Moving an Expeditionary Force: Three Case Studies in Afghanistan

A Monograph
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14. ABSTRACT

This monograph explores theory, history, and doctrine in order to determine if past expeditions into Afghanistan offer logistics lessons to 21st Century U.S. Army expeditions. The monograph also proposes how the U.S. Army can best deploy and supply its expeditionary forces in the future. These case studies, the Second Anglo-Afghan War (1878-1880), the Soviet-Afghan War (1979-1989), and Operation Enduring Freedom of the U.S. War on Terrorism (2001-Present), explore events leading to the war, deployment of forces, use and protection of lines of communication (LOC), use and supply of logistics bases, and methods of movement and sustainment throughout operations. Case study analysis incorporates criteria from current Army doctrine. Though none of the case study logistical approaches are fully viable for future U.S. Army expeditions, they offer options that the U.S. Army does not currently possess, but could. Recommendations for moving expeditionary forces of the future are twofold: first, the U.S. Army can harvest the strengths of past expeditions in Afghanistan for future use; and second, the Army can make changes in theory, doctrine, organizations, and materiel in order to improve deployment and movement practices. Deploying the U.S. Army to battle and supplying it there should be the job of the U.S. Army. This monograph concludes that to be successful in this arena, the U.S. Army will have to recognize the significance of logistics, especially transportation, and make it the top priority for military development in the 21st Century.

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ABSTRACT

MOVING AN EXPEDITIONARY FORCE: THREE CASE STUDIES IN AFGHANISTAN by MAJOR Martha G. Granger, U.S. ARMY, 69 pages.

Recent scholarly work on the history and significance of logistics suggests logistics is 90% of the business of war. Logistics enables the deployment of armies to war and their subsequent movement and sustainment during war. As such, transportation – strategic, operational, and tactical – is the most significant of the Combat Service Support (CSS) Functions. This monograph explores theory, history, and doctrine in order to determine if past expeditions into Afghanistan offer logistics lessons to 21st Century U.S. Army expeditions. The monograph also proposes how the U.S. Army can best deploy and supply its expeditionary forces in the future.

These case studies, the Second Anglo-Afghan War (1878-1880), the Soviet-Afghan War (1979-1989), and Operation Enduring Freedom of the U.S. War on Terrorism (2001-Present), explore events leading to the war, deployment of forces, use and protection of lines of communication (LOC), use and supply of logistics bases, and methods of movement and sustainment throughout operations. Case study analysis incorporates criteria from current Army doctrine. The CSS Characteristics of responsiveness, flexibility, attainability, sustainability, and survivability, enable the comparison of the three experiences with deployment and movement. The monograph also presents lessons learned by the countries involved in the expeditions.

Though none of the case study logistical approaches are fully viable for future U.S. Army expeditions, they offer options that the U.S. Army does not currently possess, but could. In order of most successful to least, based on the evaluation criteria, the expeditionary approaches to logistics fell in this order: British-Indian forces, Soviets, and finally, the U.S.

Recommendations for moving expeditionary forces of the future, then, are twofold: first, the U.S. Army can harvest the strengths of past expeditions in Afghanistan for future use; and second, the Army can make changes in theory, doctrine, organizations, and materiel in order to improve deployment and movement practices.

The first recommendation involves research and development (R&D) in rail and pipeline construction and use; a renewed focus on "living off the land" and using captured enemy logistics; employing a "push" vs. "pull" logistics system; and a return to employing redundant (*all available*) means of transportation and supply.

The second recommendation involves exploration and development of an Army long-war theory and its associated logistics. Doctrinally, the Army must focus on becoming an *independent* member in the joint *interdependent* force, finding a middle ground between the concepts of "Iron Mountains" and "Small Logistics Footprint," and striving toward effective vs. efficient logistics practices. Organizationally, Army units must have organic strategic lift, and logistics units must be capable of providing logistics in peace and war *without assistance*. Regarding materiel, the Army must increase and balance its holdings in the strategic mobility triad through acquisition of strategic airlift and increased prepositioning. Finally, the Army needs to take a logistics, rather than combat, focus in science and technology (S&T) and R&D.

Deploying the U.S. Army to battle and supplying it there should be the job of the U.S. Army. This monograph concludes that to be successful in this arena, the U.S. Army will have to recognize the significance of logistics, especially transportation, and make it the top priority for military development in the 21st Century.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

"The provisioning of troops, no matter how it is done, whether through storehouses or requisitions, always presents such difficulty that it must have a decisive influence on the choice of operations."

Carl von Clausewitz, *Principles of War*[1]

When considering the question of whether war governs the supply system or is governed by it, Clausewitz argued that at least in the initial stages of war, the latter is true.[2] The debate is still fresh, almost two centuries later, and the question remains unanswered: does maneuver drive logistics or is it the other way around?

Dr. Martin Van Creveld, prominent historian and author of the influential work, *Supplying War*, argues that logistics drives maneuver, or at least that it should. After all, he argues, "logistics make up as much as nine tenths of the business of war."[3] In his study of almost two centuries of logistics, Van Creveld discounts the notion that great armies can move in any direction, at any speed, and for any distance, as long as they set their minds to it. "In reality," he writes, "they cannot, and failure to take cognizance of the fact has probably led to many more campaigns being ruined than ever were by enemy action."[4]

Clausewitz's position on the significance of logistics was quite similar. "Often the finest victory has been robbed of its glory as a consequence of [problems of supply]. Strength ebbs away, retreat becomes unavoidable, and gradually the signs of genuine defeat appear."[5] These

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[1] Carl von Clausewitz, *The Principles of War*, translated by Hans W. Gatzke, in *Roots of Strategy: Book 2* (Mechanicsburg, PA: Stackpole Books, 1987), 370.
[2] Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (New York: Everyman's Library, 1993), 403. Clausewitz observed, "We would answer that at first the supply system will govern war insofar as the other governing factors will permit: but where these start to offer too much resistance, the conduct of war will react on the supply system and so dominate it." His example, Napoleon's expedition in Russia, highlights an army's failure, in large part, due to lack of care over supplies during the advance (*On War*, 405). Another source credits Napoleon's logistics failure in Russia on his expectation that the war would only last 3 weeks (Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (London: Cambridge University Press, 1977), 64.).
[3] Van Creveld, 231.
[4] Ibid., 2.
[5] *On War*, 407.

problems, he continued, are most severe in two situations: during the advance; and when LOCs are overextended, especially in "an impoverished, thinly populated and possibly hostile country."[6]

Expeditions in Afghanistan over the past two centuries have certainly proven both of these points: first, that logistics is most difficult in the advance; and second, that long LOCs compound logistics problems. Logistical attempts by British-Indian forces in 1878, Soviet forces in 1979, and U.S. forces in 2001, provide historical examples. Though none of these expeditions were unsuccessful due to logistics, none of them were executed without major logistical flaws – especially with regard to deployment and movement.

This study examines three expeditions in Afghanistan with regard to the following: first, the logistic factors enabling or limiting the army's operations; second, the arrangements made to deploy and sustain the army, highlighting those arrangements that are still viable today; and third, how logistics can be done better in future expeditions.[7]

The Second Anglo-Afghan War (1878-1880), the Soviet-Afghan War (1979-1989), and Operation Enduring Freedom of the U.S. War on Terrorism (2001-Present) offer case studies which explore events leading to the wars, deployment of combat and logistics forces, use and protection of lines of communication (LOC), use and supply of logistics bases, and methods of movement and sustainment throughout operations.

This monograph explores theory, history, and doctrine in order to determine if past expeditions into Afghanistan offer logistics lessons to 21st Century U.S. Army expeditions. The monograph also proposes an approach by which the U.S. Army can best deploy and supply its expeditionary forces now and in the future.

The majority of the discussion revolves around deployment and movement – strategic, operational, and tactical. At times, it includes discussion of general supply and distribution. This

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[6] Ibid.
[7] Van Creveld, 3. Van Creveld asked similar questions in his study: "what were the logistic factors limiting an army's operations? What arrangements were made to move it and keep it supplied while

study does not, however, address personnel, maintenance, medical, morale, or training issues, though these issues greatly influenced each of the expeditions.

CHAPTER TWO

THREE CASE STUDIES

"Whichever method of supply is chosen, it will, of course, work better in a rich, densely populated area than in a poor and uninhabited one."

Carl von Clausewitz, *On War*[8]

During the last two centuries, three states sent expeditionary forces into Afghanistan with varying degrees of success. Just as their strategic, operational, and tactical objectives differed, so did their logistics. Analyzing logistics support during the Second Anglo-Afghan War (1878-1880), the Soviet-Afghan War (1979-1989), and Operation Enduring Freedom of the U.S. War on Terrorism (2001-present) suggests future considerations for expeditionary forces.

Each case study addresses logistics support to the force occupying Afghanistan, beginning with a brief "road to war" describing the political events leading to the deployment of the expeditionary force, the preparation and planning involved, and the force structure and logistics. Logistics analysis includes deployment, LOCs, logistics bases, and movement.

"Throughout its history, Afghanistan has proved inhospitable to invaders."[9] The United States and the Soviet Union experienced much the same Afghanistan as did the British. Mountains and high desert make up 85 percent of the 647,000 square kilometer country. Though landlocked, Afghanistan has several major rivers and highly fertile areas, as well as various improved and unimproved airports. The imposing Hindu Kush forms a mountain chain across the northeast joining the Paropamisus Mountains in the west. The Sulieman mountains form the eastern boundary. The Dasht-e Margow and Registan Deserts dominate the south. Afghanistan

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moving? How did these arrangements affect the course of the campaign, both as planned and as carried out? In case of failure, could it have been done?"

[8] *On War*, 404.

[9] Robert F. Baumann, *Russian-Soviet Unconventional Wars in the Caucasus, Central Asia, and Afghanistan* (Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, 1993), 149.

has a limited road network, no significant rail line, and two river ports. The north and northeastern parts of the country range from 3,000 to 5,000 meters above sea level.[10]

Second Anglo-Afghan War, 1878-80[11]

Road to War

"The danger of a war with Russia…passed away, but unfortunately our relations with Afghanistan did not improve concurrently, and in August, 1878, these had reached so unsatisfactory a stage that the Government of India were constrained to call on the Commander-in-Chief for his proposals for a campaign."

Army Headquarters-India
The Second Afghan War: Official Account[12]

On November 21, 1878, Great Britain declared war on Afghanistan following two years of futile negotiations to form an alliance against Russia. The Russian and British Empires had expanded right to Afghanistan's borders, leaving Afghanistan's Amir Sher Ali with a precarious choice of allies.[13]

Sher Ali allowed a Russian delegation into Afghanistan, but rejected a simultaneous British presence. Afghan officials informed the British Envoy's advanced party that "any attempt to enter Afghan territory would be resisted by force."[14] The British government offered the Amir a second chance while preparing for war.[15]

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[10] Jane's Information Group, *Jane's Sentinel Security Assessment: South Asia* (United Kingdom: Directory & Database Publishers Association, November 2001-April 2002), 14-15; Oleg Sarin and Lev Dvoretsky, *The Afghan Syndrome: The Soviet Union's Vietnam* (Novato, CA: Presidio Press, 1993), 93, 102.
[11] Sources vary as to the official dates of the Second and Third Anglo-Afghan Wars. Several sources portray the Second War as 1878-80 and the Third War as May-June 1919. Others portray the Second War as 1878-79 and the Third War as 1879-80. For the purpose of this paper, the Second Anglo-Afghan War will cover events from 1878-80.
[12] Army Headquarters, India, *The Second Afghan War 1878-1880: Abridged Official Account* (London: John Murray, 1908), 2. Subsequently referred to as AHI.
[13] David Chandler, ed, *The Oxford Illustrated History of the British Army* (Oxford: Oxford University Press, 1994), 389.
[14] Waller Ashe, ed. *Personal Records of the Kandahar Campaign by Officers Engaged Therein* (London: David Bogue, 1881), 1xxii-iii.
[15] Ashe, 1xxv.

Deployment

Field forces established camps to facilitate invasion. By October 4, 1878, Major General Frederick Roberts' Kurram Valley Field Force's camp had functioning logistics bases at Kohat and Thal.[16] Similarly, General Sir Samuel Browne's Peshawar Valley Field Force encamped at Peshawar. Both sites were supplied from Rawalpindi, located 85 miles southeast of Peshawar and 145 miles northeast of Thal. Unfortunately for Roberts, supplies and transport intended for Thal were diverted to Peshawar. Nevertheless, Roberts organized his force and established a base hospital in Kohat, while bridging the Kurram River and positioning his main supply depot at Thal:

> For the present the bulk of the troops on their arrival were echeloned in the vicinity of Kohat, to prevent any premature crowding to the front until the final concentration was required, thereby allowing supplies to be collected at the Thal depot more speedily.[17]

General Roberts recognized the pivotal role of stockpiling supplies: "The matter of supply is a most important one, and every endeavor must be made to rapidly collect some two or three months in advance of the daily demands of the force."[18] In reality, Roberts hoped to deploy with one month's supplies due to the diversion of resources to Peshawar.[19]

On November 21, 1878, British-Indian forces crossed into Afghanistan. Over 40,300 British-Indian combatants, 144 guns, and 29,300 followers advanced along a 300-mile front in three columns:[20]

> **Northern line** – Peshawar forces [Peshawar Valley Field Force] under Lieutenant General S. Browne with 10,000 combatants, 48 guns, and 10,000 followers with the objective of taking Dakka.

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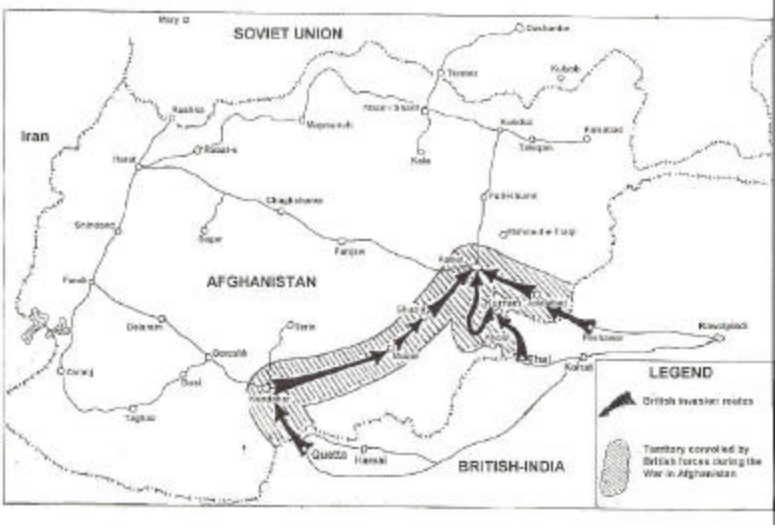
[16] AHI, 91.
[17] Ibid., 97.
[18] Ibid., 95. Text from the Adjutant-General's letter No. 138-K., dated October 22, 1878.
[19] Ibid., 96.
[20] Charles Miller, *Khyber: British India's North West Frontier, The Story of an Imperial Migraine* (New York: MacMillan Publishing Co., Inc., 1977), 170; Ludwig W. Adamec, *Dictionary of Afghan Wars, Revolutions, and Insurgencies: Historical Dictionaries of Wars, Revolutions, and Civil Unrest, No. 1.* (Lanham, MD: The Scarecrow Press, Inc., 1997), 199: total numbers include reserves of 5,000 for the northern and central lines and 6,000 for the southern line.

> **Central line** – Kohat force [Kurram Valley Field Force] under Major General F. Roberts with 6,500 combatants, 18 guns, and 6,500 followers with the objective of moving up the Kurram valley.
> **Southern line** – Quetta force [Kandahar Field Force] under Lieutenant General D. M. Stewart with 12,800 combatants, 78 guns, and 12,000 followers.[21]

By the end of the war, the number of deployed personnel more than doubled.[22]

Figure 1. British Deployment and Occupation.



Deployment was slow and costly. General Roberts had the most difficult terrain. New to command and with the smallest force, it took Roberts almost two months to secure the Khost region. Soldiers and civilians froze to death in winter winds and zero temperatures while crossing terrain barely fit for mountain goats.[23] Roberts' Scottish Highland and Indian Gurkha regiments often lost their way in the forests and boulders while baggage animals frequently plunged hundreds of feet to their death after losing their footing on the icy ground.[24]

The artillery included mule-born mountain guns, horse-drawn nine-pound guns, and elephant-drawn forty-pound guns. Despite road-building as they advanced,[25] Roberts had to abandon

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[21] Adamec, 199. Field force [official names] added for clarification.
[22] AHI, 684.
[23] Miller, 171.
[24] Ibid., 172.
[25] Donald Featherstone, *Victoria's Enemies: An A-Z of British Colonial Warfare* (London: Blandford Press, 1989), 29.

many of his elephant-drawn guns. In later years, Roberts discovered that removing the wheels from the guns and placing the guns on the backs of animals better facilitated the movement of artillery through the almost roadless mountain country.[26]

LOCs

"The lines of communication…link the army to its base, and must be considered its arteries…These arteries, then, must not be permanently cut, nor must they be too long or difficult to use. A long road always means a certain waste of strength, which tends to cripple the condition of the army…The only true lines of communication are those on which depots and hospitals, relay points and postal services, as well as commandants, field police and garrisons have been installed."

Carl von Clausewitz, *On War*[27]

British-Indian forces in Afghanistan devoted most of their effort to establishing, maintaining, and securing LOCs. This included building and improving roads and bridges; guarding main depots and smaller posts along the routes; and guarding the convoys moving along the routes.[28] Approximately 70% of the troops and 50% of the guns employed in Afghanistan were dedicated to maintaining the LOCs.[29]

Despite the importance of LOCs, budgetary constraints limited the British force's ability to secure them since one hundred men were required to maintain a mile of the LOC in mountainous territory. The forces on one axis were two thousand men short of the mark.[30]

British forces carried fifteen or more days of supply with them which slowed their rate of march, encouraging ambush and looting. In the Khost Valley, General Roberts alleviated this problem by sending out small mixed infantry, cavalry, and mountain-gun battery escorts to protect his convoys.[31] As time progressed, forces employed "movable columns" to protect the

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[26] Miller, 211.
[27] *On War*, 412-3.
[28] Henry B. Hanna, *The Second Afghan War 1878-79-90: Its Causes, Its Conduct, and Its Consequences*, Volume II (Westminster: Archibald Constable & Co Ltd, 1904), 41-2.
[29] Adamec, 199: The greatest number of troops employed at any given date was 20,000 (with 72 guns) in the main theater and 50,000 (with 74 guns) on the LOCs.
[30] Hanna, 46.
[31] Featherstone, 31.

