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75th FIELD ARTILLERY BRIGADE AMMUNITION RESUPPLY DURING OPERATION DESERT STORM

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

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This study compares ammunition resupply doctrine for nondivisional units with the 75th FA Brigade experiences during Desert Storm. The intent is to analyze the reasons the 75th was nearly out of ammunition at the end of the war. A four step process identifies the inadequacies of current resupply doctrinal procedures, the impact of future distribution system improvements, the experiences of the 75th FA Brigade resupply operations and a synthesis of what doctrinal improvements should alleviate the potential of similar problems occurring in the future.

The comparison determined the ammunition distribution system albeit with ongoing improvements was capable of sustaining the 75th FA Brigade. The Desert Storm resupply problems occurred because the 75th did not properly prepare for wartime operations. Peacetime constraints prevented the unit from drawing ammunition as they would during war. The key to the successful resupply operations is proper practice of resupply doctrinal procedures during peacetime training.

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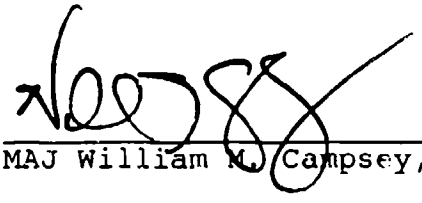

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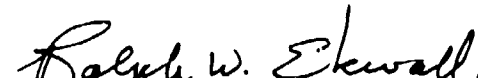

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ABSTRACT

75th FIELD ARTILLERY BRIGADE AMMUNITION RESUPPLY DURING OPERATION DESERT STORM by MAJ Jesse T. Acosta, USA, 122 pages.

This study compares ammunition resupply doctrine for nondivisional units with the 75th FA Brigade experiences during Desert Storm. The intent is to analyze the reasons the 75th was nearly out of ammunition at the end of the war. A four step process identifies the inadequacies of current resupply doctrinal procedures, the impact of future distribution system improvements, the experiences of the 75th FA Brigade resupply operations and a synthesis of what doctrinal improvements should alleviate the potential of similar problems occurring in the future.

The comparison determined the ammunition distribution system albeit with ongoing improvements was capable of sustaining the 75th FA Brigade. The Desert Storm resupply problems occurred because the 75th did not properly prepare for wartime operations. Peacetime constraints prevented the unit from drawing ammunition as they would during war. The key to successful resupply operations is proper practice of resupply doctrinal procedures during peacetime training.

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INTRODUCTION TO STUDY

I. INTRODUCTION

"We won the war and it was largely won by the artillery. I think it is very important that you now record on paper what you did (not what you think you did) so that the artillery in the next war can start off where you stopped."[1] That quotation by General Patton appeared in the Field Artillery Journal in 1947 after World War II, but it could have just as well appeared in the journal in 1991 after Desert Storm. In both wars artillery was a major player in the eventual victory. In fact, after Desert Storm, the Commandant of the Field Artillery School, MG Marty said that "not since World War II has [sic] fire support in general and the field artillery in particular proved such a major force for the combined-arms team."[2] It is appropriate that the field artillery community now heed General Patton's words and capitalize on the successes of artillery during Desert Storm. Resolving the issues generated from that recent experience will allow the artillery to start the next war where it stopped after Desert Storm.

One of the issues the Field Artillery School recognized in its Desert Storm after action report was that "CSS [combat service support] doctrine for nondivisional FA [field artillery] units was unworkable."[3] This paper addresses one aspect of CSS doctrine that did not work during Desert Storm; the ammunition resupply for the 75th Field Artillery Brigade. The paper uses a four step process to determine why the 75th did not receive adequate resupply. Chapter Two's review of literature reassesses the assumptions of CSS doctrine and points out any relevant inadequacies. Chapter Three explains the process for ammunition resupply. The fourth chapter details the ammunition resupply experiences of the 75th FA Brigade during Desert Storm. The final step is the analysis of how doctrinal fixes eliminate the problems encountered by the 75th FA Brigade.

Desert Storm Background

There were seven FA brigades in Desert Storm. These units operated alongside the seven division artillery (DIVARTY) units and together provided the maneuver commander with decisive fire support results. Even though the FA brigade and DIVARTY sometimes worked in the same area they were supported through different processes. The difference in support caused hardships for both the FA brigade and the

DIVARTY. These hardships escalated to the point where FA brigades were running out of ammunition when the war ended. The lack of ammunition for FA brigades could have negated fire support's early contributions to American combat power.

Fire support was instrumental in the early successes of Operation Desert Storm. In one account, recorded after the war, an Iraqi artillery commander stated that "before the Ground War he had lost only 10 percent of his cannon tubes, but in the initial phase of the ground assault, he lost all of his remaining guns to massed indirect fires."[4] Enemy combat units had to fight the coalition's combined arms team without any indirect fire support. This gave coalition forces a distinct advantage over enemy forces.

The coalition indirect fire advantage not only inflicted heavy enemy losses but also helped limit the number of friendly casualties. "During the 1st Infantry Division's breaching operation along the Iraqi border, more than 6,000 cannon rounds and 414 rockets were fired by three field artillery brigades and two division artilleries. The result: no enemy counterfire, no resistance and no casualties during the breach."[5] In sum, the FA brigade and DIVARTY indirect fire team had a devastating effect during Desert Storm.

This destructive effect would have been short-lived had the war continued because one member of that indirect fire team was running out of ammunition. FA brigades were so low on ammunition, their ability to augment division artillery fires were seriously degraded at wars end. In fact, many of the units were almost out of ammunition when the cease fire was declared.[6] Coalition forces would have lost part of their advantage over the enemy because FA brigades could not continue to join DIVARTY's fires supporting combat units.

The doctrinal ammunition resupply process was responsible for the potential loss of FA brigade reinforcing fires. The Corps Support Command (COSCOM) sustains FA brigades with what is termed area support.[7] After Desert Storm, the FA School stated in its after action report that "the area support concept for corps units and particularly field artillery brigades did not provide the required level of support."[8] This doctrinal concept is at the heart of the resupply problem. The area support concept requires FA brigades travel extended distances to the rear for their ammunition. The fast pace of the war and the large amounts of ammunition required during Desert Storm made acquiring logistical support difficult over these long distances.

Some units tried non-doctrinal methods to overcome the difficulty caused by the long distances. Rather than travel

the extended distances, one unit rolled up its support requirements into their neighboring division support unit. This was just a "quick fix" and the division had to get additional logistical support for this temporary process to occur.[9] The FA brigade could not draw its support from the closer division support command (DISCOM) on a routine basis because the "DISCOM does not have the capability to support requirements of the FA brigade while supporting the fully-committed division."[10] Units could not use non-doctrinal methods for very long and they were too far away from their parent units for doctrinal methods to work effectively.

Following Desert Storm, the Field Artillery Journal was replete with articles detailing the struggles executive officers and supply personnel had getting the requisite logistics for these "stepchildren for other units."[11] The commander of the 18th FA Brigade called logistical support "a tough challenge"[12] and the commander of the 1st Armored Division Artillery stated that his unit "spent a lot of time and energy trying to figure out how to provide enough support to the FA brigades."[13] All the articles from units that were involved with FA brigades wrote of similar problems getting support to their FA brigades.

Some units did offer solutions to the problems encountered during Desert Storm. The article from the 1st

Infantry Division Artillery suggested that the FA battalions from an FA brigade be given to a larger DIVARTY and "support it by adding an artillery forward support battalion (FSB) to the division support command."[14] The article from the XVIII Airborne Corps called for "either organic or dedicated logistical units"[15] to support FA brigades. Although the solutions varied, each article recognized there was a need to adjust the way FA brigades are sustained during combat.

Jomini described logistics as "providing for the successive arrival of convoys of supplies."[16] This description emphasizes that logistics is getting the right amount of supplies to the right unit at the right time. The Army's current logistics manual for a corps operations, FM 63-3J, refers to this as battlefield support - "the timely provision of required supplies and services to all elements."[17] The resupply of an FA brigade is an example where logistics is not fulfilling its role.

The destructive potential of artillery demands logistic resupply doctrine work. Napoleon once said, "We could wipe out the enemy by an immense superiority in artillery."[18] To do this, FA bde's need adequate ammunition resupply. The objective of this paper is to identify the resupply problems of the 75th FA Bde so they can be properly addressed before the next time FA bdes are used in combat.

II. THE PROBLEM

The Statement of the Problem

The primary purpose of this study is to determine why the 75th FA Brigade was not resupplied with ammunition during Operation Desert Storm.

Analysis of the Problem

The solution to this problem requires answers from the following subproblems.

1. The first subproblem. What doctrine inadequacies may have contributed to the resupply problem?

2. The second subproblem. How are FA brigades supposed to be resupplied with ammunition?

3. The third subproblem. How was the 75th FA Brigade resupplied with ammunition during Operation Desert Storm?

Assumptions and Characteristics

The assumptions and characteristics for this study are:

1. Future military operations will use large amounts of firepower. The success of the 1st Infantry Division initial barrage proved that indirect fire can sometimes defeat enemy forces without any loss of friendly lives. If using indirect fire reduces the possibility of losing friendly lives then military leaders are sure to use this asset as much as possible in the future.

2. Maneuver oriented ammunition distribution system (MOADS) improvements will be incorporated into ammunition resupply procedures. These improvements correct many of the deficiencies addressed in Chapter Three's description of the current ammunition distribution system.

3. Future military operations could occur anywhere in the world. The downfall of the Soviet Union and the abatement of their threat in Eurcpe promotes this new focus. This focus shifts planning for a European mature environment to a global contingency preparedness.

4. The FA brigade operates in the same geographical area as divisional field artillery units and has similar

missions, but has a totally separate logistical chain.

5. The FA brigade uses twice the tonnage of supplies of other corps units operating in the division sector.

6. Because artillery is almost never held in reserve, the brigade's support requirements will be virtually continuous.

7. The division support command (DISCOM) does not have the capability to support requirements of the field artillery brigade while supporting the fully-committed division.

Delimitations

The following delimitations were imposed on this study;

1. This study focuses on operations during Operation Desert Storm. This is the most recent use of the FA brigade. Operations in Grenada and Panama did not use FA brigades and Vietnam did not involve large scale tactical movements of FA brigades.

2. This study discusses only the 75th FA Bde. There were seven FA brigades that participated in Operation Desert

Storm. The 75th FA Brigade's resupply problem embodies the possible logistical problems because they moved between three divisions and two corps. The move between units highlighted the problem with the area support concept because logistical support changed when the unit moved from one unit to the other.

3. This study addresses the ammunition aspect of the total logistical resupply problem for the 75th FA Brigade. The large transportation requirement and the continual resupply needs makes this a good area by which to identify resupply problems.

4. This study uses the ammunition distribution system of the force development test and evaluation (FDTE) conducted in 1987 as the model used for current resupply procedures. This was the most recent documentation of resupply operations conducted according to doctrine.

5. The FDTE had 4 ammunition transfer points (ATPs). The current field manual on munitions support decreases this number to 3. The change was effective 1 September 1989 and occurred just prior to Desert Storm. Even though some units used the new configuration, this change did not affect FA brigade resupply operations because they draw their ammo from ASPs.

The Importance of the Study

There are several possible effects of not solving the ammunition resupply problem for the FA brigades. The brigaces could lose confidence in their support units ability to sustain them. The FA brigade supply personnel would then take time away from future planning to figure out how to meet current needs. Poor planing could adversely affect soldier lives by not providing the fire support they need. This potential loss of American lives is the most serious effect of not addressing the resupply issue.

The people responsible for getting the 75th ammunition lost confidence in the corps' ability to provide the essential resupply. The 75th's leaders had to search for their units ammunition themselves. In the artillery leader's eyes no doctrinal process for the resupply of field artillery brigades existed. The 75th Bde XO recalled that, "if the ground war had continued, the 75th FA Brigade would have run out of ammunition, and the supply chain would have taken days to fix the problem."[19] FA units must have the confidence that their weapon systems can be resupplied.

The greatest impact on field artillery operations is the possible loss of lives by the maneuver forces when they do not receive the expected fire support. The amount time

spent getting ammunition for current operations prevented the staff from planning for future ammunition requirements. If they are unable to plan future operations because they are spending so much time getting ammunition for current needs, FA brigades will not have enough ammunition to provide the maneuver commander with fire support. When artillery is not able to provide fire support to the maneuver units because they lack sufficient ammunition, combat leaders lose confidence in the ability of the field artillery system to support them. The result of this loss of confidence can be lethal to the soldiers the FA should have been supporting. In an interview with the Field Artillery Journal, General Foss, the Training and Doctrine Commander, recalled "units in Vietnam where they didn't have confidence in field artillery and, therefore, didn't use fire support. And when they were in a tough spot, they fought a tough infantry battle without fire support and took a lot of casualties."[20]

Ultimately, ammunition resupply procedures should insure leaders have confidence in doctrine. By being able to meet current needs and anticipate future requirements, leaders can ensure maneuver forces have fire support. This study will help define the problem of sustaining the field artillery brigade so a solution can be developed before the consequences of not addressing it are seen in the next war.

ENDNOTES

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CHAPTER TWO

REVIEW OF LITERATURE

I. INTRODUCTION

Doctrine is based on the military's state of technology, the strategic environment and the most likely threat. A standard for waging war is developed from these factors. This standard is not an absolute solution but is situation dependent.[1] Many of the German Army's early successes during World War I occurred because they followed Crown Prince Rupprecht's caution - "There is no panacea. A formula is harmful. Everything must be applied according to the situation."[2] When units claim doctrine is the cause of their problems, those responsible for changing doctrine must balance two perspectives. They must consider if the original factors for doctrine are still valid and they must determine if the problem occurred because the unit failed to adapt doctrine to the situation.

The 75th FA Brigade experience in Desert Storm challenges the ammunition resupply doctrine. The review of literature examines resupply doctrine and the viewpoint of units that experienced this problem. The intent of this

chapter is to establish the degree of credibility of doctrine principles and the identified problem.

The three bodies of information used in this examination of doctrine and unit experience are doctrinal manuals, periodical articles and interviews. Doctrinal manuals prescribe how ammunition is supposed to be resupplied for FA brigades within the Army's AirLand Battle doctrine. The plethora of articles from military professional journals provide the viewpoints of FA brigades experiences from World War II (WWII) to the recent Operation Desert Storm conflict. Finally, interviews with the individuals responsible for ordering ammunition focused on ammunition resupply aspects of the 75th FA Brigade.

II. DOCTRINAL MANUALS

The Army uses doctrine to standardize operations. Using an established guide for conducting wartime activities reduces the uncertainty and complexity of war.[3] With accepted ways of doing business, subordinates can rely on a common method when performing their functions. The more a standard is used, the more routine their function becomes and the less uncertain and complex the environment is for them. Therefore, the reduction of uncertainty and complexity determine the credibility of doctrine.

The sources that provide information on the Army's current doctrine are operation manuals, field artillery manuals and logistic manuals. Operational manuals provide the authoritative foundation for subordinate doctrine by explaining how Army forces plan and conduct campaigns, major operations, battles, and engagements.[4] Field artillery field manuals describe how field artillery units are organized and how they participate in the AirLand Battle.[5] Logistical field manuals describe how the Army employs combat service support to sustain combat units and weapon systems.[6] Each of these manuals contain shortcomings that contributed to the 75th's ammunition resupply problem.

