



**INSTITUTE FOR NATIONAL  
STRATEGIC STUDIES**

**MOVING THE FORCE**  
*Desert Storm and Beyond*

---

**SCOTT W. CONRAD**

---

**NATIONAL DEFENSE UNIVERSITY**

---

**McNair Paper 32**

***A popular Government,  
without popular information or the means of  
acquiring it,  
is but a Prologue to a Farce or a Tragedy; or  
perhaps both.  
Knowledge will forever govern ignorance;  
And a people who mean to be their own  
Governors,  
must arm themselves with the power which  
knowledge gives.***

**JAMES MADISON to W. T. BARRY**  
August 4, 1822

**MOVING THE FORCE:  
*Desert Storm and Beyond***

SCOTT W. CONRAD

---

McNair Paper 32  
December 1994

---

**INSTITUTE FOR NATIONAL STRATEGIC STUDIES**

---

**NATIONAL DEFENSE UNIVERSITY  
Washington, DC**

## NATIONAL DEFENSE UNIVERSITY

□ *President:* Lieutenant General Ervin J. Rokke

## INSTITUTE FOR NATIONAL STRATEGIC STUDIES

□ *Director:* Hans A. Binnendijk

**Publications Directorate & NDU Press** □ Fort Lesley J. McNair

□ Washington, D.C. 20319-6000 □ Phone: (202) 475-1913 □ Fax: (202) 475-1012

□ *Director:* Frederick Kiley □ *Chief, Publications Branch:* George C. Maertz

□ *Editors:* Jonathan W. Pierce, Mary A. Sommerville

□ *Editor for this volume:* Mary A. Sommerville

□ *Secretary:* Laura Hall □ *Circulation Manager:* Myrna Morgan, Internet  
Morgan.M@NDU.edu

---

*Lieutenant Colonel Scott W. Conrad is an Army Transportation Corps Officer who is currently serving as the Chief of Strategic Mobility at the newly formed Naval Doctrine Command—the first Army officer assigned to the command. LTC Conrad is a graduate of Bowling Green State University and earned master's degrees from the University of Puget Sound and the Naval War College. He wrote this monograph while a Senior Fellow at the National Defense University.*

INSS publishes the McNair Papers to provoke thought and inform discussion on issues of U.S. national security in the post-Cold War era. These monographs present current topics related to national security strategy and policy, defense resource management, international affairs, civil-military relations, military technology, and joint, combined, and coalition operations.

*Opinions, conclusions, and recommendations, expressed or implied, are those of the authors. They do not necessarily reflect the views of the National Defense University, the Department of Defense, or any other U.S. Government agency. Cleared for public release; distribution unlimited.*

Portions of this publication may be quoted or reprinted without further permission, with credit to the Institute for National Strategic Studies, Washington, DC. A courtesy copy of reviews and tearsheets would be appreciated.

---

For sale by the U.S. Government Printing Office  
Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328

**ISSN 1071-7552**

# Contents

---

Preface .....	1
1. NOTHING HAPPENS UNTIL SOMETHING MOVES! .....	3
Three Levels of Movement .....	9
The Theater Commander's View at the Terminal Port .....	10
2. PREPARATION FOR <i>DESERT STORM</i> .....	13
Transporting a Highly Mobile Armor Force ...	13
The Decision to Increase Ammunition Supplies	15
Iraq's Advantage: Strategic Geography and Surprise .....	17
The Saudi Decision to Allow Access .....	17
Iraqi Isolation Versus the U.S.-led Coalition ..	18
The Right Force, the Wrong Scenario .....	19
The Four U.S. Objectives .....	20
3. MOVING THE FORCE IN <i>DESERT STORM</i> .	23
A Systems Approach .....	24
Everything in War is High Priority .....	26
Closing the Window of Vulnerability .....	28
One Hand Tied .....	29
Balanced Strategic Force and Mobility .....	33
Shortage of Surge Sealift .....	35
An Inefficient Distribution System .....	38
Gaining Air Supremacy .....	39
The Luxury of Time to Deploy Forces .....	40
The Key to Victory: A <i>Decisive</i> Force .....	42
Lean and Mean We Were Not! .....	43
Forward Basing and Pre-positioning .....	45
Trucks Are Power .....	46

4. MOVING THE FORCE IN FUTURE	
CONFLICTS . . . . .	51
The Afterglow of <i>Desert Storm</i> . . . . .	54
Improving Strategic Surge Lift and Pre- positioning Capability . . . . .	55
The Broken Link Between Industry and Government . . . . .	60
Integrating Operational Transport into the Mobility Strategy. . . . .	61
Streamlining the Force . . . . .	68
Exploiting America's High-Technology Advantage . . . . .	70
Figures	
1. Map of Saudi Arabia . . . . .	14
2. Joint Theater Movement Control Agency: Strategic-Operational Interface . . . . .	65
Notes . . . . .	77

# MOVING THE FORCE: Desert Storm and Beyond

---

## PREFACE

Without oil, no engine can run. *Movement* is the oil that enables America's military forces to sustain an operation, and *nothing happens until something moves!* As America's military priorities are reordered, the ability to move quickly, sustain forces anywhere in the world, and pre-position equipment and materiel near likely areas of crisis is more important than ever. Because of the apparent ease of movement during *Desert Shield* and *Desert Storm*, however, decisionmakers may, in the afterglow of the *Desert Storm* victory, be prone to misinterpret the lessons of the Gulf War and fail to address movement capabilities properly for the future. A good example is a recent Congressional decision to divert funds from slated improvements to the Army's afloat pre-positioning capability to the building of an amphibious assault ship.

The capacity to foster global stability and defend our national interests depends upon correct long-range planning for transport. Logistics—especially mobility—has long been a bill payer for combat equipment, so perhaps a reappraisal is in order. Lessons of the Gulf War can help reshape America's defense transportation system for the post-Cold War era. Commitment to a balanced and unified mobility strategy should provide the most cost effective, rapidly deployable, and sustainable combat capability. Regional focus—particularly in a multiple-conflict scenario—and reduced forward presence will significantly increase America's reliance on movement in the future. Careful

## 2 MOVING THE FORCE: *Desert Storm* and Beyond

---

restructuring of military movement capabilities will lessen the risks of distance and time in an unstable world and contribute to the economic well-being of the nation. To do less might invite confrontation with adversaries willing to test the substance and purpose of our reach.



# 1. NOTHING HAPPENS UNTIL SOMETHING MOVES!

*In a tale of war, the fierce glory that plays on red triumphant bayonets dazzles the observer. Nor does he care to look behind to where along the thousand miles of rail, road and river, the convoys are crawling to the front in uninterrupted succession. **Victory is the beautiful, bright colored flower. Transportation is the stem without which it would never have blossomed.***

Winston Churchill  
*The River War, 1899*

The death knell of superpower communism was also a signal to those who would listen that America's 40-year strategy of global *containment* was shifting to one of supporting regional stability. After those 40 years of planning on a U.S.-Soviet standoff, what actually drove us to war was a regional flashpoint. We may debate whether *Desert Storm* represented the last page of the Cold War or the first of the "new world order," but of one thing we can be certain: The function of *movement* that had so often taken a back seat in American military planning was suddenly thrust into the forefront. The massive Persian Gulf War deployment was perhaps the greatest in the history of the world. The brevity of warning time, the massive size of the force, the lack of pre-positioned equipment, the immense distance from the United States to the Arabian Peninsula, and the threat of imminent Iraqi attack required more lift in a shorter period than ever before. General Jimmy D. Ross, then the U.S. Army's

#### 4 MOVING THE FORCE: *Desert Storm and Beyond*

---

Deputy Chief of Staff for Logistics, likened the feat to "moving the entire population, and all movable objects, from Atlanta, to Saudi Arabia"—a distance of well over 8,000 miles.<sup>1</sup> On the battlefield, transporters then spearheaded the now famous "Hail Mary" flanking action, sealing the Gulf War victory.

While the accomplishments of Gulf War transporters—truckers, stevedores, movement controllers, terminal operators, pilots and merchant mariners, alike—were truly Herculean, lack of transportation was the key limiting factor in our eventual Gulf War victory. The mark of a successful movement system is one invisible to combat forces; it is gauged by how little it influences the commander's actions and available options. Because of the constant concern and impact of transportation shortages, such was not the case in *Desert Shield* or *Desert Storm*.

In July 1990, with the Soviet Union in disarray, the U.S. military faced major budgetary cutbacks—the so-called "peace dividend." The desert war, however, provided a reality check: Perhaps America should maintain the capability to project a decisive land force to distant shores, after all. Throughout the buildup, many had recognized that all the planning, training, and equipping imaginable would not get forces to the fight. Only the capacity to deploy anywhere, with the right mix of firepower and support, in sufficient time would do the job. The Gulf War's successes aside, various aspects of our movement capacity did not measure up to this test.

With fewer forces, based primarily in the United States, we may not have the luxury of 6 months to respond decisively to a future regional contingency. We will need more reliable and more rapid sealift, airlift and pre-positioning than we had during *Desert Storm*. While we may never again mount the scale of forces levied against Iraq, the Gulf War remains a model for contingency transportation planning in future regional conflicts. Furthermore, because the mobility decisions ahead affect all forces jointly, the decisions on lift should be made jointly, not by individual services.

Although Gulf War deployment triumphs were highly

publicized, its shortcomings were not. Logistical lessons are often the most quickly forgotten aspects of any conflict. During crisis, there is no opportunity for reflective analysis of the lessons that the event teaches. Ultimately, the victor will recall the successes, and forget failures and the contribution of good luck along the way to success. If we believe, though, that *our* side was the source of all meaningful understanding of the war, then we have missed a vital point. Aspiring adversaries will surely exploit Iraq's mistakes in future conflict. In victory, our greatest danger is to learn and apply the wrong lessons.

*Desert Storm* provides a benchmark for future military planning. Is there common ground that the Gulf War shares with past experiences that may draw us to follow or avoid these lessons in the future? If so, how will we use this knowledge?

Our nation has a track record of demobilizing poorly, probably because of a traditional American aversion to large standing forces. The trend has been for government to demobilize rapidly and massively, turn attention to the civilian economy in an effort to stimulate it, then hasten a return to peacetime production. This trend usually has led to toleration of a less-than-ready military capability. As General George C. Marshall described it, "We have tried since the birth of our Nation to promote our love of peace by a display of weakness. This course has failed us utterly."

Because of our military history, trite phrases now abound regarding the poor decisions made during retrenchment and downsizing:

- *Don't prepare to fight the last war.*
- *You are destined to repeat the mistakes of the last conflict if you do not learn from them.*
- *No more Task Force Smith's* (referring to the debacle of unprepared and ill-equipped soldiers first deployed to Korea in July 1950).

The demobilization decisions made in the "in-between years" have traditionally led to poor preparedness to fight the next conflict, no doubt convincing adversaries of our vulnerability.

## 6 MOVING THE FORCE: *Desert Storm and Beyond*

---

Yet, if we can learn from *Desert Storm*, America will accomplish a responsible drawdown, while maintaining necessary capabilities.

Too often in our military past, peacetime systems and procedures have been replaced by wartime pandemonium—as if that’s the way it’s supposed to be. Somehow, ad hoc logistics has become America’s standard operating procedure in war. In stark contrast to tactical doctrine, which is studied and finely honed, logisticians often support that doctrine by the seat of their pants and relegate movement to the art of improvisation. And we have proven to be great improvisers! High technology and the myriad new roles and missions, however, may not allow the ad hoc to continue serving us so well.

*Desert Storm* euphoria should not overshadow an accurate assessment and clear articulation of transportation successes and failures. What worked and what did not work? What capabilities are worth preserving, or improving upon, and which are not? What uniquely occurred or, unexpectedly, did not occur? Answering these questions is the basis of this work.

As we embark on a course to meet tomorrow’s defense challenges, will tight budgets, a renewal of the *Fortress America* view, or the *apparent* transport success of the Gulf War convince decisionmakers to neglect building this nation’s military movement capability? At a time when America’s military priorities are being reordered, we must answer this critical question: Is the ability to move quickly, sustain forces anywhere in the world, and pre-position equipment and materiel near likely areas of crisis still important? The capacity to foster global stability and defend America’s national interests rests upon the outcome of this debate.

The military spending decisions ahead will be fraught with difficult tradeoffs. Logistics—especially mobility—has been a traditional bill payer for combat equipment. Despite the robust defense budgets of the 1980s, actual improvements in the nation’s military mobility never kept pace with the requirements identified in many Congressionally mandated mobility studies. As we downsize, the Services’ temptation will be to take the traditional

salami-slice approach, making defense cuts equally across-the-board. This will leave us with less of everything, including lift.

The demobilization of a nation calls for dramatic action. Otherwise, defeat in future conflicts is sealed. Warnings from the *Final Report of the Army Service Forces* after World War II ring true today:

It is inevitable that the human tendencies to revert to old habits of thought and action, to promote segmentary interest, to protect the established order, to resist change, to be swayed by sentiment, will exert powerful influences. These tendencies have no place in our efforts to ensure our Nation's security. Realism demands that we rise above lesser motivations and loyalties and work always for the highest good of the Nation.<sup>2</sup>

America's military now confronts a declining budget, shrinking manpower, increasing weapon costs, erosion of the available industrial base, slow access to high-tech advances, and increasing dependence on foreign sources. In the midst of these challenges, our stewardship has to target resources where they count the most: to empower the National Security Strategy. If moving the force—providing robust transportation support—is considered an essential enabling requirement, our commitment should provide the most cost effective, rapidly deployable and sustainable combat capability—the most logistical bang for the buck. We must reforge links with industry, secure quick access to state-of-the-art technology, achieve lower costs with higher quality, and assure rapid response to crisis demands.

We have undergone a remarkable strategic metamorphosis in an amazingly short period. The free world has moved from a high-threat, highly stable conflict environment, to one of low threat, but low stability. The risk of conflict with the Soviet Union once provided a benchmark for defense planning. The road to meet the next threat is not signed so well. The Middle East continues to simmer, as does the Western Hemisphere, the Pacific Rim, Eastern Europe and the Horn of Africa. While the United States now has no major adversaries, it lives in a world

## 8 MOVING THE FORCE: *Desert Storm and Beyond*

---

that is more unstable than ever. The Department of Defense estimates that by the year 2000, 15 developing nations will have ballistic missiles; eight of these may be nuclear-capable. An estimated 30 nations will have chemical weapons and 10 more will have biological weapons. More than a dozen developing nations already possess large and capable armored forces.<sup>3</sup> Clearly, we should not assume that future conflicts, even in lesser developed areas, will be low intensity or low risk. We may face very well armed adversaries.

The shape of conflict is changing as well. It may be waged with little or no allied backing, and with unknown host nation support or infrastructure. Any fighting that we do will probably occur far from our borders, in lands that cannot adequately receive our ships and planes. Can our forces get there quickly enough? Will the power we project be effective upon arrival, be sustainable, and able to quickly defeat any enemy? On the leading edge, the *Army Strategic Mobility Program* ambitiously establishes critical deployment time lines for one major regional contingency: The lead brigade must be on the ground in 4 days; the first light division by day 12; two more heavy divisions in place by day 30; and the full corps (five divisions and all of their support elements) must close by day 75.<sup>4</sup> This schedule calls for well-equipped mobility power because if we cannot project contingency forces rapidly, they will not deter or shorten conflicts.

A quantum leap in the type of conflict we can expect to encounter is on the horizon. Massive armored warfare will be eclipsed by intervention operations of rapidly deployable, but highly lethal, forces. This leap commands an equally bold shift in our framework for moving forces and the priority we set for the mobility tools we will use to move them. Although it will be very tempting to further cut the "tooth-to-tail" ratio as defense dollars shrink, the order of the day must be cold calculation and a pragmatic assessment of what is truly essential for the warfighting CINC to win decisively on tomorrow's battlefield.

Transportation has been a critical factor in strategy since

fighting men carried equipment on their backs and lived off countries where they were engaged. It has grown more important as the scope of hostilities has widened, and the burden of military equipment and supplies has increased.<sup>5</sup> Transportation enables any operation to begin and end, and nothing happens until something moves. Movement includes transport of forces, their equipment, and their logistics requirements to the battlefield. More than just the use of sea, air and land, it also includes planning, setting priorities, controlling, and allocating transportation resources. Movement is the glue that binds sustainment and all other battlefield functions together.