LOCs a section at a time. Intelligence was essential for employing these limited resources effectively.[32]

By 1880, command and control of the LOCs improved. For instance, the LOC from Jamrud to Kabul became a single command under a major general – Roberts' Inspector General who reported directly to Roberts in Kabul. His staff included Roberts' Deputy Adjutant and Quartermaster General (a colonel); Roberts' Assistant Adjutant General and Assistant Quartermaster General (both majors); and the Deputy Assistant Quartermaster General (a lieutenant). He divided the LOC into three sections, each commanded by a brigadier general and their associated headquarters.[33]

In spite of the improved command and control and reinforcements, this LOC was not free from harassment. Tribesmen successfully raided British troops and property betweenLandi Kotal and Jamrud:

> Between one and two hundred Afghans rushed down on the rear guard of a convoy…and fired a volley, killing three men of the 31st, dangerously wounding three more, as well as wounding two horses of the Bengal Cavalry; they also succeeded in carrying off eleven pack-bullocks, five sheep, and four rifles and accoutrements...[34]

Similar attacks on the LOC between Quetta and Chaman caused casualties and losses of baggage and supplies. One commander's response was to establish several fortified posts along the LOC manned by four infantry regiments and two cavalry regiments instead of the single infantry regiment originally planned for.[35] Additionally, the commander cut back to ten days' of rations accompanying his force, while another fifteen days' of supplies followed days later using its own security.

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[32] AHI, 595.
[33] Ibid., 431-32.
[34] Ibid., 453.
[35] Ibid., 588.

Logistics Base

"'A base of operations,' said General Roberts, 'where I could have magazines, provisions, ammunition, and recruits, and to which I could send back my sick and wounded men and horses, would imply an amount of transport which it would take a month to supply; and, moreover, I have every confidence in our being able to for once discard such depot, as our commissariat and political officers are assured by the Ameer that supplies will be readily forthcoming on the route."

Major Waller Ashe
Personal Records of the Kandahar Campaign[36]

The British used purchasing agents in British India and foraging parties in Afghanistan to establish stockpiles at logistics bases. The purchasing agents supplying Kohat had the most difficult time due to the shortages of supplies in the Khost region. As a result, they had to go further to get supplies which compounded the shortage of transport animals.[37]

The British also employed foraging columns which traveled up to 30 miles to obtain food, water, and fodder. One such column, the August 1880 Margha-Chaman Column, consisted of:

> Lieutenant-Colonel T. Bell, 17th Bombay Infantry Regiment, Commanding
> Lieutenant-Colonel J. G. Lindsay, commanding 3 Companies of Sappers and Miners and Engineer Staff
> Major R. Westmacott, Road Commandant
> No. 2 Mountain Battery, 2 guns – Major R. Wace
> 2nd Sind Horse Squadron – Major Carpendale
> 27th Bombay Infantry Regiment[38]

In addition to the depots and posts along the LOCs, the British established logistics bases at each of the cities and camps they moved through or occupied. Two initial bases were located at Ali Khel and the Paiwar Kotal. Ali Khel maintained commissariat storehouses with two months of British and one month of native troop supplies.[39] The citadel at Kandahar had abundant

[36] Ashe, 124.
[37] AHI, 120.
[38] Ibid., 593.
[39] Ibid., 135.

supplies and ammunition, which were stored in underground tunnels. The supplystockage objective, by 1879, was five months' of supply.[40]

What Kandahar lacked was a reliable supply of water.

> water will have to be seen to. There are plenty of tanks, and we have fatigue parties all day and night employed in cleaning them. This water, as I before said, is supplied by the outside canals, and can be at any moment cut off. This may be our weak point.[41]

As time progressed, British camps were selected largely for their access to water. The Sherpur cantonment had running water and wells just seven feet below the surface.[42] In cases where rivers or canals could be cut off, the British maintained seven days of supply which was supplemented by wells and mule resupply.[43]

Kabul was often short of supplies due to enemy raids and ambushes.[44] Therefore, General Roberts defended at Sherpur cantonment during the siege of Kabul. It sheltered troops, horses, transport animals, supplies and stores,[45] and its stockpiles provided over four months of supplies for the entire Kurram Field Force.[46]

During movement, the British reduced the need for a supply base by two methods: carrying most of their supplies with them or living off of the land. The first method caused the British their most serious setbacks of the war. Foot and wheeled movementwas slowed by baggage and supply trains moving alongside the British forces.

When General Burrows' advanced guard was moving from Kandahar to Maiwand in July 1879, his baggage train not only slowed his rate of march, but also absorbed over 200 line soldiers as guards.

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[40] Charles M. MacGregor, W*ar in Afghanistan, 1879-80: The Personal Diary of Major General Sir Charles Metcalf MacGregor*, edited by William Trousdale (Detroit: Wayne State University Press, 1985), 105.
[41] Ashe, 59.
[42] AHI, 274.
[43] Ibid., 378.
[44] Ashe, 9.
[45] Featherstone, 33.
[46] AHI, 276.

> The column was encumbered by a very large quantity of ordnance and commissariat stores and baggage, a disadvantage that was unavoidable, for the hostile state of the country rendered it impossible to leave anything behind in safety.[47]

The opposing "logistics lite" Afghan army could maneuver twice as fast as the baggage-encumbered British.[48]

Outgeneraled and slowed by supply trains of 6,000 animals, supply and transport personnel, and camp followers, the British brigade was quickly destroyed.[49] Burrows' losses totaled over 1,300 officers and men, and a complete loss of all guns and ammunition. While the Afghanis stopped their pursuit to loot the British baggage and stores, pockets of survivors retreated to Kandahar.[50]

Baggage was sometimes separated from its force due to difficult terrain or enemy contact. On one such occasion, over 300 troops were detailed expressly to collocate troops and baggage. In the meantime, "columns bivouacked without baggage, many without food, and some without even great-coats" for three days. Some even went without water.[51] When baggage followed troop movement, it moved at night for security using sixty transport animals per night.[52]

The second method of reducing the need for stockpiling was to live off the land; however, this was not always possible and ate into resources. In February 1878, the Kandahar Field Force had to take twenty days of supply with them in order to scout Girishk and Helmand for supplies. Movement was slow, the barren land offered few supplies, and the force returned to Kandahar empty handed:

> All of the country in the vicinity of Girishk had been drained of supplies; and before a move could be effected the arrival of a convoy from the Garmsel

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[47] Ibid., 499.
[48] Ali A. Jalali and Les Grau, "Expeditionary Forces: Superior Technology Defeated – The Battle of Maiwand," *Military Review* (May-June 2001), 1 [on-line @ http://fmso.leavenworth.army.mil, accessed 24 October 2002].
[49] Leigh Maxwell, *My God – Maiwand!: Operations of the South Afghanistan Field Force 1878-80* (London: Leo Cooper, 1979), 92-3.
[50] Featherstone, 35.
[51] AHI, 428-29.
[52] MacGregor, 138.

> district, with supplies collected from 30 to 40 miles to the southwest, had to be awaited.[53]

In many cases, however, British forces lived off the land. Indian and Afghan camp followers included hunters and fishers.[54] These combined with purchasing agents and foraging parties enabled units to move without stopping at or establishing an extensive supply base.

Shortly after the Battle of Maiwand, General Roberts conducted a 320 mile forced march from Kabul to Kandahar in order to join and assist General Burrows and General Primrose in the defense of Kandahar. Traversing rugged country with transport priority given to food and forage, Roberts' forces moved while living off the land:

> Mobility had to be the keynote of the operation. The maximum weight allowed for each British soldier's kit was thirty pounds, that of a sepoy twenty. The force would be expected, somehow, to live off the land. No food supplies were carried except for iron rations of bread, flour, ghee (clarified butter), preserved vegetables, tea, sugar, salt and rum.[55]

Movement

"Transport and commissariat difficulties, and that of 'unspiritual god, Circumstance,' have, as usual, compelled our General to alter his arrangements…"

Major Waller Ashe
Personal Records of the Kandahar Campaign[56]

Animals moved the baggage; however, acquiring and maintaining the numbers of animals necessary to move troops, equipment, and supplies along the LOCs was difficult and expensive. Lack of local hill-camels, compounded by the daily death rate of 200 less-sturdy Sind and Punjab camels, forced the British to purchase additional transport animals at a premium rate. However, most of the new animals were weaker than the original ones.[57]

In 1879, the Peshawar Valley Field Force estimated its transport requirement for baggage, ammunition, three-days' rations, and twenty-seven days' supplies at 8,900 camels and 2,432

[53] AHI, 169-70.
[54] Ashe, 70.
[55] Miller, 211.
[56] Ashe, 250.

mules; however, numbers available totaled less than half of that requirement.[58] Similarly, General Stewart's estimate of transport for the Bombay Division of the Kandahar Field Force totaled 6,800 camels and 1,500 mules.[59] Both of these estimates were submitted to the Quartermaster-General, but in vain.

Compounding the problem of limited assets was the heavy toll the roads and weather took on the animals. The siege of Kabul, for example, required extensive movement along the route between Peshawar and Kabul. Ultimately, the route became "littered by the dry bones of baggage animals, dying of toil, disease and cold, or falls over the edge of the track – by March 1880 it was estimated that eighty thousand had perished."[60]

By British estimates, one day of supply for 14,000 men required 1,453 camel loads of supplies.[61] On those occasions when commanders desired increased speed, supplies and equipment were left behind, but this often left the soldiers without food for days at a time, while putting unprotected stragglers and supplies at increased risk.[62] Despite some three supply posts per route, distribution of supplies to the British forces and their animals was sometimes only day-to-day.[63]

Transport was supplemented by hired cart or carriage. This usually required building or improving roads and bridges, increasing forage for the cart horses, and providing wages for the drivers. Supply transfer required careful planning. Hired transport was preferable to government transport because it reduced convoy escort, was more reliable, allowed continuous stocking of posts along the LOCs, and provided regular bi-weekly or weekly supply deliveries.[64]

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[57] Hanna, 119.
[58] AHI, 69.
[59] Ibid., 340.
[60] Featherstone, 33.
[61] Hanna, 246-7.
[62] Ibid., 2, 34.
[63] Ibid., 35.
[64] AHI, 343-44.

Troop movement was by foot. This was particularly difficult if only one route was passable or available to mass against the enemy. The rate of march for large bodies of soldiers traveling on one road was less than two and a half miles per hour allowing occasional rest halts. Daytime marches were often under the hot summer sun heat and nighttime marches presented navigational challenges. One veteran of Afghan and Indian marches recalled the bedlam:

> the horrors of the hour or hour and a half preparing for the road will not easily be forgotten. The discordant bellowing of the overloaded camel, and the *debris* caused by an elephant who has quarreled with his mahout, the screams of the native drivers, and the abjurations of the English soldier, make an *Inferno* worthy of a modern Dante.[65]

Despite these difficulties, General Roberts' force moved on foot from Kabul to Kandahar with ten thousand men, eight thousand native camp followers, ten thousand mules, horses, and baggage animals, and eighteen guns. Extending some eight miles on the road, his column moved an average of fourteen miles daily covering three hundred and twenty miles in twenty-three days.[66]

Officers moved by animal. Due to the nature of the roads and terrain, it often occurred that a variety of animals were necessary for a single route. In his diary, one officer described traveling on a horse, then a mare, and finally a pony to reach his destination.[67]

Movement by rail was never fully realized. Colonel G. Medley, the Government of India's Consulting Engineer, deployed to Afghanistan to develop plans and estimates; however, the hot season quickly turned to cold before his work could be completed.[68] Where the terrain was suitable for railroad construction, the required tunnel sections were too costly.[69]

The planned Bolan line, tying British/India to Kandahar, was never built and only portions of the Harnai-Kandahar railway were completed.[70] The British did succeed in completing the

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[65] Ashe, 56.
[66] Miller, 211-214; Featherstone, 35.
[67] MacGregor, 170.
[68] Hanna, 161.
[69] MacGregor, 80.
[70] AHI, 341-2.

railway in India between Karachi and Multan, which greatly eased deployment, movement and resupply throughout the war. They bridged the Indus after the war.[71]

The British also used river rafts for transport. After the Treaty of Gandamak, 25,000 "maunds" of stores from Jalalabad were shipped down the river on rafts overnight to India.[72] One or more sappers guarded each raft and the divisional headquarters staff were on the lead rafts:

> before night all the stores remaining were down at the wharves; and, by carrying on the preparation of the rafts all night, everything was cleared off…A little wetting to the food supplies was incurred, but no loss whatever to the Engineer stores.[73]

General Roberts selected the Sherpur Cantonment as his supply base, considering that a navigable river (the Kabul) flowed through it.[74] When he could not move guns by road, he moved them on rivers.[75]

In both routine and emergency situations, the British also throughput supplies.[76] Most supplies entering Afghanistan from British-India either came through or from Rawalpindi. Supplies were especially critical to Roberts' Kurram and Khost region forces due to the lack of local rice or wheat. Not only was throughput required at the depots at Thal and Kohat, but Kurram also had to be stocked in case roads became impassable or were cut by rising rivers.

Early in the British deployment into Afghanistan, General Roberts directed throughput of critically short transport animals. On this occasion, thousands of animals were deployed by rail from Mirzapur through Kohat and onto the Khost Region.[77]

The partial siege of Kabul (late 1879 to the spring of 1880) also required throughput of supplies. The garrison was able to sustain itself in Kabul only because of its resupply by

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[71] Hanna, 160.
[72] A "maund" is an Indian weight of approximately 82.8 pounds; therefore, 25,000 maunds are equivalent to 1,000 short tons.
[73] AHI, 87.
[74] Ibid., 273.
[75] MacGregor, 185.
[76] Throughput is generally the preferred method of distribution. This method allows materiel to move from the air or sea port of debarkation directly to the using unit.
[77] AHI, 120.

"continuous columns of camels, oxen, mules, ponies and men laboriously traversing the deep and dark defiles from Peshawar to Kabul."[78]

Conclusion

British logistics in the Second Anglo-Afghan War were remarkably successful considering the limited transport available. Despite this success, however, Great Britain is only remembered as achieving a Pyrrhic victory in the war.[79] Operations in Afghanistan became unpopular in Britain and too expensive.[80] By the end of 1880, all British troops had returned to India.[81]

Soviet-Afghan War, 1979-1989[82]

Road to War

A communist coup d'etat and rebellion against it threw Afghanistan into civil war in 1978. Unhappy with the modernization efforts of President Mohammad Daoud, army and air force officers lead the Saur Revolution to install a communist regime. Religious unrest, local rebellions, and sweeping communist reforms drove most of Afghanistan into open revolt by early 1979.

The communist regime worked in concert with Soviet advisers and elite officers and units. The communists were fragmented and unfocused. Hafizullah Amin ousted and killed Moscow's ordained leader. The Soviet leadership decided to invade Afghanistan at the 26 November Politburo session.[83] The purpose was to stabilize a Marxist country that was spinning out of control and to pacify the southern border of the USSR.

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[78] Featherstone, 33.
[79] Sources vary as to the outcome of this war. One source goes as far as to say that the British army was defeated in 1880 (Larry P. Goodson, *Afghanistan's Endless War: State Failure, Regional Politics, and the Rise of the Taliban* (Seattle: University of Washington Press, 2001), 34).
[80] Ashe, xxiii.
[81] Miller, 204.
[82] Sources vary as to the inclusive dates of the war. One historian wrote, "In practical terms, the war in Afghanistan had begun by late 1978, over a year before the large-scale insertion of Soviet forces" (Baumann, 132).
[83] Goodson, 55-57.

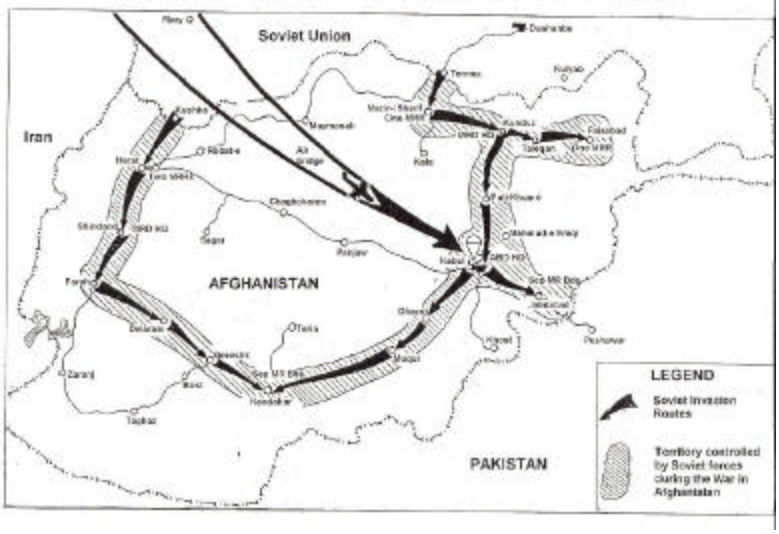
Deployment

"The initial movement of major Soviet invasion forces into Afghanistan was conducted with a speed and effectiveness that seemed the essence of Soviet military theory and practice."

Dr. Graham H. Turbiville, Jr.
Ambush! The Road War in Afghanistan[84]

In the days preceding Christmas 1979, Soviet troops made their way to Kabul by air, land, and river crossing. Within days, 15,000 soldiers were maneuvering on Kabul while others had seized Bagram airfield.[85] Landings followed at Bagram and Shindand airbases and the Kandahar Airport. Within days, President Hafizullah Amin was dead, Babrak Karmal was installed and addressing the Afghan people by radio.[86] Within weeks, 75,000 Soviet troops controlled the cities and government.[87]

Figure 2. Soviet Deployment and Occupation.



[84] Graham H. Turbiville, Jr. "Ambush! The Road War in Afghanistan" (Fort Leavenworth, KS: Soviet Army Studies Office, U.S. Army Combined Arms Center), 3.
[85] Baumann, 138.
[86] Goodson, 58; Sarin and Dvoretsky, 84.
[87] "Ambush!", 4.

The Soviet ground deployment plan called for an advance along two major routes, which would later serve as LOCs. In the east, the Termez—Khairaton—Pul-e-Khumri line focused on Kabul. In the west, the Kushka—Heart—Shindand line focused on Kandahar.[88]

Previously, the Soviet General Staff estimated that 30 to 35 divisions would be needed to fully control Afghanistan; however, the Soviet Union deployed fewer than six division equivalents.[89] Major ground units of the Soviet 40th Army included three motorized rifle divisions, an airborne division, motorized rifle regiments (two) and brigades (two), an air assault brigade, a parachute regiment, a separate multiple rocket launcher regiment, and an engineer regiment.[90]

Major air units included separate helicopter regiments (two), squadrons (two) and detachments (one).[91] Forces arrived on hundreds of sorties flown by AN-12, Il-76, and An-22 Military Transport Aviation (VTA) aircraft.[92]

Through trial and error, the Soviets realized the need for light, highly mobile forces in Afghanistan. They sent tank regiments, heavy artillery and mortars and towed air-defense weapons back to the Soviet Union in return for infantry fighting vehicles, amphibious trucks, and light reconnaissance vehicles.[93]

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[88] Baumann, 138.
[89] Lester W. Grau, interview by Martha Granger, 17 December 2002 (School of Advanced Military Studies, Leavenworth, KS). Subsequently referred to as Grau interview. At the time, the USSR had 210 divisions in various states of manning and equipment fill.
[90] Figure 2 from The Russian General Staff, *The Soviet-Afghan War: How a Superpower Fought and Lost*, Trans and ed by Lester W. Grau and Michael A. Gress (Kansas: University Press of Kansas, 2002), 315. Subsequently referred to as RGS. By 1988, two Spetsnaz Brigades were deployed (318). A separate account lists two supply and support brigades as also deployed (Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict* (London: Brassey's (UK), 1991), 308).
[91] RGS, 315. List also includes other fighter, aviation and reconnaissance units. By 1988, an additional three separate helicopter squadrons were deployed (318).
[92] "Ambush!", 5.
[93] Sarin and Dvoretsky, 91.