Operational Manuals (FM 100-5 & FM 100-15)

Operational manuals prescribe how units are supposed to conduct their wartime activities. The operational manual that details how the Army intends to fight its next battle is FM 100-5, Operations. The largest maneuver unit that conducts these battles is the corps. The operational manual that covers how a corps functions is FM 100-15, Corps Operations. Planning, training and support issues generated from these manuals' principles contribute to the complexity and uncertainty for FA bdes operating in wartime environments.

The change in the probable theater of operations for the Army's doctrine creates new planning challenges for American units. The army's doctrine, focuses on combat operations in Central Europe against a massive, echeloned Warsaw Pact threat.[7] This doctrine emphasizes "securing or retaining the initiative and exercising it aggressively to accomplish the mission."[8] The Central European environment is a mature theater with established resupply points and defined distances. The aspects of this predetermined mature theater lowered the difficulty of planning for combat operations. Support plans could be developed easily since support personnel knew where the resupply points were and how far the unit had to travel to get to these points. The recent dismemberment of the Warsaw Pact and the Soviet Union changes the focus for future operations to a global contingency. Preparing for possible global operations is now more complex because units can not rely on defined distances or established resupply points to preplan their support for combat operations.

Proper training is another issue that is generated from these operational manuals. Ammunition resupply training is not conducted according to principles advocated in the operational manuals. The Army uses various training centers throughout the United States and Europe for leaders to train their units. However, the procedures used at the national

training centers (NTC) do not properly train resupply operations. FM 100-5 states that training is the cornerstone of success and unit training should simulate as closely as possible the battlefield's tempo, scope and uncertainty.[9] At the NTC, units use procedures required during peacetime but not conducted during war. These peacetime practices hinder units ability to exercise resupply doctrinal procedures in a real combat environment. Units draw ammunition at the training center in the same way they would at a garrison supply point.[10] This is done to maintain ammunition accountability. The result is units do not practice wartime resupply operations. FM 100-5 states that "support units should also be rigorously trained under realistic conditions."[11] The national training centers do not provide realistic training on resupply operations. Wartime operations are, therefore, more complex since units have not practiced doctrinal procedures during peacetime training.

FA bde ammunition support is the final issue from operational manuals. Ammunition resupply operations are more complex for FA brigades than other corps units operating in a division sector. FA brigade ammunition requirements mandates these units travel farther than the other corps units. FM 100-15 states support for all corps units operating in a division sector is supposed to come

from corps support command (COSCOM) units.[12] These COSCOM units are normally located at or near the division rear boundary so that they are equidistant from their base support structure and the units they are supposed to support. Division support units draw their requirements from here and then position resupply points closer to the division units requiring the supplies. Corps units operating in the same area as those division units are supposed to travel back to the original COSCOM unit for their resupply. Experiences from Desert Storm validated that FA brigades traveled the extended distances for their resupply from COSCOM units.[13]

The manual does allow that division support units can sustain certain corps units if arrangements are coordinated in advance.[14] But this system works well for corps units other than FA brigades. The other type of corps units operating in a division sector require low density types of ammunition that can be supplied by division assets. The type and quantity of FA brigades ammunition requirements far exceed the capability of the division support units so the FA brigade must make the long trip back for their ammunition. In practice, most nondivisional units draw their ammunition requirements from division support units to avoid the time required traveling to the COSCOM. The FA brigade, however, must follow the established procedure.

Doctrine is supposed to provide a universal way of doing business. If corps units are supposed to receive their support one way but in reality get it another way, then doctrine has not established a standard for all units.

Field Artillery Manuals

Field artillery manuals address the organizational structure of field artillery forces available to the maneuver commander. These manuals emphasize what the field artillery mission is and detail how FA units are supposed to accomplish this. FA brigade resupply operations are complicated because tactical support differs from ammunition support. Also the manual for FA brigade operations does not give an accurate representation of resupply responsibilities.

Field Artillery doctrine increases the complexity of fire support by establishing a tactical mission different from the support structure. The tactical missions are direct support, reinforcing, general support reinforcing and general support. These missions prescribe how field artillery units provide fire support.[15] The FA brigade missions differs from its ammunition support system. The FA brigade supports a division but is not receiving its logistics from the division. It still must receive its

support from the COSCOM. The division does not control how much ammunition is provided to the FA brigade, where the brigade is resupplied or when resupply can occur. The result is that a division may not receive the desired fire support from the FA brigade because its ammunition comes from a source outside of the divisions control.

Field Artillery doctrine further confuses operations by associating FA brigade operations with DIVARTY operations. The manual that details FA brigade doctrine is the same manual for DIVARTY doctrine - FM 6-20-2J, Division Artillery, Field Artillery Brigade, and Corps Artillery Headquarters. "This publication describes how a corps artillery headquarters, a division artillery, and a field artillery brigade headquarters is organized and how they participate in the AirLand Battle."[16] Although both units are the major players that provide fire support for the maneuver commander, they do not have the same support structure.

The manual does not make the distinction that these units receive their ammunition differently - DISCOMs support DIVARTYs, while COSCOMs support FA brigades. The manual states that the "division G4, DISCOM commander, and DIVARTY S4 work with an FA brigade operating in a division area to ensure that the brigades ammunition requirements are

considered with the division's requirements."[17] This states divisions are involved in the ammunition resupply for a FA brigade when it is not. FA brigades order their ammunition through corps channels.

Logistic Manuals

The doctrine for logistics operations is found in the doctrinal field manual for AirLand Battle, FM 100-5, Operations. By placing logistics doctrine in the core doctrinal manual, the Army recognizes the importance of logistics to the success of battle.[18] Logistics doctrine uses the generation of combat power at the decisive time and place as the sole measurement of successful sustainment.[19] To achieve this measure of success in today's challenging environment, logistics doctrine has five fundamental imperatives to guide sustainment actions. These five imperatives are anticipation, integration, continuity, responsiveness, and improvisation.[20] The difficulty using these imperatives is that too much improvisation discounts doctrine's value.

Improvisation highlights the definition of doctrine that requires it to be "versatile enough to accommodate a wide variety of worldwide situations."[21] Improvisation becomes a obstacle to guiding operations if each time a

difficult situation arises, units immediately improvise nondoctrinal methods to support it. Logistic doctrine needs to stress that improvisation is only a necessary expedient to prevent failure and meet one of the other imperatives. Doctrine is supposed to provide a standard way of fighting and sustaining. When a unique situation arises, improvisation ensures operations are sustained when normal doctrinal methods cannot accomplish this.

III. PERIODICALS

The Army uses input from lessons learned through field exercises, training centers and individual recommendations for changes to doctrine.[22] Periodicals are a source from field exercises. The value of periodicals is that they present a perspective of unit experiences. The credibility of the source and the relevance of the experience determines whether doctrine should be changed.

The credibility of the source involves determining the base of knowledge of the individual who claimed there was a problem. This is to ensure doctrinal changes occur because it was identified by someone who was able to differentiate a cause from a symptom. Being able to tell the difference requires a good working knowledge of what is supposed to occur and what actually occurred.

The 75th ammunition resupply problem was identified in a Field Artillery Journal article. The author was the executive officer (XO) for the unit, LTC Pete Gibbons. According to the doctrinal manual dealing with field artillery brigades, FM 6-20-2J, the Field Artillery Logistics Officer (S4) is the individual who coordinates with appropriate COSCOM elements to ensure the full support of deployed of FA weapons.[23] This is the individual directly responsible for ammunition resupply operations. As a primary staff officer, the actions of the S4 fall under the purview of the XO. The XO performs functions similar to a Chief of Staff, who is responsible for the directing execution of staff tasks.[24] As the XO, LTC Gibbons was in a prime position to observe what was going on and fully comprehend its impact on operations.

LTC Gibbons did have a working knowledge of FA bde resupply operations, which he described as the "Mother of All Nightmares."[25] His article defined the problem encountered getting all types of logistical support for the 75th FA Brigade. It stated how doctrine said resupply operations were supposed to occur and how this "worked better on paper than in the field."[26] For each problem identified, LTC Gibbons also provided a recommendation to solve the problem. His report on operations displayed the breadth of knowledge required for accurate problem identification.

The 75th is not the only unit to experience ammunition resupply problems. LTC Gibbons' wrote his article after Desert Storm for the October 1991 issue of the Field Artillery Journal. This follows the trend when field artillery brigades were a topic of discussion in branch professional manuals. After each major combat conflict where FA brigades were used, leaders wrote to complain how brigades were not supported. The problems from Desert Storm are similar to those mentioned after WWII. During the interim years, FA brigades were not used in the same way so they did not experience resupply problems and are not mentioned in the periodicals during that time.

The articles on WWII experiences, in addition to experiences from other Desert Storm articles substantiate the resupply problems of the 75th FA Brigade. During both wars, FA brigades augmented the fires of division artillery assets. Each time they had problems getting logistical support because they were not part of the division support structure. In fact one article described these organizations as "orphans"[27] in the same way LTC Gibbons described them as stepchildren. These articles verified that FA brigades had difficulty getting logistical support in division sectors.

The authors during both time period were members of the units experiencing resupply problems. Their perspectives were restricted to problems in their units. They were well informed of their unit problems and their recommendations were solutions for those particular situations. The recommendations ranged from developing a separate support structure, to augmenting transportation assets, to even breaking the brigades up and giving the divisions the additional FA battalions. The units recommended different solutions even though the problem of resupplying the FA brigade was the same.

The after action report of the field artillery school after Desert Storm also suggests a separate package.[28] But the school already had previously identified that ammunition resupply as a problem for field artillery units in general. An article in the April 1989 Field Artillery Journal stated that the Field Artillery School was rewriting FM 6-20-1, Field Artillery Cannon Battalion. This manual would include a chapter on CSS and would address ammunition resupply.[29] In their after action report the school advocates the introduction of a new support organization that would be responsible for ammunition resupply for an FA brigade only. If ammunition resupply is a problem for all types of FA units the solution should not address only one aspect of ammunition resupply.

IV. INTERVIEWS

Interviews were either verbal or written and are separate from periodical articles because of the type of information they provide. The articles written by unit leaders deal with a number of unit concerns, but the interviews with the supply personnel from each unit focused on ammunition resupply procedures in particular.

The two verbal interviews did not conclude that the introduction of a new support system was the solution to the ammunition resupply problem. These interviews were with the S4s of the 75th FA Brigade and the 1st ID DIVARTY. They had each been with their units for the entire Desert Storm operation. They knew how resupply operations were conducted but did not know why there was a problem. The S4 of the 75th FA brigade believed part of the cause was the commander's decision to not wait for the resupply after the breach.[30]

V. SUMMARY

The review of literature examined the current AirLand Battle doctrine and discrepancies that may have contributed to resupply operations for the 75th FA Brigade. The review established that doctrine is supposed to reduce uncertainty

and complexity for units. When a doctrinal manual did not accomplish this it was noted as a discrepancy. The discrepancies disclosed by this review include the following:

Doctrine currently focuses on a Soviet attack in Central Europe. Planning for support becomes more complex when the probable theater of operations changes from a mature theater to a global contingency preparedness.

Combat service support operations are not trained realistically at the training centers because of peacetime requirements. This presents support units with added difficulty when required to conduct support activities in combat environments.

Requiring corps units to receive their support from corps support elements is only used by the FA brigades. This is not a uniform standard for all nondivisional units.

Field Artillery doctrine establishes a tactical mission that is different from the support structure. The unit being supported does not really control the asset if it is not able to ensure the asset receives proper logistical support.

Field Artillery doctrine states divisions are involved in the logistical resupply of FA brigades. This is not an accurate representation of resupply procedures.

Improvisation can invalidate doctrine if it is used too often. If the problem will occur every time and the unit must address it with improvisation each time then the original procedure could be wrong and need to be revised.

The initial premise of this chapter is that doctrine is supposed to be an established way of doing business. But, it is not sacrosanct; doctrine could be wrong. This review pointed out areas where doctrine was not correct because it did not prescribe a standard for all units or made operations more complex for units operating in a wartime environment.

The review also looked at the credibility of the facts concerning the ammunition resupply problem. The perspectives of the individuals who provided information on the experiences of ammunition resupply were examined. Other FA brigades from WWII to the present validated the ammunition resupply problem of the 75th FA Brigade.

VI. CONCLUSION

The decision to abolish doctrine and introduce new concepts should be predicated on internal and external factors. The AirLand Battle concept was set in the context of a U.S. - Soviet conflict. It focused on combat operations in Central Europe against a massive, echeloned Warsaw Pact threat.[31] "The current AirLand Battle doctrine reflects the world and the Army of the last 20 years, a period dominated by the Cold War."[32] With the opening of the Berlin Wall in November 1989, the Cold War became a part of history. This does not mean the concepts of doctrine are no longer valid. Units may still apply the same concepts of how to fight their battles if doctrine does not focus on countering our enemies' weaknesses but emphasizes the Army's strengths. The recent victory in Operation Desert Storm is prima facia evidence that AirLand Battle doctrine can be successful against an enemy other than the Soviet Union in an environment outside Central Europe.

External and internal events require updating the Army's doctrine. The environment has changed since the AirLand Battle doctrine was first adopted 20 years ago. Doctrine changes must be driven by threat analysis, technology evolution and resource considerations.[33] Since the current edition of AirLand Battle was first developed the Army has experienced changes in all three of these elements. The Army recently published a Training and Doctrine pamphlet, TRADOC PAM 525-5, AirLand Operations, that disseminates the concepts of the doctrine for future operations.[34] The Army is rewriting FM 100-5 because the Army's primary war-fighting focus has shifted from deterring Soviet aggression in Europe, to projecting overwhelming land power to deter and defeat potential regional threats.[35] The introduction of a long range artillery syste (MLRS/ATACMS) and its ammunition differences is an example of the technological changes that have occurred. Changes in the third element occur with realization that in "today's resource constrained climate, its impossible to field the large armies of the past."[36] Changes to doctrine should occur because the internal and external factors of the environment have changed.

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CHAPTER THREE

CURRENT AND FUTURE DOCTRINE

I. INTRODUCTION

In 1800 Napoleon Bonaparte introduced the concept of a corps organization to help control the maneuver forces under his command. "The corps system worked so well that in 1805 Napoleon transferred all cavalry and part of the artillery in every corps to the corps reserve under the direct control of the corps commander."[1] A lot has changed since that time when corps artillery was iron cannons pulled by horses. During 1800's there was no ammunition resupply - any ammunition required for a campaign was carried with each cannon.[2] The U.S. Army is not able to ignore ammunition resupply the way Napoleon did. Advances in technology that increased the rate of fire and the use of artillery make resupply a major concern for the commander.

This chapter describes the doctrinal process to resupply artillery ammunition. The introduction discusses the corps supply organization. The field artillery support of the corps follows the introduction. The next part of the chapter details how the corps supports field artillery

units. The final part addresses the current and future ammunition distribution system.