### THREE LEVELS OF MOVEMENT

- *Strategic Movement* involves transporting forces, their accompanying equipment, and supplies from the United States and other theaters to the theater of operations. Sealift, airlift, and the pre-positioning of supplies and equipment form the *strategic mobility triad*. Each has advantages and disadvantages, and each technique's strengths compensate for the other's limitations. Sealift has the largest capacity and is inexpensive, but it is slow and relies on available ports and open sea lanes. Airlift is fast and flexible, but is expensive and has limited capacity. For example, the first two fast sealift ships deployed to Saudi Arabia arrived 3 weeks after initial alert, but they carried more equipment and cargo than all aircraft had delivered to that point. Airlift depends upon available airfields and open air routes. Pre-positioning, either afloat or on land, places cargo and equipment closest to where they may be most needed in advance, thus minimizing onward movement. It was the pre-positioned ships of the Marine Corps and Army that saved the day during the early stages of *Desert Shield*. They delivered sufficient military supplies when not much else was available in the theater of operations.

- *Operational Movement* marshals available military and host-nation transportation assets—watercraft, airplanes, trains and trucks—to provide reception and onward movement of forces and

their logistics support within the theater. Operational movement varies from theater to theater. In a European scenario, the conflict is with civilian traffic over an extremely crowded transportation network. In a regional conflict, the challenge may be just the opposite—dealing with a limited movement capacity unable to support heavy and oversized equipment demands. Normally accessible ship off-loading cranes and other materials-handling equipment may be scarce or nonexistent. Host nation support may also be insufficient to augment military transportation.<sup>6</sup> Ports in the theater of operations represent the transition point between strategic and operational movement.

- *Tactical Movement* affords combat units the ability to position forces and critical supplies on the battlefield with assigned trucks or helicopters, before, during and after engagements with the enemy. As might be expected, available transportation assets at this level are significantly less than at the operational level.

### **THE THEATER COMMANDER'S VIEW AT THE TERMINAL PORT**

Because movement is logistics' bridge between strategy and tactics, the commander's perspective is vital. The words of that quintessential operator and logistician Rear Admiral Henry Eccle resonate:

The logistic viewpoint is essentially that of the commander. The command point of view is that logistics itself has no purpose other than to create and to support combat forces, which are responsive to the needs of the commander. The end product of logistics lies in the operations of combat force.<sup>7</sup>

It's useful to review military operations from the viewpoint of a warfighting CINC. The planning process—from drawing arrows on the map to putting troops on the ground—is a long and difficult one. Envision what might be needed most to support the next operation. How can you effectively shape the strategic



landscape through combat power and logistics? What capability is necessary to accomplish operational aims? What are the movement requirements?

- *Look outward.* How quickly must the force be in place to be effective? Do you count on any warning time? How big a force and what of type of force do you need to get the job done decisively?

- *Look inward.* After their arrival, over what routes and distances must forces move to reach operational and strategic objectives? What support can the host nation render? How long and at what pace do you need to sustain the force—what is the time line for conflict termination?

These are crucial questions that movement directly affects. The answers are critical from the vantage point of the theater commander. "A higher commander must think BIG," Field Marshall Slim once advised. Although the tendency may be to apply the broad brush approach ("Get there fast with lots of stuff!"), detailed planning is essential.

We have too frequently come to believe that armies can magically move anywhere, in any direction, at almost any speed, once their commanders have made up their minds to do so—as if it were all a giant board game. Perhaps this perception is due to the great military history saga—or maybe *CNN*. However, in reality, commanders cannot do so, and, according to the distinguished scholar Martin Van Creveld, failure to recognize this fact has probably ruined more campaigns than enemy actions have.<sup>8</sup>

How will America face tomorrow's challenges to its vital interests, or respond to the requests of our allies or the United Nations? The resources that we now assign to improving our global reach and operational agility—our movement capacity—will define us as a nation into the 21st century. In March 1994 testimony before Congress, regional CINCs left no doubt that shortage of lift was their number one concern—a "show stopper for a two-war scenario." Improving these capabilities will increase our options in any given scenario by reducing

## 12 MOVING THE FORCE: *Desert Storm and Beyond*

---

limitations. Only through such an effort will the United States maintain its freedom to achieve national aims—the ultimate purpose of any strategy.

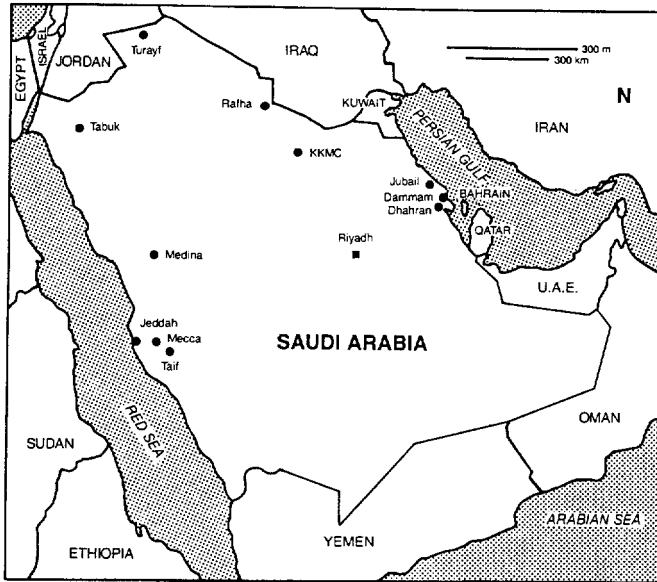
## 2. **PREPARATION FOR DESERT STORM**

*This will not stand. This will not stand, this aggression against Kuwait.*  
President George Bush  
August 5, 1990

On August 2, 1990, forces from Iraq invaded neighboring Kuwait and successfully seized control of the Emirate within 24 hours. Iraq's battle-tested army of one-million men was touted as the world's fourth largest. It was equipped with some 5,500 tanks, 5,000 armored vehicles, 5,700 tank transporters, 5,000 support vehicles, 700 modern combat planes, and vast supplies of guided missiles and artillery pieces.<sup>1</sup> They appeared formidable.

### **TRANSPORTING A HIGHLY MOBILE ARMOR FORCE**

The less a unit weighs, the easier it is to move strategically. But there's a catch: Upon arrival, its ground mobility depends on how mechanized the unit is. That is why light and medium forces have predominated in America's initial response during recent military interventions. The basis for this predomination has been their rapid deployability—not the overwhelming firepower those units brought to the battlefield. In a world now demanding potential response across the spectrum of conflict and peacemaking, this logic is flawed—we have designed too few forces capable of rapid deployability. The United States must be able not only to project a light or medium force quickly to



(Source: Association of the U.S. Army, Institute of Land Warfare, *Operations Desert Shield and Desert Storm: The Logistics Perspective*, Special Report, September 1991.)

demonstrate American presence and resolve, but also to confront regional armies rapidly, including armies possessing hundreds or thousands of tanks with strong anti-armor power. The strategic deployment ramifications of these force capabilities are significantly different: The former force requires available surge airlift; the latter calls for pre-positioning and fast sealift to move the force.

The Gulf War proved to be one of highly lethal, set-piece battles requiring many tanks and attack helicopters, and the requisite ships to get them there. The most mobile force on the battlefield includes armored and mechanized infantry divisions whose primary weapons are the M1 Abrams Main Battle Tank (weighing over 67 tons), and the M2 Bradley Fighting Vehicle (weighing about 33 tons combat loaded). These systems usually deploy by sea because they are so large. (For example, only one M1 can be transported aboard the gigantic C-5 Galaxy). This

force is the most draining on strategic mobility resources because of heavy weight, associated high volumes of ammunition, and support requirements.

Strategic mobility has eroded as the force has steadily put on weight. According to the *Armed Forces Journal*, the weight of a mechanized division has grown 40 percent since 1980. During Operation *Desert Shield*, the defensive phase of the Gulf War, each division required 345,000 gallons of diesel fuel, 50,000 gallons of aviation fuel, 213,000 gallons of water, and 208 40-foot trailers of other supplies ranging from barrier material to ammunition *each day*. During the 100-hour offensive of Operation *Desert Storm*, a single division consumed 2.4 million gallons of fuel transported on 475 5,000-gallon tankers—eight times the amount sold by the average service station in a month.<sup>2</sup>

We make our weapon systems more effective so they can put more rounds on target, in less time. Target acquisition and fire control processes are at the moment the limiting factors to maximum effectiveness. Soon, lack of strategic transport to deploy equipment and battlefield transport to move the additional ammunition will replace them as limiting elements.<sup>3</sup> Awareness of this problem has resulted in an emphasis on how to get more fuel and ammunition forward faster and has focused the acquisition community on pursuit of more capability. Unless we improve strategic lift and operational transport, the United States will have an even harder time getting forces to war in the future. Taking the longer view, it may be wise to concentrate technology efforts on lightening the heavy burden of high mobility and reducing fuel and ammunition consumption, while improving lethality.

## **THE DECISION TO INCREASE AMMUNITION SUPPLIES**

Because of the ammunition-intensive environment of the mobile battlefield, commanders want as much as they can get. When

planning work began on offensive operations, General H. Norman Schwarzkopf decided to "up" the requirement for ammunition on the ground—from 30 days of supply to 60 days. The cascade effect of this decision upon transportation was tremendous. From additional shipping to the associated people, everything increased. According to Lieutenant General William Pagonis, who headed the Army's logistical effort in the Gulf, just the unused ammunition that remained in the sands after the fight amounted to 250,000 tons—about two-and-one-half times the weight of the newest aircraft carrier.<sup>4</sup> Eventually, over 220,000 tank cannon rounds were moved to the theater, only 3,600 rounds of which were actually fired.<sup>5</sup> Just as in the past, instead of asking, "How much do we need?" the emphasis was on "How much can we get?" (Not surprisingly, this emphasis has not been corrected in more recent operations. The Army used nine ships to deploy equipment and supplies from the United States and Europe to support Operation *Restore Hope* in Somalia. Almost 18 percent was reloaded and returned to origin without use—representing more than an entire fast sealift ship [FSS] worth of cargo.<sup>6</sup>)

## **IRAQ'S ADVANTAGE: STRATEGIC GEOGRAPHY AND SURPRISE**

Iraq's sinister attack on and seizure of Kuwait was bad enough, but along with the defeated nation, the tyrant held hostage much of the world's oil supply. Regional hegemony, if not global control of the precious commodity, loomed real. The free world was galvanized and the prospect of intervention seemed inevitable. During that first week in August, 11 Iraqi divisions were in, or deploying to, Kuwait.<sup>7</sup> They appeared to be massing for further advance against the region's linchpin, Saudi Arabia. Iraq's armor force was already positioned and poised for further advance. Gulfs and oceans separated Saudi Arabia from friendly nations that could bring a comparably heavy force to the fray.

Spade work had fortunately begun in the fall of 1989 to counter a regional threat to the Arabian Peninsula—a shift away from the previous U.S.-Soviet confrontation scenario. In spring 1990, U.S. Central Command (CENTCOM) had prepared a preliminary plan that roughly outlined the necessary forces and basic strategy for such a defense. By July 1990 this outline plan was in the final stages of development, but still without the resources of identified forces and transportation. To test the plan, CENTCOM's Commander in Chief Gen. Schwarzkopf conducted a wargaming exercise, *Internal Look 90*. It provided a clear vision of how the United States might defend Saudi Arabia and greatly facilitated an American response. Demonstrating that we at least had a plan gave the Saudis a sense of U.S. resolve when the aggression occurred.<sup>8</sup>

## THE SAUDI DECISION TO ALLOW ACCESS

King Fahd, Saudi Arabia's head of state, at first demurred against American attempts to use his country as a stronghold. Key U.S. envoys (including Gen. Schwarzkopf and Secretary of Defense Dick Cheney) ultimately convinced him of the approaching danger. Eventually he requested U.S. military assistance to deter such an attack and defend his nation. If the United States had not gained ready passage to the ports of Saudi Arabia, its determination to deploy forces may have been far more tenuous. There were few viable military options. American forces could have been forced to move slowly over the unsecured beaches of Kuwait, or let Iraqi aggression go unchecked.

Saddam Hussein viewed his "bold annexation of Iraq's 19th province" as a means to assume the mantle of leadership of the Arab world. By annexing Kuwait, he also gained 40 percent of the world's oil reserves—oil that could help resolve his country's pressing economic problems.<sup>9</sup> Others saw it differently, and the brutal aggression was so wanton that it greatly simplified the task to muster world response and unify a coalition.

The United States believed that the unprovoked attack threatened the world's oil supply and decided to "redress a great wrong."<sup>10</sup> To Arab neighbors who became part of the coalition, conflict appeared inevitable, if distasteful. Saddam's fanaticism and deception had already worn thin with them. Others throughout the world less threatened by Iraq nevertheless feared the potential long-term repercussions of doing nothing. Forces of America and 38 other nations therefore took on the task of deterring Iraq from further attack. The entire United Nations, even the Soviet Union and China, backed the responses and did not interfere with the U.S.-led military operations.

Once President Bush decided to intervene, public sentiment for action appeared unwavering. Americans stood with the world community against aggression. If there were to be war, American soldiers would fight side-by-side with the soldiers of other nations to evict Iraq from Kuwait.

## **IRAQI ISOLATION VERSUS THE U.S.-LED COALITION**

Iraq was denied freedom of action largely because it had no meaningful strategic alliances, but the alliances forged over the years brought America essential strategic access. Besides Saudi Arabia's cooperation, more than 80 percent of deploying flights flowed through en-route staging bases in Spain and Germany. Global deployment required overflight agreements from many governments. At this critical time, European countries also made key transportation contributions to supplement America's resources—then fully employed moving U.S.-based forces. While some nations contributed money, many others provided critical operational transportation assets to attain coalition membership (e.g., barges, tank transporters, trucks, and land rovers). These assets proved indispensable to the total success of the war effort, and they made the war less expensive for the United States to prosecute.



Previous to *Desert Shield/Desert Storm*, there had been lip service but precious little real accomplishment toward interoperability. So the United States remained self-reliant for all equipment and resupply. There was almost no sharing of supplies and equipment among allies in the operational theater, which further drained U.S. transportation resources. Having witnessed the success of *Desert Shield/Desert Storm*, Americans may not be willing to support future violent intervention without the added strength of a coalition. Indeed, resource considerations alone militate toward this conclusion.

## THE RIGHT FORCE, THE WRONG SCENARIO

Events in the Arabian desert in 1990-91 had their basis in a nearly 50-year-old commitment by the United States. In 1943, President Roosevelt declared, "The defense of Saudi Arabia is vital to the defense of the United States."<sup>11</sup> President Carter conceived the Rapid Deployment Force concept in 1979, aiming to protect America's national interests in the Middle East. President Reagan gave the concept teeth when he activated the very real, if not fully manned, U.S. Central Command (CENTCOM) in 1983. Previous Middle Eastern operation plans had focused on responding to a potential Soviet onslaught into Iran. Iraq's invasion of Kuwait, though envisioned by a few, surprised many policy makers and military planners.

On August 6, 1990, President Bush ordered U.S. forces to commence deployment as part of Operation *Desert Shield* (to emphasize that it shielded Saudi Arabia from further attack). Ironically, it was ultimately the right force for the wrong scenario—Fulda Gap and Kola Peninsula replaced within the blink of an eye by Wadi Al-Batin and the Persian Gulf.

Following Vietnam and the Soviet buildup in Germany, U.S. Army doctrine had taken on a distinctly Central European flavor. There, a significant transportation infrastructure was in place, and

although substantial, America's presence was as a part of a larger alliance. The anticipated warning time and support structure of a war in Europe caused many to discount the notion of preparing for a come-as-you-are war. The Gulf War should by now have changed this mind set.

Our ability to project forces rapidly and massively, halfway around the world—contemplated but never accomplished—was put to the ultimate test. Within days, the nation energized its defense mobility resources.

## THE FOUR U.S. OBJECTIVES

- Immediate, complete, and unconditional withdrawal of Iraqi forces from Kuwait
- Restoration of Kuwait's legitimate government
- Security and stability of Saudi Arabia and the Persian Gulf
- Safety and protection of the lives of American citizens abroad.<sup>12</sup>

Noticeably absent from the list was perhaps our true vital interest—preservation of access to oil. Many coalition members had similar motivation. America's objectives also did not directly address a desire to balance military power in the region. This balance had significantly shifted in Iraq's favor because of its successful war with Iran. Finally, although rallying public opinion included branding Saddam Hussein "another Hitler," stated policy did not include his removal from power.