LOCs

"He'd been ordered to move our transport column down the road as fast as possible. But he had a premonition, and even though the road had already been checked by other minesweepers, he gave the order for us to check it again."

Vladislav Tamarov
Paghman, Afghanistan
September 1985[94]

The most critical shaping operation for the Soviet battle in Afghanistan was "for control of the lines of communication."[95] Of the various objectives in the Soviet war strategy, the first was "to secure Kabul and the highways linking the capital to Kandahar and Heart in the south and, via the Salang Pass, Termez on the border of the USSR."[96] Despite armored vehicle escorts, the Soviets took heavy losses in their "highway war" – protecting convoys along long, harsh, and frequently-interdicted routes.[97]

> A typical supply column consisted of from 100 to 250 vehicles, of which about 1 in 10 were infantry fighting vehicles. The use of a helicopter escort was also a standard procedure. The rapid coordination of tank and artillery fire, often called in from distant batteries, saved many pinned-down units.[98]

The cost to combat power was onerous as the Soviets committed 85 percent of their combat regiments and divisions to securing cities, base camps, garrisons, airfields, LOC outposts, pipelines, and convoys.[99]

"Every day up to 600 soldiers, 90 BTRs, 20 helicopters, and 140 air-defense guns conducted convoy escort and security duty. Armored personnel carriers also accompanied convoys,[100] with

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[94] Vladislav Tamarov, *Afghanistan: A Russian Soldier's Story,* translated by Naomi Marcus, Marianne Clarke Trangen, and Vladislav Tamarov (Berkeley: Ten Speed Press, 2001), 86. Comment made about Tamarov's commander, Oleg Palich.
[95] Thompson, 308.
[96] Baumann, 136.
[97] "Ambush! ", 3.
[98] Baumann, 164.
[99] Grau interview. Sources vary on the percentage of troops dedicated to movement; an opposition leader estimated that nine out of ten Soviet soldiers were committed to the protection of Soviet convoys, roads, or logistic bases (Mohammad Yousaf and Mark Adkin, *Afghanistan – The Bear Trap: The Defeat of a Superpower* (Havertown, PA: Casemate, 1992), 68); another source estimated that 60 percent of Soviet forces, primarily motor-rifle units, were committed to securing Kabul and the highways leading to it (Baumann, 136); and another source estimated that 35 percent of Soviet troops were used to protect LOCs and outposts (Sarin and Dvoretsky, 92).

one armored vehicle assigned for every 10 to 15 trucks."[101] A single division, occupying an area 120 by 380 kilometers, would control 70 garrisons, of which 60 were strong points along the LOC.[102]

The Salang Highway, A-76, crossed the 450 kilometers from Termez to Kabul and served as the main Soviet LOC.[103] From there additional routes, including Highway A01 connected Ghazni and Kandahar in the south (500 kms) as well as Gardez, Jalalabad and Peshawar in the east. The secondary LOC in the west crossed the 1,000 kilometers from Kushka through Kandahar and back to Kabul.[104]

The mujahideen focused on attacking Soviet logistics moving on the LOCs.[105] Bordering on several mujahideen bases of supply, the eastern LOC was particularly vulnerable.[106] Mountainous terrain also facilitated ambushes. To counter this threat, the Soviets established a series of strong points every two to seven kilometers along each route. Along the Salang Highway, large garrisons were positioned at intervals of 20 kilometers, each having a mobile reserve force, armored vehicles, artillery, tanks, and air force controllers.[107]

The widespread use of mines by the guerrillas also hampered Soviet movement. To counter this threat, the Soviets employed platoon to battalion-size movement-security detachments for reconnaissance and removal of road barricades and mines. These units cleared routes of obstacles and mines with electronic mine detectors, tanks equipped with rollers, and trained dogs.[108]

> Engineer troops escorted companies having convoy protection duties so they could be on hand to remove mines emplaced on roads. Between 1980 and 1985,

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[100] Graham H. Turbiville, Jr., "Soviet Airborne Troops," *Soviet Armed Forces Review Annual (SAFRA)*, Volume 10, 1985-1986, 1987 (DTIC File Copy AD-A216 488, Carl Library, Fort Leavenworth, KS), 3-4.
[101] RGS, 282.
[102] Ibid., 264. Typically, 40 to 60 percent of a division's combat equipment would be dispersed in these strong points (265).
[103] This highway was built by the Soviets in the 1960s (Baumann, 131), and is also referred to as Highway 2. The secondary LOC (termed "ring-road") was built by the U.S.
[104] Yousaf and Adkin, 66.
[105] Sarin and Dvorestsky, 92; Baumann, 164; Goodson, 65-6: Soviet tactics responded in kind with emphasis on the interdiction of mujahideen supply lines by special operations and airborne units.
[106] Yousaf and Adkin, 68.
[107] Ibid., 76.
[108] Baumann, 165.

> Soviet troops cleared almost 23,000 mines of all kinds and captured some 56,000 antitiank and antipersonnel mines as well as 68 tons of explosives.[109]

The Soviets also installed minefields and used artillery for route security along portions of the LOCs. Nevertheless, the mujahideen continued to own the countryside, especially at night.[110]

The Salang Tunnel, built by the Soviets in 1964, was a particular point of vulnerability on the LOC and required its own security and control force.[111] Five kilometers long and 11,000 feet up in the Hindu Kush, this tunnel was troublesome for the Soviets and often a target of opportunity for the mujahideen. "To me it was probably the most alluring target in Afghanistan. It cried out for attack. To destroy the tunnel would cause staggering logistic difficulties for the Soviets," recalled a Pakistani intelligence officer who supported the mujahideen. He was never able to do so.[112]

In addition to ground LOCs, the Soviets used "air bridges." These aviation LOCs facilitated deep operations.[113] The Soviets employed long- and short-range air transport and were able to reach many outposts solely by helicopter.[114] They were able to airlift supplies to most of their operational bases and garrisons, and even to surrounded posts in emergencies.[115] Such was the case at the government outpost of Khost, under siege during most of the war, which "survived only by virtue of aerial resupply."[116]

Logistics Base

"When an army begins an operation, whether it is to attack the enemy and invade his theater of war or to take up positions along its own borders, it necessarily remains dependent on its sources of supply and replenishment and must maintain communications with them. They constitute the basis of its existence and survival."

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[109] Sarin and Dvoretsky, 120.
[110] Goodson, 60.
[111] "Ambush!", 4; Baumann, 131.
[112] Yousaf and Adkin, 74-5. There was an elaborate plan worked on by the mujahideen to position tankers full of high explosives inside the tunnel and detonate them; however, the plan proved too ambitious and risky, and was never executed.
[113] "Ambush!", 22.
[114] Thompson, 308.
[115] Yousaf and Adkin, 67.
[116] Baumann, 151.

Carl von Clausewitz, *On War*[117]

With little infrastructure or resources in Afghanistan, from the outset of the war the Soviets relied on logistics support from the Soviet Union. Strategic supply bases were located at Termez, on the eastern corridor, and Kushka, on the western corridor. According to a Pakistani officer supporting the mujahideen, these bases and the routes running from them were equally critical to the Soviet operation:

> A secure base of supply in which you can stockpile all the necessary weapons of war is useless unless the items can be delivered to the units in the field. For that lines of communication are essential. They are the arteries and veins of an army. Just as a human heart pumps blood along these veins to all parts of the body, so a strategic base must pump supplies to all parts of an army…Termez…was their heart…[118]

This distant support quickly proved difficult, however, especially during sustained operations.[119] With no forward maintenance capability, materiel sent back to the Soviet Union for repair never returned. Soviets soon established supply depots and supply points throughout the country, which included maintenance and multi-functional technical support groups.[120] Major garrisons included Jalalabad, Ghazni, Gardez, Faizabad, Kunduz, Lashkargah, and Kandahar.[121] Major logistics centers included Pol-i-Khomri, Kabul, Shindand, and Jalalabad.[122]

These depots stockpiled supplies forward, while providing increased flexibility for movement around the country. Operations were tied to within 100 kilometers of supply depots,[123] but even this system failed to prevent critical shortages:

> Each major Soviet offensive was always preceded by a logistical build-up of ammunition, fuel, food, and spare parts. Most Soviet operations were terminated after 4-6 weeks because they reached a logistical (as opposed to operational)

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[117] *On War*, 408.
[118] Yousaf and Adkin, 66-7.
[119] RGS, 264; Thompson, 308.
[120] RGS, 273, 278.
[121] Sarin and Dvoretsky, 125.
[122] Scott R. McMichael, *Stumbling Bear: Soviet Military Performance in Afghanistan* (London: Brassey's (UK), 1991), 113.
[123] RGS, 264.

> 'culminating point.' The command simply could not sustain a large force out of garrison beyond that time.[124]

For the first few years of the war, maintenance and supply were conducted from rough shelters and tents; however, extended operations brought improvements. Engineers and construction battalions built fixed maintenance facilities and established and hardened ammunition and fuel depots and storage facilities.[125]

Water was not available at the logistics bases. Due to Soviet bombing, most of the wells, ditches, cisterns, and channels of the previously functioning water supply system were destroyed. Soviet troops carried their water with them. Some bases the Soviets occupied were abandoned because of severe water shortages:[126]

> …most units had no running water and hot water was seldom available. Soldiers often went a month without a bath or shower, dinner plates and utensils were scrubbed, but not washed, laundry seldom got cleaned nor bedsheets changed, and drinking water was often impure. Diseases like jaundice, dysentery, hepatitis, malaria, typhus, intestinal parasites, and skin infections approached epidemic proportions.[127]

Movement

"From the very first day of the war, helicopters proved to be an integral asset, a true friend of the ground forces, and often their sole support and salvation."

Russian General Staff
The Soviet Afghan War[128]

To meet the immense needs of the Soviet forces, ground movement was the major effort, and the most costly. Since there were no railroads in Afghanistan, everything necessary for sustaining operations was delivered by truck convoys or by air."[129] With the exception of fuel, 75 to 80 percent of cargo moved by truck transport.[130]

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[124] McMichael, 114.
[125] Ibid., 113.
[126] Ibid., 114.
[127] Ibid., 115.
[128] RGS, 308.
[129] "Ambush!", 5; Sarin and Dvoretsky, 92; Baumann, 151.
[130] RGS, 282.

> …cargo was moved throughout the USSR on railroad and barges to the transfer bases at Termez and Kushka. From there, the cargo was moved on trucks to the army bases at Shindand and Kabul and then on to division and regimental depots. An insignificant part of perishable goods (5 to 8 percent) was flown on military transport aircraft directly to the forces.[131]

To facilitate ground movement, Soviet engineers and construction battalions had to widen, improve, and extend highways.[132]

The Soviets supported highway traffic with small bases providing traffic control, refueling, repair facilities, and security for overnight stays and rest stops.[133] All movement required minesweepers. "Without minesweepers along, no group ever went into the mountains, no car ever drove off the base, and no transport column ever set out along the road."[134]

Ground movement was restricted to the daytime. "Everything stopped at night. There were no convoys, no movement, no attacks, and very few patrols during darkness. This was primarily due to the reduced effectiveness of air cover."[135]

The Soviets relied on helicopters from the VTA for bringing in support elements and routine resupply.[136] Helicopters carried heavy equipment, provided fire support, and supported airborne and air assault operations in flat and mountainous terrain.[137] The Soviets quickly learned to use them to air-land troops into blocking positions in support of large sweep operations.[138] "On a single day 1,280 men were airlifted from the Bagram airfield to the vicinity of the Pizgoran ravine" using shuttles of 24 Mi-8 helicopters.[139]

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[131] Ibid.
[132] McMichael, 112.
[133] Ibid., 113.
[134] Tamarov, 74.
[135] Yousaf and Adkin, 76. Another source discussed improved training for night operations and Soviet use of night operations to achieve surprise (Sarin and Dvoretsky, 94, 111).
[136] "Ambush!", 5.
[137] "Soviet Airborne Troops," 10-11.
[138] Yousaf and Adkin, 59-60.
[139] Sarin and Dvoretsky, 102. Frequent errors occurred using helicopter delivery of troops and supplies due to lack of knowledge in the behavior of aircraft at different altitudes and temperatures (108).

In a transport role, the Mi-6, Mi-8, and Mi-26 predominated in difficult terrain and at high altitudes.[140]

> These would land on site or drop cargo from a height of 5 to 30 meters at a speed of 20 to 70 kilometers per hour (12 to 43 miles per hour). The cargo that was dropped was well-packed in boxes in which rags or sand took up one-fourth of the space. They also used a heavy-duty supply container that was designed for airborne drops and equipped with shock absorbers.[141]

Both the Mi-8 and Mi-26 could land in restricted terrain at night and under fire.[142] Air movement of wheeled and air-droppable 120mm self-propelled mortar/howitzers facilitated flexible indirect fire capability.[143] The importance of helicopters increased dramatically during the first half of the war. The Soviets expanded the role of the helicopter from movement to security, reconnaissance, and close air support. In 1980, "the number of Soviet helicopters swelled from 15 to 20 to 250 to 300.[144]

The Soviet and Afghan construction of a rail line from 1979-1982 created an 816 meter combined rail and road bridge over the Amu River linking Termez to Khairaton. Plans were to continue the line 200 kilometers to Pul-e-Khumri; however, progress was blocked by mountains, snow, and combat.[145]

The Soviets used fuel pipelines and trucks to move diesel and aviation fuel from the Soviet Union to major airfields in Afghanistan. Three pipelines ran from the Soviet Union to the Afghanistan border.[146] From there, two pipelines paralleled the roads from Khairaton to Bagram and Turagondi to Shindand. Each route had one line for aviation fuel and another for diesel.[147]

> Not only did 75 per cent of all ground traffic to support the war travel down this road, but so did all the fuel oil. Only a few feet from the highway, above ground, ran the oil pipeline from the Soviet Union. It followed the road throughout its

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[140] Baumann, 151.
[141] RGS, 287.
[142] "Soviet Airborne Troops," 7-8.
[143] Ibid., 3-4.
[144] Baumann, 153.
[145] Ibid., 143; Jane's Sentinel, 20. The northern line was built primarily to export Afghan national resources to the river ports and then to the Soviet Union (McMichael, 113).
[146] Yousaf and Adkin, 66; Baumann, 151.
[147] RGS, 282.

length to the air base at Bagram and was another tempting target for the Mujahideen.[148]

Engineers were assigned to protect the pipelines.[149] Despite their associated security requirements, the pipelines greatly enhanced Soviet air and ground maneuver capability.[150] Additional fuel was moved by tanker trucks and helicopter-liftedblivets.[151] Fuel made up 60 to 65 percent of the daily 2-3,000 tons of supply moved to the combat zone.[152]

A combination of trucks and helicopters moved ammunition. Ammunition made up seven percent of the daily tons of supply moved. Supplemental ammunition reserves and separate artillery ammunition depots decreased movement requirements significantly.[153]

The Soviets improved their ability to move supplies before the war by adding material support units to their airborne, motorized rifle and tank divisions.[154] This change enabled the distribution of ammunition, fuel, repair parts, rations, clothing, and other supply items to subordinate units on a "push" system, instead of waiting for unit requests or requiring units to draw from supply depots (a "pull" system).[155]

Conclusion

For over nine years, the flexible Soviet logistics system supported 150,000 Soviet and Afghan soldiers in an extremely hostile environment through major ground offensives, artillery and rocket barrages, urban warfare, bombing campaigns, and other combat.[156] The Soviets withdrew

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[148] Yousaf and Adkin, 76.
[149] Sarin and Dvoretsky, 120.
[150] "Ambush!", 11.
[151] Thompson, 309; Sarin and Dvoretsky, 86.
[152] RGS, 282.
[153] Ibid., 266-7, 282.
[154] "Ambush!", 38; Graham H. Turbiville, Jr., "Soviet Logistics Support Concepts Change," *Army Logistician* (March-April, 1987), 2.
[155] RGS, 291.
[156] Sources vary as to the total number of forces employed by the Soviets. This source cites combined number of Soviet and Turkestan Military District troops at 150,000, and total Soviet and Afghan troop strength at 400,000 (Baumann, 149). Another source cites Soviet strength at 120,000 (Goodson, 64-5). Sources vary on how flexible the Soviet logistics system was. Another source explains that once the Soviets realized that the occupation was indefinite, they greatly improved the logistics infrastructure;

not because they could not sustain their force in Afghanistan, but because they could not win the "protracted and difficult war against a determined resistance movement."[157] Geneva talks in 1988 facilitated the withdrawal of Soviet troops from Afghanistan. They completed their withdrawal on 15 February 1989.[158]

Operation Enduring Freedom of the U.S. War on Terrorism, 2001-Present[159]

Road to War

"Our objectives in this war are simple: to disrupt and destroy global terrorist organizations, eliminate safe havens for terrorists, and prevent access to WMD by terrorist groups."

General Richard B. Myers
Chairman, Joint Chiefs of Staff
8 February 2002[160]

On 11 September 2001, over 3,000 people died in international terrorist attacks on U.S. soil. Within minutes, a plane crashed in Pennsylvania, smoke bellowed from the Pentagon in Washington, D.C., and the twin towers of the World Trade Center collapsed in New York. Three days later, President George W. Bush declared a state of national emergency and called the Ready Reserve to active duty.[161] The U.S. began the War on Terrorism with tandem operations: Noble Eagle for the defense of the U.S.; and Enduring Freedom for the offensive in Afghanistan.[162]

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however, this did not preclude problems with terrain, climate, and underdeveloped roads, rail, depots, and repair facilities (McMichael, 112).

[157] Baumann, 129; Thompson, 309. Sources vary as to the outcome of this war, but generally agree that neither side achieved their objectives (Sarin and Dvoretsky, 121). Another source regarded the war as a Soviet failure, despite the author's emphasis on many successful Soviet innovations and adaptations (Stephen J. Blank, *Operational and Strategic Lessons of the War in Afghanistan, 1979-90* (Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, 1991), 1).

[158] Goodson, 69.

[159] For the purposes of this analysis, U.S. sister service and coalition force involvement in the U.S. War on Terrorism will not be discussed unless specific logistical implications are relevant. The coalition included the U.K., Australia, France, Canada, Denmark, Norway, and Germany (Michael E. O'Hanlon, "A Flawed Masterpiece," *Foreign Affairs* (May-June 2002), 49).

[160] Chairman of the Joint Chiefs of Staff, "Global War on Terrorism: Posture Statement" (8 February 2002), 2 [on-line @ http://www.dtic.mil/jcs/chairman/Posture_Statement.html, accessed 19 August 2002]. Subsequently referred to as CJCS.