U.S. Army Field Manual 100-15, Corps Operations, states that "corps are the largest tactical unit in the U.S. Army, the instruments by which higher echelons of command conduct maneuver at the operational level."[3] This is the level of force that the Army uses to fight its battles. But the corps is not just a tactical unit. "It is now responsible for providing administrative and logistical support for its subordinate units."[4] Combat service support units provide the administrative and logistical support while combat units are the warfighters of the corps. The third category of units in a corps are combat support units. Table 3-1 depicts the type corps units found in each category.[5]

TABLE 3-1
Corps Organization

COMBAT UNITS	COMBAT SUPPORT UNITS	COMBAT SERVICE SUPPORT UNITS
Maneuver Division	Signal Brigade	Personnel Group
Separate Brigades	Military Police Bde	Personnel Group
Cavalry Regiments	Civil Affairs Bde	Finance Group
Aviation Brigade	Chemical Brigade	COSCOM
Engineer Brigade	Military Intel Bde	
Air Defense Artillery Brigade	Psychological Operations Bde	
FA Brigade (corps artillery)		

Three units from table 3-1 that are involved in ammunition resupply for the FA brigade are the COSCOM, the maneuver divisions, and the corps artillery. The maneuver divisions are the principle subordinate units of the corps. "The divisions fight the decisive central battles."[6] Each division has its own area of operation (AO), distinct from other divisions' AO. Within the divisions are the brigade size units, DIVARTYs, that provide fire support for the division. The corps artillery has field artillery brigades that may be apportioned out to augment the division's organic artillery assets. The COSCOM is the logistical unit that supports all the units within the corps geographical area. Figure 3-1 depicts the corps battlefield structure and where each major player is on the battlefield. The relationship of each player will be explained as the distribution system is developed throughout the paper.

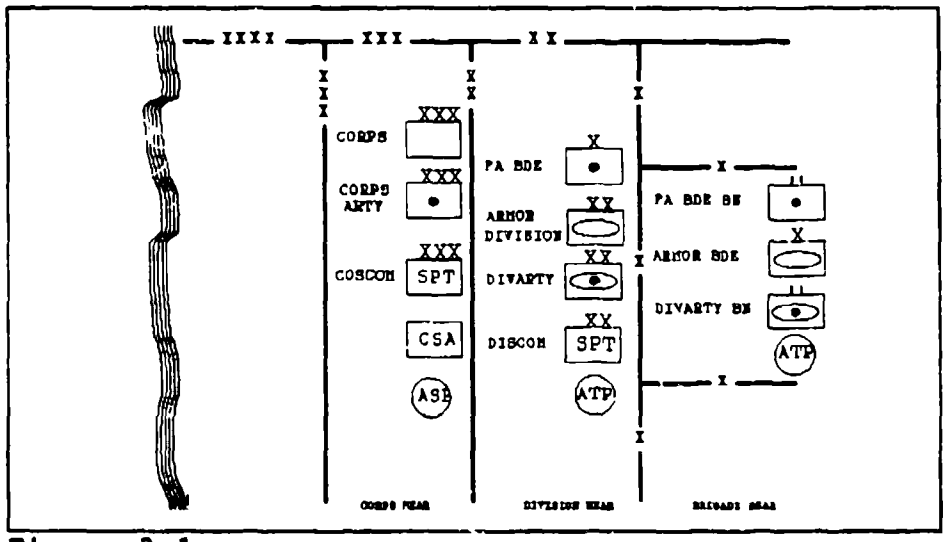

Figure 3-1.
Corps battlefield structure

Maneuver Division

The type and number of maneuver divisions within a corps varies according to the mission. These divisions may be armor, light infantry, mechanized infantry, airborne, or airmobile. Though there are different types of divisions, certain characteristics are common among all divisions. All divisions have their own support command (DISCOM) and their own artillery assets (DIVARTY). The DISCOM material management center (MMC) manages the flow of ammunition into the division area of operation. The DISCOM operates the ammunition transfer points (ATP) where divisional units receive their ammunition. The DIVARTY is a brigade size unit that provides the FA support to the division. The DIVARTY is comprised of battalion size units (155-mm or 105-mm) that habitually associate their support with one of the maneuver brigades within the division.

COSCOM

The COSCOM is the corps support command. It is not a fixed organization and can be tailored according to the size of the corps. "This tailoring permits a COSCOM to support a larger or smaller corps by adjusting the number and type of units attached to the COSCOM."[7] The size of the COSCOM is dependent on four factors:

1. the COSCOMs geographical area of responsibility;
2. the number and type of weapon systems supported;
3. the number of personnel to be supported;
4. tons, types, and volume of supplies to be handled.

Three of the agencies within the COSCOM are vital to ammunition resupply operations. The corps MMC manages the ammunition flow into the corps. The ammunition groups man the corps supply areas (CSA) and the ammunition supply points (ASP). And the transportation group delivers ammunition from the corps rear to the brigade rear.

Corps Artillery

The only organic element of the corps artillery is the corps artillery headquarters. "The corps artillery headquarters plans and coordinates fire support for the corps. It provides tactical control of those corps FA units not attached to subordinate maneuver elements of the corps."[8] The size of the corps artillery varies according to the mission. The number of field artillery brigades assigned to the corps artillery depends on the mission of the corps. The corps artillery can receive up to six FA brigades.[9] "Cannon, missile, or rocket battalions, or a combination thereof, are then attached to the FA brigade headquarters."[10] While the type of division determines the type of weapons system found there, all corps artillery

units can have the same type of weapons systems. Each type of weapon system uses a different type of ammunition (except for 155-mm towed and SP). The table below lists the field artillery resources available within the corps.[11]

TABLE 3-2
Corps Field Artillery Resources

WEAPON SYSTEMS	LEVEL FOUND	WEAPONS/BATTALION
105-mm how towed	Lt inf, abn, AA div	24
155-mm how towed	inf division	24
155-mm how SP	corps hvy division	24
203-mm how SP	corps	24
MLRS (M720)	corps (bn)/ DIVARTY (btry)	27
LANCE MGM	corps	6

The corps commander augments the fire support capability of the maneuver units by either attaching FA brigades to a division or assigning them a tactical mission that makes them more responsive to the fire support needs of the divisions and other corps maneuver units.[12] Part II of this chapter explains the difference between these two methods.

II. FIELD ARTILLERY SYSTEM

The field artillery system defines how artillery assets are used and who is responsible for the logistical support

of these assets. In the battlefield framework there are three battles that each level of command is concerned with: rear, close and deep operations. It is in the close operations where the "corps field artillery will be used to augment the fires of the committed divisions and separate maneuver brigades."[13] This is where FA brigades can support the division as it fights the decisive central battle. FM 6-20-2J, the army field manual on field artillery brigade operations states that "clearly defined, systemic, and positive command and control ensure that the field artillery contributes to the total fire support in a responsive manner that is adequate to support the mission."[14] The manual further states that command and control is established through a two step process referred to as organization for combat.[15] The two step process consists of:

1. Establishment of a command relationship which determines how the FA brigade is to be logistically supported.

2. And assignment of tactical missions which determine how the FA brigade augments the fires of the supported unit.

Command Relationship

Command relationships include the following;[16]

a. Organic. These FA units are an essential part of a military organization. An example is the corps artillery headquarters that is part of the corps organization. While the number of corps artillery units may vary, the corps always has a corps artillery headquarters in its structure. This unit is supported by the parent organization's logistical unit - the COSCOM.

b. Assigned. These FA units are placed in an organization under a relatively permanent basis for the purpose of strategically tailoring the force. A commander has the same degree of command and control over assigned units as over organic units. The 210th FA Brigade is an example of this relationship. The 210th is assigned to the VII Corps Artillery. While the corps may gain other FA brigades, the 210th is an FA brigade that is already an integral part of that organization. The support of assigned units also comes from the parent unit's logistical unit - the COSCOM.

c. Attached. This occurs when FA units are placed under an organization on a relatively temporary basis. Subject to the limitations stated in the attachment order, the receiving unit has the same degree of control over the attached unit as over organic units. The 75th FA Brigade

was attached to the VII Corps Artillery during Operation Desert Storm. The 75th is assigned to the III Corps Artillery in Ft. Sill, Oklahoma. However, to tailor the VII Corps, the 75th was added to this organization. After the war the 75th returned to the III Corps Artillery. The attached unit (the 75th) obtained its support from the receiving unit (VII Corps COSCOM).

d. Operational control (OPCON). This status is often used between maneuver elements but rarely used to establish a relationship between a maneuver headquarters and an FA unit. Generally, OPCON has the same intent as attachment, but the receiving unit has no responsibility for logistical support.

Therefore, only when a unit is attached to another does the support requirement change. For example, if the 75th had been attached to the 1st Infantry Division (1st ID), logistical support would come from the 1st ID DISCOM. Because the DISCOM is not tailored, as the COSCOM is, it is not suited to support an FA brigade. FA brigades are rarely attached to maneuver divisions because of this limitation. The normal procedure keeps the FA brigade under the logistical support of the COSCOM (through its normal assignment or from its attachment orders to the corps) and assigns it one of four tactical missions.

Tactical Missions

The tactical missions are direct support, reinforcing, general support reinforcing and general support.[17] The assignment of a tactical mission determines how the FA brigade provides fire support for the corps.

a. Direct Support (DS). An FA brigade can be assigned a mission of direct support for a maneuver unit such as a maneuver brigade or a brigade size task force. The battalions of a DIVARTY are in direct support of its division maneuver brigades. The FA unit responds to requests for fire support from the maneuver force.

b. Reinforcing (R). An FA brigade reinforces another FA unit. In this case the FA brigade responds to requests from the FA unit not the maneuver unit.

c. General Support Reinforcing (GSR). An FA brigade given the mission of GSR remains under the control of the parent corps while reinforcing another FA unit. Its first priority is to answer requests for fire support from the parent organization and then from the reinforced FA unit.

d. General Support (GS). The parent corps retains total control of the FA brigade with a GS mission. The FA brigade's first priority are requests from the parent unit. Other authenticated requests for fire are evaluated in light of that mission.

Regardless of the type of tactical mission assigned, the COSCOM remains responsible for the logistical sustainment of the FA brigade. This means that even though the FA brigade can be supporting the division in the division area, it must still travel to the corps rear area for resupply of ammunition. The procedure that operates under this requirement is the current ammunition distribution system.

III. CURRENT AMMUNITION DISTRIBUTION SYSTEM

Figure 3-2 is the current ammunition distribution system.

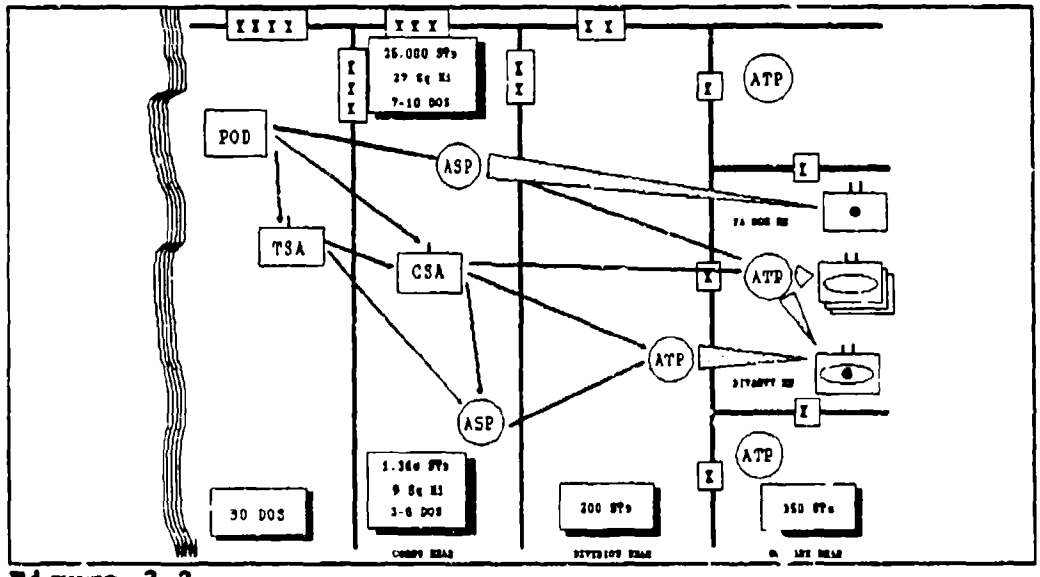

Figure 3-2.
Current Ammunition Distribution System

Essentially the corps operates a push system where the amount of ammunition is transported forward to corps and division resupply locations. Units use their own

transportation assets to pick up the ammunition from these locations. Divisional units get their ammunition from ammunition transfer points (ATPs) located in the brigade or the division rear areas. Corps units operating in the division area of operation travel to the corps rear area to pick up their ammunition from the corps ammunition storage points (ASPs).

Units arrive in the theater with a predetermined amount of ammunition referred to as the unit basic load. "A unit basic load is the amount of ammunition that a unit requires to sustain itself in combat until it can be resupplied."[18] During combat, the corps commander or higher headquarters determines the size and composition of the basic load based on considerations of the mission, enemy and type of unit being supported. As the battle develops, the units submit their anticipated ammunition requirements, required supply rate (RSR). The RSR is "based on the type of operation to be executed, the number of weapon systems to be armed, and the number of enemy targets to be engaged."[19] It is an estimate based on experience and ammunition planning factors contained in FM 101-10-1. These requirements are reviewed, consolidated, and passed to the next higher headquarters. Each layer of command from theater to division decides the controlled supply rate (CSR) based on subordinate unit missions, stocks on hand, and the transportation assets

available.[20] The CSR establishes priorities for transportation assets and ensure units have the ammunition required to support the tactical mission. This is the tactical determination of the ammunition required for each unit. The logistical support of this requirement is the manner in which the ammunition is made available to the using units.

A force development test and evaluation (FDTE) conducted in 1987 documented the current and future procedures to receive ammunition. This paper uses that FDTE process as the model for the current and future ammunition distribution system.[21] The FDTE is as close to the practical application of doctrine possible. Figure 3-2 on page 44 graphically depicts the current ammunition distribution system. Appendix D also contains the same figure.

Theater

The ammunition enters the theater via the point of debarkation (POD). From the POD the ammunition is transported to the theater storage area (TSA). Thirty days of theater ammunition requirements are normally stored on the ground in the TSA. The TSA ships ammunition to the corps storage area (CSA) and the ammunition storage point

(ASP). Transportation assets are provided by theater transportation units. Ammunition delivery competes for these assets but usually has a significantly higher priority than general supplies.

Corps

Road or rail networks entering the corps rear area represent the flow from the TSA or ports on corps main supply routes (MSRs). Each CSA usually will not store more than 25,000 short tons of ammunition (7 - 10 days of corps requirements). Usually three to four GS ammunition companies are required to operate the CSAs for the corps.

Based on the CSR, the assistant chief of staff for material and his corps material management center (MMC) establish the stockage objectives for each ASP in support of the committed divisions, and ammunition is pushed forward to the ASP on corps transportation assets. When a requirement is received to ship ammunition forward, the ammunition company loads it on line haul transportation. The corps transportation company has a tactical truck fleet composed of M931 5-ton tractors and M871 S&P trailers.

Division

There are typically two ASPs per division located in the corps rear area. These two ASPs combined can store three to five days of ammunition for a division and its nondivisional units. A direct support (DS) ammunition company operates the two ASPs. It consists of 233 personnel and has 16 forklifts and eight 7 1/2 ton cranes. When stocks arrive at the ASP on corps or theater transportation, the DS ammunition company off loads and positions stocks.

High-volume, high tonnage ammunition, such as cannon artillery, multiple launch rockets, tank ammunition and helicopter gunship rockets, is called forward from the CSAs and ASPs to the ATPs in the division area by the division ammunition officer (DAO). The DAO is responsible for the management of all ATPs. Divisional units draw their ammunition from the ATPs.