The JCS translated these political aims into four military objectives:

- Develop a defensive capability in the Persian Gulf region to deter Saddam Hussein from further attacks
- Defend Saudi Arabia effectively if deterrence failed
- Build a militarily effective coalition and integrate coalition forces into operational plans
- Enforce the economic sanctions prescribed by UN Security Council Resolutions.<sup>13</sup>

These initial objectives did not include forceful restoration of Kuwait's rightful government, if sanctions failed. This option would require the deployment of a significantly larger force, one that the United States could not, initially, move to the battlefield. The overall intent of deterrence and defense options was to confront Iraq with the prospects of unacceptable costs and a widened conflict with the United States.<sup>14</sup> Initially, this called for deploying a force at least equal to Iraq's that should have been able to deploy quickly.

### 3.

## MOVING THE FORCE IN DESERT STORM

*I can't give credit enough to the logisticians and the transporters who were able to pull this off.*

General H. Norman Schwarzkopf  
February 27, 1991, Riyadh, Saudi Arabia

Pre-hostility estimates suggested that a potential adversary's armor columns could reach defensive positions near the Saudi Arabian port at Al-Jubayl in just 4 weeks (19 days of pre-hostility buildup and 9 more days of movement to reach the objective).<sup>1</sup> To counter this threat, planners calculated that adequate forces would take at least 17 weeks to deploy—too late to defend Saudi Arabia, much less deter aggression.<sup>2</sup>

The Army's lead elements launched their deployment to Saudi Arabia on August 7 (designated as C-day, for the first day of deployment). This began Phase I of the fastest buildup and movement of combat power across the greatest distances in history.<sup>3</sup> Distances were immense—7,000 airlift miles and 8,700 sealift miles from the east coast of the United States. During that first deployment phase, which lasted from August 7 until November 8, the United States moved about 1,000 aircraft, 60 Navy ships, 250,000 tons of supplies and equipment, and 240,000 military personnel to the Gulf.<sup>4</sup> By historical contrast, the United States airlifted 168,400 to Vietnam in 1965, during the most intense 1-year buildup of that conflict.<sup>5</sup> In the first month of the Korean Conflict, America sealifted 79,965 tons of equipment and cargo.<sup>6</sup> We moved over 2½ times that amount—300,000

tons—during those first 30 days of the Gulf War.<sup>7</sup>

While impressive in gross terms, these numbers conceal that it took over 1½ months to get the first full heavy division, the 24th Infantry Division (Mechanized), in place. Nearly 7 months passed before a sustainable force, capable of offensive operations, was fully positioned, in large part because of transport limitations.<sup>8</sup> Hardly rapid!

On the other side of the coin was the success story of the afloat pre-positioning ships—particularly those of the Marine Corps' Maritime Pre-positioning Squadrons (MPS) that were completely outfitted with two Marine Expeditionary Brigades (MEB). Each squadron contains 30 days of supplies and equipment for a MEB of about 16,500 Marines. To deploy the Marines and marry them up with an MPS requires 249 C-141 sorties. Amazingly, it would take about 4,500 sorties to deploy a force of that size without the MPS ships. Arriving just 10 days after call-up, this was our most responsive means of delivering necessary supplies and equipment in the first days of *Desert Shield*.<sup>9</sup> The MPS ships took less than half the time to deliver their cargoes than if transported directly from the United States.

## A SYSTEMS APPROACH

The massive amount of cargo and people to be moved to any theater in war requires an automated systems approach to plan and execute deployment. The purpose of the strategic planning process is to produce a scheme that will effectively project the right blend of combat and support forces to a theater of operations—in time. Joint planners incrementally synchronize the movement of forces because there isn't enough transport to move them all simultaneously. Terminal ports would be deluged unless this *phasing* were accomplished.

Running computer simulations of the transportation requirements (forces and cargo that must be moved, and the time line for their arrival), and capabilities (strategic lift assets allocated and available) produces the sort of information that allows automation to manage deployments more simply. If the

simulations identify a transportation shortfall, planners devise ways to eliminate bottlenecks or redesign the plan to fit the limitations. Ultimately, they determine if forces will arrive on time and if support can be furnished.

Because the Saudi Arabian defense plan was not yet finalized, much of the deployment data had not yet been automated, so the deployment execution system was not brought on line as intended. Early in *Desert Shield*, most of the movement was managed manually; planners improvised, making up the force deployment list as they executed it.

Without having stood the test of the iterative planning process, or the benefit of fully functional automation to simplify the deployment, airlift and sealift did not operate at full capacity. Deploying units often didn't know where or when to meet their deploying aircraft, or marry up equipment with departing ships. This caused some planes to fly virtually empty or with low priority cargo, and single unit's equipment to be carried on multiple ships. Later, in the last mad rush to push troops into the theater, synchronization of troop and equipment arrival became low priority. The air war started with 30,000 VII Corps soldiers—a lucrative target—still waiting at the ports for their equipment.

Midstream revisions in the unit movement flow priority, caused by the constantly and quickly changing operational situation in Saudi Arabia, created havoc for the computers, not to mention the affected units and transport assets. Ask a transporter about the scene of converging units and cargo—often of unknown origin—that began to appear at air and seaports such as Dover, Jacksonville, Charleston, Savannah, and Bayonne beginning in mid-August. It was bedlam. Because of the no-notice nature of the conflict and the constantly revised prioritization of unit deployments, planning and execution were frequently simultaneous acts.

The magnitude of this operation required an automated means to turn on certain types of forces for deployment and turn off others. In an engaged theater, the operational situation changes

moment to moment, so our deployment system must have the capability to adjust accordingly. *But* at some point, changes to the unit deployment sequencing must stop. All deploying units are directly affected by the on-again, off-again nature of most deployments. And, as a senior *Desert Storm* logistician noted, "I found that the people I was requesting on Day One were not necessarily the people I needed most when they arrived on Day Six."<sup>10</sup>

When Iraq attacked Kuwait, the CENTCOM Commander quickly reviewed the bidding. With a focus on rapidly injecting deterrent combat power, it became clear to him that something had to give: There simply wasn't enough quickly available strategic lift to move the range of forces necessary to attain stated objectives—the requirement was greater than the capability. There was the very real threat that Iraq would exploit Saudi Arabia's vulnerability and continue the drive south. The theater commander had to figure out what he could live without for the short run to defend Saudi Arabia, and he decided that the answer was logistics. Thus, Schwarzkopf made the early decision to front load mobile combat units into Saudi Arabia. This order had tremendous impact upon movement.

## **EVERYTHING IN WAR IS HIGH PRIORITY**

Initially, most cargo-capable aircraft were flying into major deployment sites to move units. As the number of forces in Saudi Arabia grew, the logistics system provided more and more cargo for air movement. Because units at war are authorized to order supplies at the highest priority, the airlift system—flying only high priority cargo—was saturated and could not keep pace with demands. By December 1990, there were more than 7,000 tons of cargo on the ground at just one of the air hubs—Dover Air Force Base—exceeding total airlift capacity by sixfold. Despite efforts at the highest military levels to reduce the volume of cargo that requisitioners and shippers wanted to ship by air, the amount of cargo entering the airlift system grew.

The airlift system could not cope with the volume coming

into air bases. So there was no priority among the cargo—except first in, first out. The priority system was not accomplishing its purpose. Out of this chaotic situation was borne *Desert Express*—a new priority system within one that was floundering. It was modeled after commercial overnight air express delivery services. Initially, it entailed a daily C-141 flight from Charleston Air Force Base, flying whether full or not. When the plane landed in Saudi Arabia, it was unloaded and the cargo was put aboard waiting intra-theater aircraft for immediate delivery to the customer.

To ensure that further backlogs did not subvert the system, U.S. Transportation Command (USTRANSCOM) attempted to provide discipline by allocating pallet spaces to each of the Services. As forces continued to increase, and high priority requisitions grew, another *Desert Express* flight was added, and a *European Express* was committed when units began to arrive from Germany. Despite these attempts, the movement system remained clogged.

Movement of units in the desert, from one supporting organization to another, often resulted in the same supplies being ordered three or more times—all on high-priority requisition. By January 1991, the volume of air cargo was out of control. Ultimately, the Secretary of Defense had to activate the Civil Reserve Air Fleet (CRAF) Stage II, to acquire more civilian aircraft to haul the backed up air cargo. Strategic plans had long envisioned air hauling but 5 percent of all cargo—and only the highest priority. In the Gulf War, military and civilian aircraft hauled three times that amount—15 percent of all cargo.<sup>11</sup>

*This was certainly not a new experience for American forces. Within 3 three weeks after the Korean Conflict began, it became obvious that many of the lessons learned during World War II had been forgotten. More than one-half of the initial requisitions were listed as top priority. Because this priority required air transportation, large backlogs of shipments quickly accumulated in U.S. ports. Air cargo capabilities could accommodate only a fraction of the amounts requested. Flooding the supply system*



*with top-priority requisitions was self-defeating. Cargo jammed air bases in the United States and sat there for months, although it could easily have been delivered in less time by sealift. Two years after the start of the Korean War, an Army general inspected the port of Pusan. He reported that, despite prolonged hard work, one-fourth of the supply tonnage stored there had still not been sorted out.*<sup>12</sup>

## **CLOSING THE WINDOW OF VULNERABILITY**

In the initial stages of the conflict, there was just a thin line of Saudi forces along the border with Kuwait. Saudi Arabia would remain vulnerable until decisive, mobile power could arrive. Until these forces could be deployed, Saudi Arabia faced a window of vulnerability to the threat of Iraqi attack. As the curtain raised on *Desert Shield*, the theater commander's military options were limited by the time required to move heavy forces over significant distances. Available strategic transport could not meet his required delivery dates. Because of this, holding the key desert ports and airfields was weighed to be more important than closing logistical power into the theater of operations.<sup>13</sup> This decision, though apparently prudent, nearly became our Achilles' heel.

Allocating the most and the fastest strategic lift to combat units results in a force that is critically unsustainable for some period. It also throws an already complex operation—the synchronized buildup of a theater support structure—out of kilter. Our ability to rapidly deploy forces depends largely on strategic air and sealift and the capacity to throughput forces at ports of debarkation. In *Desert Shield*, the early preferential movement of combat forces delayed organizing theater support that future operations would dictate. Logistics forces necessary to clear ports and airfields, as well as ammunition handling and supply, were not available, which limited operational choices. Deployed units became tied to host-nation sources and the strategic lifeline. The initial support structure was built on an ad hoc basis.

Resulting impromptu design was then tied to a defensive posture. It was severely stretched when called on to support the offensive in Operation *Desert Storm* and showed early signs of fatigue after only 100 hours of intense combat.<sup>14</sup>

The first show of force units in theater, from the 82nd Airborne Division, lacked significant mobility, survivability, or sufficient firepower to match an Iraqi armored assault. In many ways they were no more than a speed bump in the path of the fourth largest army in the world. It was, however, one of the few forces that could deploy quickly enough to the region. Because the 82nd is lighter and less mobile than heavy forces, and normally deploys with only a few days of supply. CENTCOM planners believed that most of its requirements could be met by the host nation. When they arrived in Saudi Arabia, they created an immediate demand for resupply, but, with the deployment of the airborne division, the line in the sand was drawn.

One reality of modern warfare emerged: Forces poised for rapid deployment grow markedly when faced with a protracted conflict. (This observation has been further reinforced during our recent Somalian experience). Upon alert, steps were taken throughout the 82nd Airborne Division to increase on-hand equipment and supplies not normally authorized—especially additional antitank weapon systems. This added significantly to the transportation requirement and highlighted the propensity to rely on early employment of light forces instead of designing a rapidly deployable force with more firepower.

## **ONE HAND TIED**

Host-nation support requirements were heightened beyond original estimates because of the decision not to deploy the normal complement of XVIII Airborne Corps logistics elements until later. This result was not a surprise. America's military has a long tradition of tying one hand behind its back, logistically, and then wondering why we commit the same mistake in every war.

*Early in 1942, the strategic situation of World War II was*

*precarious. The Russians, long on manpower but short on equipment and supplies, were reeling under German blows. It was imperative for the Allies to keep Russia in the war and actively fighting the bulk of the German land forces. The urgent situation required the shipment of badly needed trucks, tanks, and guns through the costly northern supply line in the Persian Gulf. The Combined Chiefs of Staff decided that an attack would be made in North Africa in late 1942, and postponed the planned cross-channel assault—then known as Bolero.<sup>15</sup>*

*The United States was already preparing earnestly for Bolero and was committed to the shipment of available troops and supplies to the United Kingdom. The early concept of Torch, the North African operation, envisaged a joint British-American task force to be mounted from the United Kingdom. Considerations influencing the early plan were the availability of troops in Britain, the short line of communications from England to North Africa, the corresponding savings in shipping, and the reduction of vulnerability to submarines.*

*The plan's logistic disadvantages soon became apparent. Sufficient supplies were not on hand in the United Kingdom to completely support the American portion of the force. The available supplies were not properly warehoused and so were not totally useful. This resulted from too few American service troops to sustain depot operations in the United Kingdom. Preference had been given to the deployment of combat and construction troops and antiaircraft units to England. Because of a lack of logisticians, it was impossible to unload supplies from the United States, to segregate and store them, and to outload them for Africa.*

*Meanwhile, troops in the United Kingdom were completing their training, receiving their equipment, and moving to ports for embarkation. However, much of the equipment that had been shipped for these units could not be located in the British Isles because it had not been properly identified and stored, thus requiring duplicate shipments from the United States. This further glutted the already tenuous transportation network.*

Although the receiving capabilities of the North African ports and beaches were adequate, the Navy's inability to provide enough escorts for cargo convoys required a change in the operational plan, which meant that less cargo could be moved. In late September, two movement alternatives were presented: (a) Reduce the size of one British task force from 167,000 to 100,000, and provide full equipment and reserve supplies for all forces; (b) employ the original number of men and reduce the equipment for the U.S. task forces by approximately 50 percent, mainly in general purpose vehicles. Since the mission was originally conceived to be occupational, the second alternative was accepted.

After capturing initial objectives on the North African coast, the British Task Force turned east toward Tunisia. It quickly outraced its supply support because of the lack of rail and highway transportation. The rapid buildup of Axis forces in Tunisia and eastern Algeria forced the British to halt, consolidate their supplies, and await reinforcements. Railroads were single track and had little usable rolling stock. The decision to leave vehicles in the United States, based on a mission of occupation, proved inauspicious when it became a campaign of movement.

The North African campaign clearly proved that combat forces depend directly upon the capacity of their lines of communications. Early emphasis upon maximum quantities of combat troops and equipment at the expense of service troops and equipment had been faulty. Only after correcting this fault could the campaign be pressed to its successful conclusion.

More recently, as Joint Task Force 120 prepared to enter Grenada during Operation Urgent Fury, virtually no consideration was given to logistics. The 82nd Airborne Division's habitual support relationship with XVIII Airborne Corps' 1st Corps Support Command (COSCOM) was severed. In essence, this meant that most of the Army element's logisticians were taken out of the loop. Unlike other services that are predominantly self-supporting, Army divisions need a "slice" of logistical support to accompany them. While the 82nd

*could fight upon its arrival in Grenada, it could not sustain itself for more than 3 days. Of course, Grenada has become synonymous with ad hoc jointness because logistics was nearly totally lacking.*

*Finally, in the "will we ever learn" category: During our recent involvement in Operation Restore Hope, the Army's 10th Mountain Division (Light Infantry) initially deployed to Somalia. These light fighters faced a fate similar to the one the 82nd Airborne Division had met in Operations Urgent Fury and Desert Shield. The mountain division, expected to provide self-contained logistics, was initially ill-equipped to overcome the logistical nightmare of Somalia. Problems associated with the download of the pre-positioned ships and operations of the sea and air ports of debarkation were directly attributable, once again, to the late deployment of key transporters.*

If Iraq had continued its attack in early August, prior to U.S. presence, Saudi Arabia would surely have been lost. Sufficient American forces could not have been brought to bear quickly enough to defend it. Equally important, had Saddam Hussein chosen to invade Saudi Arabia *after* the first U.S. troops hit the ground, this light force—the only type in the Army that can be deployed by air—would probably have been quickly overrun. Only reinforcing with heavy armored forces that arrived weeks later diminished the force imbalance. In the future, we need forces with strategic and operational reach, plus the lethality to fight outnumbered and win.

Iraq's strategy of inaction, and the monumental efforts of deploying units, and military and civilian transporters, allowed the *window of vulnerability* to be narrowed by early October. The local commander was then satisfied that a successful defense could be mounted.