[161] Under Secretary of Defense for Acquisition and Technology, "Memorandum for Secretary of the Army, Secretary of the Navy, Secretary of the Air Force, and Directors of Defense Agencies," Washington, D.C., 9 October 2001, 1 [on-line @

Taliban and Al-Queda forces under the command of Osama bin Laden were the focus of Operation Enduring Freedom as President Bush rallied the American people for war. NATO, standing squarely by America's side, invoked Article V, the mutual-defense clause.[163]

The U.S. allied with anti-Taliban forces in Afghanistan to attack the international terrorists,[164] and convinced Pakistan to join the effort. Pakistan began working with Afghanistan's Northern Alliance, severed its ties with the Taliban, and agreed to U.S. basing andoverflight in Pakistan. The U.S. also gained the support of Russian President Vladimir Putin.[165]

The first step taken by President Bush was to demand that the Taliban government hand over Osama bin Laden, but Taliban leader Mullah Omar refused.[166] On 7 October 2001, American bombing and Special Operations Forces (SOF) infiltrations began.[167] "In mid-October, only three special operations 'A Teams,' each consisting of a dozen personnel, were in Afghanistan; in mid-November, the tally was 10; by December 8, it was 17."[168]

SOF teams performed admirably as forward air controllers. USAF precision bombing, directed by SOF teams, enabled the anti-Taliban forces to advance southward. The Taliban government collapsed as their forces fled to the mountains. However, the war was not over. More troops and more logistics support were needed.

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http://www.acq.osd.mil/dp/docs2001/Contingency_Ops_Enduring_Freedom.pdf, accessed 19 August 2002]. Subsequently referred to as USD.

[162] CJCS, 2.

[163] O'Hanlon, 47, 49.

[164] Bryan Bender, Kim Burger and Andrew Koch, "Afghanistan: First Lessons," *Jane's Defence Weekly* (19 December 2001), 18: Anti-Taliban forces include the United Front in the north and opposition Pushtun forces in the south.

[165] O'Hanlon, 47.

[166] Stephen Tanner, Afghanistan: A Military History from Alexander the Great to the Fall of the Taliban (New York: Da Capo Press, 2002), 292.

[167] Coalition SOF included Australia, New Zealand, Canada, Sweden, Denmark, and the United Kingdom (Richard D. Newton, "Special Operations Campaign Design," briefing given at Fort Leavenworth, KS, 19 February 2003). Subsequently referred to as "SOCD."

[168] O'Hanlon, 51.

Deployment[169]

"The difficulties of deploying American forces were both physical and political. The United States had no bases in Central Asia, nor was there sufficient infrastructure to support a major deployment."

William R. Hawkins, *Parameters*, Summer 2002[170]

Logisticians, civil engineers, air transport and tanker crews, and thousands of other support personnel had gone to work weeks before the U.S. invasion. Due to Afghanistan's remote location – 400 miles from Arabian Sea-based aircraft carriers and even farther from air force land bases – the need for tanker and airlift support units was immense.[171]

Of the active duty fleet of over 378 long-range air transport and tankers, 25 percent were awaiting repairs. Within days, U.S. Air Force (USAF) maintenance crews reduced that by half. The early Afghan air campaign tied up 70 percent of the available tankers.[172]

The U.S. deployed to Afghanistan by air from various staging bases: Seeb air base in Muskat, Oman; Jacobabad air base in Pakistan; Karshi Khanabad (K-2) airfield in Uzbekistan; Kuwait air base in Kuwait City, Doha airfield in Qatar; Kulyab air base in Tajikistan, and Ganci air base in Kyrgyzstan.[173] Assistance from U.S. Navy carriers also aided deployment.[174]

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[169] There are many facts about Operation Enduring Freedom that remain classified and if released, might explain or challenge the unclassified observations used to support this thesis. Regarding deployment and movement, much of the initial planning was done in compartmentalized channels. This reduced surface options largely because the requirements were operating in a narrow window. Sometimes only 72 hours separated validation of a requirement to expected delivery. This caused air to be the only viable option because movement had to occur immediately. Compartmentalization also kept many transportation planners outside the room, thus further limiting options (from discussion with LTC Brian Waters, Fellow of the School of Advanced Military Studies, 20 February 2003).

[170] William R. Hawkins, "What Not to Learn from Afghanistan," *Parameters* (Summer 2002), 27.

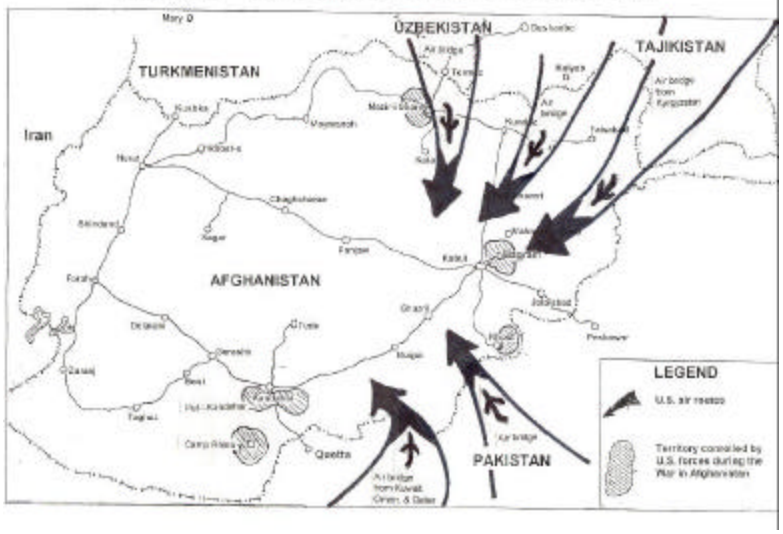
[171] Richard J. Newman, "Tankers and Lifters for a Distant War," *Air Force Magazine* (January, 2002), 57.

[172] Newman, 57.

[173] Grau interview.

[174] Nicholas Florenza, "European Navies Weigh In: Modernization Programs Aim At Eliminating Shortfalls Seen During Afghanistan Operations," *Armed Forces Journal* (March 2002), 54, 58.

Figure 3. U.S. Deployment and Occupation.



Many of the air bases used by the U.S. were inadequate. Though the USAF deployed Contingency Response Groups early to prepare facilities and equipment, they were unable to achieve a common standard.[175]

Air Force officials credited the successful deployment to three recent changes in Air Force and Army doctrine: first, the Air Force's development of the Expeditionary Aerospace Force (EAF) concept; second, the use of commercial carriers for military equipment transport; and third, the Army's recent improvements in the area of asset visibility, especially with bulk supplies.[176]

The U.S. military's focus on keeping a small logistics footprint enabled a speedy deployment. Forces were on the ground in three weeks. At its peak, 60,000 U.S. forces and 15,000 allied forces were deployed in support of Enduring Freedom.[177] Though U.S. Central Command (CENTCOM) considered deploying up to 3,000 more in support of the Tora Bora operation, the idea was dropped largely due to logistics issues:

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[175] Robert Wall, "Military Assesses War Strengths, Shortfalls," *Aviation Week & Space Technology* (15 April 2002), 26; Newman, 58. Subsequently referred to as "Military Assesses." Primitive conditions, poor sanitation, no potable water, and inadequate facilities were common of airports in Uzbekistan and Pakistan.
[176] Adam J. Hebert, "Supply Chain Visibility: US Air Force Adapts to War in Afghanistan and Learns Logistics Lessons," *Armed Forces Journal* (April 2002), 33-4.
[177] O'Hanlon, 48.

> Deploying such a force from the United States would have required several hundred airlift flights, followed by ferrying the troops and supplies to frontline positions via helicopter…a new airfield might have had to be created, largely for fuel. Such an operation would have taken a week or more.[178]

The USMC lacked the ability to deploy artillery to Afghanistan. Transporting the artillery underneath rotary wing aircraft over the long distance from the sea to the area of operations was impossible.[179]

LOCs

"The inability to establish Sea Lines of Communication (SLOC) and Ground Lines of Communication (GLOC) during the initial phases of the operation due to political, diplomatic and force protection challenges, resulted in almost total reliance on theater airlift."

LtCol Sherril
Combatant Commander Joint Logistics (CCJ4)[180]

Within days of the 11 September attacks on the U.S., the USAF began establishing "air bridges." C-5 and C-17 transports headed both east and west, along with 20 to 25 control teams, and began setting up command and control centers, fuel stations, and cargo-handling operations. Equipment to house troops, sustain military operations, and maintain aircraft was also prepositioned.[181]

The establishment of the "air bridges" hinged upon diplomacy. Originally limited to the Pacific and European theaters, these bridges quickly shifted to a Europe-only mode asoverflight and basing privileges were gradually granted.[182] Numerous challenges emerged, to include "diplomatic clearances, beddown of aircraft, fuel, airfield capabilities, force protection and engineering/repair of airfields."[183]

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[178] Ibid., 57-8.
[179] USCENTCOM Active Database, Joint Universal Lessons Learned System (JULLS) NUMBER: 21332-00925, submitted by MARCENT [furnished by CARL, 15 August 2002]. Subsequently referred to as JULLS.
[180] JULLS, 21240-18700, submitted by CCJ4.
[181] Newman, 58.
[182] John A. Tirpak, Enduring Freedom, *Air Force Magazine* (February 2002), 36; Newman, 58.
[183] JULLS, 21240-18700, submitted by CCJ4.

> (U) OBSERVATION: …numerous country considerations…must be addressed…
> (U) DISCUSSION: …RESTRICTIONS TO OVERCOME (1) Government limitations – Support aircraft only or no combat operations…(2) Basing limitations – Partial use of runway only; restrictive flights on certain days. (3) ACSA limitations by law/crossing CINCDOM AORs. (4) Unexpected country rule changes – Air and contract limitations during RAMADAN…UNDERSTAND CAPABILITIES (1) Working MOG; PARKING MOG; Day and night operations (2) Fuel Availability (3) Support Infrastructure – Beddown; facilities.
> (U) LESSON LEARNED:…Actual contributions by a coalition partner will often be much less than…U.S. expectation…Limitations must be known up front. Assumptions lead to poor planning.[184]

Since U.S. forces were tied to air bridges, airlift requirements soon exceeded U.S. military capabilities. "Three weeks into the war, nearly the entire active duty C-5 and C-17 fleets – some 140 aircraft total – had been dedicated to supplying the war effort." The U.S. also contracted 100 commercial flights during the first month of the war.[185] The intratheater airlift plan, based upon a "hub and spoke" concept, lacked sufficient numbers of C-130s, C141s and C-17s.[186]

The C-5, one of the oldest airframes in the military, began to break down and soon clogged the deployment system.

> In a four-day period in late September, 20 percent of the C-5s supporting the build up for Enduring Freedom broke down…During the worst of the breakdowns, there were 22 C-5s on the ground, most down for repairs…The C-5's poor reliability is one of the primary limitations; planners routinely program two aircraft per mission in case one poops out.[187]

Though U.S. truck movement was minimal, contracted ground movement relied on GLOCs. Ad-hoc checkpoints, controlled by various local warlords, often slowed, if not stopped, ground movement. By February of 2003, checkpoints normally waived U.S. vehicles through.[188]

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[184] Ibid., 21742-16597, submitted by CCJ4. ACSA: Acquisition and Cross-Servicing Agreements; MOG: Maximum aircraft on ground.
[185] Newman, 58. Author notes that the smaller C-130s and C-141s took over the regular missions of the C-5s and C-17s instead of being used toward the war effort.
[186] JULLS, 21240-18700, submitted by CCJ4.
[187] Newman, 59.
[188] Wilson Shoffner (Chief of Plans, Coalition Task Force (CTF) 82), on-line interview by Martha Granger, 8 March 2003 (School of Advanced Military Studies, Leavenworth, KS). Subsequently referred to as Shoffner interview.

Logistics Base

"…it is quite impossible to do without any depots whatever…a wise military leader does not fail to establish depots in his rear for unexpected emergencies and in order to be able to concentrate his forces at certain points."

Carl von Clausewitz, *Principles of War*[189]

Operation Enduring Freedom was supplied by logistics "hubs" located outside of Afghanistan. Supplies arrived by sealift to Karachi, Pakistan, and by fixed-wing aircraft to Bagram, Kandahar, and K-2, Uzbekistan. From Uzbekistan, supplies continued to Bagram and Kandahar by fixed-wing aircraft. From Karachi, supplies moved to Bagram and Kandahar by "jingle trucks" contracted from India, Pakistan, or Afghanistan. From Bagram and Kandahar, supplies moved to outlying bases inside Afghanistan by "jingle trucks" or rotary-wing aircraft.[190]

Supplies also flowed from other bases, to include "Camp Snoopy" in Qatar. Here, thousands of pallets of general supplies were collected, packaged, and loaded for transport to Afghanistan by USAF C-130s and C-17s.[191]

During initial operations, U.S. Army logistics supported the cornerstone concept of its new force projection doctrine – velocity management.[192] This system, with its reduced stockpiles and "plug and play" repair concept, was favored for its small logistical footprint, but it could not sustain the force:

> (U) **OBSERVATION**: U.S. CENTCOM attempted to abide by the principles of Velocity Management during Operation Enduring Freedom. There was a constant reminder that we do not want to build iron mountains. Because of this aversion…CENTCOM did not develop a theater logistics base in the AOR…

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[189] *Principles of War*, 357.

[190] Shoffner interview. "Jingle trucks" named for their bells, fringe and brightly-colored paint. Rotary-wing aircraft used instead of "jingle trucks" when moving Class I (perishables), Class IX (repair parts), and mail.

[191] Greg Heath, "Logistics Task Force Supplies on Demand," *Qatar News* (26 March 2002), 1 [on-line @ http://www-qa.arcent.army.mil/news/2002/armysnoopy.html, accessed 19 August 2002].

[192] Velocity Management (VM) initiative began in 1995 and sought to "improve the responsiveness, reliability, and efficiency" of the supposedly outdated army logistics system. The old system, based on "massive stockpiles of supplies and weapons systems, many of them prepositioned "just in case," had proven "increasingly less effective and unaffordable" after the end of the Cold War. RAND's VM team received the "Hammer Award" from the Vice President of the U.S. in 1998 for having made "army logistics work better and cost less" (Mark Y.D. Wang, "Accelerated Logistics: Streamlining the Army's Supply Chain" (Arroyo Center: RAND, 2000), 1-5).

> (U) **DISCUSSION**: …Since most items ordered were needed immediately, they had to be shipped by air. This tied up strategic air assets, which were already over-tasked and critically short…Without a theater logistics base, units and components went hand-to-mouth on many supply items and were in great risk of mission failure several times. In addition, the cost of flying all of the required supplies far outweighed any potential saving in reduced inventory costs.
> (U) **LESSON LEARNED**: Velocity Management is too risky and too costly.[193]

The U.S. Marine Corps (USMC) initially provided logistics support to the SOF teams.[194] Two Marine Expeditionary Units (MEU) established Camp Rhino, a base 60 miles south of Kandahar, which was supplied from bases in Pakistan.[195] Even with this and other conventional logistics augmentation, the 528th Special Operations Support Battalion (SOSB), the SOF organic logistics unit, had difficulty supporting the large SOF deployment.[196]

To reduce the need for logistics bases, local purchase and cash procurement were emphasized. Oman and Afghanistan, however, did not accept the Government Commercial Purchase Card (GCPC). Cash, with trained purchasing and paying agents, became extremely important. Not all SOF forces deployed with this capability.[197]

Supplying the Northern Alliance (and acquiring the money to do so) was an entirely different and equally complicated issue. Cross-agency lines between the Department of Defense and other U.S. government agencies (OUSGA) were so complicated that supplies never arrived in the appropriate quantities.[198]

Reachback capability was used to solve a variety of supply issues.[199] Not all services or coalition partners had this capability, and often relied on the Army supply staff and funding for

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[193] JULLS, 21058-68448, submitted by CCJ4.
[194] O'Hanlon, 51.
[195] Ibid., 53.
[196] JULLS, 21155-35759, submitted by CCJ4.
[197] Ibid., 30454-95839, submitted by SOCCENT.
[198] "SOCD."
[199] Reachback is "the electronic ability to exploit organic and nonorganic resources, capabilities and expertise, which by design are not located in theater. Reachback enhances the operational agility of the deployed unit by improving its access to timely and relevant information. Additionally, it improves deployability by reducing the unit's in-theater footprint" (John M. Neal, "A Look at Reachback," *Military Review* (September-October 2000), 39).

support.[200] Confusion arose as to which items were considered "common" across all services and coalition partners and who was responsible for providing them.[201] Problems with accountability of shared logistics between the U.S. and coalition partners arose due to inadequate Acquisition and Cross-Servicing Agreements (ACSA).[202]

Kandahar International Airport and Bagram Airbase became the largest military bases in Afghanistan. "This airfield is extremely important," said a commander at Kandahar. "It brings in continued Air Force supply and resupply. Holding this airfield and ensuring everyone here is safe and secure is my primary job right now."[203] Bagram Airbase was the main base for various SOF units.[204] Both Kandahar and Bagram were operational logistics hubs, but were short basic items of equipment. Units without organic tents (101st Air Assault Division and SOF elements) lacked basic lodging, and necessary tents were on backorder for over 60 days.

"As late as February 2002, more than 60 days after the initial occupation of Kandahar Airfield, many of the areas being used for both berthing and offices lack[ed] adequate power or heat."[205] No laundry services or hot meals were available.[206] Battery shortages were also critical. CENTCOM's recommendation as a result of these shortages was to "enforce the development of sustainment requirements for extended operations and to deploy with required supplies."[207]

Other air bases occupied by U.S. forces included: Khost, a logistics and supply area; Mazar-e-Sharif, a runway with a small contingent of security and logistics troops; and Pul-i-Kandahar, a small helicopter base.[208]

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[200] JULLS, 30455-24966, submitted by SOCCENT.
[201] Ibid., 30455-57322, submitted by SOCCENT & 30542-97112, submitted by SOCCENT.
[202] Ibid., 21852-57786, submitted by CCJ4.
[203] Alberto Betancourt, "Force Protection, Logistics Key for 101st in Afghanistan," *Army LINK News* (31 January 2002), 1 [on-line @ http://dtic.mil/armylink/news/Feb2002/a20020201101stbetan.html, accessed 19 August 2002]. Source quotes COL Frank Wiercinski, 3rd Brigade Combat Team.
[204] CNN.com, "Front Lines: Bases for Coalition Operations During Operation Enduring Freedom," 1 [on-line @ http://www.cnn.com/SPECIALS/2001/trade.center/military.map.html, accessed 22 January 2003]. Subsequently referred to as "Front Lines."
[205] JULLS, 30537-08964, submitted by SOCCENT.
[206] Betancourt, 1.
[207] JULLS, 21059-22703, submitted by CCJ4.
[208] "Front Lines," 1.

U.S. efforts to use contracted logistics augmentation were hampered due to inadequate statements of work (SOW), which did not specify costs or provide for extended hours of operation.[209]

Movement

"It is stressful; there's no doubt about it. We're flying the wings off airplanes and trying to haul fuel into the Afghanistan area and Pakistan basically by airlift, which is a terrible way to do it."