The ATP is a collection of loaded, corps transportation 2 1/2 ton S&P trailers with high-tonnage, high usage single-item ammunition. An ATP will typically control 10 to 25 trailers of artillery, armor, infantry and other ammunition. There are a total of four ATPs in support of a division slice, one in each brigade support area (BSA) and one in the division rear. The ATPs in the BSA can transload 350 to 500

short tons of ammunition per day. These are equipped with five forklifts and two cranes and staffed with 10 soldiers. The rear ATP can transload 200 short tones per day and has three forklifts, three cranes and six soldiers. The entire collection of ATPs can only support less than half the division total requirements. FA units expend 60 to 80 percent of the division total ammunition. A DS 155 FA battalion has 27 10-ton HEMTT trucks to distribute ammunition to its 24 howitzers.

Transportation Distances

Distances between the various nodes in one notional scenario of the corps portion of a theater ammunition distribution system is two to three kilometers from the FA unit to the ATP, 46 kilometers to the ASP and 130 kilometers to the CSA. This typifies a corps ammunition distribution system in a mature theater of operations. The FA brigade travels about 46 kilometers one way to pick up its required ammunition using organic 10-ton heavy expanded mobility tactical trucks (HEMTTs) or 5-ton cargo trucks.

Analysis

AirLand Battle was devised to keep the enemy confused and to take advantage of an advanced generation of fast and

lethal weapons. "The doctrine emphasized blitzkrieg-like offensives, fluid battle lines and deep-strike capability."[22] Unfortunately as a member of Field Artillery School accurately stated "during the past several years as our weapons systems technology and lethality have improved, our CSS effort has fallen behind."[23] The current ammunition resupply system is not capable of supporting Airland Battle doctrine because of several deficiencies:

First, ATPs can't provide enough tonnage for users, therefore, divisional ammunition vehicles travel to corps ASPs for some resupply requirements. Also, nondivisional units, particularly FA bdes, use ASPs for their resupply because the ATPs handle only 200 short tons per day.

Second, the total capacity of all four ATPs equals approximately 1,250 short tons per day or one-third of the heavy division projected requirements of 3,500 short tons per day. Corps and division transportation assets must haul the rest from corps ASPs.

Third, the ASPs offer the enemy large targets and are relatively immobile and ill-equipped to handle rapidly changing missions and non-linear operations.

Fourth, not shown is a paper-oriented, totally unresponsive requisitioning and inventory management system that can not automatically forecast unit requirements or update projections or usage fluctuations based on changing tactical dynamics.

IV. FUTURE AMMUNITION DISTRIBUTION CONCEPT

The School and US Army Logistics Center at Fort Lee, Virginia, recognized the problem with the current system and began a three-phased attack to address it.

First, the current fleet of material handling equipment (MHE)-forklifts and cranes needed to be updated. The current MHE are 20-plus years old, cumbersome, maintenance-intensive and inadequate in lift capacity and flexibility. New MHE scheduled increase the lift capability in addition to providing more versatility and improved maintainability.

Second was the total redesign of the ammunition management system. Currently, the standard Army ammunition system (SAAS) is used for ammunition units' internal distribution and inventory management. The redesigned system eliminates paper requisition and gives the battalion S4 the ability to compute requirements automatically and requisition, forecast and adjust for task-force organizations, varying intensities and changing threats.

The third phase involves intensive doctrinal examination to improve ammunition distribution without increasing the number of soldiers required to operate the system. The result is the maneuver oriented ammunition distribution system-MOADS.

MOADS

A new distribution system - the maneuver-oriented ammunition distribution system (MOADS) - introduces a new concept for ammunition requests. Under MOADS, units request combat-configured loads (CCLs) instead of separately ordering each ammunition item. The CCLs are standardized loads of artillery, armor, infantry and other ammunition that fit into an 8 by 30-foot space on an M871 trailer.

This change yields two effects. First, it simplifies ammunition ordering and forecasting in combat (e.g., 'three A packs, two E packs' versus '72 pallets, D563; 12 pallets, D541,' etc.). Simpler ordering procedures reduce the likelihood of miscommunications and improve the probability the user will get the ammunition he needs. Units currently are using CCLs in III Corps, Fort Hood and V Corps, West Germany. The 24th Infantry Division also used MOADS in Desert Storm. Second, the CCL system smoothes loading at the CSA and ASP. Using old procedures, ammunition handlers at these nodes could not load ammunition on trailers until the corps MMC directed an ammunition issue. Unless there is a permanent backlog at the CSA or ASP, there are periods of nonproductive time.

With MOADS, CSA and ASP ammunition handlers can use the time between ammunition issue to preconfigure CCLs and anticipate requirements since the approximate demands for each type of CCL are known. The GS ammunition company at the CSA remains the same as in the current system. Figure 3-3 details the ammunition distribution system with MOADS. Appendix E also has the same figure.

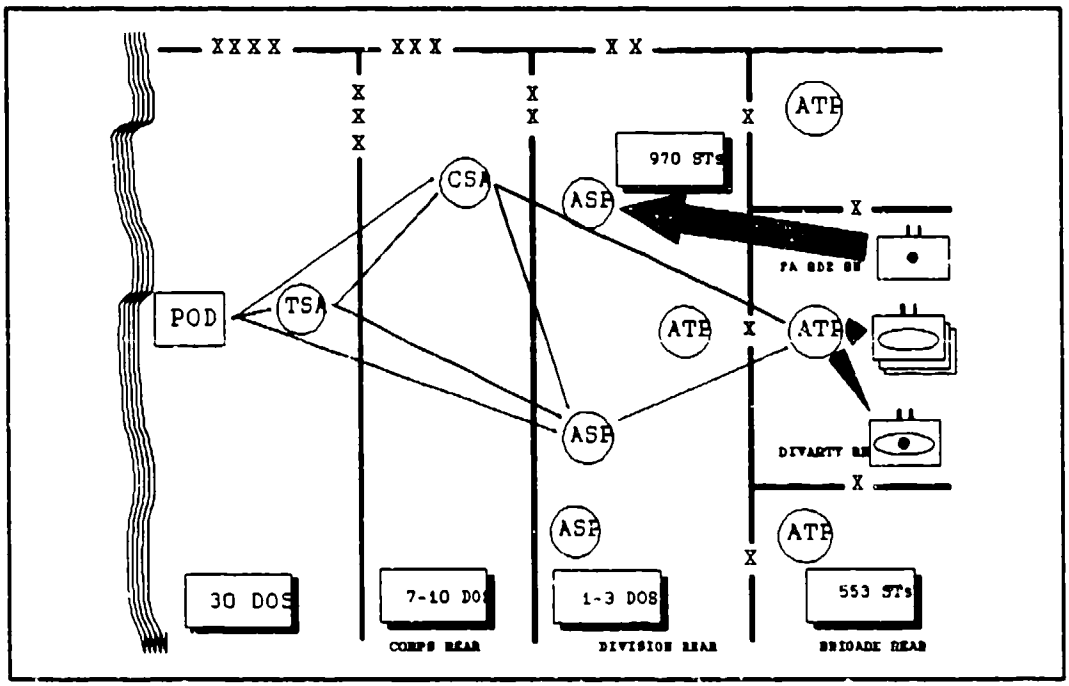

Figure 3-3.
Ammunition Distribution System with MOADS

Three ASPs support the entire division (to include nondivisional units) instead of two. These ASPs are further forward and smaller than current ASPs. The MOADS allows the DS ammunition company the capability to provide an additional ATP to support corps combat units in the division. The amount of ammunition in the ASPs is reduced

from three-to-five days to one-to-three days of supply for the division slice. This is still enough ammunition for short periods of time if communications lines are severed.

More ammunition is shipped directly from the CSA to the ATP, which eliminates additional handling by the ASP. Those items routinely shipped from the ASPs to the ATPs (about 25 percent of the combat users' requirements) are shipped in CCLs. The combined effect of the reduced ASP stockage and flow of ammunition through the ASP is that the DS ammunition company remains relatively constant is size.

The ATPs provide 100 percent of combat unit's ammunition requirements from a single trailer. Under the current system, the user must pick up stocks from several different trailers at the ASP and ATP to make complete, fireable rounds (e.g., fuze, projectile, propellant charge and primer) and to get the proper mix of components. With MOADS, a user only needs to go to a single trailer to get the items he needs. The combat units pick up their entire ammunition requirements from the ATP, thus eliminating the long distances traveled under the current system.

The MOADS improves ammunition distribution significantly. It orients on the combat user by providing 100 percent of his ammunition at the ATP. The shortened

unit resupply loop leaves more ammunition trucks available to resupply combat vehicles for the combat unit commanders. MOADS enhances the survivability of the ammunition system by making ASPs smaller and more dispersed. It improves flexibility by making CSAs and ASPs more productive and by eliminating unnecessary loading and unloading of ammunition. For example, it reduces the CSA to ASP to ATP loop to CSA to ATP for 25 percent of the division slice's daily demands. The MOADS puts more forklifts in the divisional ATP, which increases the ATP's ability to meet ammunition requests, reducing the queue and the ATP signature on the battlefield.

One crucial problem remained - the efficiency of moving ammunition. To move ammunition stocks on the battlefield, the CCL must be: (a) picked up by a forklift one pallet at a time, (b) placed on a trailer, (c) taken to the new location, (d) picked up by a forklift one pallet at a time and (e) placed on the ground. There is no difference between the current system and MOADS in these most time-consuming and labor-intensive activities. For example, if an ASP with one day's supply of ammunition (assume 2,250 pallets of ammunition) needs to move forward or rearward, it would take five forklifts and two cranes 53 hours of continuous loading at the ASP to move that ammunition. (This assumes five minutes per lift, no equipment breakdowns and unlimited availability of M871 trailers.)

The highly mobile warfare envisioned in AirLand Battle doctrine cannot be supported without large increases in the number of ammunition handlers and equipment, if the current equipment is used. To alleviate these requirements, revolutionary material handling technology is required.

MOADS-PLS

The palletized loading system (PLS) provides that technological breakthrough-a truck with a demountable cargo bed. It allows one soldier to load or unload from six to 24 pallets of ammunition at one time without a forklift. The PLS system is a truck and tailer both with demountable beds and each with a 16.5-ton capacity, a 33-ton combined capacity.

With PLS, pallets are, on the average, handled only once. All subsequent movements are on flatracks. This decrease in ammunition handling reduces the CSA's equipment and personnel requirement. The PLS difference is that there is no waiting for ammunition loading. This is a major improvement in the ammunition system's responsiveness. The DS ammunition company and ATP are smaller in a PLS configuration.

Field Artillery ammunition is delivered directly to self-propelled units. The PLS convoy stops at the ATP, determines if the customer can accept the ammunition shipment and follows a unit guide to the service battery location. The PLS cost and operational effectiveness analysis eliminated all forklifts from ATPs. Starting 1992, the self-propelled 155-mm and 8-inch Field Artillery units are scheduled to receive PLS trucks by corps sets. When a PLS convoy arrives, corps trucks will unload full PLS flatracks and pick up empty PLS flatracks. The artillery units will pick up full PLS flatracks, leaving no ammunition on the ground.

The Fort Hood test found the PLS stribution system to be more effective than the current ammunition system. It moved 42 percent more ammunition using 36 percent fewer vehicles. The PLS improves distribution by delivering ammunition directory to artillery users, virtually eliminating load time for ammunition supply trucks. It improves support to other users by reducing queue time and enhances system survivability by making ATPs smaller. The PLS creates flexibility and responsiveness in a system known to be rigid and untimely. For example, if an ASP with one day's supply of ammunition (assume 2,250 pallets) needs to be moved forward or rearward, it requires no forklifts to prepare the ASP to move. As soon as corps PLS trucks

arrive, the ASP can begin to move. There is no waiting time for loading.

V. SUMMARY

The Field Artillery School recognized that new doctrine requires a relook how FA brigades are employed in a non-linear battlefield. The FA brigade was originally meant to fight the classical European scenario, where corps commanders arrived in mature theater with support assets already in place. The corps commander then had time to determine what type of tactical mission to give each of the FA brigades in his corps artillery. Support was not a major consideration because the support structure was already in place. There was time for the FA brigade to travel back to the corps rear for ammunition resupply.

Doctrine changed these preconceived notions. MG Hallada, the Commandant of the FA School emphasized this in a State of the Branch Address. He stated "the corps artillery is no longer a collection of field artillery brigades waiting to be apportioned in wartime. Instead, it's decisively engaged as a single tactical entity from the moment conflict begins."[24] In order for the FA brigade to accept this new mission, the current ammunition resupply system required a revamping.

The Field Artillery and Logistics Schools are developing a new system (MOADS) that eliminates the deficiencies found in the current system. Deficiencies such as "extended travel, long loading times and long queues when trying to replenish their ammunition."[25] The majority of details from the FTDE came from an article in the Field Artillery Journal that describes these defeciencies and the respective school's solutions.[26] Appendices D and E contain graphical representations of both the current and MOADS distribution system.

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CHAPTER FOUR

RESULTS OF STUDY

I. INTRODUCTION

The events of Operations Desert Storm and Desert Shield dominated world news from August 1990 until May 1991. Iraq's brutal invasion of Kuwait and anticipated attack on Saudi Arabia galvanized public opinion against Iraq and its leader, Saddam Hussein. The United States reacted quickly to a Saudi request for help by "launching the largest deployment effort since the Vietnam war."[1] American soldiers from the United States and Europe were sent into Saudi Arabia to defend against the possible invasion of Saudi Arabia and ultimately repel the invading forces from Kuwait.

To support this grand assemblage of fighting power, the United States also deployed "the largest contingent of US artillery since World War II."[2] A total of seven division artilleries and seven field artillery brigades with five different indirect fire systems (105mm, 155mm, 8 inch, MLRS and ATACMS) were used in the war effort. The fire support provided to the ground offensive by these varied field

artillery systems contributed significantly to the final coalition victory over Saddam Hussein's forces. This chapter will trace the activities of one of these units, the 75th Field Artillery Brigade, and the problems it encountered getting ammunition to its subordinate units.

To demonstrate the magnitude of the problem facing American units in Southwest Asia (SWA), the chapter presents a brief strategic overview of US actions in response to Iraq's invasion. The operational strategy to defeat the enemy forces explains how the military leaders planned to move units within the theater of operations to achieve a decisive victory over the Iraqi military. A detailed depiction of the 75th's tactical actions illustrates the impact operational decisions had on the ammunition supply system. The final portion of the chapter are those facets of the operation that contributed to the ammunition resupply problem for the 75th FA Bde.

II. STRATEGIC OVERVIEW

After the war in SWA, General Vuono, at the time Army Chief of Staff, acknowledged Operation Desert Storm had been the most complex campaign for the U.S. Army in over two decades.[3] This portion of the chapter is designed to present some of the reasons why this was such a complex

campaign. The majority of facts in this strategic overview came from a special report provided by the Association of the United States Army (AUSA). This report focused on the logistical perspective of Operation Desert Storm.[4]

On 2 August 1990, the military forces of Iraq invaded Kuwait. 24 hours later the Iraqi military forces had defeated the Kuwaiti military forces and taken control of the country. After four days the Iraqi army had positioned sufficient forces to continue operations against Saudi Arabia, as depicted on figure 4-1. Fearing an imminent invasion, the Saudi head of state, King Fahd, requested U.S. military assistance to defend the sovereignty of Saudi Arabia.