Time became an unforeseen ally. Deployment of forces necessary to execute this primary objective had taken nearly 2 months to complete. Fortunately, the threatened Iraqi assault never appeared. Ability to quickly overcome distance with a sizable force has always been an underpinning of U.S. strategic

success. In *Desert Shield*, inability to surge mobile forces *en masse* was our most insurmountable obstacle.

What are the implications?

- There are few places in the world that possess the wealth of resources comparable to the Gulf States. Yet even with this host-nation support, the absence of firm support agreements complicated planning. It placed U.S. and other coalition combat forces at risk when deployed without the full complement of their organic and supporting logistical organizations. As in the past, the fog of war affected the strategic situation.

- The intent of the military operation shifted from defense to offense to eject an invader. The early decision to deploy shooters constrained the effective establishment and ongoing support of the theater logistics structure.<sup>16</sup> An unsustainable force may be deployed for legitimate reasons. But the associated risks of failure in combat and inability to support continuous, lengthy operations, should be recognized.<sup>17</sup> Except when forced entry is required, units critical to the throughput of follow-on forces should be deployed first.

- Finally, light forces are not as light as advertised when facing a heavy threat. This leads to underestimating already critical strategic lift requirements within a system that is unable to meet the planned theater requirements (much less the unplanned).

## **BALANCED STRATEGIC FORCE AND MOBILITY**

The debate now wages over how we should restructure our forces. There are those who advocate lighter, more easily deployable forces, and others who argue for mobile, more survivable formations. We often frame force structure decisions by comparing the faster delivery times of air with those of the slower sea deployment. But, other than the light divisions, closing a ground combat force into most regions of the world will likely involve sealift, unless we have pre-positioned massive amounts of materiel. When logistical support is included in the

movement requirement, the deployment time difference between light and heavy combat forces is much less pronounced. Even the light fighters will require sealift. In fact, when the size of the force exceeds initial airlift capacity, the rapid deployability advantage of light forces almost disappears.<sup>18</sup> This advantage should weigh into the force structure calculus.

Today's force structure cannot afford redundancy, yet we must also avoid preparing for only one type of conflict. *Desert Shield* might not have become *Desert Storm* if the paratroopers of the 82nd Airborne Division had had to fight Republican Guard tanks without the M1 tanks and Bradley Fighting Vehicles of VII Corps.

Just as a threat-driven mix of light and heavy forces is essential, each leg of the strategic mobility triad must be balanced in order to provide America the power to respond aggressively to regional crisis. Sealift, airlift, and pre-positioning are mutually exclusive and bring distinctive and necessary traits to our movement arsenal. Airlift will always play the paramount role in delivering people and high priority cargo early. Sealift is the key to deployment of any force larger than one light Army division. Once the deployment requires sealift, the weight to be moved is less important than the early availability of capable ships.<sup>19</sup> Pre-positioning of the right supplies and equipment in or near crisis locations enables sharp reductions in response time and total required lift.

In the zeal to save defense dollars, however, some have suggested tradeoffs among components of the triad—for example, Air Force C-17 long-range transport planes for fast sealift ships, or vice versa. But, as the congressionally mandated *Mobility Requirements Study* of 1992 concluded, "To support national interests, deployment capability must increase through expanded investment in sealift, pre-positioning, and transportation infrastructure in the United States, and in sustained investment in aircraft."<sup>20</sup>

## SHORTAGE OF SURGE SEALIFT

Shortage of easy to load, roll-on/roll-off (RO/RO) fast sealift ships meant that the sought-after heavy combat units would have to deploy incrementally. Sealift shortages resulted in slow buildup of heavy forces during September and October.<sup>21</sup>

Within America, the decline of the shipping industry—ship building, manpower and shipyards—has led to reliance upon available allied and foreign flag shipping. For example, of the 359 ships that formed America's *steel bridge* to Saudi Arabia during *Desert Shield/Desert Storm*, 180 of the 212 chartered vessels flew foreign flags. Twelve ships were on loan from allies.<sup>22</sup> In planning for the future, there is danger that foreign ships will not meet military needs (RO/RO ships versus commercially preferred tankers) and may not be there when we need them most.

Since 1987, only two noncombatant ships have been built in America, leaving the United States with a shortage of merchant mariners. This widely recognized shortage would likely stifle unilateral crisis response. As we look over the horizon, these facts raise the question: Can America go it alone in sealift, as the 1987 National Security Council Directive 28 mandated? The answer is quite clearly *no*. If we seek global responsiveness, unconstrained by the international marketplace, renewal of American sealift is critical. The historical parallels are ironic. For some years prior to World War II, it had been recognized that a national emergency deployment would require large numbers of merchant ships. During the war, the availability of sealift set the tempo for deployments. Campaigns were often delayed because of the lack of merchant shipping. From World War II on, a reserve merchant fleet was built up. It was mobilized for both Korea and Vietnam, but by the 1970s, the ships, built mostly during World War II, were no longer viable. As long as the only important contingency was a NATO war, this situation seemed acceptable; materiel would be carried by ships of the other NATO allies, and even by important Asian allies such as Korea and Japan. However, the situation changed



radically with acceptance of the CENTCOM mission in Southwest Asia. There, the United States might well have to build up forces on its own. Allies might even deny it the use of their ships. After all, the NATO allies' record of assistance in U.S. military operations in the Middle East was less than encouraging.<sup>23</sup>

Other factors contributed to the slow pace of the deployment. One was the glut of *stuff* that piled up at piers and marshaling areas, virtual *iron mountains*, caused by lack of in-transit asset visibility through the transportation pipeline. Two views, from different conflicts, prove that our learning curve building up to conflict is as steep as our forgetting curve after conflict:

Lieutenant General Gen. William Pagonis, who commanded the theater's ad hoc 22nd Support Command, recounts that one of his biggest challenges was handling the thousands of containers throughout the Gulf War buildup. Shippers were intent to fill every 40-foot container to the brim to assure that ship capacity was maxed out—good sense because of the known shipping shortage. This practice, though, became a real drain on terminal resources. Most of the containers were intended for multiple consignees or were loaded with unidentifiable loads. Some 28,000 of the 41,000 arriving containers had to be opened pierside to find out their contents. Then, many were hauled 2,000 miles out into the desert just to find that most of their contents really belonged to units near the ports. Pagonis was caught on the horns of a dilemma. Shippers were trying to get as much cargo to Saudi Arabia as quickly as possible. The mission was being disrupted because port operators and truckers in the theater of operations were swamped.<sup>24</sup> This had a cascading effect that highlighted shortages of storage space, materials-handling equipment (MHE), and trained equipment operators. It also dramatically demonstrated what can happen when visibility of incoming cargo is lost. Ultimately, because units lost confidence in the distribution system, they submitted multiple supply requisitions on the same items. This reaction further choked the system and slowed the delivery of critical items.

A choked distribution system was symptomatic of a problem that has historically plagued logisticians. As the House Government Operations Committee concluded in 1970, "Supply support to Vietnam was at once a demonstration of superb performance and appalling waste."<sup>25</sup> Lieutenant General (Ret.) Joseph Heiser, who was Pagonis's counterpart for much of the Vietnam Conflict, agreed. *First with the Most* became a banned motto in Heiser's 1st Logistical Command. It represented, to Heiser, the philosophy that had created the logistical *mountains* to be found in Vietnam in 1968—almost 2 million tons—of which only about a third could even be identified.<sup>26</sup> No one makes the point more clearly than Heiser:

In three different wars, I've faced many different, serious logistics problems. In each war, because supplies were low or nonexistent or could not be located, we lost critical time getting the support required by the combat troops. The worst situation is to arrive at combat with an excess of noncritical items and a shortage of critical items. For five years we struggled to determine what we had on shore in Vietnam. By that time too much of it was left for the North Vietnamese. I hope they are still trying to sort it out!<sup>27</sup>

As in the Gulf War, the United States faced two logistical challenges during the Korean War. The first involved moving enough supplies and equipment to sustain the forces deployed to stop the initial North Korean offensive. The second involved the reconstitution of reserve stocks and continued sustainment of UN forces.

*Korean distribution was based largely on World War II experience. Initial shipments to Korea were rushed and normal procedures were mostly ignored. While a shortage of sealift ships forced the activation of the National Defense Reserve Fleet, ships moving from Japan and the United States jammed Korea's harbors, creating delays. With no discipline in the system, unnecessary cargo was often delivered while critical items waited to be unloaded. As a result, available shipping was inefficiently utilized. Some sat in harbors as long as 25 days; the average in-*

*port time during the Korean War was 22 days. Fortunately, the North Koreans never acquired active heavy duty naval craft with strong offensive capability. Early distribution to forward areas was complicated by rapid movements of combat forces and lack of associated transportation systems.*

## **AN INEFFICIENT DISTRIBUTION SYSTEM**

Like so many other aspects of the Gulf War movement epic, what was a heralded success story from one vantage point frequently obscured a known shortfall at another. This is a defining point to the theater commander's perspective discussed earlier. To the commander, it is inconsequential that gross amounts of tonnage are being off-loaded at the ports; he wants to know, "Is it the *right* stuff?" Like the difference between information and intelligence, the cargo we deliver must be meaningful to carrying out the commander's plan. If it is not, we are reduced to moving mountains of stuff!

The Gulf War was waged from an allied country with a magnificent logistical base. With ongoing U.S. assistance, the Saudi government has built a huge and modern complex of military installations. The terminal ports in Saudi Arabia are a transporter's dream. They are second to none in throughput capacity because the country imports nearly everything it uses, and the Saudis have built facilities for just such a contingency. Persian Gulf seaports at Ad-Dammam and Al-Jubayl are among the most modern in the world (e.g., Ad-Dammam can berth and off-load 39 ships simultaneously, including the gigantic fast sealift ships). Airports at Dhahran, Riyadh, King Fahd, and King Khalid Military City are equally impressive.

Can America deploy a similar force into developing countries with inadequate ports, or where access has been denied? Most worldwide ports could not have handled the types and volume of ships and planes offered up. For example, few seaports can berth a fast sealift ship because of its tremendous size. Future intervention thus may require a much slower alternate method of cargo discharge—such as over-the-shore, without the benefit of

a fixed port. This capability is rarely practiced on major exercises—particularly outside the United States—because of lack of equipment and shortage of trained people.

As spectacular as the Saudi ports are, our military found that the country had limited improved roadways away from the coast and almost no logistical infrastructure to sustain the gigantic inbound force. Saudi Arabia is half a globe away—with a climate and landscape notoriously inhospitable to humans and equipment. But the desert provided the most advantageous terrain to showcase U.S. strengths in armor and air power. The desert floor and wadis eased the tactical freedom of movement so essential to win the ground war.

## **GAINING AIR SUPREMACY**

Had Iraq been planning a follow-on attack, intelligence reports suggested the most likely avenue of approach was along the Saudi coast road. This high-speed road from Al-Khafji to Al-Jubayl and Ad-Dammam<sup>28</sup> seemed tailor-made for an armor attack. Such an advance would offer the most lucrative targets in the port complex, desalinization plants, oil refineries and other coastal facilities. Loss of, or serious damage to, the port facilities would have made any force buildup in theater extremely difficult. In many ways, this coastal port complex was Saudi Arabia's center of gravity.

If Iraq had taken Saudi ports, strategic access would have been denied to the allies, and Saudi Arabia would surely have fallen. Unbelievably, the enemy did not attempt to capture, disrupt, or destroy the port complex. As the coalition began massing ships, planes and tanks in Saudi Arabia, Saddam Hussein did little to respond. He took few steps to impede the coalition's preparations for war—there was no serious interdiction of the sea lanes or air routes. (Ironically, threats of releasing his terrorist "hit squads" sent a chill through the airline traveling public and freed up precious air transport assets for the deployment). He allowed the coalition to assemble, acclimate and train in Saudi Arabia for 5 months. Then, he allowed them to attack. His

inaction was often perplexing—but provided the coalition with an unexpected advantage. That a country would initiate a conflict, then passively wait for the other side to lose interest, is nearly unprecedented.

## THE LUXURY OF TIME TO DEPLOY FORCES

The key variables in movement are requirements (forces), capabilities (ships, planes, etc.) and time. By giving us time, Iraq minimized the effects of our capabilities' shortfall—but *we should not count on similar enemy strategy in the future*. As the weeks passed, Saddam Hussein showed no signs of abiding by the UN resolutions calling for his withdrawal from Kuwait. Operation *Desert Shield* appeared to have met its objective of deterring an Iraqi drive into Saudi Arabia. Kuwait, though, was still under Iraqi occupation. By mid-October, some 435,000 Iraqi soldiers, supported by more than 3,600 tanks, almost 2,400 armored personnel carriers, and more than 2,400 artillery pieces occupied Kuwait.<sup>29</sup> Besides other coalition partners, American forces then opposing those 27 Iraqi divisions in October, consisted of XVIII Airborne Corps (with 4½ Army divisions), I Marine Expeditionary Force, three carrier battle groups and one battleship battle group, an amphibious task force, and over five fighter and bomber wing equivalents.<sup>30</sup> Our ability to defend Saudi Arabia then appeared secure. Even with superior weaponry, however, coalition forces did not yet have the overmatching forces to drive Iraq from Kuwait.

The Gulf War was unique, as shown by the movement stage evolution:

- There was no enemy sea or air threat, which enabled freedom of strategic movement and allowed our forces to deploy to the region without disruption.
- This was to be a war fought in open terrain, well suited for coalition air and armor power, requiring significant and rapid resupply but allowing nearly uncontested convoy movement on limited road networks. With the advent of the Global Positioning

System, the key impediment to cross-country mobility—lack of identifiable landmarks—vanished.

- Unlike nearly any other scenario, the battlefield was to be free of noncombatants—easing unimpeded movement along otherwise congested main supply routes.

- The coalition knew generally where the enemy was, its numbers and disposition of equipment. The reverse was not true. This situation is best exploited by concentrating movement assets in concert with the advance of the battle.

- No enemy safe havens or sanctuaries were to be honored, minimizing potential diffusion of the sustainment effort.

- Though the battlefield was to be nonlinear, the battles would be set-piece and require the synchronization of combat power, movement and sustainment.

Compare this movement scenario with past conflicts, such as Korea or Vietnam, or to possible future ones in a regional setting. Obviously, the United States cannot be assured of such accommodating terrain, ports, freedom of movement, or enemy strategy in future conflicts.

The deck was clearly stacked in our favor. Iraq negated the key advantages it possessed, surprise and strategic geography. The UN embargo reinforced Saddam's intent to keep the Iraqi army in fixed positions. This minimized fuel consumption and wear and tear on its equipment. However, it did not free Kuwait. By quickly projecting a symbolic presence, we had engineered a delay. The static situation afforded America invaluable time for more movement—a strategic pause. Iraq's inaction opened the door to enable the joint force commander to inject an offensive potency. So, at the end of October, the National Command Authorities decided to increase force levels for deployment to Saudi Arabia, thus changing the strategic calculus. No longer was an equal force sufficient; to eject Iraqi forces from Kuwait an overmatching force would have to be employed. Ultimately, U.S. *expansibility*—the power to generate forces—provided the joint force commander the capacity to eject Iraq from Kuwait.

## **THE KEY TO VICTORY: A DECISIVE FORCE**

Many agree that our major error in the Vietnam Conflict was applying U.S. power gradually. The hope was that the enemy would realize what it was up against and sue for peace. Instead, North Vietnam used this gradualism to improve its strategic advantage. Post-Vietnam doctrine has focused on the fast concentration of American firepower to destroy the enemy's military power and will to fight. (At the strategic level, this fast concentration of firepower relies heavily on sufficient and rapid deployability, now wanting). For example, the latest version of the Army's doctrinal bible, Field Manual 100-5 *Operations*, recognizes that the American people "expect quick victory and abhor unnecessary casualties" and "reserve the right to reconsider their support should any of these conditions not be met." Senior decisionmakers remembered all too well the "underkill" approach that ultimately led to U.S. failure in Vietnam. They were intent that it not be repeated in the Persian Gulf. This required the employment of a decisive force. The impact upon movement was dramatic, and fortunately, the enemy allowed the time and freedom of access to make this strategy attainable.

At Cold War force levels, and with significant forward presence, the United States was readily able to exercise strategic leverage around the world. Today, force levels on the horizon make this unrealistic. What risks will America accept in one region to assure strategic reach to other theaters? While the lengthy Gulf War deployment may have appeared simple, imagine future deployments that could occur simultaneously and with no notice. Current surge lift capacity would be helpless to mount a decisive offensive formation in one theater, much less respond to multiple flashpoints.