Pete Aldridge
Under Secretary of Defense for Acquisition, Technology and Logistics
American Forces Information Service[210]

The primary mode of both intratheater and intertheater movement was by fixed and rotary-wing aircraft. USAF C-17s and C-5s provided the bulk of intratheater lift, flying at high altitudes and landing on unimproved dirt and gravel strips. Called "C-130s on steroids" by pilots, the C-17s, along with some C-130s, flew heavy equipment, troops, ammunition, clothing, and even oats for the SOF's newly acquired horses.[211] By early December, eighteen to twenty-five of these aircraft crowded Ramstein Air Base in Germany at any given time.[212]

Of the 6,800 sorties flown by the Air Force by mid-December 2001, half had been fuel resupply missions. Despite "flying the wings off airplanes" to get fuel into Pakistan and Afghanistan, major shortages of fuel plagued the force.[213]

Initial attempts at resupplying bulk fuel through the Air Bulk Fuel Delivery System (ABFDS), better known as "bladder birds," were unsuccessful due to poor coordination between Air Combat Command (ACC) and Air Mobility Command (AMC). This dual agency coordination failure "negatively impacted fuel support to the warfighter."[214]

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[209] JULLS, 12342-52035, submitted by CCJ6-C.
[210] Linda D. Kozaryn, "Anti-Terror War Requires All-Out Logistics Effort," *American Forces Information Service* (22 March 2002), 1 [on-line @ http://www.defenselink.mil/news/Mar2002/n03222002_200203221.html, accessed 20 January 2003].
[211] Tirpak, 35.
[212] Ibid., 36.
[213] "Military Assesses," 26.
[214] JULLS, 21154-96674, submitted by CCJ4.

Local fuel availability was limited due to the lack of required additives and injector equipment to convert commercial fuel to military specifications (JP-8).[215] Lack of proper estimates of fuel support availability in Afghanistan and surrounding countries prior to U.S. deployment compounded this problem.[216]

The lack of an interservice flightline refueling truck caused several problems in the transfer of fuel. Army fuel trucks were slow in refueling Air Force aircraft and could not fit under the wings. USMC fuel trucks were too heavy to be airlifted to support refueling operations at Camp Rhino, so Air Force fuel trucks had to be sent instead.[217]

Distribution of ammunition was a problem during initial operations; in fact, bombing missions from Diego Garcia almost ran out of ammunition before they were resupplied by dozens of sorties from AMC.[218]

Aircraft also provided the bulk of intertheater lift. The altitude dictated the one type of aircraft that could be used – the MH-47E helicopter. Of the twenty-six MH-47E available, half were operating within Afghanistan by April 2002. MH-47Es flew infiltration and extraction missions, as well as multiple rescue operations in severe weather and terrain and at altitudes above 16,000 feet. This type of flying not only required supplemental oxygen but on occasion stripping the aircraft of their standard ballistic protection plating.[219]

Many aircraft became combat ineffective due to enemy RPG fire. During Operation Anaconda, 2 MH-47Es and four Apaches were hit within hours.[220] High mission tempo, losses to enemy fire, and accidents quickly strained the small force of aircraft.[221]

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[215] Ibid., 21057-83006, submitted by CCJ4. Additives required to meet U.S. military fuel specifications include fuel system icing inhibitor (FSII), corrosion inhibitor (CI), and static dissipater additive (SDA).
[216] Ibid., 21058-08381, submitted by CCJ4.
[217] Ibid., 21243-20774, submitted by CCJ4.
[218] Hebert, 34.
[219] Robert Wall, "MH-47 Crews Detail Conflict's Exploits, Woes," *Aviation Week & Space Technology* (15 April 2002), 22-3. Subsequently referred to as "MH-47 Crews."
[220] Grau interview.
[221] "MH-47 Crews," 22.

> (U) **OBSERVATION**: Operations pushed limits on available aircraft, particularly rotary winged assets. Missions were delayed or postponed due to availability and limitations of air assets.
> (U) **DISCUSSION**: Air assets were continually stretched to their operating limits placing men and machines at risk. Numerous executable missions were placed on hold because adequate air assets were unavailable.
> (U) **LESSON LEARNED**: Air assets have been the "long pole in the tent" for numerous situations. Rotary wing and airlift assets have continually impacted mission success.[222]

With repairs of damaged aircraft taking months at a time, the Army began looking at the possibility of converting regular Army CH-47s to MH-47Es, as well as introducing a "G" model aircraft with improved computers and easier disassembly and reassembly during transport. USMC CH-53s were used to augment Army airlift assets.

Rotary-wing aircraft were also used for resupply, though their effectiveness was limited by terrain, altitude, and weather. "Historical planning factors for missions per day were much higher than what we were capable of in Afghanistan," recalled the Chief of Plans for Coalition Task Force (CTF) 82.[223]

SOF movement evolved over time. Horses provided flexibility of movement, but were difficult to ride with heavy packs. Eventually, saddles were flown in to improve riding conditions. Pick-up trucks and four or six-wheel all-terrain vehicles also assisted troop movement.[224]

Water, general supplies, and soldier equipment also arrived slower than expected. An Air Force analysis blamed the logistics flow problems from the U.S., in part at least, on poor communications between the airlift providers and the Army troops being supplied.[225]

Bottled water took a heavy toll on aircraft space and fuel. To alleviate this and other supply problems, the U.S. turned to host nation support. Pakistani teamsters trucked fuel into

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[222] JULLS, 30539-30863, submitted by SOCCENT.
[223] Shoffner interview.
[224] "SOCD."
[225] "Military Assesses," 26.

Afghanistan at high cost, and soldiers relied on bottled water from local vendors. Initial supplies of both of these commodities were contaminated.[226]

C-17 sorties delivered humanitarian rations in addition to supplies needed by U.S. forces. Flying from Ramstein Airbase in Germany, two C-17s delivered 35,000 "Humanitarian Daily Rations" daily to Afghanistan. European Command (EUCOM) coordinated with CENTCOM and the U.S. Transportation Command (TRANSCOM) to facilitate this "air bridge."[227]

Humanitarian supplies were also moved by rail to the Afghan border. As early as January 2002, the Army deployed a rail assessment team to the "Freedom Bridge," the rail bridge built by the Soviets over the Amudarya River. The track was serviceable with moderate reconstruction requirements.[228]

U.S. efforts to use Federal Express (FEDEX) to ship repair parts into Afghanistan were unsuccessful. Items were often detained in customs due to the lack of international policy and procedure agreements and the lack of expediters at customs offices.[229]

Conclusion

Compared to the British and Soviets, the U.S. conducted their expedition in Afghanistan at relatively low cost in manpower and money. Unconventional warfare, foreign internal defense, special reconnaissance, and direct action characterized the expedition.[230] At its peak, 7,000 soldiers and airman were stationed inside the country. Despite logistical difficulties, the U.S. won a relatively easy tactical victory over the Taliban.[231] Strategic victory remains to be seen,

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[226] Special Operations Forces (SOF) soldier, interview by Martha Granger, 21 August 2002 (School of Advanced Military Studies, Fort Leavenworth, KS).
[227] David Josar and Jon R. Adams, "EUCOM Takes the Lead in Delivering Humanitarian Aid to Afghanistan," *Stars and Stripes* (9 October 2001), 1 [on-line @ http://ww2.pstripes.osd.mil/01/oct01/ed100901f.html, accessed 19 August 2002]; Newman, 60.
[228] "Soldiers Helping Assess Afghan Infrastructure," ArmyLINK News (11 January 2002), 1 [on-line @ http://www.dtic.mil/armylink/news/Jan2002/a20020111fpwebsite.html, accessed 19 August 2002].
[229] JULLS, 21239-49208, submitted by CCJ4.
[230] "SOCD."
[231] Hawkins, 26.

however, since Osama bin Laden and Mullah Omar have neither been captured nor killed, as was originally planned.[232]

By the end of January 2002, President Bush's focus had largely shifted. However, February and March brought Operation Anaconda and its associated airlift and supply build-up. In May, the XVIII Airborne Corps Headquarters and part of the 82nd Airborne Division arrived and began the relief of the 10th Mountain Division and the 101st Airborne Division. The U.S. drawdown of forces in Afghanistan was interrupted in January 2003 with some of the heaviest fighting seen in the region in over ten months. At the time of this writing, the U.S. continues to garrison airfields there while also building-up its forces for the next campaign in the U.S. War on Terrorism.[233]

CHAPTER FOUR

CASE STUDY ANALYSIS

The Second Anglo-Afghan War, Soviet-Afghan War, and Operation Enduring Freedom of the U.S. War on Terrorism offer various examples of supplying an expeditionary force in Afghanistan; however, none as a whole merit adoption for future U.S. forces moving to and around future battlefields.

CSS Characteristics[234]

The following diagram compares and contrasts the success of the logistical approaches described in the three case studies. The evaluation criteria are the CSS Characteristics listed in Department of the Army *Field Manual 3-0: Operations*. Associated notes highlight the key elements of the criteria as accomplished by the logistical approach taken.

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[232] Tanner, 319.
[233] Iraq became the next target of U.S. military action.
[234] Headquarters, Department of the Army, *Field Manual 3-0: Operations* (Washington, D.C., June 2001), 12-3 thru 12-4. CSS Characteristics not used as criteria in this analysis include simplicity, economy, and integration.

	British	Soviets	U.S.
Responsiveness	YES[1]	YES[2]	NO[3]
Flexibility	YES[4]	YES[5]	YES[6]
Attainability	NO[7]	NO[8]	NO[9]
Sustainability	YES[10]	YES[11]	NO[12]
Survivability	NO[13]	YES[14]	YES[15]

[1]The British dual system of stockpiling or carrying all necessary supplies enabled them to provide the **right support** in the **right place** at the **right time**.
[2]The Soviets' ability to **foresee operational requirements** enabled them to tailor their logistics system before and during operations to best meet support requirements.
[3]Due to its reliance on a single mode of transportation, the U.S. system lacked responsiveness. The object of responsiveness is to have the **minimum** assets that still meet support requirements.

[4]The ability to **make, invent, or arrange for what is needed** from what is at hand is key to flexibility. The redundancy in transportation modes (rail, road, river) and the ability to live off of the land offered the British a flexible movement system in spite of limited resources.
[5]The Soviets tailored and **adapted CSS structures and procedures** to meet changing situations and mission requirements.
[6]The U.S. system was able to **maintain CSS continuity** in light of critical transportation shortages by using *all available* aircraft for extended time periods.

[7]The British deployed with adequate logistics to begin operations; however, their load (including officers kit, regimental silver and mess tables, etc.) was not the **minimum essential supplies and services necessary**.
[8]The Soviets relied on virtually all supplies from the Soviet Union and could not support sustained operations.
[9]The U.S. deployed quickly with too small of a logistics footprint, and quickly ran short of critical fuel and ammunition.

[10]Carrying supplies, maintaining depots, and living off the land enabled the British to **maintain continuous support** during all operations.
[11]Pipelines, ground and air LOCs, and the "push" system synchronized the **delivery of minimum sustainment stocks** throughout the operation.
[12]Reliance on a single mode of transportation severely strained the U.S.'s ability to maintain continuous support. Had host nation support or air LOCs been blocked, U.S. sustainment would have ceased indefinately.

[13]The British were unable to **protect support functions** from destruction or degradation.
[14]Notwithstanding its negative impact, the Soviets dedicated 85% of their combat power to protect support functions.
[15]By limiting the vulnerability of support functions with a small logistics footprint, the U.S. requirement for survivability was greatly reduced.

Lessons Learned

"…one of the most important aspects of the Soviet military experience in Afghanistan…is the performance of the Soviet logistic system…A growing body of evidence suggests that Soviet rear service problems in Afghanistan are having a major impact on logistic and movement support concepts force-wide…"

Dr. Graham H. Turbiville, Jr.
Ambush! The Road War in Afghanistan[235]

British lessons learned regarding their use of LOCs resulted in the following observation:

> The importance of the work performed by troops employed on lines of communication is so great and so often overlooked, that it is well to emphasize it by a brief summary of the duties…
>
> - Every arrangement connected with the prompt, efficient and safe transmission of troops, transport and supplies of every kind to the Advanced Force.
> - The construction and garrisoning of the fortified posts along the whole line of communications.
> - The provision of troops for the various moveable columns.
> - Road and bridge making.
> - Furnishing escorts for convoys, survey parties, officers, etc.
> - Patrolling and outpost duty.[236]

British doctrine stresses the use of foraging as discussed in the first case study. Soviet doctrine goes further to stress the use of captured food, fuel, transport, engineer plant[s], accommodation, and water:

> Foraging for food and for POL particularly, is still considered to be of great importance…The…quartermaster service has butchery and grain grinding facilities. All units have cooks well used to dealing with totally unprepared foodstuffs, raw grain, cattle on the hoof and such like. Their engineers of the fuel service are equipped with pumps which could be used to evacuate the tanks of service stations overrun intact.[237]

USMC doctrine also stresses the use of captured enemy logistics, while U.S. Army doctrine does not. USMC doctrine lists possible "expeditionary bases and sites," which can support

[235] "Ambush!", 2-3.
[236] Hanna, 131-2.
[237] Thompson, 306. Soviet planners do not count on captured weapons and ammunition.

deployment, employment, and sustainment. Of this list, one seems appropriate for adoption by the U.S. Army: "existing facilities within the AO seized from the enemy."[238]

The Soviets relearned some of the tough British lessons from one hundred years earlier. They also developed several innovative approaches to supplying war – approaches they considered useful against the U.S. and NATO in the future.[239] Revised Soviet guidelines for the organization of rear support included:

- The organization of the rear must reflect the character of the war and the nature of the fighting.
- The reserves must be echeloned in depth and deployed before the war starts.[240]
- The higher command is responsible for supplying lower formations, units, and sub-units.
- *All* available forms of transport must be used.
- Foraging for local supplies must be undertaken wherever possible.[241]

Soviet lessons learned spurred logistics innovations during the war, including the:[242]

1. Creation of "Pipeline Troops," combat units who constructed fuel pipelines from the USSR to Afghanistan (vital to air and land operations).
2. Construction of fixed, fortified security garrisons to protect key bridges, roads, and other facilities (reinforced by roving patrols, traffic control forces, and combat forces).
3. Construction of heavily mined and echeloned defensive strongpoints and installations guarding key logistical infrastructure (manned by special forces and airborne units).
4. Integration of convoy and highway troops into combat operational formations for protection.
5. Extensive use of engineer units in reconnaissance, mine-clearing, and road construction.

The U.S. may have learned from the lessons of the British and Soviets in not attempting to maintain ground LOCs; however, they did so prematurely, since adequate lift is not available in the U.S. Armed Forces inventory. Additionally, the U.S. supply concept of velocity management, and its associated small logistics footprint, quickly proved inadequate. As a result, the U.S. was

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[238] Headquarters, United States Marine Corps, *Marine Corps Doctrinal Publication (MCDP) 1-0: Marine Corps Operations* (Washington, D.C., September 2001), 2-18 [on-line @ https://www.doctrine.usmc.mil/mcdp/html/mcdp10.htm, accessed 17 January 2003].
[239] "Ambush!", 23.
[240] This guideline demands the establishment of supply bases well forward along all axes of advance.
[241] Thompson, 302.

forced to revert to its previous doctrine of stockpiling at depots. By April of 2002, the U.S. was already considering increasing overseas stockpiles and prepositioned stocks afloat to meet the demands of supplying the Afghanistan campaign.[243]

One SOF lesson learned revealed great insight into the future of logistics: "The "tooth to tail" ratio may no longer be a relevant measure of merit because it draws an artificial distinction between integral elements of U.S. combat power.[244] The initial teeth in Enduring Freedom were a few hundred SOF personnel and aviators; however, the tail included tens of thousands of support personnel. This ratio, though extreme, was essential for "the U.S. military to reach halfway around the world; commence combat operations in an unexpected, austere theater within weeks; and succeed on an extremely chaotic battlefield."[245]

A *Foreign Affairs* piece written in May/June 2002 listed lessons learned from Operation Enduring Freedom, and two stand out: "Military mobility and deployability should continue to be improved…most parts of the Army still cannot move…quickly and smoothly (as compared to the USMC);" and "more joint-service experimentation and innovation are highly desirable."[246]

CHAPTER FOUR

MOVING FUTURE EXPEDITIONS: RECOMMENDATIONS

"An expedition is a military operation conducted by an armed force to accomplish a specific objective in a foreign country. Expeditionary operations encompass the entire range of military operations, from humanitarian assistance to forcible entry in a major theater war. The defining characteristic of expeditionary operations is the projection of force into a foreign setting."

Marine Corps Doctrinal Publication (MCDP) 1-0: Marine Corps Operations[247]

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[242] "Ambush!", 10-18; Blank, 50-51. Text summarized by author.
[243] Hebert, 34.
[244] John Jogerst, "What's So Special about Special Operations? Lessons from the War in Afghanistan," *Aerospace Power Journal* (Summer 2002), 1 [on-line @ http://www.airpower.maxwell.af.mil/airchronicles/apj/apj02/sum02/jogerst.html, accessed 19 August 2002].
[245] Jogerst, 1.
[246] O'Hanlon, 60-61.
[247] *MCDP 1-0*, 2-4.

The 2001 Quadrennial Defense Review (QDR) identified the biggest challenge to the Nation (other than homeland security) as "*projecting* and sustaining U.S. forces in distant anti-access environments."[248] Operation Enduring Freedom did this as both a "contingency operation"[249] and an expedition. Regime change in Iraq will do this as both a major theater war, and still an expedition. If *the projection of force* is the defining characteristic of these expeditions, then the U.S. Army should focus first and foremost on the capabilities required for the projection of force. To do this, the Army could take several fresh approaches to a very old problem.

Theory

"If there were going to be a sustained ground war, you'd see EUCOM working logistics, mobilizing, that sort of thing. But it's not going to be that type of battle."

Michael O'Hanlon
on Operation Enduring Freedom[250]

"It does not surprise me that someone would say, 'Oh gosh, the military is going to be in Afghanistan for a long, long time.' Sure we will be."

Army General Tommy R. Franks, August 2002[251]

"The lopsided reliance upon the "tail" in Enduring Freedom highlighted long-standing concerns about what would happen if war broke out elsewhere, and the United States found itself fighting in two conflicts or more."

Richard J. Newman
Air Force Magazine[252]

What is the Army's theory of future war? If the Army were to have one, it should somehow address the fact that future war will continue to include physical occupation of territory.[253] This

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[248] Department of Defense, *Quadrennial Defense Review Report* (Washington, D.C., 30 September 2001), iv. Subsequently referred to as QDR. Emphasis on "projecting" added by author.
[249] USD, 1.
[250] Josar, 1.
[251] "Franks Sees Troop Presence In Afghanistan Lasting Years," *Washington Post* (16 August 2002), 1 [on-line @ http://ca.dtic.mil/cgi-bin/ebird.cgi?doc_url=/Aug2002/e20020816franks.htm, accessed 16 August 2002].
[252] Newman, 60.
[253] Robert H. Scales, Jr., "A Sword With Two Edges: Maneuver in 21st Century Warfare," *Future Warfare* (Carlisle Barracks, PA: U.S. Army War College, 1999), 77: Scales writes, "War is a test of will. The surest way to collapse an enemy's will is to control his territory. Without physical occupation warfare is

territory could be at home or abroad, on simple or complex terrain, in urban, desert, or mountainous conditions, and under varied climates. For these reasons, future war will largely be an issue of logistics. Force projection and deployment, reach and reachback, and sustainment abroad have dominated every U.S. expedition and will continue to do so.