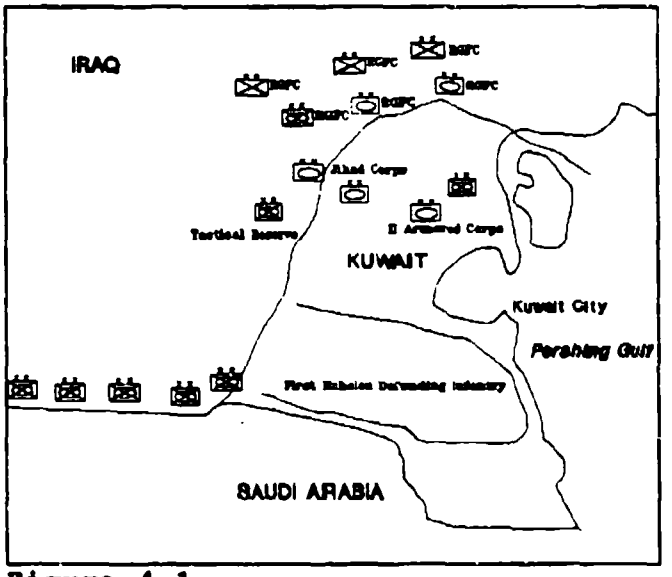

Figure 4-1.
Initial Iraqi Unit Positions

On 6 August, the president of the United States ordered U.S. military forces to deploy to the Persian Gulf in what was termed Operation Desert Shield. One of the first American soldiers to arrive in Saudi Arabia was MG Pagonis,

chief logistician for the U.S. Army Central Command. His primary mission was to prepare for the arrival of the expected units. Since there was such an imminent threat from Iraq, combat units were deployed before logistical units. This made Pagonis' job much tougher preparing this logistically austere environment so U.S. troops could accomplish the national policy objectives.[5]

The United States ultimately sent over half a million soldiers, sailors, airmen, marines, coast guardsmen and civilians to the Persian Gulf region. In addition, military forces from 38 other nations also undertook the task of deterring an Iraqi attack on Saudi Arabia (Operation Desert Shield). When U.N. sanctions proved ineffective and Iraq failed to withdraw from occupied Kuwait, the allied coalition decided to forcibly eject Iraq's military forces from Kuwait (Operation Desert Storm).

All these factors made support a monumental task for logisticians. Logisticians not only had to prepare for a large U.S. contingent, but they had to do this competing with 38 other nations in an environment where "no military logistic infrastructure had existed previously."[6] The logisticians ability to succeed depended on their concept of support. The next part of this chapter details the operational campaign plan and associated support concept.

The airfield at Dhahran and the ports at Ad Dammam and Al Jubayl were the APOD (aerial port of debarkation) and the SPODs (seaports of debarkation)."[7] These locations are depicted on figure 4-2. It was through these ports that ammunition in addition to other supplies for American units would vie for space and time with the other countries of the coalition.

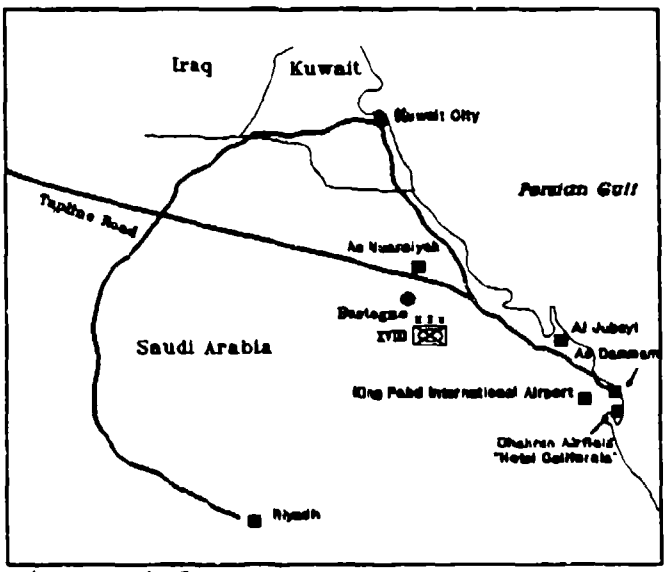

Figure 4-2.
APODs and SPODs in Saudi Arabia

Support for the units came from the Theater Army - ARCENT support command, 22d SUPCOM and the XVIII Airborne Corps support command, 1st COSCOM. 22d SUPCOM was located near the ports of debarkation. 1st COSCOM supported the XVIII Airborne Corps out of Log Base Bastogne. The corps, however, occupied the area behind their logistical support base. The logistics base was placed forward in anticipation of future military operations.

On 8 November President Bush ordered the VII Corps stationed in Europe to SWA to support an offensive military option if it were needed.[8] The entrance of a larger corps sized unit into the area placed additional strains on the logistics system. There was also a significant difference in the deployment of the two corps. Although XVIII Airborne Corps had to start operations without much support, this unit had conducted operations in the past without much theater support. VII Corps, on the other hand, was used to operating in a Central European environment and relied heavily on host nation support from a theater with a well-developed infrastructure - the theater of operations in SWA offered neither. Therefore, the support unit for the VII Corps, 2d COSCOM, was tailored for the operation and grew from 8,000 personnel to 24,000. The majority of the increase was in signal, medical, transportation and engineer assets. In addition the corps expanded from two to five maneuver divisions.[9] The size of the COSCOM tripled because the logistical support to VII Corps alone involved the provision of supplies to support 1,400 tanks and 1,200 fighting vehicles. This was the largest armor corps in U.S. history.[10]

Campaign Plan

After the decision to send the additional corps, the Central Command (CENTCOM) commander, General H. Norman Schwarzkopf, briefed his campaign plan to the major commanders. He "told VII Corps that it would conduct the attack's main effort during the ground campaign. Its mission would be to attack and destroy the Iraqi Republican Guard Forces Command (RGFC)."[11] The XVIII Airborne Corps would be the supporting attack to the left of VII Corps.

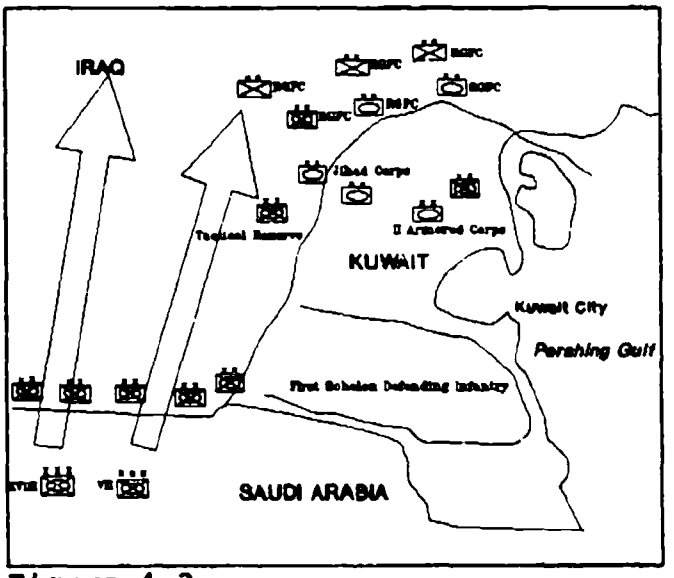

Figure 4-3.
CENTCOM Campaign Plan

VII Corps plan called for the 1st Infantry Division to attack and secure a breach area. The other corps forces (2d ACR, the 1st and 3d Armored Divisions) would pass through the breach and attack to the northeast. Due to the number of enemy units facing VII Corps, later an additional unit (1st UK Armored Division) was added to VII Corps. The commander of the VII Corps also stated he would "be on the lookout for a chance to call an 'audible,' meaning a last-

minute shifting of the corps' forces on the 'line of scrimmage' to take advantage of enemy weaknesses."[12]

Support Plan

VII Corps vehicles and heavy equipment arrived at the SPODs during the following two months. By 17 January, about 80 percent of its elements were in theater.[13] 2d COSCOM established Log Base Alpha to support VII Corps, whose units were deploying to assembly areas in that vicinity.

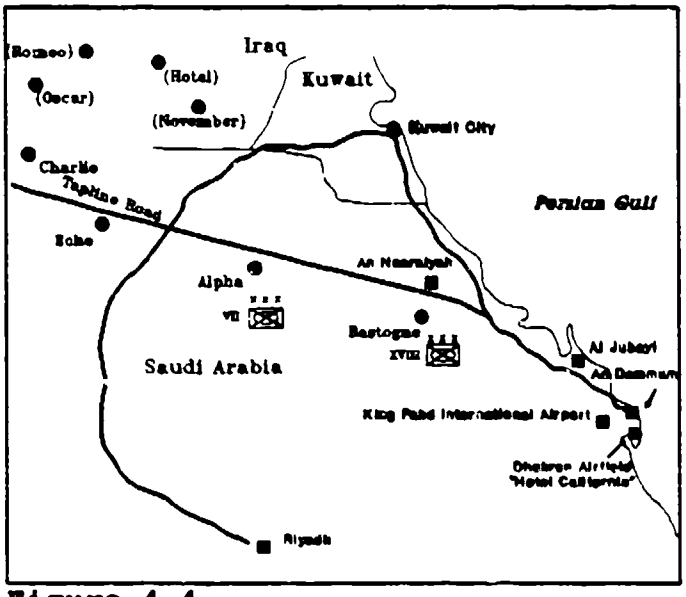

Figure 4-4.
CENTCOM Support Plan

The support plan for the operation involved a series of log bases. Log bases Echo, November and Hotel were scheduled to support VII Corps. Log bases for the XVIII Corps were Charlie, Oscar, and Romeo. Because the plan of attack was to be kept from the enemy, Log Bases Echo and Charlie could not be established until the units moved into their attack positions. This left little time to move the large amount of supplies in support of the attack.

The operational plan further complicated the logistical support requirement because they required units travel long distances to get into place for the attack. "In terms of numbers of vehicles and distances traveled, this movement dwarfed General Patton's movement of the Third Army in 1944 during the Battle of the Bulge. It was the equivalent of moving the entire population of Fayetteville, North Carolina, to Philadelphia, Pennsylvania, over a single two lane-road in 14 days."[14] This movement hampered the support capability because future log bases could not be established in advance. Support units would have to travel as fast as maneuver units to their new locations and be prepared to support the attack in a very short time.

The schematic in figure 4-5 depicts the major CSS players in the Southwest Theater of Operations. Note the projected ammunition requirement for the theater on G-day was 45 days of supply (DOS). Four days later that figure would be up to 60 DOS. There was sufficient ammunition for the conduct of the operation but this could

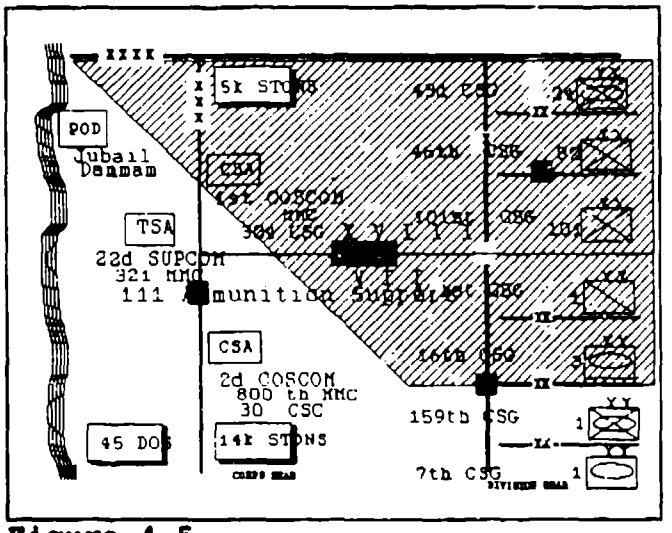

Figure 4-5.
CENTCOM Battlefield Structure

not be achieved with the long lines of support envisioned. The series of log bases were to address the situation but the shortness of the war negated their implementation.[15]

IV. 75th TACTICAL OPERATIONS

The 75th F.A. Brigade is stationed at Ft. Sill, Oklahoma and is normally a III Corps unit. There is no permanent support relationship because the brigade is supposed to be able to plug into any corps and perform its mission. With this purpose in mind, the 75th was one of the units directed to deploy to Saudi Arabia and "plug" into the XVIII Airborne Corps.

The majority of facts for this part came from a briefing to the Deputy Chief of Staff for Logistics by the Commander of the 75th F.A. Brigade after Desert Storm.[16] In addition, an interview with the S4 from the unit provided key insights into unit actions.

Upon notification, the unit deployed to its ammunition storage site and loaded the basic load onto its ammunition carriers and weapons. The subunits deploying with the 75th F.A. Brigade and the type of ammunition they took with them were;

1-17th FA Battalion (18 - 155mm weapons),

5-18th FA Battalion (24 - 8" weapons),

A/6-27 FA Battery (9 - ATACMS weapons).

The unit traveled to Saudi with three different type units and ammunition resupply requirements. Only 155mm ammunition is located in ammunition transfer points (ATPs). As a III Corps unit, the basic load for the 75th was configured for use in Central Europe. The ratio of types 155mm ammunition changed once the unit arrived in theater. Duds caused by loose sand required more conventional ammunition than mine ammunition so the basic loads were changed to reflect the new requirements.

The unit arrived at the port of Dharan on 5 October, less than three months after the first American units arrived in theater. There was very little improvement in the logistics system when the 75th FA moved to its initial assembly area. The move to Tactical Assembly Area (TAA) Diamond occurred on 25 October. The unit traveled a distance of 490 miles in tracked vehicles uploaded with the units basic load because transportation assets were used elsewhere. TAA Diamond was located in the vicinity of Log Base Bastogne.

As part of XVIII Airborne Corps, the units' primary mission was to prepare for defensive operations and deter an

expected Iraqi attack into Saudi Arabia. "The brigade spent October to December 1990 getting people and equipment acclimated to the desert and undergoing an intensive training program."[17] Training consisted of firing during battery, battalion and brigade level exercises.

Each time the 75th fired rounds during this training period, it was resupplied from a corps ammunition supply point (ASP) using procedures similar to those used at the Ft. Sill ammunition supply point. Units would travel 55 - 75 miles away, fill out a request form and restore their level of basic load onto the vehicles.[18] Training was meant to improve the firing proficiency and prepare the unit for combat but training did not practice resupply procedures. (This was the first of four different resupply procedures the unit would use during Desert Storm to get ammunition.)

After VII Corps deployed to Saudi Arabia and the decision was made to forcibly eject Iraq from Kuwait, the 75th was chopped to VII Corps to support offensive operations.[19] The 75th also received an MLRS battalion (1-158 FA) to augment its capability. The MLRS system would add another type of ammunition to the resupply requirements.

On 15 January, the brigade road marched 107 miles from TAA Diamond to TAA Roosevelt in the VII Corps sector. Enroute to the new TAA, the air campaign started and the 75th's ATACMS unit fired a missile into Iraq units. The 75th S4 requested the resupply for the spent ATACMS missile through the VII Corps G4. A date, time and resupply location was given to the unit. The 75th was responsible for going to that location and receiving the new ATACMS missile.[20] (This was the second method to resupply ammunition for the 75th.)