## LEAN AND MEAN WE WERE NOT!

It took more strategic lift than estimated to transport forces to the Gulf War. This trend, established in Phase I deployments, only got worse during Phase II. While planning data have been called into question, deploying units simply took much more equipment and supplies to war than was anticipated in peacetime exercises.

To illustrate, in mid-October, U.S. decisionmakers pondered the potential for transition from the defense to deploying an offensive capability—a *second wave*—primarily from forward based units in Germany. Transportation planners were charged to quickly determine the time and lift required (almost exclusively by sea) to move an additional corps to the Middle East. Requirement estimates of 8 million square feet of cargo space were based on available type unit planning data. Planners told policy makers, "If the green light is given tomorrow, we can move the force by the 15th of January." This was, not coincidentally, the deadline date later established by the United Nations for Iraq's withdrawal from Kuwait. The decision was delayed, however, for 3 weeks, until the President's November 7th speech—wasting precious deployment time.

Despite the delay, transporters successfully moved over 8 million square feet of equipment and cargo by the mid-January set deadline. There was only one problem: They weren't completed—not by a long shot! Finally, by early March—after the conclusion of the ground war—all equipment was finally closed into Saudi Arabia. All told, about 15½ million square feet of cargo was moved as part of that second wave—nearly double the original estimate. To put this into perspective, imagine 130 football fields laid end to end, as far as the eye can see—about 9 miles. Now envision those fields filled with bumper-to-bumper and door-to-door equipment and cargo. This provides a sense of just the additional gear—that above the planned requirement—added to the deployment burden. Critical to this planning, though, was that there was no distinction made between deployment to a protracted scenario—such as the Gulf War—versus a short one, like Grenada.



#### 44 MOVING THE FORCE: *Desert Storm* and Beyond

---

*Desert Shield* splashed reality in the face of the American forces' lean and mean delusion. It is very easy now to suggest that the deploying units should not have been allowed to inundate the movement system, but units believed that this was to be protracted war in a bare base environment—and they took action to fill real or perceived shortfalls accordingly. Without effective control mechanisms in place and accurate identification of lift requirements—both for long and short scenarios—deploying organizations will clog the transportation network. Commanders want to take everything necessary to survive and win on the battlefield. Because the transportation requirements determination process does not effectively differentiate between exercise and actual crisis response movement, nor between long and short scenarios, the *real thing* was sluggish instead of a seamless flow.

These problems are not new! The simple comments in World War II's *Final Report of the Army Service Forces* speak volumes to our continuing inability to resolve the requirements determination problem:

War is unpredictable and does not lend itself readily to precise long-range planning; however, a better system must be developed for estimating troop requirements and anticipating the deployment of units—one that will provide the logistician time and a firm basis for producing munitions and equipping the forces needed to implement strategic and operational plans.<sup>31</sup>

On November 8, Phase II deployments began with the President's announcement that the theater would be reinforced by approximately 200,000 additional military personnel. So what already had been done once now had to be repeated. Most of the forces deployed during the second wave were forward based in Germany and thus were closest to the pending fray—with a truly viable forward presence. These included VII Corps headquarters, two armored divisions, and an armored cavalry regiment. (Ironically, many of these were deactivated immediately upon war termination and redeployment). Other American forces moved during this phase included over 400 U.S. Air Force

aircraft, three carrier battle groups, a battleship battle group, and the 1st Infantry Division (Mechanized) from Fort Riley, Kansas.<sup>32</sup> (The strategic dichotomy of deploying forward based units as well as those stationed in America's heartland, did not go unnoticed. Base locations such as Fort Riley and Fort Carson, Colorado, and others are strategically inefficient because they add the significant leg of continental United States movement. While these posts served a useful purpose in America's westward expansion, they are not well suited for today's quick response deployment of heavy forces). With the deployment of these forces, there could be no doubt that the coalition was readying to go on the offensive.

## **FORWARD BASING AND PRE-POSITIONING**

Forward basing of forces and pre-positioning of equipment and supplies were critical to our employment of an offensive strategy because they partially offset the requirements for greater strategic lift. The forward presence of over 300,000 U.S. forces in Europe, as well as the four divisions' pre-positioned equipment, had camouflaged the previous strategic lift shortfall. The value of forward basing combat power in strategically located areas was proved in this instance.

Are we in for trouble in the future? Since the conclusion of the Gulf War, the Army has decreased forward basing from nearly 40 percent of all Army units to less than 20 percent. Simultaneously, large-scale amounts of pre-positioned equipment and supplies have been removed from forward sites in Europe. We can no longer count on the transport slack that pre-positioning large scale amounts of equipment and supplies afforded us in NATO. The global demands of regional focus and reduced forward basing will yank this slack instantly taut. A tough movement situation has gotten worse.

By mid-January, all units that were to participate in the liberation of Kuwait had arrived in Saudi Arabia or were en route. The movement stage was set. The total U.S. movement

effort to the Persian Gulf was impressive. By all modes, transporters moved:

- Four million tons of dry cargo—about the weight of 40 modern aircraft carriers<sup>33</sup>
- 31,800 tons of mail—that would cover 28 football fields in mail 6 feet deep<sup>34</sup>
- 12,435 tracked combat vehicles and 117,157 wheeled vehicles<sup>35</sup>
- Over 41,000 containers that, if laid end to end, would have stretched 188 miles<sup>36</sup>
- In excess of 6 million tons of petroleum products
- Over nine divisions worth of troops (about 560,000) and equipment.<sup>37</sup>

The coalition's intense air campaign was launched on January 17, 1991, and the "thunder and lightning" of Operation *Desert Storm* had begun. The campaign wore down the Iraqi military, taking away their ability to detect mounting movement of massed coalition forces in what Gen. Schwarzkopf called the "Hail Mary play." Lt. Gen. Pagonis, who engineered much of the movement, best captured the unparalleled scope of this operation:

Simply put, the two Army corps and all their equipment had to be trucked westward and northward to their jumping-off points for the assault. VII Corps was trucked 330 miles across the desert, and XVIII Airborne Corps leapfrogged more than 500 miles west and north. This required us to assemble a fleet of nearly 4,000 heavy vehicles of all types, many of which had to be contracted for. Just before the ground assault began, peak traffic at a checkpoint on the northernmost of these supply routes approached 18 vehicles per minute, seven days a week, 24-hours a day. This volume of traffic was sustained for almost six weeks.<sup>38</sup>

## **TRUCKS ARE POWER**

Although the Army deployed nearly 75 percent of its truck companies in support of only 25 percent of its combat divisions, there was still insufficient ground transport to move the force.<sup>39</sup> Many believe that had the war gone longer than 100 hours,

combat operations would have come to a quick halt until the logistical tail caught up.<sup>40</sup> While supplies were then more plentiful in the theater, the ground transport was insufficient and lacked necessary mobility for a quickly moving force. Former Secretary of Defense Les Aspin suggested that by the end of the 100-hour ground war, "We were pretty much at the end of our string in being able to fight this thing."<sup>41</sup> Historically, armored and mechanized battles and campaigns have been slowed or even halted due to the inability of support forces to provide adequate fuel and ammunition resupply—exacerbated by the steady increase in requirements of these battlefield commodities since World War I. Even in our most recent operations, such as *Restore Hope* in Somalia, prioritization of competing requirements was a problem that transcended all other facets of the operation. Our long-term experience dictates the early, high-level emphasis on theater combat service support force requirements and their prioritization as theater imperatives rather than as mere competitors for apportioned lift.

*Whether irony or a forgotten lesson of history, we nearly met the fate of so many in the past. A similar circumstance had defeated another desert warrior in North Africa in 1941—Field Marshal Erwin Rommel was outfoxed by logistics. He pumped plenty of combat power into the port at Tripoli, but continued to overextend resupply lines. Only about 10 percent of Rommel's fuel requirements for his tanks was delivered during the critical days when the fate of North Africa hung in the balance. What he needed could have been delivered. This was proved the next year when German equipment and supplies poured into Tunisia in response to the American landings in Africa, but it was too late. Rommel's promising opportunity for decisive victory evaporated because transportation had been badly planned, and clear organizational channels for logistics support had never been established. There simply were not enough trucks to sustain the fast paced offensive. Supplies piled up at the wharves while shortages grew at the front.<sup>42</sup>*

*Who can forget Patton's pursuit of retreating German forces*

*through France in the late summer of 1944? Patton's Third Army (interestingly, the forerunner of the Army's Gulf War contingent to CENTCOM) was seizing everything in sight. It was spread over a 700-square mile area extending from the port of Brest in the west to the banks of the Seine River in the east. Initially, Third Army had accomplished in 19 days what planners had thought would take at least 75. A logistical halt was to occur, but the opportunity for greater gains convinced Supreme Allied Headquarters to continue. The pace grew faster and snowballed—some would say out of control. On September 12, General Patton's advance came to a halt due to lack of fuel, ammunition, and the transportation to distribute those supplies. The breakneck pace, length of required sustainment, and inaccurate consumption estimates had clearly caught planners by surprise. Ironically, it had been Patton who had defeated an initiative to add a supply battalion, equipped with 96 2½-ton trucks to each armored division. Patton's shortsightedness returned to haunt him.<sup>43</sup>*

Most modern American military trucks were designed for the Cold-War European scenario, where road networks are prevalent in nearly every square kilometer. They are incapable of moving off-road in a theater with not much more than a dirt track road system. During the Army's armor modernization of the 1980s, its transportation fleet had not kept pace. In the zero-sum game of defense spending, we had bought more tanks and fewer trucks. Nowhere was this more apparent than with heavy equipment transporters (HETs). It was argued that Europe had plenty of railroads to carry tanks eastward to combat areas, so the few HETs in the inventories of the Army and Marine Corps were relegated to evacuating disabled tanks. Our Gulf War Army divisions had an average of only six tank transporters apiece (compared to over 350 M1 tanks assigned to each of these divisions). While the Army was able to acquire the support of others, it had only 112 of its own HETs available in the theater, and the Marines but 34 (compared to Iraq's 5,000+ tank transporters).<sup>44</sup>

In Saudi Arabia, HETs saved us from two major problems: First, wear and tear on our tanks, second, wear and tear on the fragile roads. If our tanks were driven on the 120° hot roads, for example, the resulting damage to the roads would have made it impossible to move the precious logistical bases up to the front. The mountains of supplies would then have continued to pile up at Dhahran. The theater Army's head logistician explained:

Logisticians are paid to look at reality. We might not have made it in the Gulf without the HETs that Saudi Arabia, Germany, Egypt, and the Eastern bloc so generously provided. In how many contexts can we count on our allies, let alone our former Warsaw Pact adversaries, to equip our armed forces?<sup>45</sup>

Also troubling was that most trucks deployed had very little off-road mobility and were ineffective in moving supplies over long distances in the desert. This constrained the fast-paced forward offensive of the ground campaign. Trucks designed for the German autobahns did not fare well on the sandy desert wadis, and there weren't enough drivers for the round-the-clock operation. Peacetime manning had reduced many transport battalions to 60 percent of authorized personnel.<sup>46</sup>

The much anticipated coalition ground campaign began on February 24, massively moving to reclaim Kuwait and deliver a devastating defeat to the Iraqi Army. Prompted by the widespread destruction, President Bush declared a cease-fire on February 28, only 100 hours into the ground war. Stated political and military objectives had been attained—an apparent victory!

## 4. MOVING THE FORCE IN FUTURE CONFLICTS

*Preparation for the preservation of our freedom must come in peacetime, and we must pay for it in money and inconvenience. The alternative is payment in blood and extinction.*

General Brehon Somervell  
U.S. Army Services Commander, World War II

Had Saddam Hussein been a good military tactician, he could have manipulated our weaknesses and caused a prolonged, costly battle much longer than the 3-day routing. Future enemies need only exploit the lessons of the Gulf War to disrupt America's deployment and sustainment by:

- Capturing, disrupting, or destroying rival ports to slow or eliminate U.S. ability to close and sustain equipment and forces.
- Mining harbors to prevent amphibious assaults or over-the-shore cargo discharge, taking advantage of American weakness in mine clearing. (At sea, the lack of U.S. minesweeping ships may have been a factor in our decision not to stage an amphibious landing into Kuwait.)<sup>1</sup>
- Interdicting sea and air lanes to bottle up the movement flow of U.S. forces and equipment. (Iran recently bought three Russian submarines, with an option to buy two more).
- Employing nuclear, biological, or chemical weapons on ports and main supply routes.
- Taking first strike action and follow through, before the United States can deploy forces.
- Employing terrorism or other means to destroy or disrupt

key American ports, intermediate staging bases and coalition ports.

*To avoid these pitfalls*, U.S. strategy will have to face these new realities:

- Geography separates America from most of our vital interests by long distances over water, requiring a viable means of long-range strategic lift.

- Crisis response strategy requires more strategic lift that can quickly surge, and the ability to place necessary war materials nearer to a potential battlefield. We had to rely on others during the Gulf War; their assistance may not be available the next time around.

- The United States will never have enough lift for all scenarios, but the U.S. role on the world stage demands sufficient capability to project a decisive force to at least two regional flashpoints in time to ensure success.

- To save cost and lives, we will need to go with enough force to get the job done quickly.

- The defense budget will continue to shrink.

- Pressure will increase to find economies of scale to save acquisition and transportation costs.

- Few regional scenarios have sufficient infrastructure to support U.S. force requirements.

- The value of information, communication and space systems will play a critical role in optimizing the global transportation network.

- Americans will work more closely with our allies in intervention operations.

- Increasing the distances forces must travel increases the transportation requirement. As forward presence decreases, the likelihood of strategic deployment from the continental United States increases. Surge lift—quickly available transport—will thus take on ever increasing importance.

- It is not economical for the civilian transport industry to maintain a capacity to move massive amounts of heavy military equipment—a requirement without commercial application.



America's next conflict may not call for the full mobilization of the armed forces. So, unlike the Gulf War, we cannot expect to rely so heavily upon commercial transportation to support future deployments. Only increased organic military transport can meet this challenge.<sup>2</sup>

- The capability to deploy sufficient forces quickly provides an early response to crisis. This early response will reduce the forces required later, when more lift options may be available to deploy them.<sup>3</sup>

- The duplicate supply systems among the Army, Navy Air Force and Marines complicated and slowed the movement flow. Such inefficiencies and redundancies, if not corrected, will plague us again in future operations, at the expense of timely deployment and effective sustainment.

- Our *Desert Shield/Desert Storm* success, as in past conflicts, was accompanied by inefficient logistical, particularly movement, practices. Too much was accomplished by placing a terrific strain on a tenuous movement system. Not enough can be attributed to sound organization and efficient procedures.

Compared to the Cold War model, there is a paradigm shift in the type of conflict we can expect to encounter. This commands a major change in our framework for moving and sustaining forces, and the mobility tools we will use to project that power. Transportation has been, perhaps, the most frequently limiting factor of modern war, including our recent endeavor in the Persian Gulf. There's always been the hope that on the day of reckoning everything would somehow come together. As national security strategy evolves, the United States will have less warning time to react to regional flashpoints. America will rely more acutely than ever upon viable strategic and operational mobility.

## **THE AFTERGLOW OF *DESERT STORM***

The basis of this nation's defense—a U.S.-Soviet confrontation—has disappeared. In its place is a host of potential regional flashpoints, and domestic agendas throughout Europe

and in the United States have altered previous priorities.

In the afterglow of *Desert Storm*, the United States may be lulled into a false sense of security, but the reasons that brought us together will rarely exist in the future. Our regional military alliances, no longer challenged by the Soviet threat, may fail to provide a reliable basis for strength, and the United States should prepare to act alone when vital national interests are at stake.

In any regional scenario requiring the intervention of a tailored military force, the key to eventual success is the ability to arrive in a logistically immature theater before hostile forces and to self-sustain for a reasonable period and fight—or make peace—immediately. But the Gulf war was unlike past conflicts, in which the United States had time to organize adequate support bases or had the convenience of established regional presence, the Gulf War was different. Although the region had been the focus of strategic planning since the fall of the Shah of Iran 1979, there was no American presence to speak of. The Gulf War model probably more closely resembles what the United States can expect in future conflict, as forward basing decreases. To that end, the times ahead will not be business as usual:

- American forces will need to be more mobile, flexible, lethal, and sustainable from long distances, in moving past a global strategy that focused on *containment* to one of rapid response to a regional crisis. While the threat may be harder to define, the essential elements of global reach are not. Smart planning and efficient spending can overcome the challenge of achieving these capabilities, within the bounds of decreasing budgets, reduced force levels, and shrinking forward basing.