Future war will span the spectrum of military operations from offense to defense, and stability to support. Future war will not be won "on the cheap." The spoils of war will include the responsibility for the recovery of the defeated. Though the U.S. may desire to wage war with only one enemy at a time, the enemy has a vote.

Though the U.S. seeks decisive military victory in war, the U.S. Army seems unprepared for long-term combat, and more so, the logistical endeavors required to achieve a lasting political victory. Most likely, future war will be protracted, costly, and complex. The side seeking a simple solution and rapid results will fail.

The Soviets use a long-war theory – that wars will last at least one year – due to the "combination of attrition, interdiction of forward-deploying forces, disruption of control, and simply, the increased complexity of operations."[254] Clausewitz emphasized that difference between long and short wars is primarily a logistics one:

> If war is to be waged in accordance with its essential spirit – with the unbridled violence that lies at its core, the craving and need for battle and decision – then feeding the troops, though important, is a secondary matter. On the other hand, where a state of equilibrium has set in, in which troops move back and forth for years in the same province, subsistence is likely to become the principle concern. In that case, the quarter-master-general becomes the supreme commander, and the conduct of war consists of organizing the wagon trains.[255]

Certainly, the U.S. did not take a long-term logistics approach to Operation Enduring Freedom. In planning for Iraq, U.S. efforts are largely focused on the speed and precision of combat operations instead of a logistically demanding, complex, and long-term stabilization of

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nothing more than punishment from a distance, something that any nation with a will to resist can endure indefinitely."

[254] Thompson, 298.

[255] *On War*, 405.

the region. Perhaps this is the reason that Operation Desert Storm is about to be resumed under a new name 13 years later?

The U.S. should consider adopting the Soviet long-war theory, or at least taking a "worst case scenario" approach to the theory of war and the interplay of logistics within it. The possibility of multiple major theater war expeditions looms large – the sooner the capabilities required to get to and defeat these adversaries are determined and acquired, the better.

Doctrine

Joint Interdependence

The Army (Section 3062) shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations on land, the Navy (Section 5062) for operations at sea, and the Air Force (Section 8062) for offensive and defensive air operations.

Title 10 – Armed Forces, *United States Code*[256]

The concept of joint interdependence is talked about as part of transformation and the Objective Force, but it appears to be largely misunderstood.[257] Stephen Covey put it best when he said, "effective interdependence can only be built on a foundation of true independence."[258] Yet, the army is not independent as long as it relies on the air force and navy to transport it.

Should ownership of strategic lift assets matter in a joint environment? In a perfect one – probably not. In today's environment, however, with services still competing against each other for legitimacy and budget, ownership matters. "The army vision [of the ability to project power

[256] "Title 10 – Armed Forces," *United States Code (USC)*, 1 [on-line @ http://www4.law.cornell.edu/uscode/10/index.html, accessed 17 February 2003]. Text summarized by author.
[257] "Objective Force Unit of Employment Concept – Final Coordinating Draft" (Fort Monroe, VA: Joint/Army Concepts Directorate, 7 August 2002), 17: joint interdependence defined as "deliberate, mutual reliance of each Service on the capabilities of other Services to maximize the overall effectiveness of the joint force while minimizing its vulnerabilities." Colin Powell, "1993 Report on the Roles, Missions and Functions of the Armed Forces," 1 [on-line @ http://www.dod.mil/c3i/bpr/bprcd/vol2/264a.pdf, accessed 24 February 2003], argues that "the requirements of strategic mobility illustrate the interdependence of today's Armed Forces" because "the capabilities of our Total Force are indeed greater than the sum of its individual parts."
[258] Stephen R. Covey, *The 7 Habits of Highly Effective People* (New York: Simon & Schuster, 1989), 186.

anywhere in the world] may be clear, but the navy and air force may not share a similar view."[259] As a result, when other services prioritize the use of their lift assets, it is only natural to expect them to take care of themselves first and foremost.[260]

The army has called the air force "taxi service" and navy "bus company" for long enough – it is time to change. Strategic lift costs money and the army lives on a limited budget. What the army must do to counter this dilemma is to figure out the one thing that is slowing the army down, and put army money toward that. The common sense solution is to acquire organic strategic lift.

The difficulty in making this change is threefold: first, the 1948 Key West Agreement and Title 10 of the U.S. Code directly and indirectly provide for the deployment of the army by the other services; second, the U.S. Army culture accepts its dependency on the other services for deployment; and third, cultural competitiveness is preventing change.

The Key West Agreement reached in 1948 directly provides for the deployment of the army by the air force. As Colin Powell stated in 1993, this agreement was meant to reduce "redundancy and duplication among the Services." However, he also admitted that some redundancy is "a good thing," especially in a less predictable post-Cold War environment:

> …what was recognized in 1947, and has been supported by Congress ever since, is that there are advantages in having complementary capabilities among the Services. At the national command level, such flexibility provides additional options to senior decision-makers in a crisis. At the theater level, CINCs [now combatant commanders] can more effectively tailor a military response to any contingency, regardless of location.[261]

Perhaps redundancy of organic strategic lift assets is one of these "good things." The U.S. Army is the only service without it.

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[259] Arthur W. Conner, Jr., "The Army, Transformation, and Modernization, 1945-1991: Implications for Today," *Transformation Concepts for National Security in the 21st Century*, ed. Dr. Williamson Murray (Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, September 2002), 56 [on-line @ http://carlisle-www.army.mil/ssi/pubs/2002/transcon/transcon.htm, accessed 26 January 2003].
[260] An example of this recently occurred in Afghanistan where USAF lift priorities went to the USAF, then SOF, then U.S. Army security elements for air bases (Grau interview).
[261] Powell, 1.

Title 10 of the U.S. Code indirectly provides for the deployment of the army by the other services by dictating that the U.S. Armed Forces will be a joint force. This precept assumes that the army's inability to *deploy* will be assumed by the navy and air force when it comes time for the armed forces to expand peacetime components and overcome aggressive nations imperiling the security and peace of the United States.[262]

Under the statute, joint operations are mandated:[263]

- the army and air force are intended to work "in conjunction with the other armed forces"
- the army, navy, and air force are expected to follow "integrated joint mobilization plans"
- the navy statute instructs that "matters of joint concern…shall be coordinated between the army, the air force, and the navy"
- secretaries of the military departments are responsible for "effective cooperation and coordination between the…other military departments…to provide for more effective, efficient, and economical administration and to eliminate duplication".[264]

Collectively, these mandates should ensure that adequate strategic lift assets are dedicated to army deployment. Rather than relying on that *should*, the army *could* fight to acquire its own.[265]

By law, the army has to depend on the other services to deploy. However, the army's lack of organic strategic lift is also perhaps the product of long ingrained army culture:

> The army has long understood that to be successful in battle, its ground forces must be supported by other branches and services, and cannot even reach battlefields overseas without the aid of the other two services. Thus, historically its strategy has been based on an integrative, joint approach.[266]

The U.S. Army has allowed its inability to deploy strategically to plague its success for centuries. What professional has a job and lacks transportation to get to work? It is no wonder that the U.S. Army is at the bottom of the joint force totem pole. As LTG Daniel Brown, Chief of Staff for

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[262] "Title 10," 1.
[263] Verbage extracted from Subtitle B – Army, Section 3062, Subtitle C – Navy and Marine Corps, Section 5062, and Subtitle D – Air Force, Section 8062, except where otherwise noted.
[264] Sections 3013, 5013, and 8013 each list this responsibility under the Secretary of the Army, Navy, and Air Force respectively.
[265] This idea would constitute a monograph in itself. It is presented only briefly here as a viable option for consideration and further exploration.

U.S. Transportation Command (TRANSCOM) succinctly stated, "to be more relevant, *each* Service must deploy more quickly and be able to throughputsustainment significantly faster."[267] The army has a long way to go in this arena.

The army's lack of organic strategic lift is also a result of cultural competitiveness among the services. As late as 2001, the air force was opposed to the army acquiring its own strategic lift assets:

> The army is in the midst of a…transition toward the Objective Force. Whatever its final form, the Objective Force will greatly depend on the ability to deploy rapidly by air. AMC likely will remain that army's primary source for high-capacity airlift for both inter- and intratheater movement…any effort to replicate AMC's extensive capabilities…would be wasteful and doubtfully viable in the defense budget process.[268]

This approach almost ensures the army's indefinite dependence on the air force and navy for deployment. Under current statutes and given current culture attitudes, U.S. Army independence and U.S. Armed Forces joint interdependence are untenable.

Reducing the Logistics Footprint

"'Iron Mountains' of supplies in the combat zone will not be the way we do business in the future. At the same time, logistics must change so that it costs less, requires less supporting infrastructure, and generally becomes more efficient, without adversely affecting readiness or combat capability."

LTG Charles S. Mahan, Deputy Chief of Staff for Logistics[269]

"Speed must be the essential ingredient of a future landpower force. Speed will be achieved by creating a highly mobile force unimpeded by terrain and unburdened by an agility sapping logistical yoke."

MG Robert H. Scales, Jr., *Future War*[270]

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[266] Don M. Snider, "An Uninformed Debate on Military Culture," *Orbis* (Winter 1999), 125 [reprinted for use by AMSP elective, Leading Change].
[267] Daniel G. Brown, "Deploying the Army Force…A Real Challenge," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 16. Emphasis on "each" added by author.
[268] Robert C. Owen and Todd A Fogle, "Air Mobility Command and the Objective Force: A Case for Cooperative Revolution," *Military Review* (January-February 2001), 11.
[269] Charles S. Mahan, "Combat Support and Combat Service Support Transformation," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 11. Subsequently referred to as "CS and CSS."
[270] Robert H. Scales, Jr., "The Army After Next: Intertwining Military Art, Science, and Technology Out to the Year 2025," *Future Warfare* (Carlisle Barracks, PA: U.S. Army War College, 1999), 167. Subsequently referred to as "Army After Next."

The Army deployed 'Iron Mountains', despite their inefficiency, to Saudi Arabia in 1990. The Army deployed a "Small Logistics Footprint", despite its adverse affect on readiness and combat capability, to Afghanistan in 2001. Clearly, a flexible supply system that achieves a middle ground between these extremes is essential. As stated by former Chief of Staff of AMC, "the army must remain focused on optimizing support to the warfighter, not on a reduction of force drill that immediately translates to fewer combat support and combat service support forces."[271]

The army's continued and stubborn focus on "reducing the logistics footprint" is not going to attain a middle ground. Like the U.S. Army, the USMC and USAF are also attempting to reduce their logistics footprint. USMC concepts to do so seem long-term and suggesta middle ground, including:

> …expeditionary support bases, seabased support, in-stride sustainment, reduction of consumables, improved packaging, better visibility over distribution, and development of alternative ordnance variants that are smaller and lighter, but retain equivalent lethality.[272]

USAF concepts appear to offer a lighter approach, including:[273]

- "smart" parts, munitions, & packaging (radio tags – the air force version of the army's Total Asset Visibility (TAV) enabler)
- greater reliability of equipment and parts
- nanoplastics, miniaturization ("micro-MREs"), recycling
- "just-in-time" logistics; "pull" versus "push" system
- outsourcing and "lean logistics" (using current commercial business practices)
- "smart" packaging (multipurpose, part of component, becomes fuel or food with catalyst)
- increased/improved delivery systems, containerization, and materiel handling equipment (MHE)
- Battlefield Delivery System (BDS) with Container Aircraft Concept (aircraft reconfigures to fly, fly with container, or drive container on the ground)
- prepositioning afloat, undersea, or spaceborne

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[271] Charles S. Mahan, Jr., "RML: Revolution in Military Logistics," *Army* (May 2000), 28. Subsequently referred to as "RML."

[272] Headquarters, United States Marine Corps, "Expeditionary Maneuver Warfare: Marine Corps Capstone Concept" (Washington, D.C., 10 November 2001), 1 [on-line @ http://www.mccdc.usmc.mil].

[273] Concepts extracted from various sources: Craig M. Brandt, Christopher J. Burke, Karen W. Currie, Alan R. Heminger, Terrance L. Pohlen, and Kirk Vanghan, "Dynamic Response Logistics: Changing Environments, Technologies, and Processes" (August 1996), 1; Jaydee Edgell, S.K. Spangler, G. F. Dragoo, and L.W. Jackson, "Logistics in 2025: Consider it Done!" (August 1996), 1; James A. Fellows, Michael H. Herner, Jennifer L. Pickett, and Michael F. Welch, "Airlift 2025: The First with the Most" (August 1996), 1 [all articles on-line @ http://www.maxwell.af.mil/au/2025, accessed 10 February 2003].

U.S. Army concepts, in many cases, appear to be short-term fixes:

- sustainment stock reductions (1990-1998):[274]
    - ammunition reduced by 23% worldwide and 44% in the U.S.
    - Authorized Stockage List (ASL) dollar values reduced by 33%
    - Prescribed Load List (PLL) reduced by 50%
- dollar cost banding[275]
- "faster, better, cheaper" approach of velocity management[276]
- TAV
- Reachback
- "replace forward/repair rear" concept[277]
- increased use of ISBs [278]
- "closer is quicker" approach using forward prepositioning of equipment sets[279]
- systems with built-in prognostics and diagnostics which forecast failure and are simple to repair with fewer tools; platforms which can operate on one tank of fuel for 72 hours; ammunition with fewer types of rounds, more accurate, less weight and cube, and better packaging[280]
- advances and increases in lift and deployment platforms[281]
- Future Combat System (FCS) that will "weigh less, consume less fuel, and should be able to operate for seven days or more without maintenance and support"[282]
- R&D in combat systems that do not use conventional fuel and ammunition[283]

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[274] Charles Barham, "The Revolution in Military Logistics," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 69; QDR, 56.
[275] Kenneth J. Girardini, "Improved Mobility and Higher Fill Rates without Increased Risk or Cost," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 83. Dollar cost banding was a RAND algorithm intended to improve readiness rates by increasing parts on hand (based on a cost-graduated demand system). Units arriving at JRTC under the new system arrived with six additional ISU-90 containers that stored the new lines (cost banding had been shown to double lines in an MSB and triple lines in an FSB). To reverse this trend, improvements had to be made in repair parts storage configuration and utilization – another short-term fix which may have alleviated the initial cutting of lines had it been implemented earlier.
[276] Rick Eden, "Faster, Better, Cheaper: U.S. Army Manages a Logistics Revolution" (RAND, 2002), 1 [on-line @ http://www.rand.org/publications/randreview/issues/rr.04.02/faster.html, accessed 19 August 2002].
[277] Charles C. Cannon, Jr., "Logistical Challenges On the Battlefield," *Army* (October 2000), 136.
[278] Cannon, 132.
[279] Mark J. O'Konski, "Enhancing Army Deployability," *Army* (May 2000), 30.
[280] Barham, 70; Cannon, 136; Gary J. Motsek, "Logistics Support to the Army After Next Warfighters: A Time for Fundamental Change," in *AY 97 Compendium Army After Next Project*, ed Douglas V. Johnson II (Carlisle Barracks, PA: U.S. Army War College, 1998), 101. Third source notes that "new materials ammunition packaging could have 30 percent less weight and volume."
[281] "RML," 26; Huba Wass de Czege and Jacob D. Biever, "Power Projection," *Army* (April 2001), 12; O'Konski, 31. Third source recommendations include "smaller and faster strategic sealift ships, continued improvements in overall strategic airlift capacity and an advanced tactical airlifter to replace the venerable C-130.
[282] John G. Coburn, "U.S. Industry – A Vital Partner in U.S. Army Combat Support and Combat Service Support Transformation," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 6. Subsequently referred to as "U.S. Industry."
[283] Yves J. Fontaine, "Strategic Logistics for Intervention Forces," in *AY 97 Compendium Army After Next Project*, ed Douglas V. Johnson II (Carlisle Barracks, PA: U.S. Army War College, 1998), 89; John G. Coburn, "AMC – Providing Innovations To Transform the Army," *Army* (October 2000), 88. Subsequently

- fuel-efficient propulsion (ground & rotorcraft), compact electronic power generation, and medical and soldier system technologies[284]
- smarter munitions[285]
- advanced diesel engines
- weight reduction[286]
- water purification, generation, and on-board recovery systems[287]
- consultation, collaboration, and partnership with industry for S&T[288]
- improved programs for army scientists and engineers (S&Es) for optimal in-house R&D[289]
- "pull" vs. "push" logistics[290]
- "just in time" logistics[291]
- increased reliance on other services and the global logistics network[292]
- outsource and shed non-core functions[293]

The last four Army concepts are disconcerting for various reasons. First, they cause the Army combatant commanders to remain dependent upon the support of others to conduct their warfighting mission. Second, the use of contractors rests on a flawed assumption – a "short-war theory." The Army hires contractors because they are cheaper in the short term, and can be released when the war is over. This approach is viable, just as it would be cheaper to hire a taxi

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referred to as "AMC;" "RML," 28. Second source describes "electrothermal chemical gun technologies" and soldiers being able to "gas up their generators from a personal-sized canteen of liquid fuel." Third source describes solar, nuclear, and microturbines as alternate fuel or power sources.

[284] "U.S. Industry," 8.

[285] "AMC," 86; Paul J. Hoeper, "Transforming the Force…The Critical Role of Acquisition, Logistics, and Technology," *Army AL&T* (March-April 2000), 3. First source argues that increased lethality and precision will reduce rounds required.

[286] "Army After Next," 170; Cannon, 136. Second source suggests advanced armor materials that weigh a fraction of today's army.

[287] "U.S. Industry," 8.

[288] Billy K. Solomon, "Reducing Theater Logistics Footprint," U*S Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 59; Kenneth Horn, Carolyn Wong, Bruce Held, Elliot Axelband, Paul Steinberg, and Sydne Newberry, "Smart Management of R&D in the 21st Century: Strengthening the Army's Science and Technology Capabilities" (Arroyo Center: RAND, 2001), 7.

[289] "Smart Management," 8-12. Proposals include improved incentives (to attract talented staff), career development opportunities, and retention.

[290] Cannon, 136.

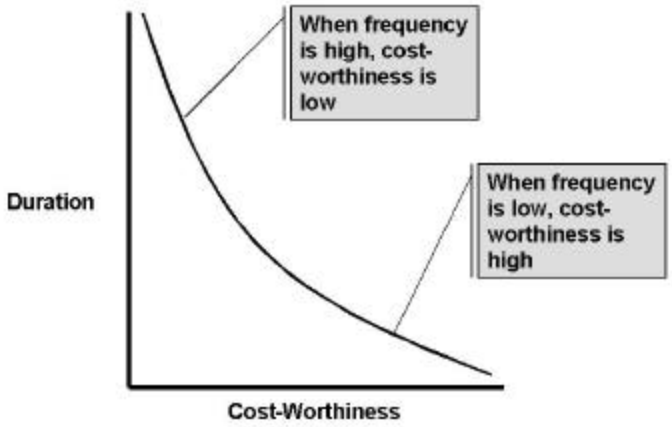
[291] Motsek, 104.