The new mission of the 75th was to prepare to reinforce 1st Infantry Division (ID) offensive and breaching operations. While in TAA Roosevelt, the 75th participated in artillery raids into Kuwait. Field artillery raids began on 16 February and continued for 8 consecutive days. In addition to raids, targets were attacked at all hours of the day and night in order to deny the enemy the ability to move, resupply or rest.[21] From 16 February to the day the ground war started on the 24th of February, a total of 4414 rounds of ammunition were fired by 75th FA units.

Each time the unit was given a mission to fire a raid, the request was given to the 1st ID DIVARTY S4 and the ammunition was pre-positioned at (or very near) the raid site. This was true for all types of ammunition except

ATACMS, where again requests for resupply were handled through the VII Corps Artillery G4.[22] The use of the DIVARTY S4 and the pre-positioned ammunition was the third method of resupply for the 75th.

The 75th FA Brigade would participate in the ground portion of the campaign plan by first reinforcing the fires of the 1st ID during the preparation fires (prep) then reinforcing one of three DIVARTYS. The three possible units were the 1st Infantry Division, the 1st Armored Division and the 1st Armored Division (UK). Since each division had different missions once they broke through the breach it was difficult to prepare complete logistical support plans for all three options.[23] The Brigade XO decided to prepare for the most likely choice and started "wiring" logistics to support the 1st Infantry Division.[24] Soon after that logistics plan was completed the XO was informed the unit would support the 1st AD not the 1st ID. The latest plan called for the 1st AD to conduct a giant sweep to the right of the 1st ID. This meant the 75th would have to catch the 1st AD to reinforce the fires of their DIVARTY. The planning for this move would have to occur within the one week left before the prep.

The initial prep was scheduled to last 2 1/2 hours and included the fires of 1ID Arty, 1AD (UK) Arty, 42d FA Bde,

75th FA Bde, and 142d FA Bde (ARNG).[25] The ammunition for this prep would come from corps ammunition resupply points (CARPS). CARPS, established the day before the attack, were located in the maneuver brigade sectors near the units firing the prep. Units were supposed to draw their prep ammunition from the CARPS so that they would not have to fire rounds from their basic load. Additional CARPS were scheduled to be established after the breaching operation so units could once again ensure they were full of ammunition when the attack into Iraq started.[26]

CARPS were run by division personnel and equipment. Corps assets transported the ammunition to the CARPS, dropped the trailers and returned to get more ammunition.[27] Transporting ammunition was the number one priority for all tractors and trailers even though all classes of supply competed for use of these limited assets.[28] (CARPS were the fourth method used to resupply ammunition to the 75th FA Brigade.)

On 24 February the 1st ID began moving into Iraq to position itself for the next day's prep and breech. The 75th FA Bde also began moving into their positions early that same day. When this did not draw any reaction from the Iraqi forces, the CENTCOM commander decided to move the attack up one day.[29] At 1300 the 1st ID was told to

assault the breech in two hours. The prep was abbreviated to 30 minutes so that units could get in position and fire plans could be redone.[30] The prep began at 1430 and the attack on the opposing Iraqi division began at 1500.

When the 1st ID DIVARTY began its move to keep up with its Division moving through the breech, control of the fires was passed to the 75th FA Brigade. The 75th was the alternate force artillery headquarters until it was their turn to move through the breech. Meanwhile the 1st AD had started its attack at 1434. By dark the 1st AD had moved 30 kilometers into Iraq territory.[31] The distance the 75th would have to travel to catch the 1st AD was lengthening.

The 75th passed control of the fires back to the 1st ID and then raced across the breach to the pre-planned rearm and refuel point to resupply its ammunition. The rearm and refuel point was not at the location because the battle had gone a lot faster than originally planned. The Brigade Commander decided to move his units after they had waited 30 minutes.[32] This was because the 75th had to catch the 1st AD that was already 128 miles away.

The unit closed with the 1st AD midnight two days later. As the unit joined the formation, the 1st AD radioed fire plan instructions to the 75th on three targets that

were to be engaged at the next stop.[33] The unit continued to support the 1st AD for the next two days. The units would alternate moving then stopping to fire, shoot at a target then start the process all over again.[34] This was done so that the maneuver units could receive continuous fire support.

At this pace it did not take long for the 75th to run low on ammunition. The Brigade XO was already trying to get his units resupplied. He had started as soon as they joined the 1AD. He quickly found out "there was no plan to have any 203-mm projectiles and extra 155-mm and MLRS ammunition in the 1st Armored Division area."[35] The corps MMC told him the 75th's ammunition was still in the 1st ID sector and that they would get their ammunition three days later. It was fortunate that the war ended when it did. "If the ground war had continued, the 75th FA Brigade would have run out of ammunition and the supply chain would have taken days to fix the problem."[36]

The 75th's ammunition was still in 1st ID's area because the requirement had not passed to the transportation unit responsible for delivery.[37] There was also no real use of an ammunition plan with required supply rates (RSR) and controlled supply rates (CSR). Some G3's developed ammunition requirements and some did not. The COSCOM

consolidated requests but did not identify the transportation requirements. While the COSCOM established package requirements and passed them to the ammunition units to configure, FA units worked with the transportation units to get the packages changed. This process caused the ammunition required by the 75th not to be loaded.

V. SUMMARY

Every unit that participated in Operation Desert Storm can boast of special achievements during war. The brief review conducted in this chapter alludes to some of the 75th's achievements. Here is the list the unit briefed to the DA DCSLOG on 3 July 1991.

- Conducted longest combined self-deployment/movement to contact of any VII Corps heavy element. (Unit traveled almost 1000 miles. Figure 4-6 depicts some of the major movements.

- First VII Corps element to fire against an enemy since WWII.

- First unit to employ ATACMS in combat.

- Only artillery brigade to participate in both of VII Corps main efforts.

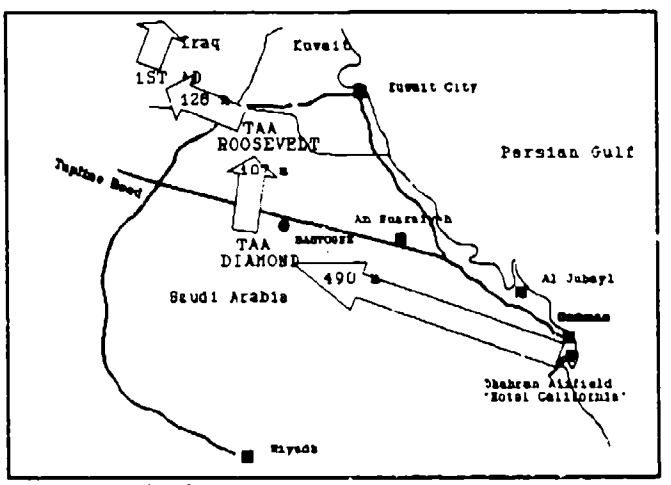

Figure 4-6.
75th FA Bde Major Moves

- Engaged elements of 6 Regular Army Iraq Divisions and 3 Republican Guard Forces Command Divisions.

- While conducting raids and offensive operations silenced 14 batteries during counterfire operations.

- During combat operations the brigade fired a total of 7,120 artillery rounds of all types.

- During combat operations brigade headquarters directed the fires of 3 MLRS Bns, 4 155mm Bns, and 3 independent MLRS batteries.

- During Desert Shield/Desert Storm the brigade supported 2 corps artilleries and 5 divisions. The brigade also had to be prepared to support the 1st AD (UK).

Some of the other accomplishments of the 75th FA Brigade that were not mentioned because they are normal functions of a field artillery brigade include;

- "Plugged" into one corps from another.

- Acted as alternate force headquarters for DIVARTY in movement.

- Worked in concert with DIVARTY units to provide continuous support in a fast paced environment.

- Provided accurate and timely counterfire against enemy field artillery.

The 75th FA Brigade worked as an FA brigade should and achieved tremendous results during the war. The question at hand is whether the 75th could have kept up that performance had the war lasted longer. The brigade XO made it very clear that the 75th was running out of ammunition when the war ended. It would have taken days to fix and the 75th did not have enough ammunition to last that long.

VI. ANALYSIS

The obvious reason the 75th did not receive its ammunition immediately while in 1st AD's sector is that the ammunition did not get loaded for delivery by a transportation unit. But addressing this transportation unit's neglect treats a symptom and not the cause of the problem. If the solution were that simple the other FA brigades would not have also had the same resupply problems. The solution to the ammunition resupply problem has to go a lot deeper than merely ensuring ammunition is correctly loaded onto transportation vehicles and delivered to the requesting unit.

This chapter brought out a number of factors that contributed to the problem. These included:

- There were a lot of troops and countries competing for the limited amount of resources in an austere environment.

- Other than Bastogne and Alpha, log bases could not be established in advance of unit movements.

- VII Corps units had trained to fight in an European scenario.

- ATP's in maneuver brigade sectors did not have extra 155mm or MLRS ammunition nor any ATACMS or 8" ammunition to supply the FA brigades operating in their sector.

- A lack of transportation assets in theater caused the 75th to travel extended distances for their resupply.

- There were four different methods used to resupply ammunition.

- Resupply points were not set up at the designated point after the breaching operation.

- There was no ammunition plan in effect.

While each of these issues contributed in some measure to the resupply problem experienced by the 75th some may never be able to completely resolved. For example, it is difficult to guarantee that American forces will never operate with other countries in an logistically austere environment. American units will deploy wherever the country needs them. With the downfall of the Soviet Union, there is just as much a possibility the next war will be in an area outside of Central Europe. The next chapter will analyze each of issues above and determine what caused ammunition resupply problems for the 75th FA Brigade.

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CHAPTER FIVE

ANALYSIS, CONCLUSION AND RECOMMENDATIONS

I. INTRODUCTION

Doctrinal procedures should not be changed because of the problems that occurred during Desert Storm. This would place too much dependence on one event for the conduct of future battles. Commanders should never fight their next battle based solely on the results of the last battle. Internal and external changes to the environment mandate that every engagement be addressed on its merit. Correcting the inadequacies in doctrine should be the impetus for changes to doctrinal procedures. In this way, internal and external environmental factors are considered for doctrinal changes. Correcting the inadequacies in doctrine then eliminates the problems encountered in the last war and prepares the Army for the next one. The key, therefore, is determining the reasons there are inadequacies in doctrinal procedures and using them to cause changes to doctrine.

The four reasons that caused inadequacies in ammunition resupply doctrinal procedures for the 75th Field Artillery Brigade were: 1) combat service support is not properly

trained, 2) divisions are not involved in FA brigade requirements, 3) the ammunition distribution system is not efficient, 4) there is too much focus on fighting a Central European war. Addressing these four reason correct the doctrinal inadequacies disclosed in Chapter Two's review of literature. Correcting the doctrine eliminates the factors that contributed to the 75th's ammunition resupply problem detailed in Chapter Four. When these factors are eliminated the 75th no longer has a problem receiving ammunition resupply during combat operations.

Distribution System and European Focus

Other Army agencies are already confronting the last two reasons. The Training and Doctrine Command (TRADOC) is refocusing doctrine to a global contingency and the Logistical School's solutions address the faults of the current ammunition distribution system. The rewrite of doctrine by the TRADOC shifts the focus from an expected Soviet war in a Central European environment to a requirement for the Army to "prepare to deploy on short notice and operate successfully on many battlefields and in many environments."[1] Logistical school improvements streamline the ammunition ordering process, accelerate the ammunition loading process and place ammunition supply points closer to FA brigades.[2] The impetus for change

has already started in these areas. To correct the inadequacies in doctrine the system improvements and refocus for future operations must continue.

CSS Training

When Desert Storm began, CSS units could not provide the required support because they had not trained using doctrinal procedures. The 75th draws ammunition using peacetime procedures during training to maintain ammunition accountability. During Desert Shield, the 75th had the opportunity to conduct realistic ammunition resupply training before the war started but instead was required to use four nondoctrinal methods to get ammunition. CSS units did not perform resupply operations according to doctrine because they do not conduct realistic training. FM 100-5 states that "training support units is as important as training tactical units. Support units should also be rigorously trained under realistic conditions."[3] When CSS units continually train in peacetime the way they expect to operate during times of war, they reinforce the standards established by doctrine. The transition to war is smoother because operations do not change. There is also less confusion in supported units because they continue to use the same procedures practiced in peacetime. This cannot happen unless operations start from an established standard.

Realistic training allows units to rely on established standards.

Division Responsibilities

FA brigades submit requests for ammunition to the corps CSS units. Requests for FA brigade ammunition resupply should go through the supported division. This improves operations because it cultivates a healthy support relationship between FA brigades and divisions. It also streamlines request procedures. The XO of the 75th referred to his unit as "stepchildren for other units."[4] By tying divisions into the ammunition request procedures FA brigades have help getting ammunition for their units. Divisions know in advance when FA brigades will augment their unit. They can anticipate the additional support requirements and inform corp support personnel of future ammunition needs. When FA brigades arrive in sector only quantity refinements are required. The corps support units should already know different types of ammunition are required.

Also corps support units receive the total requirements for a division sector through one channel. They receive it through several under the current system. Divisions and nondivisional units each submit requests to corps for support. Corps consolidates the requests and then divides

the requirements by sectors. Under the new procedure, the division area requests are consolidated at division and submitted to corps.

The introduction of maneuver oriented ammunition distribution system (MOADS) improvements facilitate these changes by placing ASPs in the division rear area. Since divisions are responsible for the positioning of all units operating in their sector they will know where the ASPs are and when they are operational. Divisions can help direct FA brigades to their ammunition. The FA brigade becomes part of a team when divisions are involved in their ammunition requests.

This change would not eliminate the corps commander's flexibility to augment the main attack with additional fire support. The corps commander still assigns the tactical missions to the units in the corps artillery. The divisions assist the fulfillment of those missions by having the ammunition pre-positioned at the resupply points prior to the FA brigades entrance.

II. ANALYSIS

The Army uses doctrine to prepare for future wars. It is how units train to fight on future battlefields. If

doctrine procedures are wrong then the value of training is lost. Units are not prepared for the next war because they have not trained for it. The discrepancies noted in Chapter Two are examples of how incorrect doctrine procedures contributed to ammunition resupply problems. A review of those discrepancies follow:

European Focus. The mature theater expected with a Soviet attack in Central Europe creates confusion when the type of theater infrastructure is different.

Unrealistic Training. Combat service support operations are not trained realistically at the training centers because of peacetime requirements. This makes support activities in war difficult since they are not practiced during peace.

Area Support Concept. Requiring nondivision units to receive their ammunition from corps support elements is not an effective procedure. Other nondivisional units can get their ammunition from closer division support units because they have small requirements. FA brigade large requirements cannot be handled by the division. The brigade must make the long trips for their ammunition.

FA Tactical Mission. Field Artillery doctrine increases the complexity of the environment by establishing a tactical mission that is different from the support structure. The unit being supported is not assured of continuous support because they are not involved in sustaining FA brigade's with ammunition.

Division Involvement. Field Artillery doctrine implies divisions are involved in the logistical resupply of FA brigades. There is no current procedure that requires this. Divisions worry about division needs and FA brigades use distant corps units for support.

Too Much Improvisation. Logistical doctrine can too easily dismiss problems if the unit must rely on adapting to the situation with improvisation. If the problem occurs every time and the unit addresses it with improvisation each time then the procedure could be wrong and need revision.

