiring the fire support coordinators to make decisions between the heavy mortars and field artillery.9 This really puts an unnecessary burden on the fire support team headquarters and the battalion fire support elements. As a result, units in the field all to often take the less effective, but more simplified approach: They simply have one company use the heavy mortars and the others use the direct support field artillery.

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5. Interview with Cpt Stephen Overman, Combat Developments Directorate, Close Combat Light, U.S. Army Training and Doctrine Command, Fort Monroe, VA. 15 December 1989.

6. Interview with Cpt Kenneth W. Arnold. Fire Power Branch, Combat Developments, U.S. Army Infantry School, Fort Benning, GA. 6 December 1989.

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8. Ibid.

9. FM 7-90. p. B-3.

CHAPTER VII

CONCLUSIONS

This Military Study Project (MSP) has focused on the heavy mortar. We have looked at how the heavy mortars were used in the army -- their development, organizations and employment. We have reviewed current heavy mortar organizations and employment doctrine, to include an analysis of how they have been used during National Training Center (NTC) rotations. In this study, we discovered that there are a lot of personnel and equipment associated with the heavy mortars: In the active force, they take up some fifty-four hundred force structure spaces, three hundred plus command post carriers, nine hundred mortar carriers, and over two thousand radios. We have examined threat doctrine and the impacts of CFE. We looked at the requirements outlined in the Airland Battle - Future (ALB-F) doctrine. As a final step we looked at the utility of the heavy mortar on the ALB-F (2004) battlefield.

Our research has clearly led us to believe that the heavy mortars are plagued with many problems and fall far short of providing an effective fire support system for future battles. A review of some of these problems and shortfalls follows.

Materiel: The heavy mortars have some serious materiel problems. The 4.2-inch HE round sticks in the tube, the WP is unsafe to fire, and the illumination has an excessive dud rate. Estimates of the cost to correct these problems range from less than $1,000,000 to fix 200,000 WP rounds to $18,000,000 to fix the 4.2-inch mortar

tube. The proposed 120mm mortar initial buy was for only one third of the force, yet projections are that the 4.2-inch mortar will be in the force structure for several more years, since the 120mm mortar has yet to make it above the budget cut line. Also due to limited funding, an illumination round will not be procured for the 120mm mortar. Since heavy mortars are captured under CFE, and given the current mood of the American people and Congress, we cannot afford to fix the 4.2-inch mortar (at the expense of other vital programs or systems) or procure the 120mm mortar only to be given up in current or future negotiations. Finally, the 120mm mortar will be employed on the old M106A2 carrier, which lacks mobility and is vulnerable to overhead fire.

Organizational: Organizational problems result from an indirect fire support system organic to a maneuver unit. The mortar platoon leader is an un-prestigious position for the infantry or armor lieutenant. There is no dedicated ammunition resupply capability. The heavy mortar platoon is generally not given the attention of the infantry or armor platoons which have a company structure.

Operational: The heavy mortars have operational problems - some of which are inherent, and some of which relate to training and doctrine. They are inherently less accurate than field artillery, are generally not well located, and habitually do not apply meteorological data. With their high angle of fire, they are very susceptible to being acquired by counter-mortar radars and are vulnerable to overhead fire. With a system like our own firefinder radar, modelling indicates a firing mortar can be acquired and return

artillery fire directed on the mortar position before the mortar rounds impact on their target. In a mid to high intensity conflict, the heavy mortar will probably not survive.

Training: Heavy mortar training has been cited as a problem for many years. The problem is perceived as a combination of organization, heavy mortar proponency, and the utility of the heavy mortar itself. The proponency problem persists because the heavy mortars belong to the infantry, which is not oriented on indirect fire systems; and the heavy mortars are commanded by either an infantry or an armor officer. The ultimate training problem is that commanders probably feel the heavy mortars are not a big contributor in the battle. If the heavy mortars were necessary to win, they would probably be better trained.

Supporting the battle: The heavy mortars are called upon to perform the role of a smoker, illuminator, and killer - all of which they have problems doing adequately.

Smoker: The heavy mortar has problems meeting the smoke requirement. They are limited to WP smoke. We rely on the field artillery to provide smoke screens with HC smoke. The current WP is unsafe to fire, and the heavy mortars do not generally have the range to meet all smoke mission requirements. These shortfalls limit the utility of the heavy mortar as a provider of smoke.

Illuminator: An illumination round is not being procured for the 120mm mortar, and the current 4.2-inch mortar illumination round has an excessive dud rate. It appears that the requirement for

illuminating the battlefield will fall primarily on the field artillery for several years to come.

Killer: The primary role of the heavy mortar is to defeat dismounted forces. Although attempts have been made to develop dual-purpose improved conventional munitions, guided anti-armor mortar projectiles, and now perhaps even a fiber optic guided mortar round, heavy mortars are currently limited to high explosive (HE) munitions. The question must be asked here; "How many different types of bullets do we need to kill the same target?"1 The requirement to defeat dismounted forces in a heavy environment has been decreased because of the threat's emphasis on mounted operations, by the introduction of the infantry fighting vehicle, and through our ever increasing ability to destroy combat vehicles deep with other systems. A primary function of the heavy mortar has been to provide final protective fires. In reality, the heavy mortar's small and inaccurate three hundred by fifty meter FPF has little utility when fighting across the normal seven thousand plus meter task force front.

In summary, U.S. Army heavy mortars have many materiel, organizational, training, and operational problems. We have fielded other improved weapon systems which kill deeper. The threat has changed his maneuver doctrine and is no longer continuing to improve his heavy mortar systems. As the probability of a shrinking Army increases daily, we must optimize the efficient use of existing resources. Thus it becomes clear that the utility of the heavy mortar is limited to the point that its cost effectiveness is

questionable. We must conclude that the heavy mortar system in the U. S. Army is broken. Further, it is not worth fixing! The U. S. Army can no longer afford the mortar in our heavy forces nor is it required to support Airland Battle-Future.

We are not the only observers to see the matter this way. In a 6 December 1989 message, the U. S. Army Combined Arms Center at Fort Leavenworth released the results of the 4 December 1989 ALB-F force design General Officer Steering Committee (GOSC) meeting.

> The heavy force division will consist of three maneuver brigades, each with three assigned maneuver battalions consisting of 3 line companies and an HHC. The battalion will have a scout and LOSAT capability but no mortars. 2

ENDNOTES

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CHAPTER VIII

RECOMMENDATIONS

- That the heavy (4.2-inch and 120mm) mortar be eliminated from the U.S. Army heavy force structure.

- That the 4.2-inch mortar and its carrier be given up under any CFE reduction before any field artillery systems.

- That the Military Occupation Skill (MOS) 11C be eliminated, and that light and medium (60mm and I81mm) mortarmen be given the MOS 11B, with a skill identifier, ie 11B-1C if mortars are used as an indirect fire weapon vice direct lay.

- That a percentage of the personnel spaces saved be used to upgrade the 60mm mortar sections in our light infantry companies.

- That the three hundred plus M577 command post carriers be distributed across the force to fill shortages.

- That the over two thousand radios associated with the heavy mortars be distributed across the force to fill shortages.

- That the remaining 4.2-inch mortars and their carriers be placed into war reserve stocks.

- That field artillery heavy force structure and doctrine be continuously reviewed to ensure that the maneuver commander's indirect fire support requirements are fully met.

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