- To break the traditional military spending mold, the focus of the national power lens should be fixed on potential economic gains, not just military threats. Uniquely among the elements of mobilization, strengthening military movement capacity directly contributes to the well-being of the nation. Renewing infrastructure—highways, ports, and railheads—increasing manufacturing—ships, aircraft, and trucks—and exploiting transportation technology, all create jobs and help grow our

nation's economy.

- Preparations should continually improve ways to save transportation, acquire additional lift platforms where absolutely necessary, and adopt techniques to lighten the cargo load. In these ways we could also reduce inventories—reaping tremendous procurement and warehousing costs savings. This will require a new approach to integrate disparate elements into a balanced and unified mobility strategy. We cannot afford to relearn the logistical lessons of the past—including *Desert Storm*—by repeating the same mistakes through omission or commission. The work of Gulf War logisticians—particularly transporters—was truly miraculous. But we must not continue to flounder in crisis, as we have historically done. We can no longer afford it.

A security strategy based on our ability to respond quickly to any regional crisis relies heavily on rapid global reach for its viability. The growing military threat posed by many developing nations would probably exceed current U.S. mobility power, especially if the United States faced two regional flashpoints simultaneously. (Such was the conclusion reached by the *Naval Logistics 2001 Wargame* conducted in January 1994.) America must bridge this requirement-capability gap to enable intervention where and when necessary—while saving cost, time, and potential casualties.

## **IMPROVING STRATEGIC SURGE LIFT AND PRE-POSITIONING CAPABILITY**

Limited strategic lift and pre-positioning constrain the number of forces that U.S. leaders can send to a crisis area quickly. Of the power that theater commanders need most, strategic lift ranks at or near the top of their critical items list. Because the United States will probably not have enough forces immediately on the scene of future conflicts or other nontraditional missions, strategic lift will determine the scope and duration of our commitment. This dictates balanced intertheater mobility—with increased forward deployed equipment and supplies, additional fast sealift capacity, aircraft that can operate from unprepared sites, and

continued civil air access. Cost-benefit and risk analysis, and the warfighting CINC's needs assessment, are guiding considerations for improvement.

The actions taken during the first 2 weeks of a conflict are crucial to preventing the enemy from gaining key theater objectives. Swift political action and the demonstrated ability to move forces eases the task of regaining lost territory and, ultimately, defeating the enemy. Because they significantly shorten deployment times, pre-positioning and airlift can best minimize that early risk. Rapid deployers, if equipped with overwhelming lethality, can hold the line while we build a decisive force capable of offensive operations. Sealift best addresses this need.

### **Pre-positioning**

Short of forward-based forces in the theater of operations, afloat pre-positioning provides essential quickness, strategic agility and flexibility to swing to different regional scenarios. Afloat pre-positioning is less costly and better able to close heavy forces than airlift. It provides a low-keyed, but ever-ready response to crisis. Often overlooked, this may be the simplest way to gain necessary strategic leverage. Land-based pre-positioning could make a big difference if close enough to the fray. It more likely would provide the edge in building up a decisive force.

Pre-positioning unit equipment requires designated units possess at least two sets—a budgetary nightmare during normal times. But, as we downsize, enough equipment should become available to pre-position. For afloat requirements, ships should be obtained through short-term renewable lease with U.S. firms. Avoiding outright purchase will require a much smaller capital investment.

Afloat pre-positioning advantages abound. The transportation savings of both time and lift are tremendous. Land-based pre-positioning may require the permission of the host-nation to withdraw in a time of crisis, and in many scenarios the permission may not be guaranteed or may sacrifice valuable

warning time. Conversely, at sea pre-positioning would remain in American hands and allow the U.S. to commit the equipment to other theaters. In short, the flexibility and speed afforded by afloat pre-positioning fit perfectly into a strategy requiring quick response to regional crisis.

### Sealift

America's maritime industry, once a formidable national resource, now relies on allied and foreign-flag shipping. Without coordinated government and private sector reinvigoration, the United States will possess limited ability to decisively respond to crisis via sealift. Past policy has been to maintain a few select units on fully mobile status and require the rest to use largely inactive sealift. The current state of the American maritime industry, along with the National Military Strategy's requirement for rapid global agility, renders this inviable. Lessons learned from the Gulf War, coupled with the follow-on *Mobility Requirements Study* (MRS), have generated enough momentum to begin to scratch the surface in shipbuilding. The MRS indicates, however, that standing pat will result in a further 15 percent reduction of available sealift by 1999.<sup>4</sup> If this continues, the future feasibility of deploying a heavy ground force and ground-based air forces to a distant battlefield is almost nil. As the warfighting CINCs have pointed out to Congress, "Forget about supporting two major regional contingencies." This essential element of national power is now dormant, with no new strategic sealift construction in over 30 years.

Without a viable merchant fleet, the United States cannot maintain the merchant mariners needed to crew whatever ships it buys or charters and cannot maintain the shipbuilding and ship repair industries necessary to maintain the largest government-owned fleet.<sup>5</sup>

There are several reasons for the decline of American-flag shipping, which has fallen to 4 percent of all U.S. commerce.<sup>6</sup> Dwindling economic markets and skyrocketing operating costs have forced U.S. shippers to register their vessels under foreign

flags, to take advantage of lower labor and other costs. Additionally, the commercial shift has been toward more and larger container ships, which comprise about 70 percent of all commercial shipping. The military has not embraced these container ships, resulting in fewer U.S. flag carriers, fewer shipyards, fewer merchant mariners (whose average age is now over 55 years), and fewer ships suited to handling military cargo.<sup>7</sup>

A balanced approach to revitalize the maritime industry is necessary:

- Acquire existing RO/RO ships with Maritime Administration acquisition funds.
- Construct modern diesel-propelled RO/RO ships in U.S. shipyards with funding already appropriated by congress for strategic sealift.
- Refurbish and renew the Ready Reserve Force (RRF) fleet. This sustainment fleet, with too few militarily useful ships, provided lackluster performance during the Gulf War (of the 74 RRF vessels activated, only 22 met their recall times), and the trend continued during the *Restore Hope* mission to Somalia, during which two of the nine RRF ships deployed were significantly delayed en route with mechanical problems.
- While nothing will help the merchant marine like an increase in U.S.-flagged ships, a merchant marine reserve will ensure sufficient seamen are available during crisis. Additionally, a tax incentive along the same lines as a recently announced British plan is needed to energize the nearly depleted merchant marine; under the British plan, once at sea, sailors and their employers are not liable for federal taxes.

We now organize for emergency sealift one way and for emergency airlift another. Perhaps we should standardize the two. Most U.S. military airlift is performed by reservists drawn from the civilian airline industry, and emergency capacity is provided by civilian airliners of the Civil Reserve Air Fleet (CRAF) and chartered civilian airliners. There is no vast fleet of idle government-owned airliners waiting for an emergency. In the case of sealift, the contention is that voyages are so long that

the civilian shipping industry could not quickly divert a large portion of its strength to meet an emergency; airliners can be diverted much more quickly. However, does that argument validate the rationale that it is uneconomical for the United States to maintain a sealift capacity—similar to CRAF—that could pay at least partly for itself? Realistically, we may be able to call on only a fraction of the overall shipping fleet immediately, but the rest of the fleet is valuable insurance against losses. That Iraq made no attempt to intercept or destroy shipping bound for Saudi Arabia should not delude us into believing that such action is not possible in future crisis.<sup>8</sup>

### Airlift

Changing world geopolitics and an aging military air fleet point to the need for improved airlift. The workhorse of the Air Force fleet, the C-141, flew a year's worth of service life in only 7 months during the Gulf War.<sup>9</sup> The wings have been, quite literally, flown off the C-141 fleet. Many of the planes have been grounded for overhaul and were unavailable when needed for recent operations in Somalia and Egypt.

An answer to our rapidly aging C-141 fleet is the C-17. Although subject to controversy since development, the C-17's unique capabilities cannot be matched by recently proposed civilian substitutes. By design, it can bypass congested destination airfields and move large quantities of supplies and equipment directly to forward areas. It is estimated that the C-17 will increase access to over 6,000 airfields worldwide that are currently inaccessible to C-141s and C-5s—an approximate 300 percent increase. This means more versatility in responding to crisis and greater speed in closing a force into a bare base theater. For example, recent estimates show that if the C-17 had replaced the C-141 during *Desert Shield/Desert Storm*, we could have met our airlift deployment requirements 20 to 35 percent faster.<sup>10</sup> Similar analyses of the Somalian *Restore Hope* operation indicate that—had the C-17 been available for cargo movement—it would have improved the level of throughput by

41 percent; it could have delivered cargo more effectively by making use of a number of smaller airfields. The aircraft's lower manpower requirements, reduced operating costs, and exceptional ground maneuverability make the C-17 an efficient and effective choice to provide high-capacity strategic mobility and tactical forward airfield delivery.

The CRAF program is based on military accessibility to U.S. commercial air carriers, who maintain modified aircraft in the fleet for considerably longer than 5 years. Today, over 30 percent of the U.S. commercial air fleet is leased, and this could reach 60 or 70 percent within the next 10 years.<sup>11</sup> Leasing provides airlines greater flexibility to change aircraft types and saves large capital costs associated with purchasing aircraft. Like the shipping industry, increasing segments of the aircraft industry—through expanding ownership of flying or leasing firms—are controlled by foreign corporations. These facts raise the specter of further decline in the CRAF, since foreign-owned aircraft are excluded from participating. In addition, the flexibility inherent in the leasing option will work against fleet stability that is so essential to CRAF.

The needs of the airlines no longer parallel those of the national defense. In crisis, can the United States rely on the provision of commercial aircraft controlled by the corporations of other nations? What occurs in board rooms around the world will inextricably control our ability to conduct independent military action.

## **THE BROKEN LINK BETWEEN INDUSTRY AND GOVERNMENT**

An underlying current emerges. America's contingency transportation capacity has become a hostage to domestic and international economic forces that have little to do with the realities of national defense. There is no mechanism in place to maintain the essential link between industry and government, but our ability to adequately respond to future crises relies on re forging this link.



Service advocacy has frequently hindered acquisition of strategic lift assets, to wit: Airlift and sealift are not the stuff of Air Medals or Navy Crosses. Weapon systems—carriers and fighters—have usually taken primacy at the expense of strategic mobility.

As we drawdown, and the competition for acquisition dollars grows, the Services will naturally gravitate toward supporting high-tech weapon systems. Why not take the burden of Service parochialism out of the strategic mobility equation by passing budgetary responsibility for strategic lift to the U.S. Transportation Command? Vest that command with the responsibility to prepare, justify, and execute a separate mobility budget line.

## **INTEGRATING OPERATIONAL TRANSPORT INTO THE MOBILITY STRATEGY**

No capability requires bolstering more than the wide spectrum of operational transportation. This is where the rubber meets the road for the warfighting CINC. Many necessary improvements extend beyond the foxhole, all the way to the producers and depots. An overarching battlefield distribution system that integrates in-transit asset visibility of cargo in the transportation pipeline, increased and improved ground lift capability, and smarter allocation of transport resources is necessary. For instance, what good is knowing where the goods are unless we have enough trucks to get them to the customer units?

### **In-transit Asset Visibility**

Our distribution system, which includes supply and transportation, is based on Cold War thinking and antiquated technology. In the Central Front scenario, units knew exactly where they were to locate, where they would draw their support, and over what routes and by what schedule they would move—everything was neat and predictable. Well, things have changed.

Progressing from a Cold War supply point logistical system that relies on getting the goods to fixed locations, to one that is distribution based, would focus on getting the goods to customer units, wherever they are at in the theater of operations. To accomplish this, though, logisticians must know where critical supplies are and direct them where most needed. Otherwise, we will continue to do no more than react and improvise, instead of anticipate support requirements.

The battlefield is mobile and transitory, and that is America's warfighting strength—but our logistics hasn't quite caught up. When units move, we don't use available technology to track and update their actual battlefield locations. With this meaningful information, updated through secure satellite links, battlefield distribution can become seamless, not accidental. Without it, we are reduced to aimless movement, like the mailman trying to guess where you've moved without a forwarding address. In *Desert Storm*, those thousands of containers filled with undeliverable goods proved to be a vast waste of resources we cannot afford in the future.

Many believe that Gulf units lacked supply discipline. Critics allege that because of repetitious supply ordering, the distribution pipeline became glutted. While duplicate requisitioning did occur, mere mention of this hides the important truth: Units lost confidence in the distribution system to deliver the goods. Unlike combat operators who were deluged with information, logisticians thirsted for it. Without timely and accurate requisition status, up-to-date unit location information, or sufficient ship, aircraft, and container manifest visibility, logisticians could not optimally support battlefield operations. The former commander of the Army Materiel Command, General William G.T. Tuttle, Jr., (Ret.) described it well:

We could get parts to the arrival ports, but there we lost asset visibility. We have done little to improve our distribution process since Vietnam, and we have seen similar—though not as poor—results on other occasions. *We should tolerate this no longer.* United Parcel Service and Federal Express can tell you

precisely where your package is located in their system at any given time. Similar processes could be applied to track combat-essential components or even to monitor the location of entire units.<sup>12</sup>

Today, shippers around the world expect not only dock-to-dock service, but transportation tracking from producer to consumer. In world shaping matters, America's military should not accept less. To produce total asset visibility of critical cargo items through the transportation pipeline, the needs of DoD must merge with the available distribution technology of the civil sector. Otherwise, we will be left, once again, to lost confidence in the distribution system and moving *mountains of stuff*. Tuttle's battlefield movement scheme would

employ satellite systems, and querying transponders on each shipment unit that would relay time-tagged locations to digitized map displays in movements management centers and report unit movements to command posts. Each shipment unit would have its unique identity. The movements management teams could then forecast arrivals reroute convoys around enemy action or obstacles, or take other actions necessary for the reliable delivery of cargo or units, all through position control. This process applies equally well to the strategic deployment and sustainment systems.<sup>13</sup>

The cost to get this system up and running will be high, but the rewards in logistical support to the warfighting CINCs, inventory and storage cost efficiency, elimination of support redundancies, and improved sustainability will quickly overshadow the initial sticker shock.

### **Joint Theater Movement Control Agency**

Future conflicts will be short-notice ones requiring quick and lethal response. There will be no time to get things organized, so to win, forces must hit the ground running. Because no service can effectively prioritize the needs of another service, efficiently allocate all transportation on land, sea, air, and inland

waterways, or arbitrarily deconflict movement access or priorities, a Joint Theater Movement Control Agency is necessary. This movement agency would:

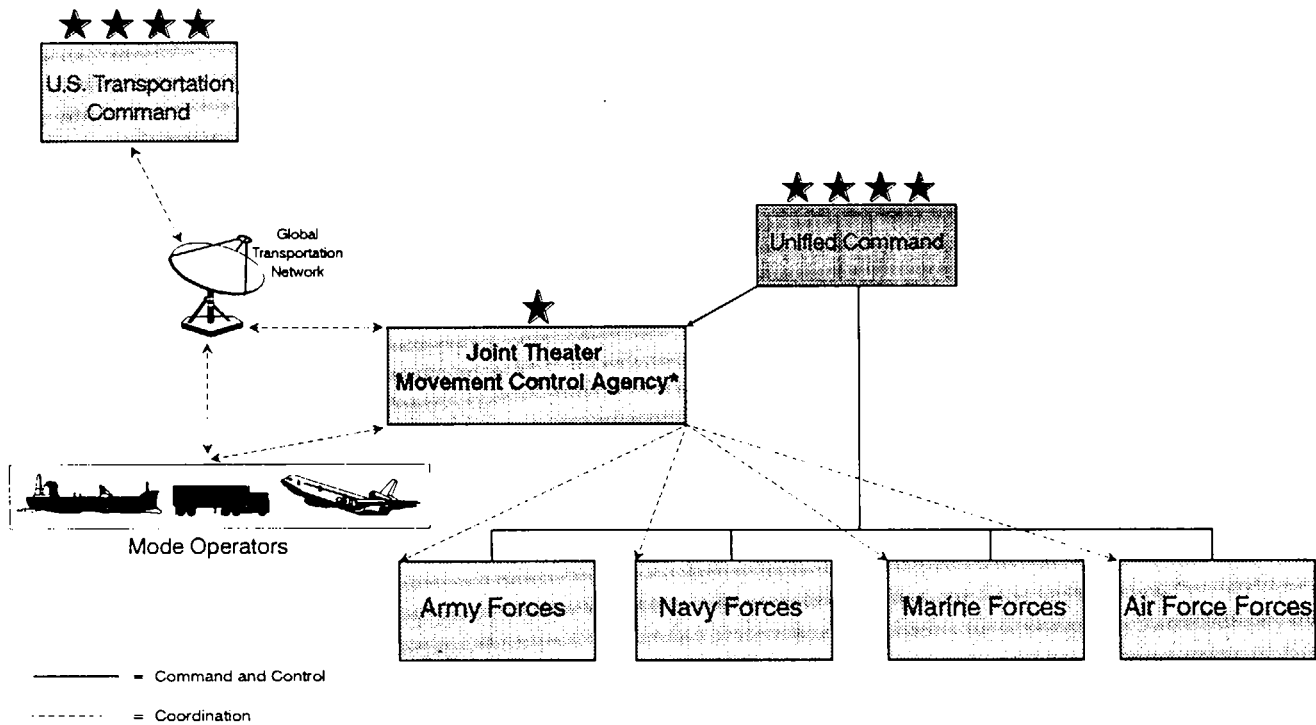
- Provide interface with the U.S. Transportation Command (USTRANSCOM) to maintain in-transit visibility of units, personnel and equipment through the emerging Global Transportation Network
- Coordinate strategic movement to the theater through USTRANSCOM
- Ensure unrestricted movement through theater air and water terminals<sup>14</sup>
- Exhaust all available host-nation support movement capability
- Integrate command and control for quick redirection of reinforcement and materiel flows—especially common-item support for people and equipment
- Oversee the execution of theater transportation priorities
- Direct theater transportation operations.