These discrepancies are resolved when they are applied against improvements in CSS training, division ownership of FA brigade requirements, anticipated Log Center solutions and the rewrite of AirLand Operations.

AirLand Operations

The refocus to a global contingency removes the reliance on a mature theater's logistical infrastructure. CSS units will have to be prepared to operate in any type of environment. They must train for the difficulties of an austere environment just as they would train for the conveniences of a mature theater. The new focus is more realistic. The recent Desert Storm experience in the logistically austere Saudi environment reinforces this point.

Logistic School solutions overcome some of the difficulties associated with operations in an austere environment. An example is the difficult of providing long lines of support. Desert Storm made transporting ammunition the number one priority of tractors and trailers. This tied up these vital assets for prolonged times transporting ammunition over extended distances. The improvements in the ammunition distribution system make more efficient use of the available transportation assets. Resupply operations

can therefore take place over long distances and the tractor-trailers are still available for other operations.

Unrealistic Training

Realistic resupply operations at the training centers is accomplished when CSS units train according to doctrine. These units do not operate according to doctrine at the training centers and as a result combat ammunition resupply is not practiced. The units reserve doctrinal procedures for war time. Units cannot operate one way during peacetime and expect to quickly change to wartime procedures without a great deal of difficulty.

The use of Log Bases and CARPs during Desert Shield illustrates how training centers encourage bad habits. Corps storage areas (CSAs) and ammunition supply points (ASPs) are locations where, according to doctrine, units receive their ammunition. Training centers do not practice establishing these locations for resupply operations. Desert Shield presented an opportunity to exercise ammunition resupply according to doctrine before the war started. Instead of using doctrine, CSS units introduced new terms to for resupply points. Log Bases and CARPS were used even though they performed functions similar to CSAs and ASPs. Future plans also used the new terms to describe

where units would receive their supplies. If CSS units had practiced establishing CSAs and ASPs at the training centers they would have used them from the start in Saudi Arabia.

One reason CSS units do not practice according to doctrine is the need to maintain ammunition accountability. MOADs improvements allow units to train realistically and still meet accountability requirements. MOADS uses combat configured loads (CCLs). Units order their ammunition in packages instead of by individual round. By using CCLs, CSS units can issue ammunition to units in packages, reducing the time spent counting by individual ammunition rounds. Accountability can still happen and the unit can train using realistic procedures.

Area Support Concept The area support concept cannct be eliminated because Divisions do not have the structure to support FA brigade ammunition requirements. FA brigades must continue to draw their ammunition from CSAs. MOADS, however, makes resupply from CSAs easier. CSAs are closer to FA brigades. Therefore, FA brigades do not have to travel as far to get their ammunition or spend as much time loading/unloading their requirements.

FA Tactical Mission FA brigades will continue to have a tactical mission that is different from the support

structure. CSAs have to support FA brigades because ATPs cannot. This difference is no longer an issue once brigades are tied into the divisions for their support.

Division Involvement This is no longer a discrepancy when divisions become an integral part of the ammunition request process. The statement that division personnel help FA brigades coordinate for ammunition is correct.

Too much improvisation

When CSS units realistically train during peacetime there is less of a need to improvise during war. By not training according to established procedures units become unfamiliar with how operations are supposed to occur. The tendency is to use improvised procedures to handle those situations not practiced. However, too much use of improvisation creates uncertainty in the battlefield. Supported units are unsure of how to conduct future operations because so many different procedures were used in the past.

The four different resupply methods used by the 75th to get its ammunition is an example of dangers of this over reliance on improvisation. The CSS units introduced new methods each time a different scenario called for resupply.

The unit ultimately got the ammunition it needed but had to use different methods each time. This improvisation did not establish a standard that units could expect future operations.

When Desert Storm started, the XO of the 75th was unsure how his unit would be resupplied. He began to have doubts the current system could provide support when the corps ammunition resupply point (CARP), expected after the breech, never materialized. The corps material management center (MMC) news that his designated ammunition was still in the 1ID's sector created further doubts there was a viable procedure for resupply. If the CSS unit had practiced doctrinal procedures, they would have had a better chance of meeting the requirement. The unit could have used the same procedures and just surged to get the ammunition to the unit. In this case, the XO would have looked for the nearest ammunition supply point (ASP) to supply his unit.

III. CONCLUSION

The four reasons cited as causing the 75th's ammunition resupply problem were an improperly trained CSS system, uninvolved divisions, inefficient ammunition distribution system and a Central European focus. Using these causes to correct doctrinal deficiencies address the issues from

Desert Storm that contributed to the 75th's ammunition resupply problem. The factors from Desert Storm were:

Austere environment. There were a lot of troops and countries competing for the limited amount of resources in an austere environment. VII Corps units had trained to fight in a Central European scenario with its established logistical infrastructure.

Future Log Bases. Other than Bastogne and Alpha, log bases could not be established in advance of unit movements.

ATP composition. ATP's in maneuver brigade sectors did not have ammunition to supply the FA brigades operating in their sector.

Transportation assets. A lack of transportation assets in theater required the 75th travel extended distances for their resupply.

Resupply methods. The 75th used four different methods to resupply ammunition before the ground war started.

Ammunition support. CARPS were not set up at the designated point after the breaching operation.

Plan. There was no ammunition plan in effect.

Correcting the doctrinal discrepancies voids the majority of these factors. The exceptions are those factors that happened as a result of a command decision or were a function of the environmental. The logistician cannot completely control the leaders decisions or the affects of the environment. However, training increases the possibility of an better command decisions. Training also reduces the adverse impact of poor environmental conditions.

Command decisions give the leader flexibility to make the choices he feels best accomplish the mission. Staff recommendations can influence his decision, but the final choice is the commanders. The subordinates responsibility is to take the necessary actions to ensure the commanders plan can be successful.

The decision to move the attack one day early is an example of a command decision that had an impact on logistical operations. The commander believed he could minimize the number of friendly casualties if he attacked while the enemy was not reacting to unit advancements into the area. This reduced the amount of time CSS units had to prepare to support the operation. The benefits of being able to gain the advantage over the enemy outweighed those concerns about supporting future actions logistically.

The weather and terrain of an area can be determined from past records. But the effect of weather and terrain is difficult to predict. The loss of effectiveness on mine ammunition was not expected or realized until it actually occurred. When units fired this ammunition during practice there were a high number of duds. The sandy environment did not ignite the rounds. The ammunition had been tested in a European environment, where there is less sand. The basic loads were then changed.

Training diminishes the impact of these two exceptions because units practice to meet a wide variety of situations. Commanders are less likely to make bad logistical decisions if their past training included similar situations. He knew what the outcome of his decision was in the past so he can gauge what the effect of his decision can be in this operation. The effect of environment factors can have a similar outcome. The commander has trained his unit in various type of environments and can therefore more accurately predict what effect the current environment will have on his operation.

Desert Storm factors

Austere environment. The effects of an austere environment no longer are a show stopper. The Army should be prepared to deploy anywhere in the world. Realistic training makes the Army train for those possible environments.

Log bases and ammunition support. These were a function of command decisions. The commander decided to keep the enemy from knowing future plans by preventing any log bases being established early. This meant log planners would have to hurry to get set up in time to support the attack. When the commander decided to move the day of

attack up one day the impact of not establishing log bases early became readily apparent. The rearm and refuel points were not in place when the 75th arrived for ammunition resupply. When units continue to train the correct procedures each time, they can anticipate the impact of commanders decisions and surge to meet the unanticipated requirements.

ATP Composition and Transportation assets. The area support concept with Log School improvements do not require ATPs carry FA brigade ammunition. ASPs are closer in to support FA brigades. There is also not the great over reliance on transportation assets because the distribution system more efficiently uses the available assets.

Ammunition planning and resupply methods. Realistic training during peacetime eliminates CSS units using different resupply methods. No matter what the situation the CSS unit can continue to provide ammunition the way the unit trained. The CSS unit should not use improvisation except to meet unanticipated situations. If the requirement is known in advance then proper planning can ensure doctrine is used and improvisation is not required.

Resolving the doctrinal discrepancies with the reasons cited eliminate the factors that contributed to the

ammunition resupply problem. The 75th FA brigade would not have experienced resupply problems had these changes been made to doctrine at the start of the war. Determining the causes for the doctrinal inadequacies ultimately addressed the ammunition resupply problem.

IV. RECOMMENDATION

There are four recommendations that follow

1) Combat service support units train ammunition resupply operations according to doctrine. It is difficult to correct a system if it is never practiced. There may be some flaws with the current resupply operations but the time to find them is during training. Improvements can be made then and doctrine modified if required.

2) Field artillery brigade ammunition requirements go through division support channels. This involvement in brigade ammunition requirements helps foster teamwork among these members of the combined arms team. Units are working together to ensure all artillery assets have the requisite amount of ammunition to conduct combat operations.

3) Army units focus on preparing to operate anywhere in the globe. This especially holds true for FA brigades.

Corps and divisions may be assigned a special area of interest to plan future operations. FA brigades could be directed to plug into any corps or reinforce any division.

4) The Army implement the three phase solution of the Log School. These solutions improve the ammunition distribution system.

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APPENDIX A

GLOSSARY

A

ACR - Armored Cavalry Regiment

AD - armored division

AO - area of operation

APOD - aerial port of debarkation

AR - armor

ARCENT - U.S. Army Central Command

ARNG - Army National Guard

ASP - Ammunition Supply Points

ATACMS - Army tactical missile system

ATP - Ammunition Transfer Points

AUSA - Association of the United States Army

B

bde - brigade

bn - battalion

BSA - brigade support area

C

CARPS - corps ammunition resupply points

cav - cavalry

CCL - combat configured loads

cdr - commander

CENTCOM - Central Command

cl - class

CONUS - continental United States

COSCOM - corps support command

CSA - corps storage area

CSR - controlled supply rate

CSS - combat service support

D

DA - Department of the Army

DAO - division ammunition officer

DCSLOG - Deputy Chief of Staff for Logistics

DISCOM - division support command

div - division

DIVARTY - division artillery

DMMC - division material management center

DOFS - day of supply

DS - direct support

DSA - division support area

F

FA - field artillery

FDTE - force developement test and evaluation

FM - field manual

FSB - forward support battalion

G

G3 - Assistant Chief of Staff, G3 (Operations and Plans)

G4 - Assistant Chief of Staff, G4 (Logistics)

GS - general support

GSR - general support reinforcing

I

ID - infantry divison

IN - infantry

H

HE - high explosive

L

LOC - lines of communication

M

MBA - main battle area

MCC - movement control center

MHE - material handling equipment

MLRS - multiple launcher rocket system

MMC - material management center

MOADS - maneuver oriented ammunition distribution system

MSR - main supply route

O

OPCON - operational control

OPLAN - operation plan

OPORD - operation order

P

PLS - palletized loading system

POD - point of debarkation

POE - point of embarkation

prep - preparation fires

R

R - reinforcing

rds - rounds

RGFC - Republican Guard Forces Command

RSR - required supply rate

S

S3 - Operations and Training Officer

S4 - Supply Officer

SAAS - standard army ammunition system

SPOD - seaports of debarkation

STON - short ton

SUPCOM - Support Command

SWA - Southwest Asia

T

TA - theater army

TAA - theater army area

TAACOM - theater army area command

TSA - theater storage area

TTP - trailer transfer point

U

UBL - unit base load

UK - United Kingdom

W

WWII - World War II

X

XO - executive officer

APPENDIX B

INTERVIEWS

Interview with Maj Tom Eckelston, S4, 75th FA brigade during Operation Desert Storm. Interview conducted 10 January 1992 at Ft. Leavenworth, Kansas.

Q. What was the mission of the 75th FA brigade when the unit first entered SWA?
A. Unit was in support of the XVIII Airborne Corps we deployed in September/October 90.

Q. Were you in support of one unit in particular?
A. According to the defensive plans we were in support of the 101st Airborne Division.

Q. What activities did the unit do when they arrived in theater?
A. They created an impact area and while we were there all our cannon units participated in a service practice.

Q. At the time of your arrival what was the mission of the U.S. forces?
A. To prevent the Iraqis from continuing the attack into Saudi Arabia along the eastern coast - the area where the oil wells were.

Q. Did the units arrive with ammunition?
A. Yes, we drew our basic load. Weapons were shipped with basic load on board.

Q. Who decided what the basic load was?
A. I do not know.

Q. How was the ammunition that was fired during the service practice resupplied?
A. XVIII Airborne Corps had established an ASP that was about 55 to 75 km away from us. Units used 581s to draw ammo from the ASPs.

Q. Did you know why you went to the VII Corps?
A. Brigade commander just told us we would be fighting with VII Corps.

Q. Did you know that VII corps would be making the main attack?
A. Yes there was a small close hold group that was told of the attack.

Q. What did you do when you traveled to TA Roosevelt?
A. We fired some raids. As a matter of fact the MLRS unit fired ATACMs enroute to TA Roosevelt. On a rotating basis the units went up and fired a raid.

Q. So you did not fire into any impact area, you actually fired into Iraq.
A. Yes we actually fired into Iraq.

Q. How was that ammunition resupplied?
A. The brigade S3 would tell us what mix he wanted for that nights raid and we would take the request to the 1ID Divarty S4. The ammunition was prepositioned where we were supposed to fire the raid (or very close to it) by the 1ID. That was for the cannon, for the ATACMs that was controlled by the corps on an individual basis.

Q. What was the function of the CARPs used in SWA?
A. Corps established three or four CARPS depending where the units were supposed to cross the breach. The ammo was for firing the support of the breach.

Q. Was the purose of the CARP to resupply you after the prep so that units could have ammunition after the prep.?
A. Our units had their basic load uploaded prior to the prep and the ammunition for the prep was seperate. That ammunition was drawn from the CARPs.

Q. Did you have to go to the CARPs for any resupply after the prep?
A. There was a plan to draw any ammunition that was short after we traveled from the breach. We knew we were supposed to race across to division sectors to get to the 1AD. That was supposed to happen so we could be full. However, we were about 12 hours ahead of schedule and the link up was never made. We got to the meeting point and they were not there. After about 1/2 hour the brigade commander said we could not wait any longer because 1AD was already traveling and we would have to catch up to them. This was the reason we almost ran out of ammo later.

Q. Wasn't the introduction of CARPs into the area something non doctrinal?
A. Yes but they worked reasonably well. Each battalion would go to a certain battalion depending on the type of ammunition they needed (8 inch was in a seperate location) or where they were in the sector.

Q. Are you familiar with the MOADs system?
A. No

Q. Were CARPS using combat configured loads?
A. Yes.

Q. Weren't CARPs just another term to describe ASP operations?
A. Yes, but since ASPs were supposed to be only for Corps units the Corps used CARPs so Division units could draw from them and this would not create any confusion.

Q. Did the divisions still set up ATPs?
A. I believe they did and they were colocated.

Q. Were you aware the number of ATPs was reduced from 4 to 3?
A. No, it would not have mattered to us since we do not use ATPs.

Q. Have the unit ever gone to NTC before?

A. No. I don't think any III Corps Artillery ever fired at an NTC.

Q. So this was the first time your unit drew ammo other than in a garrison type environment. And even then it happened in a non-doctirnal manner.
A. Yes.