[292] Solomon, 58; Motsek, 104; Cannon, 134; O'Konski, 31. Second source recommends "national" vs. "unit" ownership of resources. Third source recommends employment of host nation, allied and contractor capabilities. Fourth source recommends "a stronger reliance on the commercial transportation sector."

[293] QDR, 53-54. Findings include that only "those functions that must be performed by DoD should be kept by DoD. Any function that can be provided by the private sector is not a core government function." QDR provides examples where DoD has mirrored private sector corporations by moving away from providing its own services. "The Department has experimented with this business practice with some success (e.g., providing vertical replenishment at sea, oilers manned by civilians, or food and other services

or rent an apartment in the short term rather than buying a car or house. However, as the *duration* of this outsourcing increases, the *cost-worthiness* decreases.[294]

Figure 4. Outsourcing Cost Analysis.



The U.S. Army is currently paying contractors (in some cases at a ratio of 1 contractor per 10 soldiers), instead of *available* and equally qualified soldiers, in Germany, Korea, Kuwait, Bosnia, Kosovo, Afghanistan, and soon, Iraq. Furthermore, the army is becoming dangerously reliant on contractors for logistics and support:

> In military hot spots around the world, civilians are performing duties once reserved for military personnel – building barracks, running kitchens, maintaining tanks and jets, and even helping to plan strategy. 'The Army couldn't go to war without them.'[295]

Third, reducing the logistics footprint seems to stubbornly aim at making do "with the smallest number of supporting troops" instead of producing "the greatest possible fighting power."[296] This

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in forward deployed areas)." QDR also recommends "aggressive pursuit" of this effort to improve productivity.

[294] Anecdotal analysis developed through discussion of "Smart Management" concepts with MAJ John Reynolds, fellow School of Advanced Military Studies student, 10 October 2002.

[295] Renae Merle, "More Civilians Accompanying U.S. Military: Pentagon is Giving More Duties to Contractors," *Washington Post* (22 January 2003), 1 [on-line @ http://ebird.dtic.mil/Jan2003/e20030122148040.html, accessed 24 January 2003]. Of the $13.8 billion spent in the Balkans from 1995-2000, 10 percent went to private companies.

[296] Van Creveld, 235.

aim is the product of a bureaucratic desire for efficiency, rather than a professional desire for effectiveness.

> **efficient** *adj*. 1. Acting directly to produce an effect. 2. Acting or producing effectively with a minimum of waste or unnecessary effort. 3. Exhibiting a high ratio of output to input.
>
> **effective** *adj*. 1. Having an expected or intended effect. 2. Producing or designed to produce a desired effect. 3. In effect: OPERATIVE. 4. Existing in fact: ACTUAL. 5. Prepared for use or action, esp. in warfare.–*n*. A combat-ready soldier or piece of military equipment.[297]

Current DoD goals include pursuing actions "to sustain the force effectively and efficiently," but this is impossible. DoD cannot achieve a "dramatically improved deployment process" and "accelerate logistics," while simultaneously attempting to "reduce the cost of logistics."[298] For effectiveness, only high input will achieve high output. The incompatibility of these concepts is stymieing Army logistics doctrine.

Fourth, and finally, none of these concepts will function as planned in the "fog" and "friction" of war. Contractors have no contract provision to loyally fight and die for their country in the heat of battle. "Just-in-time" can easily become "too late" in the chaos and complexity of war (such was the case recently in Afghanistan). Where friction is concerned, more will always be better…in the long run.[299]

Organizations

"You are not relevant if you can't get to the fight."

MG Charles S. Mahan, Jr., AMC Commander[300]

The USAF has had great success in merging its supply and transportation units into 800-man Logistics Readiness Squadrons (Provisional) (LRS(P)). There are seven of these experimental

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[297] *Websters II: The New Riverside University Dictionary*(Boston, MA: Houghton Mifflin Company, 1988), 418-9.
[298] QDR, 35.
[299] "Stockpiling of supplies to mitigate risk is well ingrained in warfighters and logisticians alike" (John G. Coburn, "Logistics: Flexing Muscle For Army Transformation," *Army* (May 2001), 25. Subsequently referred to as "Flexing Muscle.").

units that have eased logistics by collocating transport and supplies.[301] This same concept could be used in the Objective Force. Instead of having USAF lift assets in separate organizations from the U.S. Army vehicles they lift, these units could merge.[302]

The organization and capabilities of the SBCT's BSB must be revisited. Currently, this battalion must be augmented by a Corps Service Support Company (CSSC) to provide adequate logistics support to its combat unit in garrison, not to mention in war. This seems both inefficient and ineffective. Army logistics units of the future must be capable of providing logistics – period.

Materiel

"I could have twice as many forklifts and still not have enough."

LTC Thomas Pirozzi
Kandahar, Afghanistan
January 2002[303]

The selling point of the "capabilities-based" approach to warfighting is that it "requires us to identify the capabilities U.S. military forces will need to deter and defeat a wide variety of adversaries."[304] Yet, no one is identifying those logistics capabilities and materiel required.

Doubling the forklifts on hand in Afghanistan, according to one Forward Support Battalion (FSB) Commander, would not provide the required capability to download and distribute supplies to light infantry in Afghanistan,[305] yet the new Brigade Support Battalion (BSB) of the Stryker Brigade Combat Team (SBCT) has less forklifts than the FSB. Obviously, common sense and thought are needed when designing forces and TO&Es.

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[300] Owen and Fogle, 11.
[301] Val Gempis, "Provisional Logistics Squadron Move Supplies, Cargos and Aircraft," *Air Force News* (28 February 2002), 1 [on-line @ http://www.hickam.af.mil/news/2002/2002046.htm, accessed 19 August 2002].
[302] This idea would constitute a monograph in itself. It is presented only briefly here as a viable option for consideration and further exploration.
[303] Betancourt, 1.
[304] CJCS, 7.

The SBCT needs aircraft and places to land them to deploy, yet the U.S. Army has neither. In fact, the U.S. Army is willing to fly the Stryker vehicle without its protective armor and with its tires deflated because only in this configuration can it fit on an Air Force C-130![306] What has the FCS given up in combat capability in order to fit in the C-130?[307]

"The Objective Force in 2015," a Department of the Army White Paper, focuses on deployment assets as the key for sustainability. The Chairman of the Joint Chiefs of Staff highlighted the "shortage of strategic lift and sustainment shortfalls"[308] as critical issues for the U.S. Military. In actuality, these problems are only truly suffered by the army. The air force, navy, and by association the marines, have adequate strategic lift – in fact, they own and provide the vast majority of the strategic mobility triad assets.[309]

Materiel (and its associated technology) enables mobility far more so than doctrine and organizations. The FCS of the U.S. Army's Objective Force will support *tactical* mobility *on* the battlefield – but is there a solid plan to get this materiel *to* the battlefield? It takes four C-17s per hour, 24 hours per day, for four days to deploy one SBCT to the fight.[310]

Without strategic lift, the army's structure – heavy, light, or medium – does not matter: "Legacy force, interim force, objective force, pentomic force – the type and structure of the force are irrelevant if there is nothing to transport them to the fight."[311] Yet, as "commercial air and

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[305] Betancourt, 1; COL Pepper, "SBCT Update," briefing given at Fort Leavenworth, KS, 18 December 2002. Doubling the organic forklifts in the FSB would give the FSB 12 forklifts; yet, the SBCT's organic logistics unit, the BSB, only has five. Subsequently referred to as "SBCT Update."
[306] "SBCT Update."
[307] If the FCS can fit on a C-130, one advantage is that a C-5 or C-17 will carry several of them; however, a fully loaded C-17 will require in air refueling or refueling stops to get across the oceans, since a C-17 can only fly for about 2,400 nautical miles in its best configuration (Owen and Fogle, 16).
[308] CJCS, 10.
[309] The strategic mobility triad consists of the following: "APS strategically placed on land and sea; a substantial sealift capability to move heavy equipment and bulk sustainment supplies where needed; [and] adequate airlift to project troops and essential equipment quickly" (Headquarters, Department of the Army, *FM 55-10: Movement Control* (Washington, D.C., 9 February 1999), 1 [on-line @ http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/55-10/ch1.htm, accessed 3 March 2003].
[310] William Matthews, "RAND Report Says Swift U.S. Stryker Brigade Deployment Unlikely" (3 January 2003), 1 [on-line @ http://www.DefenseNews.com, accessed 8 January 2003]. Movement would also require adequate airports and seaports.
[311] Conner, 59.

sealift has increased 50% to 63% respectively," military strategic lift is still only able to support "one major theater of war at a time."[312]

A materiel solution to solving the SBCT's, and U.S. Army's, problem of strategic lift is for the army to increase and balance its holdings in the strategic mobility triad of airlift, sealift, and prepositioning. Though the triad boasts of three means of lift, the U.S. Army relies upon sealift 80 to 90 percent of the time. With increased materiel acquisition in airlift andprepositioning, the U.S. Army could achieve a more effective combination of assets – a true triad.

One materiel option for airlift that will provide both of the capabilities required for the SBCT (aircraft and places to land them) is the Wing-in-Ground (WiG) heavy lift transport aircraft. Boeing's version of this, the Pelican, is only in the concept stage[313]; however, WiG technology is already available.

WiG technology is over 65 years old and has been researched and developed by 9 countries, not including the U.S. WiG craft can carry over 500 short tons while flying at 400 miles-per-hour. It can take off and land on water or land without a developed port or airfield. WiG craft can carry 50% more, using 35% less fuel (75% less fuel than a comparable hydrofoil ferry). It can fly in bad weather and is hard to detect by radar, infrared or satellite because it flies 3 to 90 feet above the surface.[314]

A rudimentary comparison of USAF strategic lift assets with the SovietWiG craft shows how far behind the U.S. is in achieving reasonable airlift payload capacities.[315]

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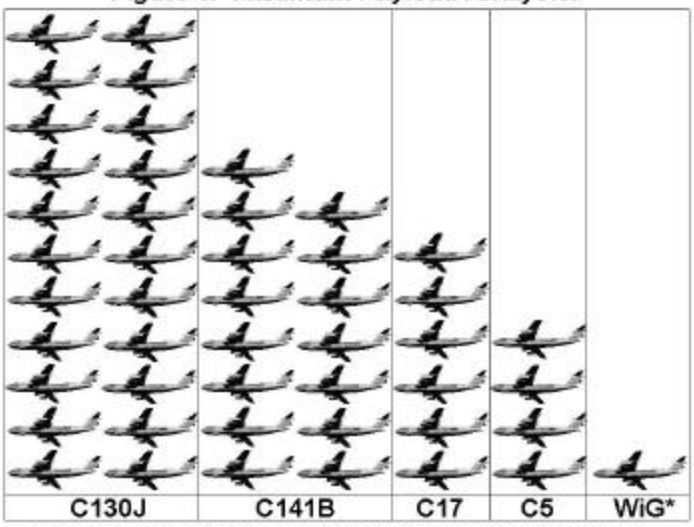
[312] Brown, 16.

[313] FuturePundit.com, "Proposed Huge Boeing Pelican Aircraft" (8 October 2002), 1 [on-line @ http://www.futurepundit.com/archives/000283.html, accessed 23 January 2003].

[314] Lester W. Grau and Jacob W. Kipp, "The Tyranny of Time and Distance: Bridging the Pacific," *Military Review* (July-August 2000), 6-7 [on-line @ http://call.army.mil/fmso/fmsopubs/issues/bridge/bridge.htm, accessed 17 September 2002]. Countries conducting R&D in WiG craft include Russia, Great Britain, China, Germany, Finland, Japan, South Korea, Australia, and Montenegro.

[315] Comparison achieved by dividing WiG maximum payload (500 tons) by payloads of USAF craft. Data collected from "C-130 Hercules," USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_130_Hercules.html, accessed 26 January 2003]; "C-141B Starlifter," USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_141B_Starlifter.html, accessed 26 January 2003]; "C-17 Globemaster III," USAF Fact Sheet [on-line @

Figure 5. Maximum Payload Analysis.



*WIG maximum payload (Soviet model) as shown here is 500 tons.

The USAF has turned down WiG technology;[316] however, it remains an existing option for the U.S. Army.[317]

In addition to acquisition in the airlift arm of the strategic mobility triad, the U.S. Army could expand its holdings in Military Sealift Command's Prepositioning Ships Program. A rudimentary comparison of prepositioning ship to soldier shows the Army's prepositioning capability trailing the Marine Corps' by 1 to 3:

Service	**Strength**	**Ships**	**Soldier to Ship Ratio**
Army	489,357	13	37,642:1
USMC	173,674	16	10,854:1[318]

The Army would be wise to double, if not triple, their use of this key and flexible enabler.

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http://www.af.mil/news/factsheets/C_17_Globemaster_III.html, accessed 26 January 2003]; "C-5 Galaxy," USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_5_Galaxy.html, accessed 26 January 2003].

[316] Fellows, 1. Reasons for USAF not adopting WiG technology include: engine design requirements; stability requirements; and confinement of WiG to waterways. Instead, the USAF continues to modernize its current assets by retiring 256 C-141s and replacing them with C-17s. Production of the C-17 is currently one aircraft per month. This is a step in the right direction; however, even after the 134 new C-17s are fielded, the military will still have a strategic lift shortage (Newman, 59).

[317] This idea would constitute a monograph in itself. It is presented only briefly here as a viable option for consideration and further exploration.

[318] "Army Prepositioned Stock (APS-3)," 1 [on-line @ http://www.globalsecurity.org/military/agency/army/aps-3.htm, accessed 20 January 2003]; "Maritime

If, in fact, logistics is a "dominant theme in the culture of the U.S. services"[319] and if commanders believe wholeheartedly that logistics must have the same emphasis as maneuver and fires,[320] then why have all Army material advances (and technology) been *combat* rather than *logistics* oriented? Rather than replacing major combat systems (the Stryker for the M113) at twice the cost, money should be devoted to logistics S&T and logistics R&D.

Army doctrine must accept and reflect the fact that war cannot be waged cheaply – it takes time, resources, and money. "Faster, better, cheaper" is not the answer, nor are short-term fixes. The Army expeditionary force of the future requires capabilities – both combat and support. The Army would do well to focus on the latter for a change. John G. Coburn, the Commander of AMC, put this best when he said, "The Chief of Staff has already challenged industry to 'deliver' on the FCS. Those of us working in Army Logistics must issue a similar 'challenge' to industry."[321]

CHAPTER FIVE

CONCLUSION

"The conflict in Afghanistan has taught us more about the future of our military than a decade of blue ribbon panels and think-tank symposiums. These past two months have shown that an innovative doctrine and high-tech weaponry can shape and then dominate an unconventional conflict."

U.S. President George Bush
11 December 2001[322]

The U.S. Army expeditionary force of the future does not need a revolution in logistical affairs to deploy – it will simply need common sense and attention. If logistics truly is "nine tenths of

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Prepositioning Ships," 1 [on-line @ http://www.globalsecurity.org/military/systems/ship/sealift-mps.htm, accessed 20 January 2003]. Where sources vary on total number of ships, highest variant was used.
[319] Williamson Murray, "Does Military Culture Matter?" *Orbis* (Winter 1999), 138 [reprinted for use by AMSP elective, Leading Change].
[320] Lon E. Maggart, "Leadership Challenges for the Future," scheduled for publishing in 2003, 16 [printed for use by AMSP elective, Leading Change].
[321] "U.S. Industry," 7.
[322] Andrew Koch, Kim Burger and Michael Sirak, "Afghanistan: The Key Lessons," *Jane's Defence Weekly* (2 January 2002), 20.

the business of war,"[323] then the army's combat focus is off the mark. There are two measures the army should take in the area of logistics to correct this oversight: first, improved logistics historical study and analysis; and second, improved capacity for change.

First, the army can harvest the strengths of the logistical approaches of the British, Soviets, and U.S. in Afghanistan:

- R&D in rail construction and use.[324]
- R&D in pipeline construction and use.[325]
- "living off the land" and making extensive use of captured enemy logistics.[326]
- employing a "push" vs. "pull" logistics system.
- employing redundant (*all available*) means of transportation.
- employing redundant (*all available*) means of supply.[327]

Second, the Army can make changes in theory, doctrine, organizations, and materiel:

- Theory:
    - exploration and development of Army theory of war (and associated logistics)
    - adoption of a "Long-War Theory"
- Doctrine:
    - army *Independence* for joint *Interdependence*
    - middle ground between "Iron Mountains" and "Small Logistics Footprint"
    - effective vs. efficient logistics focus
- Organizations:
    - army units with organic strategic lift
    - BSB restructuring

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[323] Van Creveld, 231.

[324] Recently, host nation rail was used for the first time to support KFOR container movement. Success in this operation demonstrates the viability of using rail to support future expeditions. Considerations included coordination between port authorities and the Greek rail system, customs documentation, rail car configuration, payment, routing, diplomatic country clearances, and locally-procured blocking and tie-down material (Rob Lalor, "Reception, Staging and Onward Movement (RSO) Movement Control: Small Teams With a Big Mission," *US Army Logistics: Enabling CS/CSS Transformation* (Alexandria, VA: United States Army Logistics Integration Agency, 2001), 22-23).

[325] Fuel pipelines, in addition to the use of naval fuel tankers, ground trucks, host nation support, and last, airlift, are a necessary combination to meet the demands of fuel, especially considering that fifty percent of all supplies by tonnage are fuel and fuel consumption doubles in the mountains (Thompson, 291, 309).

[326] This would require extensive training and acquisition of equipment. Milling grain, gathering wood, baking flour, and reaping fodder are currently not individual skills of U.S. Army soldiers (regardless of military occupational specialty).

[327] Clausewitz identified four ways to supply modern armies: first, to live off of local households and communities and forage (quickest, but assumes soldiers are quartered in local households); second, to enlist the soldiers to requisition for themselves (essential for advance parties and moving columns); third, to establish regular requisitioning from host nation sources (capability for this method degraded in impoverished or devastated countries); and fourth, to use depots (primarily for long deployments, 7 to 12 years; least preferable method). He predicted that "all wars are more likely to start out with a system of requisitioning," but admitted that "war could be conducted under the old method of supply [depots]" as well (*On War*, 397-404). A combination of this sort is accordance with the author's recommendation.

- Materiel:
    - army strategic lift
    - logistics vs. combat focus for S&T, R&D

There is little to be gained in searching for short-term fixes, such as reducing the logistics footprint. These fixes are desirable because they require little, if any, S&T improvements, and small, if any, investments. The old adage, "you get what you pay for" applies here. If it is cheaper, it cannot be faster and better…in the long run. Rather than reducing the logistics footprint, the Army must focus on improving the footprint and making it easier to move.

There is little to be gained by a transformation that further develops the U.S. Army's "broad portfolio of military capabilities" without further developing the means to get these capabilities to the fight.[328] Relying on the navy and air force for strategic deployment was and still is a short-term fix to a long-term problem. Without the navy and air force, army transformation does little more than give the army new toys.