Currently, there is no such joint theater organization to manage transportation for the CINCs. Too much depends on the ready ability to operate in war the way we have trained in peace to rely on ad hoc logistics. To formalize (not *provisional-ize*), stand-up, and minimally staff similar Joint Theater Movement Control Agencies for each theater will eliminate this problem.

### **Intra-theater Transport**

*Palletized Load System.* Streamlining the transportation "push" of supplies and equipment forward should be the goal of an efficient movement system. We have never fully integrated ground mobility and materials-handling procedures, and equipment that could eliminate in-transit unloading and reloading—until now. The Palletized Load System (PLS), recently approved for limited procurement, is a 10-wheel drive total distribution system able to move 33 tons of supplies faster, with greater mobility, and at less cost than previous methods. The driver can load and unload the demountable flatrack from the

# FIGURE 2. Joint Theater Movement Control Agency: Strategic-Operational Interface



\* Minimally staff full-time

cab of the vehicle, without a crane or forklift, in less than 2 minutes. With consideration for budget pressures, PLS can get the job done with fewer people and greater efficiency because it replaces thousands of conventional trucks, forklifts and cranes. Flatracks that conform to international shipping standards could be tailored as far back as the ammunition plants and supply depots in the CONUS then moved aboard RO/RO vessels on the host PLSs. Finally, these afloat pre-positioned PLSs could be driven off ships in crisis-torn ports, directly to forward units. Delivery without delays builds victory—true inventory in motion.

Take this concept a step further using high technology and battlefield pre-positioning—a technique known as "caching." Squads of PLS vehicles loaded with essential supplies could "orbit" the battlefield, awaiting delivery instructions. Equipped with global positioning systems and satellite command control, the trucks could be directed to precise locations to drop their loads, forming caches, just before needed by advancing units. Transponders or radio transceivers mounted on the flatracks would allow units to readily locate and identify these caches by satellite monitoring devices or simple radio receivers. This PLS-cache concept would provide an impetus away from delivering to fixed supply points, and anticipate battlefield distribution needs. Unlike the past, logistics would enable, instead of halt, the initiative. PLS would create faster, more efficient support for ground forces and greater value for the U.S. taxpayer.

*Heavy Equipment Transporters.* If we are to wage mobile warfare, the key lesson of the Gulf War is that we need more HETs. Heavy divisions should have enough to move a brigade with a single lift. Besides the operational advantage of agility—the capability to move heavy forces rapidly—HETs preserve tank combat readiness, extend service life, and decrease expensive operating costs.

The cost advantages are enormous: To move the tracked vehicles in a heavy brigade-sized task force just 1 mile, under their own power, costs over \$180,000, based on life-cycle, per-mile operating costs. The price is just \$15,000 to move them 1

mile on HETs—a savings of over \$165,000 per mile.<sup>15</sup> While cost is not normally a crucial factor in determining warfighting requirements, this staggering savings increases the quantity and quality of training affordable during the peace.

*Other Equipment.* Provide warfighting CINCs with enough of the right transport assets to get the job done. Equip contingency forces with trucks able to operate off-road—like the Heavy Expanded Mobility Tactical Truck (HEMTT)—instead of commercially designed vehicles unsuited to traverse sparse road networks. To maintain battlefield momentum and initiative, these vehicles will have cross-country mobility equal to the units they support.

Containerization of logistical unit equipment and sustainment supplies would streamline the movement process. The inherent advantages are obvious: Containers are easier to load on ships, increase throughput capability, and decrease cost. There are far more container ships available to load them on, in a contingency, than old fashioned breakbulk ships. Most commanders, though, fight against this. They know that there is not enough materials-handling equipment to off-load the boxes in most regional scenarios. To overcome this often overlooked shortfall, we should create at the operational level container handling and processing units outfitted to control container operations, and deploy these units early. Additionally, on a larger scale, develop and practice a joint theater container management policy for deploying units to build discipline into the container movement system.

Ad-Dammam, Saudi Arabia, is not a typical ship discharge operation in a regional setting. For example, Mogadishu, Somalia, could receive the military cargo of only one or two RO/RO ships at a time. Competition for berths with relief cargo, lack of warehousing space, and constrained airfield operations further exacerbated the deployment situation. Logistics-over-the-shore (LOTS) operations proved impossible because we were desperately short of LOTS equipment, and what there was could not handle the heavy seas. Strengthened and increased LOTS

equipment is essential to gain greater entry into most worldwide ports.

## **STREAMLINING THE FORCE**

After the military draws down, U.S. planners will have too little force structure to afford the redundancy of designating certain forces to specific regions. With fewer available forces, there will be greater need for efficient employment; therefore, we should do the following now: Adapt force structure to be rapidly deployable and, with a minimum of preplanned adjustments, capable of fighting across the spectrum of future conflict. Tailor forces so that the functions most difficult to achieve after the beginning of hostilities, such as logistical support, receive higher priority than those that can be quickly developed. Shift some support units, particularly those that speed theater buildup, from the reserves to the active force to increase readiness. In these ways we can focus our transport effort and limited resources.

Unless checked, the widespread use of cheaper unguided ordnance, rather than more expensive precision guided munitions—smart bombs—will continue to grow. The costs to stock and move ammunition within and to the theater are high, and amounts are significant. Unguided ordnance can be justified only when the combat effect sought is prolonged neutralization, harassment, or reconnaissance by fire.<sup>16</sup> We should place greater reliance on smart munitions to decrease the demand on strategic lift to move large stocks of less accurate munitions and delivery systems.

Additionally, as described earlier, the threat allocation process—determining how much ammunition is really needed to achieve objectives—has run amuck. For example, there were 78 ammo-laden ships still awaiting off-load the day the Gulf War ended, and of 3.2 million rounds of 155mm howitzer shells moved to Saudi Arabia, 2.9 million had to be returned. Correcting this problem will allow more strategic lift for the rapid buildup of U.S. forces.

Finally, based on their proven lethal advantage over the



nearest adversary, restructure armored units with fewer tanks. This will lighten the load of projecting armored formations and lessen requisite support structure. Taking this a step further, we need an improved and easily transportable capability to defeat armor and other hard targets, such as a medium-weight armored gun system.

### **Transportability**

For too long, transportability—equipment design to reduce mobility requirements—has been an afterthought in the acquisition process. Just as roles and missions redundancy has come into question, DoD has to really scrutinize and enforce the transportability of each piece of developing equipment. While lethality is the order of the day, we cannot afford mobility guzzlers any longer.

### **Collective Security**

Our continued promotion of collective security arrangements should focus on stabilizing fragile regional relationships and mitigate America's shrinking forward presence. Paramount to these accords is that they gain us strategic access. The importance of staging bases and overflight rights cannot be overestimated in planning for future operations. Additionally, the relevance of developing equipment interoperability with allies will increase as these ground forces drawdown and multinational corps are formed. This can lead either to greater resource efficiencies—or continued lack of standardization. The latter is no longer affordable. While coalitions may be ad hoc, firmly established alliances could make the strategic difference in the next confrontation.

## **EXPLOITING AMERICA'S HIGH TECHNOLOGY ADVANTAGE**

Consider this prediction:

Warfare will become more mobile, more mechanical, more destructive, more dependent upon science and technology. The rapid movement of troops and equipment to threatened points throughout the world will be of the utmost importance.<sup>17</sup>

No, not the words of some military futurist, but the logistics lessons of World War II. Truer today than ever before, exploration of new technologies should aim at easing the logistics burden of long-distance commitments. We should exploit our technological edge to enable U.S. contingency forces to overcome the constraints of time, distance, and decisive force, in reacting to contingencies. Lift-saving third-wave technology might include:

- Enhanced command, control, communications and intelligence (C<sup>3</sup>I)
- Directed energy weapons that do not require significant ammunition supply
  - Reduced combat vehicle fuel consumption through use of solid fuels, electric drive and lightweight composite materials
  - Enhancement of already existing satellite-aided ground positioning systems for sustainment vehicles
  - Space shuttle delivery of essential payloads
  - Weapons that require fewer people and need less transport, like robotic tanks
  - Electric transcription of personal mail and use of microfiche to and from the battlefield to replace bulky and burdensome mail procedures
  - Expanded versatility of the plentiful container ship fleet
  - Efficient miniaturized devices placed on mechanized vehicles to draw water from the moisture content in the air—reducing the need to move water forward

- Recycling or eliminating water altogether in laundry, bath, and decontamination operations
- Lightening of the force and reducing requirements through the use of advanced materials technologies.

Throughout military history, attitude has played a pivotal role in technological advance and innovation. Traditional attitudes have caused failures to recognize the importance and impact of technological changes, and delayed the application of this technology. From adherence to trench warfare and reluctance to give up the horse, to failure to recognize the impact of firearms on close formations, the conservative military axiom "If it ain't broke, don't fix it" has frequently ruled strategy. This threat to innovation has delayed or stopped testing of key technologies that would have resulted in battlefield effectiveness—shortening conflict and saving lives. The real challenge, as Sir Basil Liddell Hart posited during World War II, is not to put a new idea into the military mind but to put the old one out. To maintain the edge, we cannot—we must not—accept the status quo.

### **The Role of Enhanced C<sup>3</sup>I**

Perhaps the greatest strides toward transportation savings can be made in the areas of precision munitions (as previously discussed) and enhanced C<sup>3</sup>I. Imagine the possibilities: If we can increase the probability of a hit by a factor of two, then the number of guns firing can be reduced by half, without affecting the effectiveness of the support. Now, to take this a step further, if our forces can also reduce the number of targets that have to be engaged by shooting only at what *must* be destroyed, we can further reduce the number of guns required.<sup>18</sup>

When the number of guns is lowered, it logically follows that the required amount of combat service support will decrease proportionally. If the number of rounds fired can be halved, this will also reduce the number of vehicles required to transport the rounds, the amount of repair parts required, the number of support troops, and so on.

Improving C<sup>3</sup>I will reduce the demand on logistics in other

ways as well, by streamlining the use of resources such as fuel. Today, reserves sometimes move two or three times in response to an attack that never materializes. If our forces have a better idea of what's really occurring on the battlefield, unnecessary movement toward an unclear objective can be reduced—and refueled less. Forces can be concentrated at the decisive points without attempting to react to all the possible enemy courses of action. Reducing this uncertainty on the battlefield also decreases the amount of required combat service support.

Jointly, America's military can use evolving technology to integrate sea-based C<sup>3</sup>I systems, such as Aegis, with firing units ashore—Hawk, Patriot, and Theater High Altitude Air Defense System. This will certainly lessen the load for ground commanders and instill all-service battlefield connectivity.

As the United States proved in the Gulf War, our method of preparing for the uncertain demands of battle is to stockpile as many supplies as possible. American forces have a tendency to create the proverbial iron mountains of repair parts, ammunition, and all else before beginning operations. If enhanced C<sup>3</sup>I allows us to predict the time and place of demand much more accurately, then we can reduce stockages without accepting higher levels of risk.<sup>19</sup> Moving resources costs transportation, so if we reduce resource requirements, movement savings follow.

Traditionally, the price of American battlefield mobility has been a heavy logistical tail that often limits the very mobility that it supports. While today's forces have significant tactical mobility, their dependence on heavy logistical support greatly limits their operational and strategic mobility. If high technology can enhance C<sup>3</sup>I, smaller, more lethal, highly mobile formations can operate with less support along limited avenues of approach that would restrict today's forces.

The bottom line is that enhanced C<sup>3</sup>I will unburden the strategic power projection of mobile forces and change the face of battlefield lethality. Force packages, truly more lean and mean, will be able to travel far more unconstrained by the traditional limiting factor of war—transportation.

## High-Tech Theater Resupply

A different approach will be necessary for theater resupply. Large surface effect ships of 1,000 to 2,000 tons capacity with self-defense armament could load farther off shore, perhaps from larger ships of 20,000 to 40,000 tons displacement. The speed and flexibility of such ships would totally redefine theater logistics as to routes, timing, echelons of stockage, required supply quantities, and vulnerability to enemy attack.<sup>20</sup>

Container ships could take on new military utility if we determine new ways to optimize them. These vessels, plentiful in numbers and availability, have so far been an almost untapped military resource. Military adaptability, nearly an oxymoron in the past, must see the light of day if commercially available systems are to be transformed into military applications.

One such application is to integrate multistack containerization technology, available in the highway and rail industries, to make intermodal vehicle movement from home station to the battlefield an efficient and economic process. Along with the PLS concept that relies on flatracks, this would add greater usefulness to readily available container ships.

Another unique container ship application is called Arapaho. This system modifies portions of a container ship's cargo deck with an easily installed flight deck and commercial containers. Arapaho underwent sea trials in 1982. It was easy to transport (since it is portable) and effectively accepted the day and night takeoff and landing of six various types of helicopters at sea. These trials demonstrated the complete compatibility of the Arapaho modules with commercial ships to provide an air capability at sea. A much more expensive variation on this theme was recently used in *Uphold Democracy* in Haiti, as Army helicopters were placed on the flight deck of a Navy aircraft carrier.

To accommodate the Arapaho system, a host merchant ship retains 70 percent cargo-carrying capability and sacrifices roughly 30 percent of payload commonly carried on deck to specialized containers. These commercial containers, installed in virtually

any desired configuration, provide C<sup>3</sup>I, hangars for aircraft, repair shops, fuel storage, and messing and berthing. Using existing hulls, the system is stored ashore and quickly assembled aboard ship. Only modules necessary for a given mission need be installed. Alternative modules can provide dual-mission capability, maximizing return on investment. No new ship construction is required and savings are accrued by keeping host vessels in private hands for operation and maintenance. Some

Arapaho applications include:

- Power projection and indigenous defense of the equipment of a rapid deployment force loaded on container ships equipped with Army or Marine helicopters.
- Over-the-beach logistic support with cargo helicopters taking off from the decks of Arapaho-equipped container ships.
- Platform and assets for insertion into/extraction from a regional flashpoint.<sup>21</sup>

### **Harnessing America's Movement Resources**

*Lest we forget: High technology, in the abstract, does not win wars. Well-led, well-trained and well-equipped people will always carry the day.* The movement lessons of the Gulf War, if properly learned, can help reshape America's defense transportation system in the post-Cold War era. A crucial question of any realistic analysis of those lessons is this: How will forces be moved in a future characterized by regional crisis and reduced forward presence? Certainly, America will rely more than ever on efficient and timely movement of the force. The slightest delay or inefficiency in harnessing our movement resources may cost us victory. To carefully restructure military capabilities will reduce the risks of distance and time in an unstable world.

Such restructuring can no longer be "planned" for the out-years, with little hope of actual execution. We must now prioritize the actions of the movement strategy, follow through, and accomplish them one bite at a time:

- First, place afloat pre-positioning of ground equipment and supplies as the number one priority. This includes not only ship procurement and construction, but stockage and maintenance, as well.

- Front load significant quantities of smart munitions in these pre-positioned packages to maximize lethality in the initial stages of conflict. This will save critical transport resources, so essential to putting fighting forces on the ground, now encumbered by hauling massive amounts of less effective unguided bombs.

- Next, get on with the C-17, a linchpin of global reach strategy.