Q. Didn't other units have the same problem with the resupply of ammo.
A. I believe so, it took us a day and a half to catch up with 1AD. We caught up with them about midnight. And as soon as we got there we started firing at one of the RGFC divisions. The flow just traveled so fast. It was like the gold rush. It was like all hell breaking loose, 1AD and us would fire and then we would move forward and then fire and move forward. If we had not ended when we did the 75th and the 1AD would have been in a bind because we would have run out of ammunition.

Q. Why did you order your ammo through 1ID?
A. So everyone got to fire we were subordinated to the 1ID and they controlled our raid ammo?

Q. Did you try to contact the 1AD for any ammo?
A. We tried before G day and we had alot of difficulty getting ahold of them?

Q. Do you think you would have had any trouble getting ammunition from them?
A. I do not think so especially since we would be reinforcing them.

Q. There was a problem with communication because your ammunition went to the 1ID ammo points and not the 1AD.
A. When we were in TA Roosevelt we were told to prepare for three possibilities. a. go through the breach with 1ID b. go through the breach and support 1UK element. c. go through the breach and support 1AD. So we had three different contigencies we had to prepare for.

Interview with Maj Berry Brooks, S4 for the 1ID during Operation Desert Storm. Interview was conducted 10 January 1992 at Ft. Leavenworth, Kansas.

Q. Can you explain the function of the CARPs?
A. Four CARPs were formed to support the Corps breaching operation and the preparation. The reason they were formed was to ensure all FA units went forward of the breach with his basic load. It was all prep ammunition. All of the artillery units in the sector drew from the CARPs.

Q. When did CARPs come into existence?
A. They were operational D-6.

Q. Prior to the CARPs did units use the doctrinal ASPs and ATPs?
A. Yes they used 581s to the DAO reps at each ASP and at each CARP.

Q. After the units fired the breach did the units travel to the CARPs for resupply?
A. The only thing in the CARPs was Field Artillery ammunition except there was no ATACMs.

Q. Who ran the CARPs?
A. The Divisions actually ran the CARPs. The personnel who ran the CARPs and the MHE came from the FSBs and MSBs. The ammunition was transported by CORPS assets to the CARP.

Q. Who ran the ATPs?
A. ATPs were run by the FSBs. Ammunition was drawn from the ASP with division assets.

Q. Did you know of the change to FM that reduced the number of ATPs in a division sector from 4 to 3 prior to the start of the war?
A. Yes, we did and we had practiced that at Ft. Hood prior to the war. Each brigade would have their own ATP but there would not be one in the Division rear at the MSB.

Q. What was the purpose of the extra ATP?
A. That ATP was a backup in case any of the Brigade ATPs was overrun or destroyed.

Q. How were the CARPs configured?
A. Like a normal ASP. Units drove through and had to make a number of stops to pick up the correct number of fuzes, projos, powder by ammo type.

Q. How were the ATPs configured?
A. ATPs were combat configured loads. They were built back at the ASPs by the CORPs. There was a DAO rep there at the ASP also.

Q. What was the ammunition status of the 1st ID DIVARTY after the breach?
A. When the units went through the breach they were all full up with their basic load.

Q. Did any units require resupply?
A. After they left the breach the units were resupplied by their ATPs.

Q. Where did the ATPs get their ammunition?
A. ATPs got their ammunition from the ASPs. They could have gone to the CARPs but they did not. Part of that was because of the way we swung to the right.

Q. Why did they introduce the use of CARPs in SWA?
A. The concern was to shorten the length units had to travel to the ASPs. They also envisioned a six hour artillery prep so they wanted to get the ammunition for the prep on the ground for the units. There was about 60k pds of ammunition required just for the prep by all the units.

Q. Had they used CARPs before?
A. They had used CARPs in BCTPs and CPXs. It was not a new concept to us. It was a stockage fuller.

Q. How about the way raids were resupplied was that new?
A. The raids concept was new to us. Units pulling up to a location, loading their ammunition, firing on a predesignated target, waiting for their counterfire then do counter battery fire, pull back and move to a new location to start the process all over again.

Q. When did the units arrive in SWA?
A. The guns went with their brigade package, the MLRS went with the DIVARTY troops.

Q. What determined what the basic load would be for the units.
A. Basic load was designed for a European scenario. 60% DPICM and 40% HE but this was not right for Saudi Arabia. Information we had received from XVIII Airborne Corps said the sand caused there to be a high number of DPICM duds. So they said we should flip the ratio since we would be going on the attack and we would not want to attack through our own mines. We changed the ratio in Saudi and the CARPs were also set up in that ratio.

Q. What did the units do when they first arrived in SWA?
A. Units went to Jayhawk range and practiced there. They went there and registered the guns and did some ballistic checks there. The did things like calibrating the guns and recoil exercises. Jayhawk range was while we were in TA Roosevelt. Then we moved to our attack position and fired our raids.

Q. What was the distance between ASPs and the units.
A. The ASP in Roosevelt was about 10 to 15 miles from the units. When we moved over to the attack positions 10 miles from the Divarty artillery positions.

Q. Where was 75th in relation to your unit?
A. They were west of us. They were fairly close to CARP1 in that location.

Q. What interplay did you have with the 75th.
A. When we were in TA Roosevelt they were about three miles away. We went over to them to teach them the use of the CARPs. We went through several rehearsals and discussions. We did walk throughs and sand table discussions. We also discussed the raid operations there.

Q. How long have you been the DIVARTY S4?
A. I took over the position in July and we deployed in December.
Q. Did you have any training in logistics before that.
A. I had been the 2d Brigade S4 and on an NTC rotation.

Q. How was the ammunition resupplied at the NTCs?
A. Ammunition was put in the same configuration as an ASP. They used 581s. They did not use combat configured loads.

Q. So the first time you used combat resupply was after the breach.
A. Right but you just wrote down what you needed on the 581s and they gave you what you needed. The NTCs were more controlled, it was just like drawing ammunition in garrison at Ft. Riley.

APPENDIX C

FA BRIGADES IN DESERT STORM

VII Corps

210th FA Brigade
- 3-17th FA (155-mm,SP)
- 6-41st FA (155-MM,SP)
  (3d Infantry Division (Mech))
- 4-27th FA (MLRS)
  (72d FA Brigade)

42d FA Brigade
(V Corps Artillery)
- 3-20th FA (155-mm,SP)
  (41st FA Brigade, V Corps)
- 2-29th FA (155-mm,SP)
  (8th Infantry Division (Mech))
- 1-27th FA (MLRS/ATACMS)
  (41st FA Brigade, V Corps)

75th FA Brigade
(III Corps Artillery)
- 1-17th FA (155-mm,SP)
- 5-18th FA (8")
- A/6-27th FA (MLRS/ATACMS)

142d FA Brigade HQ
(Arkansas ARNG)
- 1-142d FA (8")
- 2-142d FA (8")
- 1-158 (MLRS)
  (Oklahoma ARNG)

1st IN DIVARTY

1st Cavalry DIVARTY

1st AR DIVARTY

3d AR DIVARTY

1st AR (UK) DIVARTY

3d Armored Cavalry Regiment

XVIII Airborne Corps

18th FA Brigade
- 3-8th FA (155-mm,Towed)
- 5-8th FA (155-mm,Towed)
- 1-39th FA (155-mm,Towed)
- 1-201st FA (155-mm,SP)
  (Separate Bn, ARNG)

196th FA Brigade
(Tennessee ARNG)
- 1-181st FA (203 mm)
- 1-623d FA (203 mm)
  (138th Bde, Ky ARNG)

212th FA Brigade
(III Corps Artillery)
- 2-17th (155-mm, SP)
- 2-18th (203-mm)
- 3-27th (MLRS)
  (XVIII Corps Arty)

24th IN DIVARTY

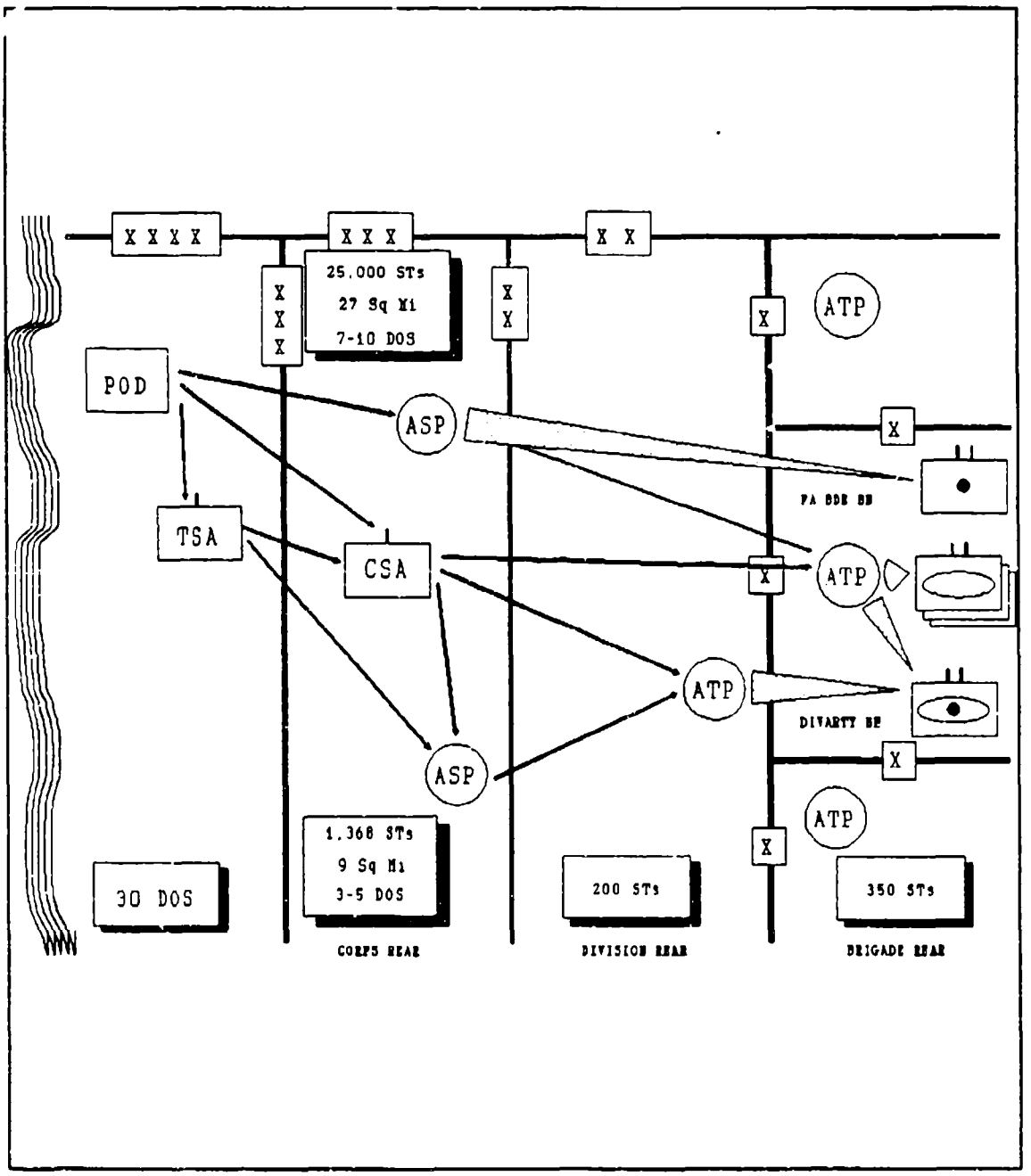
82d Abn DIVARTY

101st Abn DIVARTY

2d Armored Cavalry

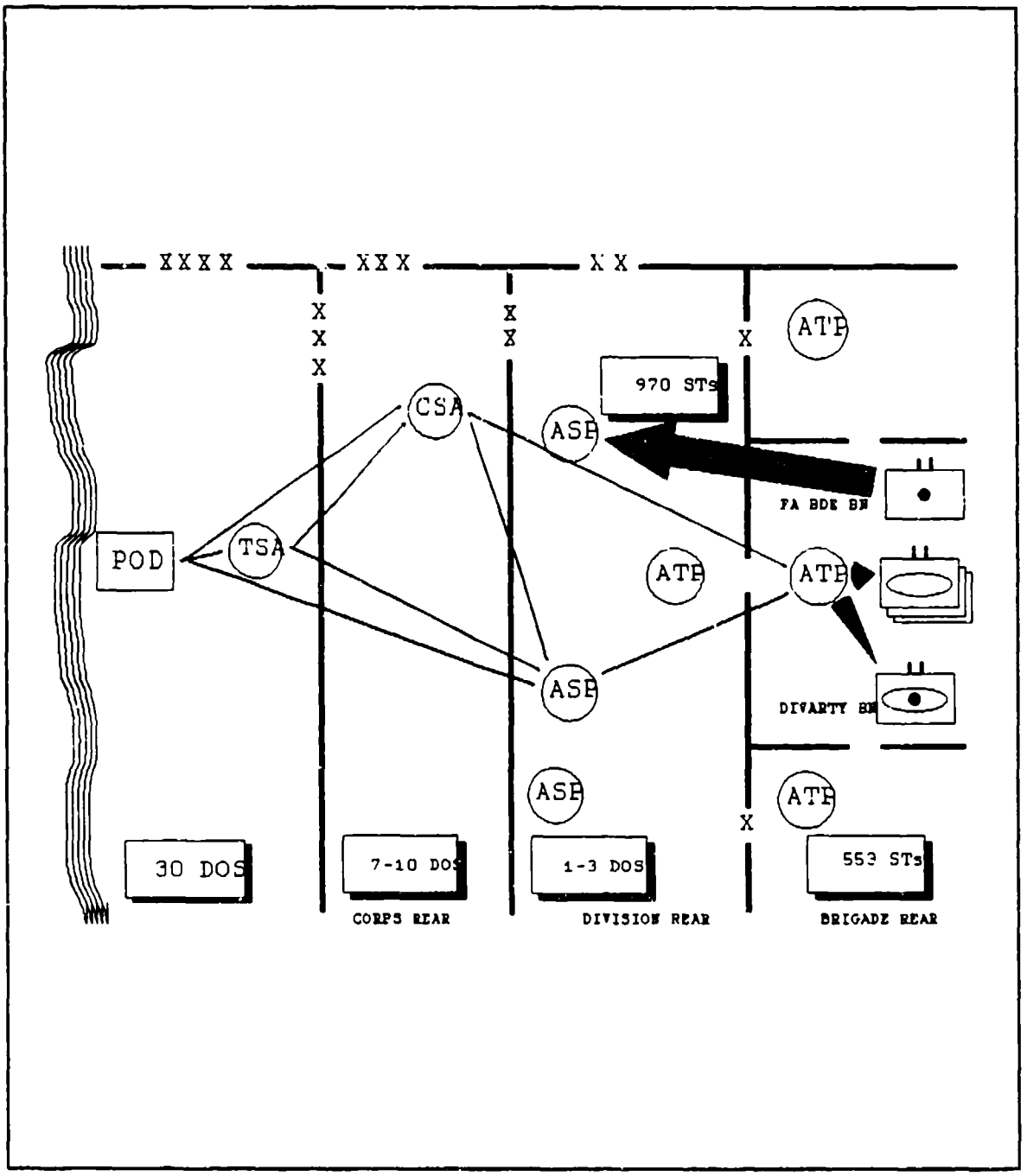
APPENDIX D

Current Ammunition Distribution System



APPENDIX E

Future Ammunition Distribution System



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