When the U.S. Army realizes the predominant role of logistics inwarfighting, then the Army expeditionary force will deploy rapidly, freely, and effectively to the battlefields of the future. Joint interdependence is the answer, and joint independence is the first step. The U.S. Army, while addressing theory, doctrine, and organizations, needs to put its effort and money (what little there is) into *getting to the fight.*

Operations in Afghanistan are a good starting point for self-assessment. If an expeditionary force can deploy to and support itself there, after all, it should be able to do so anywhere. The British, the Soviets, and the U.S. all learned the hard way that there is no easy logistics solution. Hopefully, this lesson will not have to be relearned because the U.S. Army simply ignored it.

[328] QDR, 15.

BIBLIOGRAPHY

Adamec, Ludwig W. *Dictionary of Afghan Wars, Revolutions, and Insurgencies: Historical Dictionaries of Wars, Revolutions, and Civil Unrest, No. 1.* Lanham, MD: The Scarecrow Press, Inc., 1997.

Army Headquarters, India. *The Second Afghan War 1878-1880: Abridged Official Account.* London: John Murray, 1908.

"Army Prepositioned Stock (APS-3)" [on-line @ http://www.globalsecurity.org/military/agency/army/aps-3.htm, accessed 20 January 2003].

Ashe, Waller, ed. *Personal Records of the Kandahar Campaign by Officers Engaged Therein.* London: David Bogue, 1881.

Barham, Charles. "The Revolution in Military Logistics." *US Army Logistics: Enabling CS/CSS Transformation.* Alexandria, VA: United States Army Logistics Integration Agency, 2001, 69-70.

Baumann, Robert F. *Russian-Soviet Unconventional Wars in the Caucasus, Central Asia, and Afghanistan.* Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, 1993.

Bender, Bryan, Kim Burger and Andrew Koch. "Afghanistan: First Lessons." *Jane's Defence Weekly*, 19 December 2001, 18-21.

Betancourt, Alberto. "Force Protection, Logistics Key for 101st in Afghanistan." *Army LINK News*, 31 January 2002 [on-line @ http://dtic.mil/armylink/news/Feb2002/a20020201101stbetan.html, accessed 19 August 2002].

Blank, Stephen J. *Operational and Strategic Lessons of the War in Afghanistan, 1979-90.* Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, 1991.

Brandt, Craig M., Christopher J. Burke, Karen W. Currie, Alan R. Heminger, Terrance L. Pohlen, and Kirk Vanghan. "Dynamic Response Logistics: Changing Environments, Technologies, and Processes," August 1996 [on-line @ http://www.maxwell.af.mil/au/2025, accessed 10 February 2003].

Brown, Daniel G. "Deploying the Army Force…A Real Challenge." *US Army Logistics: Enabling CS/CSS Transformation.* Alexandria, VA: United States Army Logistics Integration Agency, 2001, 16-17.

"C-130 Hercules." USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_130_Hercules.html, accessed 26 January 2003].

"C-141B Starlifter." USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_141B_Starlifter.html, accessed 26 January 2003].

"C-17 Globemaster III." USAF Fact Sheet [on-line @

http://www.af.mil/news/factsheets/C_17_Globemaster_III.html, accessed 26 January 2003].

"C-5 Galaxy." USAF Fact Sheet [on-line @ http://www.af.mil/news/factsheets/C_5_Galaxy.html, accessed 26 January 2003].

Cannon, Jr., Charles C. "Logistical Challenges On the Battlefield." *Army*, October 2000, 131-36.

Chairman of the Joint Chiefs of Staff. "Global War on Terrorism: Posture Statement," 8 February 2002 [on-line @ http://www.dtic.mil/jcs/chairman/Posture_Statement.html, accessed 19 August 2002].

Chandler, David, ed. *The Oxford Illustrated History of the British Army*. Oxford: Oxford University Press, 1994.

Clausewitz, Carl von. *On War.* Edited and translated by Michael Howard and Peter Paret. New York: Everyman's Library, 1993.

-----. *The Principles of War.* Translated by Hans W. Gatzke. In *Roots of Strategy: Book 2*. Mechanicsburg, PA: Stackpole Books, 1987, 301-386.

CNN.com, "Front Lines: Bases for Coalition Operations During Operation Enduring Freedom" [on-line @ http://www.cnn.com/SPECIALS/2001/trade.center/military.map.html, accessed 22 January 2003].

Coburn, John G. "AMC – Providing Innovations To Transform the Army." *Army*, October 2000, 83-88.

-----. "Logistics: Flexing Muscle For Army Transformation." *Army*, May 2001, 23-25.

-----. "U.S. Industry – A Vital Partner in U.S. Army Combat Support and Combat Service Support Transformation." *US Army Logistics: Enabling CS/CSS Transformation.* Alexandria, VA: United States Army Logistics Integration Agency, 2001, 6-10.

Conner, Arthur W., Jr. "The Army, Transformation, and Modernization, 1945-1991: Implications for Today." *Transformation Concepts for National Security in the 21st Century*. Edited by Dr. Williamson Murray. Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, September 2002, 25-71 [on-line @ http://carlisle-www.army.mil/ssi/pubs/2002/transcon/transcon.htm, accessed 26 January 2003].

Covey, Stephen R. *The 7 Habits of Highly Effective People.* New York: Simon & Schuster, 1989.

Department of Defense. *Quadrennial Defense Review Report.* Washington, D.C., 30 September 2001.

FuturePundit.com, "Proposed Huge Boeing Pelican Aircraft," 8 October 2002 [on-line @ http://www.futurepundit.com/archives/000283.html, accessed 23 January 2003].

Eden, Rick. "Faster, Better, Cheaper: U.S. Army Manages a Logistics Revolution." RAND, 2002 [on-line @ http://www.rand.org/publications/randreview/issues/rr.04.02/faster.html, accessed 19 August 2002].

Edgell, Jaydee, S.K. Spangler, G. F. Dragoo, and L.W. Jackson. "Logistics in 2025: Consider it Done!," August 1996 [on-line @ http://www.maxwell.af.mil/au/2025, accessed 10 February 2003].

Featherstone, Donald. *Victoria's Enemies: An A-Z of British Colonial Warfare*. London: Blandford Press, 1989.

Fellows, James A., Michael H. Herner, Jennifer L. Pickett, and Michael F. Welch. "Airlift 2025: The First with the Most," August 1996 [on-line @ http://www.maxwell.af.mil/au/2025, accessed 10 February 2003].

Florenza, Nicholas. "European Navies Weigh In." *Armed Forces Journal*, March 2002, 54-60.

Fontaine, Yves J. "Strategic Logistics for Intervention Forces." In*AY 97 Compendium Army After Next Project*. Edited by Douglas V. Johnson II. Carlisle Barracks, PA: U.S. Army War College, 1998, 75-92.

"Franks Sees Troop Presence In Afghanistan Lasting Years." *Washington Post*, 16 August 2002 [on-line @ https://ca.dtic.mil/cgi-bin/ebird.cgi?doc_url=/Aug2002/e20020816franks.htm, accessed 16 August 2002].

Gempis, Val. "Provisional Logistics Squadron Move Supplies, Cargos and Aircraft." *Air Force News*, 28 February 2002 [on-line @ http://www.hickam.af.mil/news/2002/2002046.htm, accessed 19 August 2002].

Girardini, Kenneth J. "Improved Mobility and Higher Fill Rates without Increased Risk or Cost." *US Army Logistics: Enabling CS/CSS Transformation*. Alexandria, VA: United States Army Logistics Integration Agency, 2001, 80-83.

Goodson, Larry P. *Afghanistan's Endless War: State Failure, Regional Politics, and the Rise of the Taliban*. Seattle: University of Washington Press, 2001.

Grau, Lester W. Interview by Martha Granger, 17 December 2002. School of Advanced Military Studies, Leavenworth, KS.

----- and Jacob W. Kipp. "The Tyranny of Time and Distance: Bridging the Pacific." *Military Review*, July-August 2000 [on-line @ http://call.army.mil/fmso/fmsopubs/issues/bridge/bridge.htm, accessed 17 September 2002].

Hanna, Henry B. *The Second Afghan War 1878-79-80: Its Causes, Its Conduct, and Its Consequences*. Vol II. Westminster: Archibald Constable & Co Ltd, 1904.

Hawkins, William R. "What Not to Learn from Afghanistan." *Parameters*, Summer 2002, 24-32.

Headquarters, Department of the Army. *Field Manual 3-0: Operations*. Washington, D.C., June 2001.

-----. *Field Manual 55-10: Movement Control*. Washington, D.C., 9 February 1999 [on-line @ http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/55-10/ch1.htm, accessed 3 March 2003].

Headquarters, United States Marine Corps. "Expeditionary Maneuver Warfare: Marine Corps Capstone Concept." Washington, D.C., 10 November 2001 [on-line @ https://www.doctrine.usmc.mil/emw.htm, accessed 17 January 2003].

-----. *Marine Corps Doctrinal Publication (MCDP) 1-0: Marine Corps Operations*. Washington, D.C., September 2001 [on-line @ https://www.doctrine.usmc.mil/mcdp/html/mcdp10.htm, accessed 17 January 2003].

Heath, Greg. "Logistics Task Force Supplies on Demand." *Qatar News*, 26 March 2002 [on-line @ http://www-qa.arcent.army.mil/news/2002/armysnoopy.html, accessed 19 August 2002].

Hebert, Adam J. "Supply Chain Visibility." *Armed Forces Journal*, April 2002, 30-35.

Hoeper, Paul J. "Transforming the Force…The Critical Role of Acquisition, Logistics, and Technology." *Army AL&T*, March-April 2000, 3-4.

Horn, Kenneth, Carolyn Wong, Bruce Held, Elliot Axelband, Paul Steinberg, and Sydne Newberry. "Smart Management of R&D in the 21st Century: Strengthening the Army's Science and Technology Capabilities." Arroyo Center: RAND, 2001.

Jalali, Ali A. and Lester W. Grau. "Expeditionary Forces: Superior Technology Defeated – The Battle of Maiwand." *Military Review*, May-June 2001 [on-line @ http://fmso.leavenworth.army.mil, accessed 24 October 2002].

.

Jane's Information Group. *Jane's Sentinel Security Assessment: South Asia*. United Kingdom: Directory & Database Publishers Association, November 2001-April 2002, 3-61.

Jogerst, John. "What's So Special about Special Operations? Lessons from the War in Afghanistan." *Aerospace Power Journal*, Summer 2002 [on-line @ http://www.airpower.maxwell.af.mil/airchronicles/apj/apj02/sum02/jogerst.html, accessed 19 August 2002].

Josar, David and Jon R. Adams. "EUCOM Takes the Lead in Delivering Humanitarian Aid to Afghanistan." *Stars and Stripes*, 9 October 2001 [on-line @ http://ww2.pstripes.osd.mil/01/oct01/ed100901f.html, accessed 19 August 2002].

Koch, Andrew, Kim Burger and Michael Sirak. "Afghanistan: The Key Lessons." *Jane's Defence Weekly*, 2 January 2002, 20-27.

Kozaryn, Linda D. "Anti-Terror War Requires All-Out Logistics Effort." *American Forces Information Service*, 22 March 2002 [on-line @ http://www.defenselink.mil/news/Mar2002/n03222002_200203221.html, accessed 20 January 2003.

Lalor, Rob. "Reception, Staging and Onward Movement (RSO) Movement Control: Small Teams With a Big Mission." *US Army Logistics: Enabling CS/CSS Transformation*. Alexandria, VA: United States Army Logistics Integration Agency, 2001, 20-23.

MacGregor, Charles M. *War in Afghanistan, 1879-80: The Personal Diary of Major General Sir Charles Metcalf MacGregor*. Edited by William Trousdale. Detroit: Wayne State University

Press, 1985.

Maggart, Lon E. "Leadership Challenges for the Future." Scheduled for publishing in 2003, 16 [printed for use by AMSP elective, Leading Change].

Mahan, Charles S. "Combat Support and Combat Service Support Transformation." *US Army Logistics: Enabling CS/CSS Transformation.* Alexandria, VA: United States Army Logistics Integration Agency, 2001, 11-14.

-----. "RML: Revolution in Military Logistics." *Army*, May 2000, 25-28

"Maritime Prepositioning Ships" [on-line @ http://www.globalsecurity.org/military/systems/ship/sealift-mps.htm, accessed 20 January 2003].

Matthews, William. "RAND Report Says Swift U.S. Stryker Brigade Deployment Unlikely," 3 January 2003 [on-line @ http://www.DefenseNews.com, accessed 8 January 2003].

Maxwell, Leigh. *My God – Maiwand! Operations of the South Afghanistan Field Force 1878-80*. London: Leo Cooper, 1979.

McMichael, Scott R. *Stumbling Bear: Soviet Military Performance in Afghanistan*. London: Brassey's (UK), 1991.

Miller, Charles. *Khyber: British India's North West Frontier, The Story of an Imperial Migraine*. New York: MacMillan Publishing Co., Inc., 1977.

Merle, Renae. "More Civilians Accompanying U.S. Military: Pentagon is Giving More Duties to Contractors." *Washington Post*, 22 January 2003 [on-line @ http://ebird.dtic.mil/Jan2003/e20030122148040.html, accessed 24 January 2003].

Motsek, Gary J. "Logistics Support to the Army After NextWarfighters: A Time for Fundamental Change." In *AY 97 Compendium Army After Next Project.* Edited by Douglas V. Johnson II. Carlisle Barracks, PA: U.S. Army War College, 1998, 93-110.

Murray, Williamson. "Does Military Culture Matter?" *Orbis*, Winter 1999, 138 [reprinted for use by AMSP elective, Leading Change].

Neal, John M. "A Look at Reachback." *Military Review*, September-October 2000, 39-43

Newman, Richard J. "Tankers and Lifters for a Distant War." *Air Force Magazine*, January 2002, 56-60.

Newton, Richard D. "Special Operations Campaign Design." Briefing given at Fort Leavenworth, KS, 19 February 2003.

"Objective Force Unit of Employment Concept – Final Coordinating Draft." Fort Monroe, VA: Joint/Army Concepts Directorate, 7 August 2002.

O'Hanlon, Michael E. "A Flawed Masterpiece." *Foreign Affairs*, May/June 2002, 47-63.

O'Konski, Mark J. "Enhancing Army Deployability." *Army*, May 2000, 29-31.

Owen, Robert C. and Todd A Fogle, "Air Mobility Command and the Objective Force: A Case for Cooperative Revolution," *Military Review*, January-February 2001, 11-19.

Pepper, COL. "SBCT Update." Briefing given at Fort Leavenworth, KS, 18 December 2002.

Powell, Colin. "1993 Report on the Roles, Missions and Functions of the Armed Forces" [on-line @ http://www.dod.mil/c3i/bpr/bprcd/vol2/264a.pdf, accessed 24 February 2003],

Russian General Staff, The. *The Soviet-Afghan War: How a Superpower Fought and Lost*. Translated and edited by Lester W. Grau and Michael A. Gress. Lawrence: University Press of Kansas, 2002.

Sarin, Oleg and Lev Dvoretsky. *The Afghan Syndrome: The Soviet Union's Vietnam*. Novato, CA: Presidio Press, 1993.

Scales, Robert H., Jr. "A Sword With Two Edges: Maneuver in 21st Century Warfare." *Future Warfare*. Carlisle Barracks, PA: U.S. Army War College, 1999, 57-79.

-----. "The Army After Next: Intertwining Military Art, Science, and Technology Out to the Year 2025." *Future Warfare*. Carlisle Barracks, PA: U.S. Army War College, 1999, 161-172.

Shoffner, Wilson (Chief of Plans, Coalition Task Force (CTF) 82), on-line interview by Martha Granger, 8 March 2003 (School of Advanced Military Studies, Leavenworth, KS).

Snider, Don M. "An Uninformed Debate on Military Culture." *Orbis*, Winter 1999, 125 [reprinted for use by AMSP elective, Leading Change].

"Soldiers Helping Assess Afghan Infrastructure." ArmyLINK News, 11 January 2002 [on-line @ http://www.dtic.mil/armylink/news/Jan2002/a20020111fpwebsite.html, accessed 19 August 2002].

Solomon, Billy K. "Reducing Theater Logistics Footprint." *U.S. Army Logistics: Enabling CS/CSS Transformation*. Alexandria, VA: United States Army Logistics Integration Agency, 2001, 58-59.

Special Operations Forces (SOF) soldier. Interview by Martha Granger, 21 August 2002. School of Advanced Military Studies, Leavenworth, KS.

Tamarov, Vladislav. *Afghanistan: A Russian Soldier's Story*. Translated by Naomi Marcus, Marianne Clarke Trangen, and Vladislav Tamarov. Berkeley: Ten Speed Press, 2001.

Tanner, Stephen. *Afghanistan: A Military History from Alexander the Great to the Fall of the Taliban*. New York: Da Capo Press, 2002.

Thompson, Julian. *The Lifeblood of War: Logistics in Armed Conflict*. London: Brassey's (UK), 1991.

Tirpak, John A. "Enduring Freedom." *Air Force Magazine*, February 2002, 32-39.

"Title 10 – Armed Forces," *United States Code (USC)* [on-line @ http://www4.law.cornell.edu/uscode/10/index.html, accessed 17 February 2003].

Turbiville, Dr. Graham H., Jr. "Ambush! The Road War in Afghanistan." Fort Leavenworth, KS: Soviet Army Studies Office, U.S. Army Combined Arms Center.

-----. "Soviet Airborne Troops." *Soviet Armed Forces Review Annual (SAFRA)*, Volume 10, 1985-1986, 1987. DTIC File Copy AD-A216 488, Carl Library, Fort Leavenworth, KS.

-----. "Soviet Logistics Support Concepts Change." *Army Logistician*, March-April, 1987.

Under Secretary of Defense for Acquisition and Technology. "Memorandum for Secretary of the Army, Secretary of the Navy, Secretary of the Air Force, and Directors of Defense Agencies." Washington, D.C., 9 October 2001 [on-line @ http://www.acq.osd.mil/dp/docs2001/Contingency_Ops_Enduring_Freedom.pdf, accessed 19 August 2002].

USCENTCOM Active Database, Joint Universal Lessons Learned System (JULLS) Tool V1.01. Furnished by CARL, 15 August 2002.

Van Creveld, Martin. *Supplying War: Logistics from Wallenstein to Patton*. London: Cambridge University Press, 1977.

Wall, Robert. "MH-47 Crews Detail Conflict's Exploits, Woes." *Aviation Week & Space Technology*, 15 April 2002, 22-23.

-----. "Military Assesses War Strengths, Shortfalls." *Aviation Week & Space Technology*, 15 April 2002, 26-27.

Wang, Mark Y.D. "Accelerated Logistics: Streamlining the Army's Supply Chain." Arroyo Center: RAND, 2000.

Wass de Czege, Huba and Jacob D. Biever. "Power Projection." *Army*, April 2001, 11-14.

Websters II: The New Riverside University Dictionary. Boston, MA: Houghton Mifflin Company, 1988.

Yousaf, Mohammad and Mark Adkin. *Afghanistan – The Bear Trap: The Defeat of a Superpower*. Havertown, PA: Casemate, 1992.