- Concurrently, refine the requirements determination process. World events will no longer tolerate operators who command, "Give me all you've got" because the cost in money, time, equipment, supplies, and transportation is enormous. Nothing should short the warfighting CINC of his capability to decisively defeat any potential adversary, so theater-specific computerized battlefield simulations ought to focus on providing accurate supply estimates of crisis requirements.

- Within the Army, carry out plans to acquire trucks with the same mobility capability as the armor equipment they support. This should be a full-up fielding—not the traditional trickle down of equipment, in which units receive only about 1/3 of the power that is actually required. Get the PLS out into the users' hands so that combat commanders and logisticians can weave its yet untapped distribution potential into battle plans and doctrine. Procure enough capable tank transporters to get the job done right. The hodgepodge of HETs provided by allies during the Gulf War won't be there the next time around.

- Through it all, stay the course of a movement vision. Revise the instruments of the vision along the way, based on new technology, but remain focused on the ultimate objective: To provide the warfighting CINC with the capability to move the force in order to win on tomorrow's battlefield. Toward the new world order, that battlefield may be a regional crisis with singular

U.S. intervention, as a part of a NATO or coalition peacekeeping or peacemaking force, or a major natural disaster team. But the need for rapid and sufficient transport is no less great in any of these scenarios.

To execute a credible crisis response strategy, a world power must be able to readily surge strategic mobility, and reliably move equipment and supplies on the battlefield. There is sober logic in demonstrating that development of these capacities is among the strongest possible deterrents to conflict. And there is good economic sense in suggesting that America's fiscal renewal will be enhanced by reinvestment in the military transportation base. After all, military *and* economic strength will define our future.

In moving the force beyond *Desert Storm*, it is vital that we assure America's strategic role in the world by shaping movement preeminence. To do so prudently provides, perhaps, the greatest conventional deterrent to war and strengthener of peace—global reach. To do less invites confrontation with adversaries willing to test the substance and purpose of that reach.



## Notes

### Chapter 1. NOTHING HAPPENS UNTIL SOMETHING MOVES!

1. Lt. Gen. Jimmy D. Ross, *Today's Challenge: Tomorrow's Army* (Washington, DC: Department of Defense, January 1992), 6-1.
2. Lt. Gen. LeR. Lutes, *Logistics in World War II—Final Report of the Army Service Forces* (Washington, DC: War Department, July 1947), 251.
3. Col. Joseph J. Collins, "Desert Storm and the Lessons of Learning," *Parameters* (Carlisle: U.S. Army War College, Autumn 1992), 87.
4. Maj. Gen. Fred E. Elam and Lt. Col. Mark Henderson, "The Army's Strategic Mobility Plan," *Army Logistician* (May-June 1992), 3.
5. Chester Wardlow, *The Transportation Corps: Responsibilities, Organization, and Operations in World War II* (Washington, DC: Office of the Chief of Military History, 1951), 2.
6. Col. Gilbert S. Harper, "Army Logistics in 2010," *Army Logistician*, September-October 1991, 20.
7. RADM. (Ret.) Henry E. Eccles, *Logistics in the National Defense* (Washington, DC: NAVMC 2799, 1959, reprinted 1987), 9, 18.
8. Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (New York: Cambridge University Press, 1977), 3.

### Chapter 2. PREPARING FOR DESERT STORM

1. Michael Klare, "Pax Americana Redux," in *The Gulf War Reader*, Micah L. Sifry and Christopher Cerf, eds. (New York: Times Books, 1991), 470.
2. Joseph Galloway, "The Point of the Spear," *U.S. News and World Report*, March 11, 1991, 41; and, Charles Lane, et. al., "The Killing Ground," *Newsweek*, January 28, 1991, 30.
3. Murray Hammick, "Logistics Comes of Age," *International Defense Review* (July 1992), 665.
4. Lt. Gen. William G. Pagonis, *Moving Mountains* (Boston:

## 78 MOVING THE FORCE: *Desert Storm* and Beyond

---

Harvard Press, 1992), 13.

5. Department of Defense, *Conduct of the Persian Gulf Conflict: Final Report to the Congress* (Washington, DC: GPO, April 1992), vol. II, F-21.

6. Center for Army Lessons Learned, *Operation Restore Hope: Lessons Learned Report* (Fort Leavenworth, KS: November, 1993), II-2.

7. *Ibid.*, vol. I, 38.

8. Department of Defense, *Conduct of the Persian Gulf Conflict: Interim Report to Congress* (Washington, DC: GPO, July 1991), I-8.

9. James Blackwell, et. al., *Interim Report of the Center for Strategic and International Studies Group on Lessons Learned from the Gulf War* (Washington, DC: CSIS, July 1991), 1.

10. Dick Cheney, Secretary of Defense, Department of Defense, *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, iii.

11. Joe Stork and Martha Wenger, "From Rapid Deployment to Massive Deployment," in *The Gulf War Reader*, 34.

12. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, 38.

13. *Ibid.*, 40.

14. *Ibid.*, 43.

### Chapter 3. MOVING THE FORCE IN *DESERT STORM*

1. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, 43.

2. *Ibid.*, 40.

3. *Ibid.*, vol. II, E2.

4. *Ibid.*, vol. II, E-16.

5. Association of the United States Army, *Special Report: Operations Desert Shield/Desert Storm—The Logistics Perspective* (Arlington: AUSA, September 1991), 4.

6. The first month of the Korean buildup was July 1950. *U.S. Army Chief of Transportation Briefing: Operation Desert Shield/Desert Storm* (Fort Eustis, VA: August 1991).

7. The first month of the buildup was August 7-September 7, 1990. *General Accounting Office Report: Operation Desert*

*Shield/Desert Storm* (Washington, DC: GPO, February 1991).

8. Blackwell, 34.

9. Maj. Mark L. Hayes, "Sealift: The Achilles' Heel of our National Strategy," *Marine Corps Gazette* (November 1992), 72.

10. Pagonis, 125.

11. Col. Edward T. Fortunato, *The Breakdown of a Priority System—A Logistics Case Study* (Washington, DC: Industrial College of the Armed Forces, April 1992), 1-13.

12. Lt. Col. David C. Rutenberg and Jane S. Allen, ed., *The Logistics of Waging War* (Gunter Air Force Station: Air Force Logistics Management Center, 1986), 137.

13. *Conduct of the Persian Gulf Conflict: Final Report to Congress*, vol. I, 41.

14. Col. Douglas W. Craft, *An Operational Analysis of the Persian Gulf War* (Carlisle: Strategic Studies Institute, U.S. Army War College, 1992), 20.

15. Lutes, 35-38.

16. Craft, 21.

17. Michael D. McManus and Frederick M. McNamee, *Logistics Management Institute Report: Relationships Between Mobility, Sustainability, and Firepower* (Bethesda: LMI, February 1991), iii-iv.

18. *Ibid.*, 12.

19. *Ibid.*, 13.

20. Department of Defense, *The Mobility Requirements Study* (Washington, DC: GPO, January 23, 1992), vol. I, ES-2.

21. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, 59.

22. U.S. General Accounting Office, *Part of the National Defense Reserve Fleet is No Longer Needed*, Report to Congressional Requesters (Washington, DC: GPO, 1991), 16.

23. Norman Friedman, *Desert Victory: The War for Kuwait* (Annapolis: The Naval Institute Press, 1991), 100-101.

24. Pagonis, 206.

25. U.S. Congress, *Military Supply Systems: Lessons from the Vietnam Experience*, House, 91st Cong., 2nd sess. (Washington, DC: GPO, October 1970), 3.

26. Lt. Gen. (Ret.) Joseph M. Heiser, Jr., *A Soldier Supporting Soldiers* (Washington, DC: Center of Military History, United States Army, 1991), 151.

## 80 MOVING THE FORCE: *Desert Storm* and Beyond

---

27. Ibid.
28. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, 40.
29. Ibid., 51.
30. Ibid., 103.
31. Lutes, 249.
32. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. I, 103.
33. Gen. Hansford T. Johnson, Commander in Chief, U.S. Transportation Command, *Presentation to the U.S. Senate Committee on Armed Services* (Washington, DC: March 13, 1992), 1.
34. Pagonis, 2.
35. Ibid., 6.
36. Ibid.
37. Johnson, 1.
38. Pagonis, 9.
39. *Conduct of the Persian Gulf Conflict: Final Report to the Congress*, vol. II, F-2.
40. Joel Nadel, "Logistics Lessons," in *The Gulf War Reader*, 168.
41. Rick Maze, "Storm Report: Logistics Hit Their Limit," *Army Times* (May 4, 1992), 10.
42. Headquarters, Combined Arms Support Command, "Sustainment Imperatives in History—Integration: Rommel's Nemesis," *Army Logistician* (March-April 1992), 10.
43. Maj. Anthony H. Kral, "Sustaining Patton's Pursuit," *Army Logistician*, January-February 1991, 26-30.
44. General Accounting Office, *GAO Report: Operation Desert Storm—Transportation and Distribution of Equipment and Supplies in Southwest Asia* (Washington, DC: GPO, December 26, 1991), 10.
45. Pagonis, 203-204.
46. U.S. Congress, *House Armed Services Committee Report on the Persian Gulf War* (Washington, DC: GPO, April 23, 1992).

### Chapter 4. MOVING THE FORCE IN FUTURE CONFLICTS

1. U.S. Congress, *House Armed Services Committee Report on the Persian Gulf War* (Washington, DC: GPO, April 23, 1992).
2. Johnson, 4-5.

3. Lt. Cdr. Robin E. Rathbun, "Strategic Mobility for the 1990s: The Mobility Requirements Study," *Strategic Review* (Summer 1992), 4-5.
4. *The Mobility Requirements Study*, vol. I, ES-6.
5. Friedman, 103
6. Doug Bandow, "Merchant Marine Sinks Oceans of Money," *The all Street Journal*, September 12, 1988, 20.
7. Kent N. Gourdin and Lt. Col. Robert E. Trempe, "Contingency Transportation in a Changing World: Meeting the Challenge," *Logistics Spectrum* (Spring 1992), 11.
8. Friedman, 104.
9. Gen. Hansford T. Johnson, "The Defense Transportation System," *Defense Transportation Journal* (October, 1991), 56.
10. Ibid.
11. Gourdin and Trempe, 11.
12. Gen. William G. T. Tuttle, Jr. (Ret.), "Sustaining Army Combat Forces—Part II," *Army Logistician*, November-December 1991, 12-13.
12. Ibid., 14.
14. Herb Coen, "Joint Service Movement Control Doctrine—An Idea Whose Time has Come," *Transportation Corps Bulletin* (July 1990), 33.
15. Joe A. Fortner, Capt. Jules T. Doux and Capt. Mark A. Peterson, "Bring on the HETs!" *Military Review* (January 1992), 42.
16. Dave McCurdy and John G. Rowland, *Center for Strategic and International Studies Report—Conventional Combat Priorities: An Approach for the New Strategic Era* (Washington, DC: CSIS, May 1990), 37.
17. Lutes, 251.
18. Richard J. Dunn III, *From Gettysburg to the Gulf War and Beyond* (Washington, DC: The Institute for International Studies, 1992), 48-49.
19. Ibid., 48.
20. McCurdy and Rowland, 55.
21. Scott W. Conrad, "Arapaho: The Army-Navy Game," *Military Review* (May 1988), 79-80.

## McNair Papers

---

*The McNair Papers are published at Fort Lesley J. McNair, home of the Institute for National Strategic Studies and the National Defense University. An Army post since 1794, the fort was given its present name in 1948 in honor of Lieutenant General Lesley James McNair. General McNair, known as "Educator of the Army" and trainer of some three million troops, was about to take command of Allied ground forces in Europe under Eisenhower, when he was killed in combat in Normandy, 25 July 1944.*

*The following is a complete listing of published McNair Papers. For information on the availability of specific titles, contact the Circulation Manager, Publications Directorate & NDU Press, Fort Lesley J. McNair, Washington, DC 30219-6000 (telephone: commercial 202/475-1913; DSN 335-1913).*

1. Joseph P. Lorenz, *Egypt and the New Arab Coalition*, February 1989.
2. John E. Endicott, *Grand Strategy and the Pacific Region*, May 1989.
3. Eugene V. Rostow, *President, Prime Minister, or Constitutional Monarch?*, October 1989.
4. Howard G. DeWolf, *SDI and Arms Control*, November 1989.
5. Martin C. Libicki, *What Makes Industries Strategic*, November 1989.
6. Melvin A. Goodman, *Gorbachev and Soviet Policy in the Third World*, February 1990.
7. John Van Oudenaren, "The Tradition of Change in Soviet Foreign Policy," and Francis Conte, "Two Schools of Soviet Diplomacy," in *Understanding Soviet Foreign Policy*, April 1990.
8. Max G. Manwaring and Court Prisk, *A Strategic View of Insurgencies: Insights from El Salvador*, May 1990.
9. Steven R. Linke, *Managing Crises in Defense Industry: The PEPCON and Avtex Cases*, June 1990.
10. Christine M. Helms, *Arabism and Islam: Stateless Nations and Nationless States*, September 1990.
11. Ralph A. Cossa, *Iran: Soviet Interests, US Concerns*, July 1990.
12. Ewan Jamieson, *Friend or Ally? A Question for New Zealand*, May 1991.

13. Richard J. Dunn III, *From Gettysburg to the Gulf and Beyond: Coping with Revolutionary Technological Change in Land Warfare*, March 1992.
14. Ted Greenwood, *U.S. and NATO Force Structure and Military Operations in the Mediterranean*, June 1993.
15. Oscar W. Clyatt, Jr., *Bulgaria's Quest for Security After the Cold War*, February 1993.
16. William C. Bodie, *Moscow's "Near Abroad": Security Policy in Post-Soviet Europe*, June 1993.
17. William H. Lewis (ed.), *Military Implications of United Nations Peacekeeping Operations*, June 1993.
18. Sterling D. Sessions and Carl R. Jones, *Interoperability: A Desert Storm Case Study*, July 1993.
19. Eugene V. Rostow, *Should Article 43 of the United Nations Charter Be Raised From the Dead?* July 1993
20. William T. Johnsen and Thomas Durell-Young; Jeffrey Simon; Daniel N. Nelson; William C. Bodie, and James McCarthy, *European Security Toward the Year 2000*, August 1993.
21. Edwin R. Carlisle, ed., *Developing Battlefield Technologies in the 1990s*, August 1993.
22. Patrick Clawson, *How Has Saddam Hussein Survived? Economic Sanctions, 1990-93*, August 1993.
23. Jeffrey Simon, *Czechoslovakia's "Velvet Divorce," Visegrad Cohesion, and European Fault Lines*, October 1993.
24. Eugene V. Rostow, *The Future of Palestine*, November 1993.
25. William H. Lewis, John Mackinlay, John G. Ruggie, and Sir Brian Urquhart, *Peacekeeping: The Way Ahead?* November 1993.
26. Edward Marks and William Lewis, *Triage for Failing States*, January 1994.
27. Gregory D. Foster, *In Search of a Post-Cold War Security Structure*, February 1994.
28. Martin C. Libicki, *The Mesh and the Net: Speculations on Armed Conflict in a Time of Free Silicon*, March 1994.
29. Patrick Clawson, ed., *Iran's Strategic Intentions and Capabilities*, April 1994.
30. James W. Morrison, *Vladimir Zhirinovskiy: An Assessment of a Russian Ultra-Nationalist*, April 1994.
31. Patrick M. Cronin and Michael J. Green, *Redefining the U.S.-Japan Alliance: Tokyo's National Defense Program*, November 1994.
32. Scott W. Conrad, *Moving the Force: Desert Storm and Beyond*, December 1994.

# JFQ

---

**JFQ: *Joint Force Quarterly*** is a professional military journal published under the auspices of the Chairman, Joint Chiefs of Staff, by the Institute for National Strategic Studies, National Defense University, to promote understanding of the integrated employment of land, sea, air, space, and special operations forces. **JFQ** focuses on joint doctrine, coalition warfare, contingency planning, operations conducted by the unified commands, and joint force development.

The journal is a forum for examining joint and combined warfare and exchanging ideas of importance to all services. **JFQ** appeals to a wide audience across the defense community with an interest in the nature and history of joint warfighting.

---

**TO ORDER A SUBSCRIPTION**, cite ***Joint Force Quarterly (JFQ)*** and send your check for \$22.00 (\$27.50 foreign), or provide your VISA or MasterCard number and expiration date, to Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15220-7954. You may also place orders by FAX: (202) 512-2233.